TRANSACTIONS

OF THE

ROYAL ACADEMY OF MEDICINE IN IRELAND.
Printed by John Falconer, Dublin.
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ROYAL ACADEMY OF MEDICINE IN IRELAND,
ESTABLISHED 1882.

SESSION 1914-1915.

President:
WALTER G. SMITH, 25 Merrion Square.

General Secretary and Treasurer:
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C. A. BALL, Secretary Surgical Section.
G. FITZGIBBON, Secretary Obstetrical Section.
T. T. O'FARRELL, Secretary Pathological Section.
J. R. D. HOLTBY, Secretary Section of Anatomy and Physiology.
W. A. WINTER, Secretary Section of State Medicine.

G. E. NESBITT
G. PEACOCKE
A. A. MCCONNELL
W. PEARSON
F. W. KIDD
R. D. PUREFOY
W. BOXWELL
R. J. ROWLETTE

{Representatives from Medical Council.
{Representatives from Surgical Council.
{Representatives from Obstetrical Council.
{Representatives from Pathological Council.
List of Officers.

Council of Medical Section:

*President*—J. A. LINDSAY, University Road, Belfast.

1. *Secretary*—F. C. PURSER, 20 Lower Baggot Street.

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Council of Surgical Section:

**President**—F. CONWAY DWYER, President of the Royal College of Surgeons.

1. *Secretary*—C. A. BALL, 22 Lower Fitzwilliam Street.

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Council of Obstetrical Section:

**President**—M. J. GIBSON, 74 Merrion Square.

1. *Secretary*—GIBBON FITZGIBBON, 39 Fitzwilliam Place.

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Council of Pathological Section:

**President**—J. B. COLEMAN, 9 Merrion Square.

1. *Secretary*—T. T. O'FARRELL, 26 Upper Leeson Street.

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List of Officers.

Council of Section of Anatomy and Physiology:

President—E. J. EVATT, Royal College of Surgeons.
1. Secretary—J. R. D. HOLTBY, School of Physic, Trinity College.
2. B. J. COLLINGWOOD,
3. A. F. DIXON,
4. A. A. O'CONNELL,
5. H. STOKES,
6. W. H. THOMPSON.

Council of Section of State Medicine:

President—T. P. C. KIRKPATRICK, 23 Lower Baggot Street.

1. Secretary—W. A. WINTER, 17 Fitzwilliam Place.
2. A. E. BOYD,
3. W. R. DAWSON,
4. J. M. DAY,
5. J. A. MATSON,
6. SIR W. THOMPSON.

Reference Committee:

1. A. A. McCONNELL,
2. J. O'CARROLL,
3. R. J. ROWLETTE,
4. B. A. SOLOMONS.
HONORARY FELLOWS.

1903*Beugmann, Professor von.
1885*Billroth, Professor T.
1903*Brouardel, Professor.
1899*Burdon-Sanderson, Sir J., Bart., M.D., F.R.S.
1885*Charcot, Professor.
1912 Drummond, David, M.D., D.C.L., Newcastle-on-Tyne.
1912 d'Eternod, Professor A. C. F., Geneva.
1885*Emmet, Thomas Addis.
1912 Faber, Professor Knud, Copenhagen.
1912 Berry, George A., M.D., LL.D., F.R.S.E., Edinburgh
1885*Flint, Professor Austin.
1904 Fuchs, Professor E., Vienna.
1885*Hutchinson, Sir Jonathan, F.R.S.
1885*Jenner, Sir William, Bart., F.R.S.
1912 Keatinge, Henry P., M.B., F.R.C.S., Cairo.
1885*Keith, Thomas.
1899 Kelly, Professor Howard, Baltimore.
1899*Koch, Professor.
1899 Kocher, Professor, Bern.
1885*Kolliker, Professor.
1899 Leber, Professor Th., Heidelberg.
1912 Leo, Professor Hans, Bonn.
1885*Lister, Right Hon. Baron, F.R.S.
1885*Ludwig, Professor.
1899*MacCormac, Sir W., Bart., K.C.V.O.
1912 Marsh, Professor Howard, M.A., M.C., Sc.D., F.R.C.S.
Cambridge.
1899 Martin, Professor, Berlin.
1912 Nicholaysen, Professor Johann, Christiania.
1899*Nothnagel, Professor.
1885*Paget, Sir James, Bart., F.R.S.
1885*Pasteur, Professor.
1900 Politzer, Professor Adam, Vienna.
1903 Pye-Smith, P. H., F.R.S., London.
1885*Recklinghausen, Professor von.
1912 Savage, Sir George, M.D., F.R.C.P., London.
1885*Schroeder, Professor.
1885*Simon, Sir J., F.R.S.
1912 Stroganoff, Professor V. V., St. Petersburg.
1903 Treves, Sir Fred., Bart., London.
1885*Virchow, Professor.

* Dead.
List of Fellows.

FELLOWS.

[The figures prefixed denote the date of election. Original Fellows are marked †.]

893 Allworthy, S. W., M.D., B.Ch., D.P.H., Dub., Physician Hospital for Skin Diseases, The Manor House, Antrim-road, Belfast.

907 Anderson-Berry, D., M.D., LL.D., F.R.S., Edin., Versailles, 19 Stanhope-road, Highgate, N.

905 Ashe, James S., L.R.C.P. & S.I., Lecturer on Materia Medica, Ph. Soc., Ireland, 19 Merrion-square.

† Ball, Sir Charles Bent, Bart., M.D., M.Ch., F.R.C.S., Regius Professor of Surgery, Univ. Dub., Surgeon Sir P. Dun’s Hospital, 24 Merrion-square, N., Dublin.

903 Ball, Charles Arthur K., M.D., F.R.C.S., Surgeon Sir P. Dun’s Hospital, 22 Lower Fitzwilliam-street.


† Beatty, Wallace, M.D., F.R.C.P., Physician Adelaide Hospital, 38 Merrion-square, E., Dublin.

905 Benson, C. M., M.D., B.Ch., F.R.C.S., Asst.-Surgeon Sir Patrick Dun’s Hospital, 72 Lower Baggot-street.

† Benson, Sir John Hawtrey, M.D., F.R.C.P., Consulting Physician Royal City of Dublin Hospital, 57 Fitzwilliam-square, N., Dublin.


910 Boxwell, William, M.D., B.Ch., Dub., F.R.C.P.I., Physician Meath Hospital, 2 Upper Hatch-street.

905 Boyd, Alfred E., M.B., B.Ch., D.P.H., Anaesthetist Richmond Hospital, 4 Fitzwilliam-square, Dublin.
List of Fellows.

1912 Brontë, R. M., L.R.C.P.S.I., Assistant Pathologist, Meath Hospital, 88 Stephen's Green.

1883 Browne, J. Walton, A.B., M.D., Surgeon to the Royal Victoria Hospital, 10 College-square, North, Belfast.

1891 Byrne, Herbert U., M.B., B.Ch., Univ. Dublin, Medical Officer No. 4 Dispensary District, South Dublin Union, Physician Cork-street Hospital, 17 Merrion-square.

1891 Byrne, Louis A., L.R.C.P., F.R.C.S., Surgeon Jervis-street Hospital, 50 Merrion-square, Dublin.


1898 Caraher, More, L.R.C.P. & S.I., Glenville, Drumconrath, Co. Meath.

1884 Chance, Sir Arthur, Ex-President R.C.S., Hon. Fellow R.C.P.I., Surgeon to Mater Misericordiae Hospital, 90 Merrion-square.

1891 Coffey, Denis J., M.B., President, University College, Dublin, 41 Fitzwilliam-square.

1891 Coleman, James Byrne, C.M.G., M.D., F.R.C.P., Physician to Richmond, Whitworth, and Hardwicke Hospitals, and to Nat. Hosp. for Consumption, 9 Merrion-square, Dublin.

1910 Collingwood, B. J., M.D., Camb., Professor of Physiology, National University, Adelaide Mansions, Earlsfort-terrace.


1883 Cox, Right Hon. Michael F., P.C., M.D., LL.D., F.R.C.P.I., Physician St. Vincent's Hospital, 26 Merrion-square, Dublin.

1889 Craig, James, M.D., F.R.C.P., King's Professor of Practice of Medicine School of Physic, Trinity College, Physician Sir P. Dun's Hospital, 18 Merrion-square, Dublin.

1898 Crawley, Frank Chetwode, M.D., Univ. Dub., F.R.C.S., Assistant Surgeon Royal Victoria Eye and Ear Hospital, 5 Fitzwilliam-place.
1910 Crofton, W. Mervyn, M.D., R.U.I., Professor of Special Pathology
National University, Pathologist, Steevens' Hospital, 55 Merrion-
square.

1910 Crymble, P. T., M.B., Q.U.B., F.R.C.S., Eng., 7 Upper Crescent,
Belfast.

1897 Dargan, W. J., M.D., F.R.C.P.I., Physician St. Vincent's Hospital,
45 St. Stephen's-green.

1889 Davis, F. A. G., M.B., L.R.C.S., Demonstrator of Anatomy R.C.S.,
30 York-street, Dublin.

Castle, Claremount, 8 Burlington Road, Dublin.

1899 Dempsey, Sir Alex., M.D., Q.U.I., Physician Mater Infirmorum
Hospital, 36 Clifton-street, Belfast.

1891 Dempsey, Martin J. P., M.D., R.U.I., F.R.C.P., Professor of Materia
Medica and Therapeutics, University College, Dublin, Physician to
Mater Misericordiae Hospital, 35 Merrion-square, Dublin.

Hospital, 7 Merrion-square, Dublin.

Dublin, 73 Grosvenor-road.

1895 Drury, H. C., M.D., Univ. Dub., F.R.C.P., Physician Sir P. Dun's
Hospital, 48 Fitzwilliam-square, Dublin.

1885 Dwyer, F. Conway, M.D., Pres. R.C.S., Surgeon Richmond Hospital,
Professor of Surgery Royal College of Surgeons, 83 Merrion-square,
Dublin.

1889 Earl, Henry Cecil, M.D., F.R.C.P., Pathologist Richmond, Whit-
worth, and Hardwicke Hospitals, 39 Raglan-road.

1909 Eustace, H. M., M.D., Univ. Dubl., Hampstead, Glasnevin.

1913 Evatt, Evelyn John, M.B., B.S. Durham, Professor of Anatomy,
Royal College of Surgeons.

1887 Falkiner, Ninian M'Intire, M.D., F.R.C.P., Medical Superintendent
of Statistics, General Register Office, Tyone, 17 Healthfield-road,
Terenure, Dublin.
List of Fellows.

1900 FANNIN, EDWARD M., M.B., B.Ch. Dubl., Assistant Physician, Drumcondra Hospital, 3 Rutland-square.

1904 FARNAN, DENIS J., M.B., R.U.I., Surgeon, Mater Misericordiae Hospital, 27 Merrion-square.

1904 FARNAN, R. J., M.B., R.U.I., Gynaecologist Mater Misericordiae Hospital, 5 Merrion-square.

1888 FERGUSON, HENRY LINDO, M.D., F.R.C.S., Dunedin, New Zealand.

† Finny, John Magee, M.D., Ex-President R.C.P., 36 Merrion-square, Dublin.

† Fitzgerald, Charles E., M.D., Ex-President R.C.P., Surgeon-Oculist-in-Ordinary to the King in Ireland, 27 Upper Merrion-street, Dublin.

1891 Fitzgerald, Francis Creighton, L.R.C.P., L.R.C.S., Medical Officer Dispensary District, Newtownbutler, Co. Fermanagh.

1902 FitzGibbon, Gibbon, M.D., Gynaecologist, Royal City of Dublin Hospital, 39 Fitzwilliam-place.

1891 Flynn, Robert Alexander, F.R.C.P., Gynaecologist Drumcondra Hospital, 14 Merrion-square, Dublin.

1886 Fottrell, Wm. Joseph, L.R.C.S., Medical Officer North Dublin Union Workhouse, 2 Rutland-square, Dublin.

1906 Gibson, M. J., M.D., Univ. Dub., Master Coombe Hospital, 74 Merrion-square, South, Dublin.

1891 Glenn, John Hugh Robert, M.D., F.R.C.P., late Gynaecologist Mercer’s Hospital, 75 Merrion-square.


1902 Gunn, L. G., M.D., Dub., F.R.C.S., Surgeon Adelaide Hospital, 43 Fitzwilliam-square.

1892 Hamilton, Wm. Cope, L.R.C.P. & S., late Resident Surgeon Steevens’ Hospital, 120 St. Stephen’s-green, W., Dublin.

1910 Hartigan, John L. A. H., late Assistant Master, National Maternity Hospital, Hæmadryad Hospital, Cardiff.
List of Fellows.


1899 Haughton, W. S., M.D., Surgeon to Steevens' Hospital, 16 Merrion-square.

1908 Hayes, Maurice R. J., F.R.C.S.I., X-Rayist, Mater Misericordiae Hospital, 35 Upper Fitzwilliam-street, Dublin.

1914 Holtry, J. R. D., M.B., B.S., Durham, Assistant to Professor of Anatomy, Trinity College, Dublin.

† Horne, Sir Andrew John, Ex-P. R.C.P., Master National Lying-in Hospital, 94 Merrion-square, W., Dublin.


1897 Johnston, G. Jameson, M.B., R.U.I., F.R.C.S., Surgeon Royal City of Dublin Hospital, Professor of Surgery Royal College of Surgeons, 13 Lower Fitzwilliam-street.

1905 Keegan, John Leo, F.R.C.S., Surgeon Jervis-street Hospital, 85 Lower Baggot-street, Dublin.

1899 Kennedy Denis, F.R.C.S., Surgeon Jervis-street Hospital and Children's Hospital, Temple-street, 68 Merrion-square.

1884 Kidd, Fred. W., M.D., Professor of Midwifery, R.C.S., ex-Master Coombe Hospital, Gynaecologist Meath Hospital, 17 Lower Fitzwilliam-street, Dublin.

† Kinkead, Richard John, M.D., L.R.C.S., Lecturer on Medical Jurisprudence, Professor of Obstetric Medicine Queen's College, Galway, Foster House, Galway.

1901 Kirkpatrick, T. Percy C., M.D., Dub., F.R.C.P.I., Physician to Steevens' Hospital, 23 Lower Baggot-street.

1901 Law, S. Horace, M.D., F.R.C.S., Throat Surgeon Adelaide Hospital, 46 Merrion-square.

1912 Law, William Francis, M.D., F.R.C.S.I., 24 Clyde-road.
List of Fellows.

1900 Leeper, Richard R., F.R.C.S., St. Patrick's Hospital, Dublin.

1898 Lindsay, James A., M.D., F.R.C.P. London, Professor of Practice of Medicine Q.U.B., Physician Royal Victoria Hospital, Belfast, 3 Queen's Elms, University-road, Belfast.

+ Little, James, M.D., Ex-President R.C.P., Regius Professor of Physic Univ. Dub., 14 St. Stephen's-green, North, Dublin.

1912 Lowry, Charles Gibson, M.D., R.U.I., Assistant to Professor of Midwifery, Q.U.B., Gynecologist, Ulster Hospital for Women and Children, 10 University-square, Belfast.

1897 Lumsden, John, M.D., Physician to Mercer's Hospital, 4 Fitzwilliam-place.


+ McArdele, John Stephen, F.R.C.S., Professor of Surgery, University College, Dublin, Surgeon St. Vincent's Hospital and the Mullen Convalescent Home, 72 Merrion-square, Dublin.

1897 M'Causland, Richard Bolton, F.R.C.S., Surgeon Steevens' Hospital, 79 Merrion-square, Dublin.


1904 MacGrath, James Joseph, L.R.C.P., St. Helens, Dunfanaghy, Co. Donegal.

1905 M'Loughlin, E. P., M.D., R.U.I., Professor of Anatomy University College, Medical School, Cecilia-street, Dublin.

1903 McVittie, R. B., M.D., 62 Fitzwilliam-square.

1887 McWeeney, E. J., M.D., F.R.C.P.I., Professor of Pathology, University College, Dublin, 84 St. Stephen's-green, Dublin.
List of Fellows.

1913 Madill, David G., M.B., M.Ch., T.C.D., Assistant Master, Rotunda Hospital, 31 Lower Baggot-street.

1900 Maguire, Katharine M. N., M.D., 67 Merrion-square, South.

1913 Mahon, Ralph Bodkin, M.D., R.U.I., F.R.C.S.Eng., Professor of Practice of Medicine, University College, Galway, Nile Lodge, Galway.


1897 Maunsell, R. Charles B., M.B., B.Ch., B.A.O., Dub., F.R.C.S., Surgeon to Mercer's Hospital, 32 Lower Baggot-street.

1912 Meenan, James N., M.B., R.U.I., Prof. of Hygiene, University College Dublin, 66 Stephen's-green.

1902 Meldon, G. Pugin, M.D., F.R.C.S., Surgeon Westmoreland Lock Hospital, 67 Lower Baggot-street.

1904 Mills, John, M.B., B.S., R.U.I., District Asylum, Ballinasloe.

1907 Milroy, T. H., M.D. Edin., F.R.S.E., Dunville Professor of Physiology, Queen's University, Belfast, Thornlea, Malone Park, Belfast.

1901 Mitchell, A. B., F.R.C.S., Surgeon Royal Victoria Hospital, 4 College-square, Belfast.

† Moore, Sir John William, M.D., D.Sc. Oxon., Ex-President R.C.P., Physician Meath Hospital, Professor of Practice of Medicine Royal College of Surgeons, 40 Fitzwilliam-square, West, Dublin.

1904 Moorhead, T. Gillman, M.D., F.R.C.P., Physician City of Dublin Hospital, 23 Upper Fitzwilliam-street.

1883 Murphy, John, F.R.C.P., Physician Mater Misericordiae Hospital, 13 Merrion-square, Dublin.

1904 Murphy, W. L., M.A., M.B., Cantab., F.R.C.S.I., Surgeon, Nose and Throat, St. Vincent's Hospital, 33 Upper Merrion-square.

1908 Neill, Thomas, M.B., B.Ch., Dub.; Ex-Assistant Master Coombe Hospital, 8 Fitzwilliam-place.
List of Fellows.

1910 Nesbitt, George E., M.D., Dublin, F.R.C.P.I., Assistant Physician Richmond Hospital, 71 St. Stephen’s-green, S.

1899 O’Brien, C. M., M.D., L.R.C.P. & S., Physician to City Hospital for Diseases of the Skin, 29 Merrion-square.

† O’Carroll, Joseph Francis, M.D., LL.D., V.P. R.C.P., Physician Richmond, Whitworth, and Hardwicke Hospitals, Professor of Medicine, National University, Ireland, 43 Merrion-square, Dublin.

1914 O’Connor, J. M., M.D., N.U.I., Assistant to Professor of Physiology University College, 26 Charlestown-avenue, Rathmines.

1906 O’Farrell, Thomas T., F.R.C.S.I., D.P.H., Pathologist, St. Vincent’s Hospital, First Assistant in Pathology, University College, Dublin, N.U.I., 26 Upper Mount-street.


† Ormsby, Sir Lambert Hepenstal, M.D., Ex-President R.C.S., Surgeon Meath Hospital, Surgeon National Children’s Hospital, 92 Merrion-square, West, Dublin.

1894 O’Sullivan, A. C., M.D., F.T.C.D., F.R.C.P.I., Lecturer on Pathology, Trinity College, 43 Ailesbury-road, Dublin.

† Oulton, Henry W., M.D., Dub., F.R.C.S.I., Chief Surgeon Dublin Metropolitan Police, 41 Stephen’s-green, Dublin.

1893 Parsons, Alfred Robert, M.D., Univ. Dub., F.R.C.P., Physician Royal City of Dublin Hospital, 27 Lower Fitzwilliam-street, Dublin.

1895 Peacocke, Geo. J., M.D., F.R.C.P.I., Physician Adelaide Hospital, 2 Fitzwilliam-square.

1887 Pearson, Charles Yelverton, M.D., F.R.C.S. Eng., Professor of Surgery Queen’s College, 1 Sidney-place, Cork.

1910 Pearson, William, M.D., Assistant Surgeon Adelaide Hospital, 27 Lower Baggot-street.

1904 Pringle, Seton, M.B., Univ. Dub., F.R.C.S.I., Surgeon Mercer’s and Drumcondra Hospitals, 7 Fitzwilliam-place.
† Purefoy, Richard Dancer, M.D., LL.D., Ex-Pres. R.C.S., Ex-Master Rotunda Hospital, 62 Merrion-square, Dublin.

1902 Purser, Frank C., M.D. Univ. Dub., F.R.C.P.I., Physician, Mercer's Hospital, 20 Lower Baggot-street.

† Redmond, Sir Joseph Michael, M.D., Ex-Pres., R.C.P., Physician to Mater Misericordiae Hospital, 41 Merrion-square, Dublin.

1905 Rowlette, Robert J., M.D., F.R.C.P., Physician Jervis-street Hospital, Pathologist Rotunda Hospital, 42 Lower Baggot-street, Dublin.

1900 Scott, C. Burnett, M.D., 35 Clarinda-park, Kingstown.

† Scott, John Alfred, M.A., M.D., F.R.C.S., Professor of Physiology Royal College of Surgeons, 36 Lower Baggot-street, Dublin.


1886 Smith, Alfred J., M.B., F.R.C.S., Professor of Midwifery, Catholic University, Gynaecologist St. Vincent's Hospital, 30 Merrion-square, Dublin.

1895 Smith, R. Travers, M.D., F.R.C.P.I., Professor of Materia Medica R.C.S.I., Physician Richmond, Whitworth and Hardwicke Hospitals, 61 Fitzwilliam-square, N.

1901 Smith, Trevor N., F.R.C.S., late Assistant Master Coombe Hospital, 34 Upper Fitzwilliam-street.

† Smith, Walter George, M.D., Ex-President R.C.P., King's Professor of Materia Medica, School of Physic, and Physician to Sir Patrick Dun's Hospital, 25 Merrion-square, Dublin.

† Smyly, Sir William J., M.D., Ex-President R.C.P., Ex-Master Rotunda Lying-in Hospital, 58 Merrion-square, S., Dublin.

1908 Solomons, Bethel A., M.D., Univ. Dub., F.R.C.P.I., Gynaecologist, Mercer's Hospital, 30 Lower Baggot-street.

1905 Stevenson, Walter C., M.B., B.Ch., B.A.O., Assistant Surgeon Dr. Steevens' Hospital, 60 Lower Baggot-street.
1908 Stokes, Henry, M.D., Univ. Dub., F.R.C.S.I., Surgeon Meath Hospital, 32 Upper Pembroke-street.

1907 Stoney, R. Atkinson, M.B., B.Ch., Dub., F.R.C.S.I., Surgeon Royal City of Dublin Hospital, 56 Fitzwilliam-square, N

† Story, John Benjamin, M.B., F.R.C.S., Surgeon Royal Victoria Eye and Ear Hospital, Professor of Ophthalmic and Aural Surgery R.C.S., 6 Merrion-square, N., Dublin.

1893 Symington, Johnson, M.D. Edin., Professor of Anatomy Queen's University, Belfast.

1895 Taylor, Edward Henry, M.D., Dub., F.R.C.S., Professor of Surgery Dublin University, Surgeon Sir Patrick Dun's Hospital, 77 Merrion-square, Dublin.

1898 Taylor, William, M.B., V.-P. R.C.S., Surgeon Meath Hospital, 47 Fitzwilliam-square.

1897 Thompson, W. H., M.D., F.R.C.P.I., King's Professor of Institutes of Medicine, Trinity College, Dublin.

1894 Thompson, Sir W. J., M.D., Univ. Dub., F.R.C.P.I., Registrar-General for Ireland, 59 Fitzwilliam-square.

1911 Tierney Gerald, M.B., R.U.I., Assistant Master National Maternity Hospital, 22 Lower Baggot-street, Dublin.

† Tobin, Richard Francis, F.R.C.S., Surgeon St. Vincent's Hospital, 60 St. Stephen's-green, Dublin.

1893 Tweedy, Ernest Hastings, F.R.C.P., Ex-Master Rotunda Lying-in Hospital, Gynaecologist Steevens' Hospital, 6 Fitzwilliam-place, Dublin.

1900 Tweedy, Herbert, L.R.C.P. & S., Colonial Surgeon.

1901 Watson, Edward J., M.D., F.R.C.P., Anaesthetist and Medical Officer in Charge of the X-ray Department Sir P. Dun's Hospital, Demonstrator in Anatomy T.C.D., 25 Fitzwilliam-place.

1904 Wheeler, W. I. de C., M.D., B.Ch., B.A.O. Dub., F.R.C.S., Surgeon Mercer's Hospital, 23 Fitzwilliam-square.
List of Fellows.

1900 White, Arthur H., L.R.C.P. & S.I., Professor of Pathology Royal College of Surgeons, Pathologist Meath Hospital and Cork-street Hospital.

1912 White, Reginald J., F.R.C.S.I., 23 Merrion-square.

1903 Wigham, Joseph T., M.D., Assistant to Professor of Pathology T.C.D., Albany House, Monkstown, Co. Dublin.

1898 Winter, W. A., M.D., Dub., F.R.C.P.I., Physician Steevens’ Hospital, 17 Fitzwilliam-place.


List of Members.

MEMBERS.

† Boyce, Jos. W., M.B., Medical Officer Blackrock Dispensary District, St. Kilda, Blackrock, Co. Dublin.

1911 Cahill, Frank Kennedy, F.R.C.S.I., 115 Stephen's Green, Dublin.

1887 Cope, Geo. Patrick, L.R.C.P., L.R.C.S., Medical Officer No. 3 Dispensary District, South Dublin Union, 36 Harcourt-street.


1892 Day, J. Marshall, M.B., Univ. Dublin, Resident Medical Officer Cork-street Fever Hospital, Dublin.

† Delahoyde, O'Connell J., F.R.C.S., 47 Rutland-square, Dublin.

1912 Ferrar, B. B., M.D., F.Z.S., Superintendent Royal Zoological Society of Ireland, Phoenix Park.

1897 Fleury, Eleonore Lilian, M.D., R.U.I., Richmond District Asylum, Dublin.

1900 Goff, A. S., L.R.C.P. & S., Lynton, Dundrum.

1889 Goulding, H. Benson, F.R.C.S., 12 Rathmines-road.

1898 Hatch, Richard, L.R.C.P. & S., 146 Pembroke-road.

1912 Hayden, Patrick Edward, F.R.C.S.I., Surgeon to Jervis-street Hospital, 20 Harcourt-street.

1897 Hughes, Charles, L.R.C.P. & S., 16 Lower Fitzwilliam-street.
List of Members and Student Associates.

1903 Lynn, Kathleen F., M.B., B.Ch., B.A.O., 9 Belgrave-road, Rathmines.

1913 Maxwell, Euphan, M.D., M.Ch, T.C.D., 19 Lower Baggot-street.

1912 Thomson, T. Mather, L.R.C.P. & S.I., Assistant Physician Meath Hospital, 37 Fitzwilliam-place.

STUDENT ASSOCIATES.

Budd, Elizabeth, 34 Dartmouth-road.

Deale, Violet M., 6 Cullenswood-terrace, Ranelagh.

Frewton, J. A., 8 Fortfield terrace, Upper Rathmines.

Villiers, Henry J., 120 Leinster-road, Rathmines.

Woolcombe, Robert Lloyd, LL.D., 14 Waterloo-road, Dublin.
RULES.

1. The name shall be, "ROYAL ACADEMY OF MEDICINE IN IRELAND." (1887.)

Constitution.

2. The Academy shall consist of Fellows, Honorary Fellows, Members, and Student Associates.

Management.

3. The affairs shall be managed by a Council, consisting of the President, Ex-Presidents (1893), Ex-General Secretaries (1905), the six Presidents of Sections, the General Secretary and Treasurer, the Secretary for Foreign Correspondence, six Secretaries of Sections, and eight Councillors, being two representatives from the Medical, Surgical, Obstetrical, and Pathological Sectional Councils respectively.

Meetings.

4. The Meetings shall be General and Ordinary.

Publication of "Transactions."

5. The "Transactions" shall be published by the Council, subject to the provisions hereinafter contained.

Original Fellows and Members.

6. All the Members of the present Societies (Medical, Surgical, Obstetrical, and Pathological) shall be Original Fellows or Members, without entrance fee, on payment of the annual subscription on or before 31st December, 1882.

Fellows.

7. Fellows of the Royal College of Physicians of Ireland, and of the Royal College of Surgeons in Ireland, shall be admitted, without ballot, on payment of the entrance fee and the subscription for the current year. All others, being Registered Medical Practitioners not directly or indirectly engaged in the sale of drugs, shall be proposed by two Fellows, and elected by ballot by the Council.

8. Candidates shall be proposed at one Meeting of the Council, and balloted for at the next—one black bean in four to reject.

8a. That all Rules referring to the admission of Fellows, Members, and Student Associates shall be interpreted as referring to Ladies as well as Gentlemen.

Privileges of Fellows.

9. Fellows only shall be eligible for office in the Academy. They shall have the privilege of attending all Meetings of the Academy, of making Communications, and of voting and speaking at such meetings. They shall also receive a copy of the "Transactions."

10. These privileges shall not be exercised by any Fellow in arrear with his subscription.

* Those who have paid a Life Subscription to any of the above Societies will be admitted to the privilege of Fellows on payment of Member's subscription.
Honorary Fellows.

11. Honorary Fellows, limited in number to 25, may be nominated by the Council, and elected, on motion at a General Meeting of the Academy by a majority of at least two-thirds of those present and voting.

Members.

12. Any Registered Medical Practitioner may be elected as a Member, the election to be conducted in the same manner as that of Fellows.

Privileges of Members.

13. Members shall have the privilege of attending the Ordinary Meetings of the Academy, of making Communications, and of taking part in debate. They can purchase the "Transactions" at cost price.

Associates.

14. Any Registered Medical Practitioner, temporarily resident in Dublin, may be elected an Associate for the period of one Session. The subscription must be paid before election, and the General Council may elect without notice of motion. Such Associates may attend and speak at the ordinary meetings of the Academy.

Student Associates.

15. Registered Medical Students may be elected Student Associates for the period of one year. The Subscription must be paid before election, and the Council may elect without notice of motion.

Student Associates shall have the privilege of attending the Ordinary Meetings of the Academy.

Annual Subscription.

16. Fellows shall pay £2 2s., and Members £1 1s. Associates and Student Associates shall pay 5s. The Subscription shall become due on the 1st of October in each year, and if the Subscription be not paid on or before the first Meeting in February, the defaulter shall cease to belong to the Academy, unless the delay shall be accounted for to the satisfaction of the Council. No Fellow shall vote at the Annual General Meeting who has not paid his subscription for the year. Registered Medical Practitioners not residing within 15 miles of Dublin are eligible as Fellows of the Academy on payment of the entrance fee, and an annual Subscription of £1 1s. Medical Officers on the active list of the Royal Navy and Army are eligible for election as "Temporary Fellows" of the Academy on payment of an annual Subscription of One Guinea. Such Temporary Fellows shall enjoy all the privileges of Fellows, except that of voting at General Meetings. No Fellow who has not paid his Subscription shall vote for any Candidate for Office at the Annual General Meeting, nor can the name of any Fellow be received by the General Secretary for insertion on the ballot paper as a Candidate for Office unless his Subscription shall have been paid for the current year.

Entrance Fee.

17. After admission of Original Fellows, all Fellows shall pay an entrance fee of £1 1s.

Council.

18. The Council shall meet on the last Friday in the month throughout the Session, or oftener should they see occasion—five to form a quorum.
19. Notice of all Extraordinary Meetings shall be transmitted by the Secretary to every Member of the Council. The President or any five Members of Council may call an Extraordinary Meeting of the Council. The Council shall determine questions by vote, or by division if so demanded, the President having a casting vote only. Any regulation of the Council shall have the force of a law, until submitted to the next General Meeting. The Council shall have the power of filling up any vacancies which may occur in the list of Officers of the Academy, except that of President, before the Annual General Meeting. If a vacancy in the office of President should occur, the General Council shall summon a Special General Meeting of the Academy to fill such vacancy. (1888.)

Sectional Councils.

20. There shall be six Sectional Councils elected by the Annual General Meeting in October, termed respectively—the Medical, the Surgical, the Obstetrical, the Pathological, the State Medicine, and the Anatomical and Physiological Councils.

21. No Fellow shall be eligible as a candidate for election on more than two Sectional Councils, but no Fellow shall be eligible as a candidate for election on both the Medical and Surgical Sectional Councils. (1888.)

22. Each Sectional Council shall consist of the President of the Section and ten Members, one of whom shall act as Secretary to the Section; except the State Medicine and Anatomical and Physiological Councils, which shall each consist of a President and six Members. (1888.)

Meetings of Sectional Councils.

23. Each Sectional Council shall meet on a fixed day at least one week before the Ordinary Meeting of their Section, three to form a quorum.

Powers.

24. Each Sectional Council shall have the power of making any such arrangements as it thinks necessary to carry on the work of the Ordinary Meetings which are under its charge, provided that such arrangements do not interfere with the general laws of the Academy; and any Rules laid down by such Council shall have the force of laws at the Ordinary Meetings under its charge until submitted to the General Council.

25. Each Sectional Council shall have the power of filling up any vacancies that may occur among its Members until the Annual General Meeting.

Committee of Reference.

26. The Council shall appoint a Committee of Reference to report upon morbid growths and other specimens exhibited before the Academy; of this Committee the Exhibitor shall, for the occasion, be a Member.

Officers.

27. A President, to be elected by the Annual General Meeting in October, and to hold office for three years.

28. The Presidents of all Sections shall be elected by the Fellows at the Annual General Meeting; and shall hold office for two years.
29. One General Secretary and Treasurer to be elected at the Annual General Meeting.

30. It is expedient that a fixed salary (of one hundred guineas) shall be paid yearly to the General Secretary in consideration of the fact that the editing of the "Transactions" is part of his duties.

31. One Honorary Secretary for Foreign Correspondence to be elected at the Annual General Meeting. (1888.)

32. The Councillors for each Section to be elected at the Annual General Meeting. Each Sectional Council shall elect two Members to act on the General Council, except in the case of the Sections of State Medicine and Anatomy and Physiology. (1888.)

33. Two Members in each Sectional Council shall retire annually, and be ineligible for re-election for one year, except in the Council of the Section of State Medicine, and in the Council of the Section of Anatomy and Physiology, in each of which only one shall retire. (1896 and 1912.)

34. Six Secretaries, one for each Section, to be appointed by the Sectional Councils.

35. At all elections after the year 1882, any Fellow desirous of nominating a candidate for election shall, at least ten days before the Annual General Meeting, forward an application to the General Secretary to enter the name of such Fellow on the list of candidates for office, provided that the Fellow so nominated shall have consented to act, and shall have paid his subscription at the time of nomination. Should there be an insufficiency of regularly nominated candidates, the vacancies so created shall be filled up by the Sectional Councils at their first meeting after election. (1891 and 1904.)

36. That all elections shall be by ballot, but Fellows residing more than 15 miles from Dublin, and those incapacitated by illness (to be certified), may record their votes by ballot papers, sent to the presiding officer in sealed envelopes provided for that purpose. A Fellow cannot avail himself of this privilege unless his subscription for the current session has been paid. (1896 and 1904.)

37. That in all elections to the Sectional Councils there shall be affixed to the name of each candidate the number of meetings that he has attended of that particular Section of the Council for which he is now a candidate. (1898.)

Duties of Officers.

38. The President shall preside at the Annual and Special General Meetings and at General Council Meetings. In the absence of the President, the Chairman shall be appointed by the meeting. (1888.)

39. The Presidents of Sections shall preside at the Ordinary Meetings of the Academy, and shall also preside at the Sectional Council Meetings. In the absence of the President, the Chairman shall be appointed by the meeting. (1888.)

40. The General Secretary shall attend all General Meetings of the Academy and General Council. He shall take minutes of such meetings, to be read at the following meeting.

41. He shall receive and have charge of all papers intended for publication in the "Transactions" of the Academy, after they have been handed over to him by the Secretaries of the several Sections.
42. He shall, on receiving notice from the Secretary of a Section, send out to all the Members notices of the title or titles of the paper or papers for the next Ordinary Meeting, with the name or names of the authors, and, so far as possible, of the subjects for Exhibition, with the names of the Exhibitors.

43. He shall arrange for the Exhibition of specimens and the reading of papers, which are to be forwarded to the Academy by those who are absent, or are not members.

44. The General Secretary and Treasurer shall receive all moneys, and lodge the same in bank to the account of the Academy, and all cheques shall be signed by the Treasurer and one other Councillor.

45. The Accounts shall be audited by two Fellows, not Members of Council, to be appointed by the President at some meeting previous to the Annual Meeting.

Duties of Secretaries of Sections.

46. To attend the Meetings of the Council of the Section and the Ordinary Meetings of the Academy, under the management of said Council, and to take minutes at such meetings, to be read at the next following meeting of that Section.

47. To keep such papers as the Sectional Councils recommend for publication, for the purpose of handing them over to the General Secretary.

48. To inform the Secretary of the Committee of Reference of any specimens referred to that Committee, and to transfer the specimens to that Secretary.

49. To give notice to the General Secretary, one week previously to the meeting, of the titles of papers for the evening, the names of the authors, and, so far as possible, the objects for Exhibition, with the names of Exhibitors, so that the General Secretary may inform the Members.

Meetings.

50. The Annual General Meeting to take place on the second Friday in October, for the election of Officers and Members of Council, and for the general business of the Academy.

51. Due notice of the meeting shall be given by the Secretary to all Members at least three weeks previously. (1891.)

52. No motion involving a change of these Rules shall be brought before this meeting except one week's notice thereof shall have been given by the Secretary to each Member.

53. The President may—and shall forthwith, on receiving a requisition signed by seven Fellows, at any time—on giving one week's notice, summon a Special General Meeting, for the consideration of particular business, the nature of which must be specified in the letter of summons convening the meeting, and at such meeting no other business can be transacted. In the event of the President being unable, from any cause, or declining, to summon a Special General Meeting of the Academy, it shall be in the power of the General Council to summon such meeting. (1888.)
Ordinary Meetings.

54. The communications to be submitted to the Ordinary Meetings shall be grouped under the following heads:—Medicine, Surgery, Pathology, Obstetrics, State Medicine, and Anatomy and Physiology; and the conduct of such meetings shall be in the hands of the several Sectional Councils, each Sectional Council to have the management of the Ordinary Meeting in rotation, as arranged by the General Council. (1888.)

55. The Ordinary Meetings shall be held on every Friday evening, from the last Friday in October until the last Friday in May, inclusive, at eight o'clock, except during the Christmas and Easter recesses.

56. All Fellows, Members, and Student Associates attending the meetings shall write their names in the attendance book.

57. Any Fellow or Member may introduce two Visitors by cards obtained from the Sectional Secretaries.

58. Officers of the Army or Navy Medical Departments shall, on presenting their cards, be admitted to the Ordinary Meetings of the Academy.

59. No communication shall exceed twenty minutes in its delivery, nor any speech thereon ten minutes, except by permission of the Chairman. No one shall speak twice upon the same communication, except the author, who has the right of reply.

60. A paper by any other than a Fellow or Member of the Academy shall not be read before the Academy unless the author of such a communication shall have obtained permission to do so from the Council of the Section before which the communication is proposed to be read. (1892.)

Ordinary Meetings.—Order of Business.

61. (1.) Chair to be taken at 8.30 p.m.

(2.) Chairman to read list of specimens, &c., exhibited by card, together with the names of the Exhibitors.

(3.) No Pathological Specimen shall be exhibited at any Section other than the Pathological and Obstetrical, except by card. This Exhibition shall not exclude any subsequent communication regarding it at the Pathological Section.

(4.) There shall be no Exhibition of Specimens by card in the Pathological Section.

(5.) Any member shall have liberty to exhibit any recent specimen at any of the meetings of the Obstetrical Section, provided it illustrates any question in gynaecology.

(6.) At the meetings of the Obstetrical Section recent specimens may be exhibited, and the President may invite discussion thereon, provided that such exhibition of specimens or discussion, if any, thereon, must terminate at 9 o'clock, p.m., but that, if necessary, they may be resumed after the papers for the evening have been read and discussed.

(7.) Chairman to ask if any member has any observations to make or motion to propose relative to any living specimen on the List of Exhibition.
(8.) Chairman to call upon the author of the first paper on the list to read his paper.

(9.) Chairman to call upon members to discuss the paper, or, at his discretion, to take any other paper or papers on the list relating to the subject, and have the discussion subsequently on all such papers collectively.

(10.) When the last paper has been discussed, the Chairman to ask if any member desires to speak upon any of the specimens exhibited by card.

(11.) After the discussion upon any specimen, the Exhibitor has the right of reply.

Regulations regarding the Exhibition of Specimens by Card.

62. (1.) Any member may exhibit by card at any Ordinary Meeting, except at the meeting of the Pathological Section. At the meetings of the Pathological Section all specimens must be presented and described "vivis sect," and debate may be invited thereon.

(2.) Notice shall, if possible, be given to the General Secretary, or the Secretary of the Section, on or before the previous Ordinary Meeting.

(3.) Specimens must be in the room at 7.45 on the night of Exhibition.

(4.) Specimens for Exhibition by card shall be open for inspection at 8 p.m.

(5.) A card, containing all particulars for publication, shall be placed with the Specimen. Cards for this purpose are to be obtained from the Secretary.

(6.) The Exhibitor should be present, and he shall furnish further details if asked for.

(7.) Every Exhibitor shall submit the Specimen or Specimens on view to the Committee of Reference, if the meeting so decide.

Exhibition of Pathological Specimens.

63. No lengthened reference to treatment shall be allowed upon any Specimen, except by the express permission of the Chairman. Whenever it has been agreed that a Specimen exhibited at a Sectional Meeting of the Royal Academy of Medicine in Ireland shall be sent to the Reference Committee to report thereon as to its nature, the Exhibitor is to retain the custody of the specimen until he shall be summoned to a meeting of said Committee to be convened by its Secretary, on an early day, when he will attend and submit it for examination. (1889.)

By-laws concerning "Transactions."

64. The "Transactions" shall consist of such Communications made to the Academy by or through Fellows or Members as may be deemed by the General Council suitable for publication; also, of discussions of importance or interest arising out of such Communications.
65. All Communications accepted by the Academy become the property of the Academy, but authors may also print their Communications, subsequent to the reading of the same before the Academy, in any publication in addition to the "Transactions." Papers shall be handed to the Secretary of the Section immediately after they have been read. (1891.)

66. The "Transactions" for the year shall be presented to all Fellows of the Academy who have paid their Annual Subscriptions.

67. The "Transactions" may be purchased by Members at cost price.

68. The Publication Committee of each Section shall meet not later than the Tuesday after each meeting of the Section, for the purpose of abstracting the proceedings— the abstract to be placed in the printer's hands on same evening, and forwarded to the editors of medical journals with the least possible delay. (1888.)

69. Contributors of papers may send their papers to the Academy printer early enough to allow of their being put in type before the meeting, provided the author be responsible for the cost of same should the General Council deem the communication not suitable for publication in the "Transactions."

70. That on the evening of the day of meeting of the Sectional Council when the papers for the next meeting have been decided upon, a circular be sent to each contributor by the Secretary of the Section informing him:—

(1.) That he is expected to be ready or else take his place at the bottom of the list.

(2.) That he must have an abstract ready with his paper, otherwise he will be noted in the published proceedings in such form as the Publication Committee think fit.

71. The General Council is empowered to defray the expenses in whole or in part of any illustrations which it may consider advantageous to the elucidation of the papers published by the Academy.

72. An abstract (prepared by the author) of each communication made at the Academy, along with a report of the discussions thereon, shall be furnished to the editors of such medical journals as may desire to publish them, and the authors of such communications shall be empowered to publish their papers in extenso in any periodical or periodicals they may think fit, such communications also to appear in the "Transactions," provided the Council considers them worthy of insertion.

Expulsion of Fellow or Member.

73. Expulsion of a Fellow or Member can take place only at a General Meeting of the Academy, on the motion of the Council, if two-thirds of the Members present shall vote for the same by ballot. Of such ballot the Council must give at least fourteen days' notice in writing to every Fellow of the Academy.

New Laws.

74. New Laws, or alterations in existing Laws, can be proposed only at the Annual General Meeting. Any Fellow proposing such alteration shall give notice to the General Secretary at least ten days before the General Meeting in October.
REPORT.

THE General Council reports that the number of Fellows this year is 162, Members 21, and Associates 4. The figures reported last year were—Fellows 170, Members 22, and Associates 3.

The attendances at the various meetings amounted in all to 634, which is somewhat less than the number—656—reported last year.

The accounts have been audited, and show a balance to credit of £75 8s. 9d. Last year the amount to credit was £68 2s. 6d.

During the early months of the year a request was received from the Section of Anatomy and Physiology that the meetings of that Section might be held in one of the laboratories of the Medical Schools; should a communication be offered of such a nature that the necessary exhibition or demonstration could be more conveniently made there. The Council has acceded to this request, and hopes that the new arrangement may be the means of increasing the attendance at the meetings of the Section and of stimulating the interest of the Fellows in its work.

A communication was received from the Under-Secretary to His Excellency the Lord Lieutenant in reference to the Kral Institute in Vienna. This Institute is engaged in the sale of virulent germs. In order to prevent the delivery of these germs to institutions or persons who are not entitled to make use of them, the Austrian Government intends to prepare a catalogue of all institutions which have received permission from their respective Governments to acquire such for the purposes of scientific research. It was decided by your Council to inform the Under-Secretary that in the opinion of the Royal Academy of Medicine in Ireland all universities, medical corporations, scientific and teaching
bodies, as well as those individual medical practitioners who are engaged in bacteriological research work, would be suitable to be placed on the list.

Dr. R. J. Rowlette has been re-appointed to act as your representative on the Irish Medical Committee formed to watch the interests of the profession in relation to the Insurance Acts and allied subjects.

The Council record with very great regret the death of one of our original Fellows—the Right Hon. Sir Christopher Nixon, Bart., P.C., D.L., LL.D., M.D., Vice-Chancellor of the National University of Ireland. He presided over the Section of Pathology during the years 1891-2 and 1892-3. During the years 1900-1 and 1901-2 he occupied the chair in the Section of Medicine, at the meetings of which Section he had been a regular attendant, and to which he made many interesting communications.

25th September, 1914.
Dr. RECEIPTS. £ s. d.
To Balance in Bank - - - 68 2 6
" Subscriptions and Entrance Fees - 335 19 0
" Dividends on £596 2s. 4d. 2d per cent.
Consolidated Stock, and £155 1s. 10d.
New 2s per cent. Government Stock,
and £86 12s. 2d. Bank of Ireland Stock 26 0 6
" Sale of Transactions - - - 3 12 11

Cr. EXPENDITURE. £ s. d.
By General Secretary - - - 105 0 0
" Printing and Stationery - - - 44 12 2
" Printing Transactions Vol. XXXII. - - - 106 13 6
" Royal College of Physicians - - - 15 15 0
" Royal College of Surgeons - - - 15 15 0
" Reporter - - - 29 8 0
" Servants - - - 18 14 6
" Care of Microscopes - - - 2 0 0
" Hire of lantern - - - 4 4 0
" Groceries and Milk - - - 12 8 3
" Sundries - - - 3 15 9
" Balance in Bank - - - 75 3 0
" Balance in Hands - - - 0 5 9

Total - - - £433 14 11

The Capital is invested in the names of Dr. Walter G. Smith, Dr. James Craig, and Dr. Henry Jellett.

We have examined the Accounts and Vouchers, and certify the same to be correct.

28th September, 1914.

Trevor N. Smith, F.R.C.S.I.
Henry Stokes, M.D.
Volume XXXII. of the "Transactions" has been forwarded to the following:

IRELAND:
- Queen's University
- University College
- Medical Press
- National Library
- Royal College of Physicians
- Royal College of Surgeons
- Royal Irish Academy
- Royal Dublin Society
- Royal Veterinary College of Ireland
- National University
- Trinity College

- do - Belfast.
- do - Cork.
- do - Galway.
- do - Dublin.
- do - Do.
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ENGLAND:
- Birmingham Medical Review
- Medical Institute
- Bristol Medico-Chirurgical Journal, Medical Library
- The University Library
- University of Durham College of Medicine
- Liverpool Medico-Chirurgical Journal
- Journal of Obstetrics and Gynaecology, 60 Chandos-street, W.C.
- King's College
- Lancet
- Library, British Medical Journal, 429 Strand
- Lister Institute of Preventive Medicine, Chelsea Gardens
- Medical Magazine, 44 Bedford-row, W.C.
- Medical Review, 70 Finsbury Pavement, E.C.
- Official Year Book of Scientific and Learned Societies, Exeter-street, Strand
- Public Health, 1 Upper Montague-street, Russell-sq., W.C.
- Royal College of Physicians
- Royal College of Surgeons
- Royal Society of Medicine, 1 Wimpole-street, W.
- University of London, South Kensington
- University College, Gower-street, W.C.
- The Manchester Medical Society, The Owen's College
- Victoria University
- The Bodleian Library

- do - Birmingham.
- do - Do.
- do - Bristol.
- do - Cambridge.
- do - Newcastle-on-Tyne.
- do - Liverpool.
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SCOTLAND:

University
University College
Royal College of Physicians
Royal College of Surgeons
The Advocates' Library
University
Faculty of Physicians and Surgeons
University
Do.

Aberdeen.
Dundee.
Edinburgh.
Do.
Do.
Glasgow.
Do.
St. Andrews.

EUROPE:

University
Naturforschende Gesellschaft
Kgl. University Library, Dorotheen Strasse
University College
Académie Royale de Médecine de Belgique
Société Belge de Chirurgie
Université Libre
Rivista Italiana di Neuropatologia, &c.
University College
Académie de Médecine
La Grèce Medecale, Syra
Institute Bacteriologico Camera Pestana
University College
Archivio di Ortopedia
Académie de Médecine, Rue Bonaparte, 16
Revue de Chirurgie
University of Paris
Imperial University
Karolinska Med. Khir. Institutet
University Library
Archivio Italiano di Otologia
Medical Society, Royal University
University
Naturforschende Gesellschaft

Amsterdam.
Basel.
Berlin.
Bologna.
Brussels.
Do.
Do.
Catania
Christiania
Copenhagen.
Athens, Greece.
Lisbon.
Madrid.
Milan.
Paris.
Do.
Do.
St. Petersburg.
Stockholm.
Strasburg.
Turin
Upsala.
Vienna.
Zurich.

AMERICA:

Johns Hopkins Hospital, North Broadway
Journal of Medical Research
McGill University
Academy of Medicine, 17 West 43rd Street
University

Baltimore, Md.
Boston, Mass.
Montreal.
New York.
Do.
**AMERICA—cont.**

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Medical Science seems likely to advance in three directions, viz.: first, in gaining better knowledge of the causation of disease; secondly, in the acquisition of facilities for earlier diagnosis; and, thirdly, in the discovery of improved methods of treatment. It is to the second of these topics that I propose to direct your attention at present.

Early diagnosis of disease is, we are all agreed, a matter of vital moment. It is important mainly for two reasons—first, because the neglect or misinterpretation of early symptoms often turns a slight case into a serious one; and, secondly, because the efficacy of treatment is in many cases proportionate to the promptitude with which it is applied. Amongst the "calamities of medicine"—
to use Paget's phrase—failures to make and act upon an early diagnosis take a prominent place. Time lost in the field of disease is seldom regained, and the loss is both one of safety to the patient and of credit to the physician.

Let us first glance at a few of the simplest and most obvious cases before we penetrate to the heart of our subject. Chronic dyspepsia is the blight of innumerable lives, but its first beginnings are simple enough and tractable enough. The dyspeptic, unlike the poet, *fit non nascitur*. He does not often owe much to heredity. Either he has incurred dietetic error or he has prematurely used up his original stock of nerve force. He may have eaten and drunken not wisely but too well, or, on the other hand, insufficienly; or neglected those important aids to health which the dental art supplies; or his nervous energies may have been dissipated too soon by work, worry, or pleasure. Whatever be the cause, his digestive efficiency does not fail suddenly. The machine creaks often before it refuses to move. But the admonitions are commonly neglected. A timely warning to such persons to regulate their diet, take care of their teeth, and conserve betimes their nervous energy would save them much suffering, and incidentally deprive the world of a good deal of the literature of pessimism. Gout, unlike dyspepsia, owes much to heredity. It often gives warning betimes of the coming disasters to joints, kidneys and circulation—warnings too generally ignored until the hour of nocturnal torture strikes. The late Lord Dufferin once said that his ancestors had drunk so much wine that he was obliged to drink water. Not all the scions of a gouty ancestry show a like power of self-control. An early diagnosis of a gouty tendency and of incipient gouty manifestations, and
suitable action thereon, will not always banish the enemy, but they may do something to keep him at bay. The chronic bronchitic has many warnings before his malady takes final hold. The victim of chronic rheumatism commonly makes light of his malady in the stages when treatment would be most efficacious. These are obvious cases which suggest their own moral. I pass on to consider some more difficult problems.

I wish to deal with a few cases where failure to make an early diagnosis is often due not to the carelessness of either patient or doctor, but to the inherent difficulties of the case. I have selected four examples where an early diagnosis raises problems always difficult, sometimes insoluble, and I have purposely selected them from widely different departments of Medicine. The cases are as follows:

(a) Endocarditis;
(b) Cancer of the stomach;
(c) Disseminated sclerosis;
(d) Pulmonary tuberculosis.

I believe we may study with profit the problem of early diagnosis in these four diverse fields.

(a) **ENDOCARDITIS.**

When a patient is suffering from acute or subacute rheumatism we may consider the question of cardiac involvement from three points of view. We may ask what are the probabilities of the case, based upon statistics; or we may take account of signs and symptoms; or we may seek aid from such instrumental methods of investigation as the polygraph and the electro-cardiograph. As regards the first point, while I cannot go the whole
length with Dr. Norman Moore in affirming that the involvement of the heart is an integral element in every case of acute or subacute rheumatism, I regard such involvement as extremely common in the adult and almost the rule in the child. We are justified in strongly suspecting the heart in every case of acute or subacute rheumatism, and such suspicion is specially strong in the case of the child or the young adolescent. On the signs and symptoms of early cardiac involvement I need not dilate—they are familiar to you all; but I should like to press the point that even slight physical signs—a little muffling of the first sound at the apex, a trifling increase in the area of superficial cardiac dulness, a slight degree of arrhythmia—are commonly very significant. How far the polygraph and the electro-cardiograph will help us in the detection of early valvular or myocardial changes it is, perhaps, premature to say. Neither of these instruments helps to recognise mitral regurgitation, which is by far the commonest lesion in such cases. But in a certain undetermined proportion of cases of early rheumatic endocarditis there are changes in the myocardium, sometimes involving impaired conductivity of the wave of contraction, and such impaired conductivity will show itself either in the polygraphic tracing or in the electro-cardiogram.

The importance of early diagnosis in endocarditis would be difficult to exaggerate. Dr. Caton has done good service in insisting upon the necessity for prolonged rest in such cases, and the good results which may be expected from it. Careless treatment of these patients, a too optimistic attitude, a premature return to work, spell disaster in the future. Timely watchfulness will be well repaid.
(b) CANCER OF THE STOMACH.

The early diagnosis of this lesion is beset with the most formidable difficulties. The onset may be marked by symptoms of irritable dyspepsia and pain in the epigastrium, or by loss of weight, anaemia and debility, or by a vague failure of the general health. I have not found the history of a previous gastric ulcer of much help in diagnosis. Marked and somewhat abrupt loss of appetite, especially for flesh meat, is a frequent and significant symptom, on which considerable reliance may be placed, if the anorexia is not otherwise explained. Loss of weight, even at an early stage, is usually pronounced, and is progressive from week to week and month to month. The examination of the gastric contents may assist. Some differences of opinion exist regarding the value of the HCl content. My experience of this test is that it possesses a real, but limited, value. In the great majority of cases of gastric cancer I have found an absence of free HCl, but it is also absent in many other conditions, such as pernicious anaemia, cirrhosis of the stomach, and in some cases of dilatation of the stomach and of chronic dyspepsia. The absence of the free acid must, therefore, be interpreted with caution in a doubtful case. On the other hand, no case has come under my observation where a normal acid content has co-existed with gastric cancer, though such cases have been reported by various observers. They are probably rare, and we shall hardly err in regarding the presence of free HCl as valuable evidence against the existence of gastric cancer. The bacteriology of these cases, and especially the weight to be attached to the presence of the Oppler-Boas bacillus, are still matters of controversy. Vomiting may be an
early symptom, but more usually develops after some progress of the disease has occurred. Haematemesis is rarely, in my experience, an early symptom. Some epigastric tenderness may develop early, but a definite tumour belongs to the fully-developed stage of the disease. I might suggest the following rule of practice. "If a patient, especially of the male sex, who is over fifty years of age, and who has previously enjoyed a normal digestion, somewhat abruptly develops a marked distaste for food, especially for flesh meats; suffers from discomfort after meals, and perhaps occasionally vomits; begins to lose weight rather decidedly, and exhibits some degree of anaemia and debility—then, in the absence of some other obvious explanation, such as alcoholism, cirrhosis of the liver, or renal disease, the suspicion of incipient gastric cancer is strong." An examination of the blood should not be omitted, although the evidence thus obtained must be interpreted with caution. Broadly speaking, the patient suffering from incipient gastric cancer develops a decided and progressive secondary anaemia. The subject of chronic gastritis or chronic dyspepsia has no constant or significant blood changes. The question of the handling of these cases of incipient gastric carcinoma, where the diagnosis can be made with reasonable probability in the absence of tumour or other gross signs, involves a very difficult problem both for the physician and the surgeon. To procrastinate until the proof of disease is complete is a feeble policy involving a disastrous loss of time. Exploration, which is unattended by serious risk, seems justifiable, but physicians will be governed largely in their recommendation of such procedure by surgical experience regarding the results of the operative treatment of gastric cancer. The following figures are reported by
Osler from the clinic of the brothers Mayo: In thirty-nine cases whose condition was known, who had been operated upon over five years before, seven were alive; of sixty-four, condition known, over four years, thirteen alive; of eighty-eight, condition known, over three years, eighteen alive and well.

Whether better results are likely to follow the adoption in certain cases of Schlatter's radical operation of the removal of the entire stomach the future will decide.

(c) DISSEMINATED SCLEROSIS.

The morbid anatomy of this affection, consisting as it does of small patches of sclerosis scattered irregularly through the brain, brain-axis, spinal cord, and sometimes the cranial nerves, prepares us for great variations in the symptoms and modes of onset of the disease. Few, if any diseases, present so varied a picture, and in few is error in diagnosis more probable or more frequent. Buzzard is probably correct in affirming that every physician is at some time or another mistaken in relation to the early diagnosis of the disease. When early diagnosis is in question we must dismiss from our minds the classical picture of disseminated sclerosis as described in text-books, viz.; intention tremor, nystagmus, scanning speech and spasticity of the lower limbs. Any or all of these symptoms may be absent at this stage. Rather must we inquire for transient disturbances of vision—amaurosis or diplopia—temporary impairment of bladder control, paræsthesiae of one or more limbs, diminution of the abdominal reflexes, loss of tone of the sphincter iridis, shown by failure of the pupil to remain contracted in presence of the stimulus produced by light, giddiness, emotional instability. Here we have a group of sym-
ptoms, none of which taken singly is capable of any confident interpretation, but which are highly significant when taken as a whole. Transient pareses and a sense of fatigue in the legs may appear early. In a case of doubt the alternative possibilities of the case must be borne in mind. Most of the organic lesions of the nervous system are easily excluded. Paralysis agitans will hardly cause serious difficulty, the age law being commonly decisive. Hysteria is the most fertile source of error, and the difficulty of distinction is much increased by the fact that young female "disseminates" sometimes develop a seemingly hysterical psychosis. But hysteria never exhibits the group of early symptoms which have been enumerated, and at a later stage nystagmus, pallor of the optic disc and ankle clonus make the distinction easy. How far early diagnosis may enable us to deal effectively with disseminated sclerosis is doubtful. The causation of the disease is most obscure. There is no known toxic factor. Infective diseases, chills, shock, mental stress, have been blamed, but on doubtful evidence. Syphilis has no influence. The course of the disease is so variable and periods of remission so common that treatment may easily get the credit which belongs to nature. But it seems reasonable to hope that the early recognition of these cases, the removal of sources of nervous strain, and the adoption of a well-ordered hygiene may improve the prospects of these unfortunate patients.

(d) PULMONARY TUBERCULOSIS.

I pass on to the most important case of all. The early diagnosis of pulmonary tuberculosis is a matter of vital importance because of the frequency of the disease, and of its comparative curability in the incipient stage.
immense amount of work has been done in recent years in connection with this subject, and many attempts have been made to find a short cut to a prompt and secure diagnosis. I have to essay the difficult task of evaluating these methods, which time is not available to describe in detail.

We may attempt to solve the problem of early diagnosis of pulmonary tuberculosis by the following methods:—
(1) By an analysis of symptoms, history, and physical signs; (2) by an examination of the sputum; (3) by radiology and radiography; (4) by the tuberculin tests of Koch, von Pirquet, Moro, and Calmette; (5) by an examination of the blood after the method of Arneth; (6) by agglutinin and precipitin reactions on the lines of Widal's valuable test for typhoid fever; (7) by the fixation-of-complement-test on the lines of Wassermann's well-known test for syphilis; (8) by the opsonic index method.

Most of these methods are too familiar to you to require any description. Arneth's method is, however, new and not widely known, so some account of it may not be inappropriate. Briefly, this observer hopes to find a diagnostic clue to tuberculosis, and to its activity and course, in changes which he describes in the neutrophile leucocytes. Arneth divides these cells into five groups, viz.—those in which the cells have one, two, three, four, five or more nuclei. He finds that in health these groups form approximately five per cent., thirty-five per cent., forty-one per cent., seventeen per cent., and two per cent. In the very earliest stage of pulmonary tuberculosis, when the general health is still unaffected, these various groups preserve their normal ratio, but so soon as any general infection occurs this ratio is disturbed.
The first group rises to fifteen per cent., the second to from thirty-six to forty-six per cent., while the third group falls slightly, and fourth and fifth groups fall more decidedly. In more advanced cases with active symptoms the first group rises to from twenty-eight per cent. to fifty-two per cent., the second group to from thirty-seven per cent. to fifty-three per cent., while the third group falls to ten per cent., and the fourth and fifth groups tend to disappear altogether. It is claimed for this method that it gives us an accurate indication of the intensity of the infection and of the reaction of the patient's organism, and that, hence, it affords a useful guide to prognosis. In favourable cases, where recovery is in progress, the condition of the neutrophile leucocytes is said to tend to revert to the normal.

Arneth's method is comparatively new, and has not been extensively tried in this country. It is attractive and may contain some amount of promise, but it is not easy to believe that the changes in the leucocytes which are, no doubt, reactive in character, are quite specific for tuberculosis in contradistinction to other infections. As I have not tried the method, I pass no judgment upon it.

Radioscopy and radiography afford interesting information in cases of pulmonary tuberculosis, but there is still a good deal of doubt as to their value in incipient cases, and the interpretation of the skiagram is often a matter of great difficulty. Amongst the earliest changes are a fine mottling in some of the characteristic areas, the dark lines due to the peribronchial fibrosis usually present, and, especially in children, the shadow cast by swollen bronchial glands. Impaired movements of the diaphragm are likely to develop later. Unfortunately the sources of fallacy are numerous, and the skiagram does not help us
to differentiate between old healed lesions and recent active lesions. The method is one which appeals to the x-ray expert and the pulmonary specialist, but is not likely ever to become generally available.

The various tuberculin tests, regarding which such high hopes were once entertained, have proved disappointing. A little reflection will convince us that they suffer from an inherent and incurable defect. They all depend upon the principle that the organism once infected by tuberculosis has become hyper-sensitised to the action of tuberculin. But this hyper-sensitisation may depend upon the presence of an obsolete and healed lesion in lung or gland or bone. As seventy, eighty, or ninety per cent. of our city populations—the exact figure does not affect the argument—are, or have been, the subjects of tubercular infection, a positive reaction to tuberculin gives us little information of real value and may easily mislead as to the correct interpretation of the case before us. To put the matter in another form—tuberculin reactions do not distinguish between tubercular infection and tubercular disease, which is precisely the point that is really at issue. A negative reaction may be allowed some weight, but in ordinary city practice a positive reaction is the rule.

I need not say anything about the value of a routine examination of the sputum. The discovery of tubercle bacilli is decisive, and bacilli may be found in quite early cases, although at this stage their absence, and, indeed, the entire absence of sputum is common.

The attempt to discover a reaction based upon the agglutinins and precipitins in the blood of tuberculosis patients—i.e., a reaction analogous to Widal's valuable test for typhoid fever—has so far led to no fruitful result, and there seems to be no probable future for this method.
The latest suggestion of a specific test for tuberculosis is on the lines of the well-known Wassermann reaction which has proved so useful in the recognition of syphilis. The theory is that the serums of tuberculosis patients contain an anti-body capable of fixing complement in the presence of tuberculin. Positive results have been claimed for this method in proportions varying from one-quarter to three-quarters of the cases. It is affirmed that a negative result goes far to exclude tuberculosis. This method is quite new; it is still in the experimental stage, and it would be premature to express any opinion upon its probable usefulness.

The opsonic index method, the technique of which is now generally known, seems to yield interesting information in the hands of the pathological expert, but the results are very conflicting and the method is unsuitable for general adoption.

A review of the foregoing methods will probably convince us that no sure short-cut to a summary diagnosis of incipient pulmonary tuberculosis is at present available. Laboratory methods may give us a valuable suggestion or a useful caution; they can seldom afford definite guidance. We are not yet absolved from the necessity of basing our opinion in large measure upon a careful study of history, symptoms, and signs. Let us inquire where we stand to-day in reference to these matters. Two types of incipient case rise before the mind. In one type the examination of the chest is wholly negative; in the other slight but significant departures from the normal are present; in both, symptoms—perhaps slight and not very characteristic, will be found. What are we to say of these cases where symptoms excite suspicion while signs are negative? A vague failure of general health in a
By Dr. J. A. Lindsay.

young adolescent may have many explanations, but the suspicion of pulmonary tuberculosis will be strong where we find the syndrome of loss of weight, slight afternoon pyrexia, cough, and acceleration of the pulse. There is often a history of slight haemoptysis which the patient frequently assures us "came from his throat," or "was due to his teeth." To this symptom much weight may be justly attached. Night sweating is occasionally an early symptom, and when present is most significant. Digestive disturbance may appear early and may strengthen the diagnosis, but it is often absent. On these points there will probably be no difference of opinion.

Acute divergence of view emerges, however, when we ask the question—What are the earliest physical signs of tubercular invasion of the lungs? A formidable list of authorities might be quoted who maintain that the earliest signs are auscultatory. Strümpell says: "The auscultatory signs in the beginning of the disease are in general more certain and easier to recognise than those from percussion." Cornet says: "In the earlier stages of the disease percussion does not help very materially." Wilson Fox says: "Percussion at the apex is often unaffected in the early stages." West says: "The physical signs yielded by auscultation are not only the earliest to be detected but remain throughout the disease the most important." Osler says: "Dulness is rarely present in early cases." In sharp conflict with the above views we have the opinion of an imposing array of observers who insist that the earliest signs are those yielded by percussion. Aufrecht affirms that percussion "offers positive information much sooner than auscultation." Krönig says: "It is a very widespread error to expect to find the earliest physical signs by auscultation." In England
D. B. Lees and Clive Riviere have warmly advocated a similar view. Powell says cautiously that "at this stage (viz., the incipient stage) the physical signs are but slight: the percussion note at one apex is slightly impaired and the respiration weaker, the inspiration being wavy, or even jerking. There are usually a few rhonchi, which, if limited to that apex, are very significant." My own belief is that auscultatory changes are in general prior to any appreciable muffling of the percussion note, and of auscultatory changes I believe the earliest to be a modification of the respiratory murmur either in the direction of weakness or harshness, with commonly some disturbance of the respiratory rhythm. Crepitation comes later.

The early diagnosis of pulmonary tuberculosis in young children is a separate problem and one of no little difficulty. In these patients tubercular infiltration of the lungs does not commonly show that preference for the apices which is so constant a feature in the adult. The disease is more diffusely disseminated or may specially affect the roots of the lungs. The tracheo-bronchial glands are frequently involved and may afford useful physical signs. The symptoms are often marked and progress rapid. The physical signs often trouble us not by their latency or deficiency, but rather by their abundance and by the difficulties attending their interpretation. The problem which most often arises is this—the child has a broncho-pneumonia, arising out of one of the exanthemata or otherwise, and is doing badly. The question is whether the pulmonary condition has been throughout, or has become, tubercular. In many of these cases physical signs are indecisive, and symptoms are capable of more than one interpretation. Osler hardly exaggerates when he says that in some of these cases time and the
result of treatment alone can decide the diagnosis. The examination of the sputum, when it can be obtained, may, of course, settle the problem. I would suggest the need or caution when dealing with obscure pulmonary conditions in young children, and the desirability of not prematurely affixing the tubercular label. Goodhart is undoubtedly right in holding that a good many suspicious cases ultimately clear up and come to nothing.

Before dismissing the subject of the diagnosis of early pulmonary tuberculosis I would like to record my conviction that quite early cases are in the majority of cases amenable to treatment. The human body, in spite of superficial appearances to the contrary, is really somewhat tolerant of tubercular infection, but to succeed we must begin operations before gross physical signs have developed. Many years ago I had occasion to visit that veteran of our profession, Sir Hermann Weber, and our conversation ran mainly on the subject of pulmonary tuberculosis. As I parted from him at his own door his last words to me were: "Get them early." In that, and not in any novel or heroic methods of treatment, lie at once our safety as physicians and our best hope for humanity.

Time will not permit us to consider in detail the numerous other cases where an early diagnosis is a matter of vital moment or is beset with peculiar difficulties. But I should like to emphasise my conviction that in researches in this field, from both the clinical and the pathological standpoint, lies one of the best hopes for the future of medical science. The public must learn that for disease to be countered successfully, it must have early recognition and timely treatment. Our hospitals are full of the wrecks of humanity, which we may, indeed, often
patch up with more or less success, but which can never be restored to integrity. Prevention is best; early diagnosis is the next best; late diagnosis is too often only a pis aller. How different from their usual fate would be the destiny of the diabetic, the tabetic, the subject of granular kidney or arthritis deformans if these conditions were recognised at their earliest manifestations! But the diabetic commonly seeks advice only when thirst, polyuria and progressive emaciation can no longer be ignored. The tabetic regards his early pains as "only rheumatism." The victim of granular kidney waits until his headaches, dyspepsia and visual troubles force themselves upon his reluctant attention. The arthritic makes light of early symptoms which too surely portend ultimate disablement. We must take care that to the ignorance of the public is not superadded any negligence on our part, any cavalier treatment of apparently trivial ailments, any neglect of significant symptoms. The out-patient room of one of our great hospitals is an excellent field for learning to distinguish promptly between the trivial and the essential, between some trifling ailment and the slight but significant manifestations of grave disease. It is a field to which the beginner and the junior student are, with curious perversity, often assigned. Rather it is the advanced student, who has learned his business in the wards and has already accumulated some fund of practical experience, who will there find his natural sphere and opportunity.

One of the problems of present day Medicine is to draw a just line in the diagnosis of disease between the clinician and the pathologist, between the hospital ward and the laboratory. It is most desirable that a fair balance should be maintained, and that there should be rational and
By Dr. J. A. Lindsay.

sympathetic co-operation. The pathologist has not that first-hand knowledge of disease in the living subject which is so important. Dead-house appearances represent the late results of disease, not its origin or course. On the other hand the clinician cannot hope to keep pace with the rapidly-developing and ever-increasing complexity of modern pathological technique, though he may aspire to understand its methods and appraise its results. His skill in these matters, occasionally exercised, cannot compare with that of the man to whom they are a daily routine. In such matters as the examination of sputum, the Widal test for typhoid fever, or the Wassermann test for syphilis, the laboratory can give us inestimable aid. But I would plead that in the last resort diagnosis is the business of the clinician, and that the final test is bedside experience. While we examine blood, sputum, urine, gastric contents, cerebro-spinal fluid, &c., &c., let us not forget to examine the patient. The old physicians who had not even a stethoscope or a clinical thermometer—not to mention an ophthalmoscope, laryngoscope, gastroscope, sphygmomonometer, polygraph, electro-cardiograph—were often extraordinarily shrewd judges of disease. Even Hippocrates may still be read with profit, and with a chastened sense that after more than two thousand years of the triumphant march of medical science he may still be able to teach us something. His first famous aphorism is familiar to us all, but will bear repetition: "Life is short; the art is long; occasion sudden; to make experiments dangerous; judgment difficult. Neither is it sufficient that the physician do his office unless the patient and his attendants do their duty, and that externals are likewise well-ordered." Perhaps the thirteenth aphorism is less familiar. It runs as follows: "Old men easily endure
fasting; those who are middle-aged not so well; young men worse again than they, and children worst of all, especially those who are of a more lively spirit." These echoes from the great Age of Greece still strike the ear pleasantly, reminding us that medical insight is not the exclusive property of the moderns. And the English Hippocrates, Sydenham, is not yet wholly obsolete. To come nearer home, Graves on Fevers and Stokes on the Heart may still stimulate our minds and make us proud of Irish Medicine. Their pathology may need revision, but their clinical insight was rarely at fault.

You will remember that the first great aphorism of Hippocrates affirms that it is not sufficient for the physician to do his part, that the patient also has a duty to perform. In this matter of early diagnosis we are largely dependent upon the intelligence of the public. We cannot advise until we are consulted. We cannot detect the subtle premonitions of disease if these are disregarded by the patient. I hold it our duty to inculcate a timely watchfulness—quite distinct from fussy anxiety—in matters pertaining to health. And in these matters the consultant needs the aid of the general practitioner, who is usually the first to have cognizance of the facts.

Obsta principiis is a very old and, I think, a very excellent medical maxim. The medical practitioner is too often in the position of the foolish virgins in the parable—he arrives too late. But the responsibility is not usually his.

I submit these considerations—most of them familiar and obvious—to your judgment, believing as I do that in the early recognition of disease and the prompt adoption of remedial measures lies the secret of much of the efficacy of our art.
By Dr. J. A. Lindsay.

The Chairman, in opening the discussion, complimented the author on his excellent address. Dealing with the subjects in detail, he referred to the vexed question as to whether signs elicited by percussion or auscultation gave earliest evidence of incipient phthisis. He was inclined to believe those elicited by percussion did so.

Dr. O'Carroll thought that the early diagnosis of disease had not as many disadvantages as advantages. He was not at all sure that there was not much to be said for keeping going on as long as possible and trying to be guided by nature rather than getting every ill from which we suffer diagnosticated.

As to pulmonary tuberculosis, he rather thought the debate between the value of percussion as against auscultation was a debate as to individual experience; one generally being impressed by the method by which he got the most information. He referred to a statement made by a Continental writer that the specific diagnostic sign of phthisis was the râle, which evidently indicated that no amount of percussion change would settle the question of diagnosis of pulmonary tuberculosis until the crackling is heard. He did not think one should wait until physical signs in the lungs were found before suspecting phthisis and treating the case as such. He considered that when any perfectly definite physical signs were discovered, and bacilli were present in the sputum, the life value of the patient was very low.

Dr. Drury thoroughly agreed as to the supreme value of early diagnosis. Regarding the nice point raised as to the discovery of pulmonary tuberculosis at an earlier stage by auscultation or percussion, he thought if the matter was reasoned out it would be seen that percussion would yield a very late sign as compared with auscultation. He had always believed that long before anything like crackling was discovered the roughening of the expiratory sound was the earliest departure from health. He suggested that in children with rheumatism the diagnosis of the condition of the heart was not the greatest difficulty, but rather to diagnosticate the rheumatism.

Dr. Moorhead was in agreement with Dr. O'Carroll's remarks. He said that a distinction should be drawn between the early diagnosis of phthisis on which one would
start treatment and the early diagnosis from which statistics might be compiled with fairness. He thought the auscultatory signs were the earliest.

Dr. Parsons said that the finding of no physical signs in the lungs though bacilli were present in the sputum was not a very unusual experience. He thought the auscultatory signs were the earliest. With regard to gastric cancer he mentioned cases where there was progressive gain in weight by the patients. The autopsy in one such patient who died of a ruptured heart showed quite extensive cancer of the stomach.

Dr. Lindsay, in reply, said that when emphasising the importance of an early diagnosis he did not think of it only from a therapeutic aspect, as numerous instances could be conceived where a reasonable forecast might be of the greatest assistance to the patient and his friends. For all statistical work in connection with phthisis the line ought to be drawn between cases in which bacilli were found in the sputum and those in which they were not, because in one class there can only be a suspicion of the disease, whereas in the other there is positive proof. He had seen a slight temporary increase in weight in cases of cancer of the stomach, but he had never experienced anything like progressive improvement.
A CASE OF TRICHOCEPHALUS DISPAR.

By HENRY C. DRURY, M.D., DUBL.; F.R.C.P.I.;
Physician to Sir Patrick Dun’s Hospital, Dublin.

[Read in the Section of Medicine, December 18, 1914.]

Case.—On February 4th, 1913, a boy (W.D.), aged twelve years, was admitted under my care into Sir Patrick Dun’s Hospital.

His appearance suggested Hodgkin’s disease, as there was great enlargement of the lymphatic glands of the neck on both sides from the head down to the clavicles. These could be felt to be for the most part isolated, the general swelling being due more to the number involved than to the size of any individual gland, as none of them seemed to be much larger than a hazel-nut. None of them had suppurated, nor did they seem to have any tendency to do so, nor were they painful nor tender to the touch. There was, however, no marked enlargement of the accessible glands elsewhere, though a few small ones could be felt both in the axillæ and in the groins.

The boy looked wretchedly ill; he was, in addition, very deaf, and had very defective vision due to opacity of both corneæ. We considered it probable that he was suffering from congenital syphilis.

His appetite was voracious; he crammed the food into his mouth and bolted it like a hungry animal; frequently he vomited a considerable amount of it again almost immediately. We therefore had his food minced and chopped up before it was given to him. His bowels were extremely constipated, never acting without large and often-repeated doses of purgative medicine; these doses he also frequently vomited. He frequently complained of abdominal pain.

His temperature was irregular and sub-normal.

As we suspected Hodgkin’s disease, he was at once put on iii m doses of Fowlers’ arsenical solution three times a
day. Under this, combined with a warm bed, good food and hygiene, he improved very much in his general condition, and the cervical glands became markedly smaller and more isolated.

A specimen of his blood was sent to the laboratory for microscopic examination, and also for the Wassermann reaction. The reports received were: "Large lymphocytes, 43 per cent.; polymorphs, 46 per cent.; eosinophils, 10 per cent. This does not support the idea of Hodgkin's disease, but the large percentage of eosinophil cells suggests the presence of intestinal worms."

"The Wassermann reaction was strongly positive (+4)."

The faeces were now carefully watched for a few days, but no worms were seen. Then a dose of filix mas was given, without any appearance of tape-worm. Next, santonin, $2\frac{1}{2}$ grains, was given, and a male ascaris lumbricoides expelled.

Microscopic examination of the faeces now disclosed the presence of numerous eggs of trichocephalus dispar, but none of ascaris lumbricoides, so we presumed that we had obtained the only member of that species present.

The eggs of trichocephalus are usually so numerous that they are easily found, and so characteristic that they are easily recognised. They are oval, with a dark crenated "shell," and have a rounded knob at each end of the oval, unlike any of the other intestinal worms.

The difficulty now was how to get rid of the trichocephalus. These worms generally occur in large numbers, infesting the caecum, where they bury their long, hair-like head extremity in the mucous membrane. It is hopeless, therefore, to try to reach them by enemata. They apparently do not object to filix mas, nor to single doses of santonin. We did not care to try thymol or other toxic drugs, as the boy was young and far from robust. He was, therefore, put on 1 grain doses of santonin three times a day, but after a week's trial this was given up as useless.

I then thought of asking a surgeon to open up his caecum, but saw the difficulty of clearing out the worms. On discussing it with Dr. Arthur Ball, he suggested a much better plan—namely, to do an appendicostomy—that is, to cut down on the appendix, bring it through the abdominal wall,
and sew it there, amputating the projecting end, thus leaving a fistula through it into the caecum, and so securing a channel for direct caecal medication as long as we wished to keep it open, and which would not require a second operation for closure. An abdominal operation was further justified from the fact that the boy had constant abdominal symptoms—viz., vomiting, pain, and obstinate constipation—suggestive of some chronic condition other than the presence of worms.

Dr. Arthur Ball performed this operation quite successfully and satisfactorily. The caecum was found very high up near the liver, the appendix was kinked and tightly embedded in adhesions, evidently the result of a severe attack of appendicitis. With some difficulty it was isolated and brought out through a separate small aperture in the abdominal wall, and fixed there. The original incision was closed in the ordinary way. The boy made an uneventful and rapid recovery from the operation. No worms were found in that portion of the appendix which was amputated. It was necessary to pass a bougie into the lumen of the appendix constantly to keep it open, otherwise it would have closed rapidly. No escape of faeces took place through it.

As soon as the laparotomy wound was healed, medication was commenced through the appendix.

Thymol emulsion was given, followed by a soap and water injection. This acted rapidly just like an ordinary enema, but no worms were found in what was passed. Then an injection of infusion of quassia was given through the appendix, but it came away almost immediately without bringing away any worms. Unfortunately, I did not examine the results of these two injections myself, as he was still in the surgical wards, so I am not quite sure that they were unsuccessful.

The bowels were now given a rest, so that he became constipated; then a pint of infusion of quassia was given very slowly through the appendix. This was retained, and at night three grains of calomel were given; as this had not acted by morning, a good dose of Epsom salts was given early. By 12 o'clock there was still no result, so two pints
of soap and water were prepared and given slowly at low pressure through a small catheter passed into the appendix, while the boy was placed on a bed-pan. This very soon produced the desired result of a large motion. On washing this through muslin and searching through the remaining débris and mucus—of which latter there was a very large amount—about a dozen specimens of trichocephalus dispar were found, and are, so far as I know, the first specimens of this worm obtained from the living body as the direct result of treatment.

About half a dozen quassia injections were similarly given after this at intervals of a few days. At first a few worms were found, but with the last few injections none were found, so the injections were discontinued, and the appendicular fistula was at once closed.

I think it is quite probable that most of the worms were lost after the early injections, before I undertook the search for them myself.

It will be remembered that early in the case, on suspecting congenital syphilis, we found that the Wassermann reaction was strongly positive (+4); and also that he was very deaf, and had defective vision from opacity of the cornea.

Having got rid of the worms, we decided to give him a dose of salvarsan. Before doing so, Sir Robert Woods kindly examined into the state of his hearing, and reported:—"He hears and understands an occasional simple sentence when shouted with the mouth close to the left ear. Unable to make him hear on the right side. Unable to understand that he is to tell when he hears or does not hear the tuning fork."

He was now given 0.4 grm. of salvarsan by intravenous injection. There was no unpleasant symptom about it. Ten days later it was found his hearing was slightly improved, as "he can hear a simple question by the left ear when it is put with a loud voice." There was no apparent change in the condition of his cornea. His general condition was greatly improved, and the glandular swellings very greatly reduced when he left hospital. On May 2nd—that is, about six weeks after the expulsion of the worms—the faeces were examined for ova, but none were found.

A week later the blood was examined by Professor
O'Sullivan, and he reported that the "eosinophile cells were 2.8 per cent., which is normal."

It may be taken, therefore, I think, that we got him completely cleared of the worms. But it may be asked: What harm do they do? Was the risk of the operation and the trouble encountered worth the result? That is a question, however, worth discussion.

I have only once before met with a case of trichocephalus dispar. About 1890 a young adult man was sent to Sir Patrick Dun's Hospital from the country. Careful examination by different members of the staff, repeatedly made, failed to find anything wrong with him, except that he was rather anaemic. He ate all he could get, had no fever, slept all night and a good part of the day, complained of nothing except increasing weakness, which had been coming on for some time, and that he was now too weak to get up out of bed. About that time hypnotism was the fashionable craze, and a well-known doctor, a former pupil of Sir Patrick Dun's Hospital, who practised the art extensively, and, it is said, successfully, being on a visit to his native Dublin and his old hospital, was invited to give a demonstration of his power. The above-mentioned patient was one of those selected for the trial of his skill, and in this case at least he lamentably failed to produce any effect whatever. The patient continued to grow—or at least feel—weaker though looking well-nourished and comparatively healthy. Some short time after, to the surprise of every one, he died suddenly one night. A post-mortem examination was made. Every organ in the body appeared to be perfectly healthy, except the caecum, which was found to be packed with thousands of trichocephalus dispar. They were the only abnormality found. Were they the cause of death?
I have related this case entirely from memory, but it made such an impression on me at the time that I think it is in the main correct. The notes of the case are somewhere in the hospital records, but though I have searched for them I have not been able to locate them.

In view of the fact which we now know—that the presence of intestinal worms causes changes in the blood which can be readily recognised, so much so that in the case in question it was these changes in the blood that first suggested the presence of worms, not previously suspected—it seems reasonable to suppose that the worms give rise to some toxin, and if they are in sufficient numbers, and are harboured for a sufficient length of time, the amount of toxin manufactured may eventually seriously impair the health, or even cause the death, of the host, as apparently was the case in the patient whose death I have related.

If this is so, and as it seems to be impossible by the administration of known drugs to get rid of these worms, it appears to me that the means adopted to reach them and satisfactorily deal with them—namely, through the vermiform appendix—was quite justifiable. In fact it is the only useful purpose I know of the appendix to have served its owner.

Besides this hypothetical ill-effect of trichocephalus, it is quite probable that many obscure cases of appendicitis are due to their presence, and as they are small worms, inconspicuous and buried in the excess of mucus which is present with them, their presence may not be noted at the time of operation unless specially and carefully looked for. Two cases which Dr. Moorhead kindly called to my notice bear out this contention. In the Brit. Med. J., 1906, Vol. II., page 265, there is a report by M. Oni, of Lille,
of a woman, aged twenty-two, who, after the puerperium, suffered from pain in the right iliac fossa, which was ascribed to salpingitis, and several attacks followed. Oui, seeing her in one of these, detected tenderness in that region, and operated. He found the tube was normal, but the appendix was red and thickened. On opening it, after removal, two specimens of trichocephalus were found with their whip ends buried in the mucosa; there were also little brown specks on the surface, which proved on microscopic examination to be groups of ova. The editor of the Journal adds: "The parasite, we may note, is not common in the British Isles."

In the same number of the Journal (page 364) Dr. Foster Moore, of St. Bartholomew's Hospital, relates the case of a postman who had what appeared to be ordinary appendicitis, but at operation an apparently normal appendix was found. On slitting it open one specimen of trichocephalus dispar was present in the lumen. This opens up a new field of hope for the surgeon! and is further justification for our calling in his aid in the case I have dealt with. It would encourage me to advise the operation which Dr. Ball suggested immediately the presence of this worm is recognised, as it is, I believe, the only way of getting rid of it, and it is very advisable that it should be got rid of.

[A specimen of the ovum was shown to the Academy under the microscope, and Dr. Drury passed around specimens of the male and female worms obtained from his case.]

The President said it was remarkable how treatment by the mouth was reported as unsuccessful. He considered that the surgical aspect to which attention had been now directed opened up a new field for investigation.
Dr. Law said that this worm was extremely common in the tropics, and that they had been looked upon as not giving rise to any symptoms. He considered Dr. Drury's paper of interest, as it showed that some difficulties might arise with this worm, and thought it curious that it should have been suggested that it gave rise to appendicitis. He was sorry that Dr. Drury should have been afraid of administering thymol, as in his experience children stood it fairly well, but it was not considered that it would have been followed by any better result, as he had frequently examined the faeces after the administration of thymol and had never found trichocephalus.
BENZOL THERAPY IN LEUKÆMIA AND LYMPHO-SARCOMA.

By T. GILLMAN MOORHEAD, M.D., F.R.C.P.I.; Physician, Royal City of Dublin Hospital.

[Read in the Section of Medicine, December 18, 1914.]

During the last year I have had an opportunity of testing the reputed action of benzol as a useful therapeutic agent in leukæmia. I have now treated altogether four cases with this drug—one of myelogenous leukæmia, one of lymphatic leukæmia, one of lympho-sarcoma, and one of what was regarded as osteo-sarcoma.

The introduction of the drug and its mode of action have been very fully discussed in recent papers, many of which contain a full bibliography up to the date of publication. In consequence, I only propose to refer to those facts which it is essential to bear in mind in order that the reasons for employing the drug at all may be understood, and I will omit practically all reference to the literature of the subject.

In 1910 Selling reported in the Johns Hopkins Hospital Bulletin three cases of purpura hæmorrhagica that had occurred amongst workers in a factory where benzol was largely used. Careful investigation of these showed that the clinical symptoms of benzol poisoning consisted of giddiness, headache, vomiting and diarrhoea, and purpuric eruptions. The blood picture showed a striking diminution in the number of the white cells, the polymorphonuclear cells being diminished out of proportion to the lymphocytes, and moderate red cell anaemia. Two of the
cases proved fatal, and the most significant pathological lesion found was a striking diminution in the number of the white cells in the bone marrow. Experimental work, consisting of the subcutaneous injection of benzol into rabbits, showed that moderate doses produced in these animals a leucopenia and changes in the marrow similar to that described in the patients referred to, but did not injuriously affect the red cells. If the drug was pushed, ultimately red cell anaemia was produced.

Reasoning on the above stated facts, von Koranyi concluded that moderate doses of benzol might prove of use in cases of leukæmia. He put the matter to the test, and in June, 1912, was able to report a case of spleno-medullary leukæmia in which as a result of benzol therapy the white cells had been reduced within three months from 173,000 per c.mm. to 8,000 per c.mm. with concomitant general improvement.

The conclusions derivable from von Koranyi's cases and those of others may be summarised as follows:—

1. Benzol first tends to increase the number of white blood cells, but shortly leads to an improvement of the leukæmic conditions. The decrease in white cells is at first slow and later more rapid, and may proceed in an irregular manner. Once the decline in number of white cells has started, it tends to continue for some time, even if the benzol is stopped.

2. As the white cells diminish in number, the differential count both in spleno-medullary and in lymphatic leukæmia approaches more nearly to the normal, but as a rule some myelocytes persist in the spleno-medullary disease, and in the lymphatic form the lymphocytes continue to be excessive in proportion to the other white cells. In short, even when the total number of white cells is reduced to
normal, the differential count shows the presence of some leukæmic characteristics.

3. The average dose of benzol that may be administered with safety is from 3 to 5 grams daily. It is best given in gelatine capsules, combined with an equal quantity of olive oil, which seems to lessen the tendency of the benzol to produce heartburn and gastric irritation.

4. The effect of benzol on the spleen in spleno-medullary leukaemia is variable. In some cases the spleen diminished almost to normal; in others, even when the blood picture is reduced almost to normal, the spleen remains large.

5. The ultimate result in apparently cured cases of leukaemia is still to be waited for. There is as yet no proof that the cure produced is of a permanent nature. One case of von Koranyi's was reported as quite well ten months after the cessation of the treatment.

The following is the record of the cases that have been under my care:

**Case I.—Spleno-medullary Leukaemia.**—The patient, a married woman, aged thirty-five, was sent to the Rotunda Hospital for treatment, on account of the existence of a large abdominal tumour, and through the kindness of the Master of the Rotunda she was transferred to my care on April 30, 1914. She then complained of pain in the side, palpitation, fatigue, and inability to stoop owing to the pressure of the tumour in her abdomen. She stated that she had had no previous illnesses. She was the mother of five children, and had had two miscarriages, the last eleven months previously.

In December, 1912, she first felt a lump in her left side. She was then pregnant, and after the birth of her child in February, 1913, she noticed that the lump was getting bigger. It did not, however, trouble her much till early in 1914, when, owing to difficulty in stooping and breathlessness, she consulted a doctor, and was sent to Dublin for treatment.

On admission it was found that the spleen was enormously
enlarged, practically filling the entire abdomen; some crepitations were audible at the base of the left lung; there was a heavy deposit of albumin in the urine, but no casts; the temperature was slightly raised; the patient's weight was 8st. 4½ lb. With the exception of the blood condition, which will now be dealt with in more detail, nothing else of importance was noted. A Wassermann test was negative.

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<td>3,800,000</td>
<td>.. 22</td>
<td>65,000</td>
<td>65%</td>
<td>3,800,000</td>
</tr>
<tr>
<td>June 2</td>
<td>26,500</td>
<td>68%</td>
<td>3,800,000</td>
<td>June 2</td>
<td>26,500</td>
<td>68%</td>
<td>3,800,000</td>
</tr>
<tr>
<td>.. 11</td>
<td>24,000</td>
<td>60%</td>
<td>3,800,000</td>
<td>.. 11</td>
<td>24,000</td>
<td>60%</td>
<td>3,800,000</td>
</tr>
<tr>
<td>.. 16</td>
<td>26,000</td>
<td>65%</td>
<td>3,800,000</td>
<td>.. 16</td>
<td>26,000</td>
<td>65%</td>
<td>3,800,000</td>
</tr>
<tr>
<td>.. 23</td>
<td>18,500</td>
<td>65%</td>
<td>3,800,000</td>
<td>.. 23</td>
<td>18,500</td>
<td>65%</td>
<td>3,800,000</td>
</tr>
<tr>
<td>.. 27</td>
<td>9,375</td>
<td>65%</td>
<td>3,800,000</td>
<td>.. 27</td>
<td>9,375</td>
<td>65%</td>
<td>3,800,000</td>
</tr>
<tr>
<td>July 3</td>
<td>8,260</td>
<td>68%</td>
<td>3,800,000</td>
<td>July 3</td>
<td>8,260</td>
<td>68%</td>
<td>3,800,000</td>
</tr>
<tr>
<td>.. 11</td>
<td>7,500</td>
<td>68%</td>
<td>3,800,000</td>
<td>.. 11</td>
<td>7,500</td>
<td>68%</td>
<td>3,800,000</td>
</tr>
<tr>
<td>.. 16</td>
<td>8,300</td>
<td>68%</td>
<td>3,800,000</td>
<td>.. 16</td>
<td>8,300</td>
<td>68%</td>
<td>3,800,000</td>
</tr>
<tr>
<td>.. 22</td>
<td>8,000</td>
<td>68%</td>
<td>3,800,000</td>
<td>.. 22</td>
<td>8,000</td>
<td>68%</td>
<td>3,800,000</td>
</tr>
<tr>
<td>.. 25</td>
<td>9,500</td>
<td>68%</td>
<td>3,800,000</td>
<td>.. 25</td>
<td>9,500</td>
<td>68%</td>
<td>3,800,000</td>
</tr>
<tr>
<td>Aug. 1</td>
<td>7,600</td>
<td>75%</td>
<td>4,175,000</td>
<td>Aug. 1</td>
<td>7,600</td>
<td>75%</td>
<td>4,175,000</td>
</tr>
<tr>
<td>.. 13</td>
<td>7,100</td>
<td>75%</td>
<td>4,175,000</td>
<td>.. 13</td>
<td>7,100</td>
<td>75%</td>
<td>4,175,000</td>
</tr>
</tbody>
</table>

Benzol Therapy in Leukæmia.

Benzol 30 m.  Benzol 60 m.  Benzol 90 m.  X-ray
<table>
<thead>
<tr>
<th></th>
<th>May 1</th>
<th>May 11</th>
<th>May 29</th>
<th>June 11</th>
<th>July 3</th>
<th>July 11</th>
<th>Aug. 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymphocytes (large</td>
<td>4.4</td>
<td>2.0</td>
<td>4.0</td>
<td>8.0</td>
<td>7.0</td>
<td>24.0</td>
<td>19.0</td>
</tr>
<tr>
<td>and small)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutrophiles</td>
<td>...</td>
<td>32.0</td>
<td>69.0</td>
<td>70.0</td>
<td>76.0</td>
<td>87.0</td>
<td>72.0</td>
</tr>
<tr>
<td>Eosinophiles</td>
<td>...</td>
<td>3.3</td>
<td>2.0</td>
<td>3.0</td>
<td>2.0</td>
<td>0.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Basophile myelocytes</td>
<td>10.4</td>
<td>1.0</td>
<td>4.0</td>
<td>2.0</td>
<td>0.0</td>
<td>2.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Eosinophile</td>
<td>1.8</td>
<td>2.0</td>
<td>2.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Myeloblasts</td>
<td>45.7</td>
<td>24.0</td>
<td>17.0</td>
<td>13.0</td>
<td>4.0</td>
<td>2.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Nucleated red cells</td>
<td>2.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

From May 11th onwards many of the cells classed as myeloblasts showed some neutrophile granulations.

The blood examination showed at once that the patient was suffering from spleno-medullary leukaemia. The red cells numbered 4,400,000 per c.mm. The hæmoglobin was 40 per cent. and the white cells were 133,000 per c.mm. A differential count of white cells was difficult owing to the enormous variety of cells present, but, as far as could be determined, the myelocytes numbered about 56 per cent. of the total white cells, a majority of these being of the myeloblast type. The actual count made at the time of admission gave the following figures:

<table>
<thead>
<tr>
<th></th>
<th>Per cent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymphocytes (large</td>
<td>4.4</td>
</tr>
<tr>
<td>and small)</td>
<td></td>
</tr>
<tr>
<td>Neutrophiles</td>
<td>32.0</td>
</tr>
<tr>
<td>Eosinophiles</td>
<td>3.3</td>
</tr>
<tr>
<td>Basophile myelocytes</td>
<td>10.4</td>
</tr>
<tr>
<td>Eosinophile myelocytes</td>
<td>1.8</td>
</tr>
<tr>
<td>Myeloblasts</td>
<td>45.7</td>
</tr>
<tr>
<td>Nucleated red cells</td>
<td>2.4</td>
</tr>
</tbody>
</table>

100.0

On May 1st the benzol treatment was started, 30 minims being given daily in capsules with an equal quantity of olive oil. On May 8th the dose was increased to 60 minims daily, and on May 22nd to 90 minims daily.
Benzol Therapy in Leukaemia.

On July 3rd the benzol treatment was stopped. On July 6th x-ray exposures of the spleen were started; these were given every second day until the end of the month—twelve treatments in all. They were then discontinued owing to our x-rayist being summoned to rejoin the army.

The progress of the case is best seen by reference to the table on page 32.

From the tables it will be seen:—(1) That there was a slight increase of white cells immediately after starting the benzol, and that the later decrease of cells occurred in an irregular way. Within three days the drop from 132,500 to 76,000 took place; and, again, a sudden drop from 18,500 to 9,375 took place within four days; (2) coincident with the drop in white cells a slow but steady increase in haemoglobin and in red cells took place; (3) the change in the differential count was very striking. At the last examination made, and in several previous ones, not included in the table, no myelocytes of any form could be detected, and the blood picture was practically normal.

During the period that benzol was being taken the albuminuria cleared up completely. The urine during this time became quite dark when allowed to stand for twenty-four hours, due, presumably, to hydroquinone. On July 3rd, when the benzol treatment was stopped, although the blood was practically normal, the spleen was still considerably enlarged, extending almost half-way to the umbilicus. X-ray treatment was, therefore, started, and brought about rapid reduction. At the time of leaving hospital—August 14th—the spleen could be felt about a fingerbreadth only below the ribs. The patient then felt and looked perfectly well, but I, of course, await a report of her further progress. During her stay in hospital she had gained 5 lb. in weight.
Case II.—Nodular Lymphatic Leukæmia.—This patient was of interest from several points of view. He was a labourer, aged fifty-six, admitted complaining of weakness and of lumps in his groins.

When thirty-six years of age he had had rheumatic fever. During the second week of this attack the ankles became swollen, and later the legs, thighs, and abdomen. This necessitated his staying in bed for two months, and when he got up he noticed that the veins on the front of the abdomen were swollen. This venous swelling increased gradually and persisted up to the time of admission. His present illness started six months before he came to hospital. He began to suffer from pains in his legs and giddiness, and found lumps appearing in his groins, his armpits, and elsewhere.

On admission a large swelling was noticed under each eyebrow, there were enlarged glands on each side of the neck, in both axillæ, and in the groins. In addition the glands in the popliteal space and those at the elbow were enlarged, and numerous subcutaneous nodules were present, scattered here and there over the body. The mammary glands were very firm, hard, and swollen. The case, in fact, in these particulars is seen to belong to the group known as nodular leukæmia, the facial and mammary swellings being specially characteristic of this type.

The veins of the abdominal wall were enormously distended and tortuous, due presumably to thrombosis of the inferior vena cava, dating from the rheumatic attack of twenty years previously. There was a slight trace of albumin in the urine. The thorax appeared normal to both radiographic and other examination, as did the abdomen. With the exception of the blood, no other abnormality was detected anywhere in the body, and a Wassermann test proved negative.

The first blood examination made on April 26th gave the following counts: Red cells, 2,475,000 per c.mm.; white cells, 222,500 per c.mm.; haemoglobin, 58 per cent. Differential count: Lymphocytes, 97 per cent.; neutrophiles, 3 per cent.

On this date, April 26th, benzol was administered in 60 minims doses daily; this was increased to 90 minims on May 9th, and on May 21st was discontinued.
The progress of the case so far as the blood was concerned can be seen best in the table on page 37.

From these it will be observed (1) that there was an increase in white cells continued progressively after the benzol, and that, as in the previous case, the subsequent decrease occurred irregularly—for example, the fall from 198,000 to 57,000 occurred within four days; (2) the decrease in which cells continued progressively after the benzol was stopped; (3) only very slight, if any, increase of red cells and of haemoglobin took place during the benzol course; (4) even when the white cells had been reduced to the normal number, the proportion of lymphocytes remained very much in excess of the normal. The increase of neutrophiles to 34 per cent., as shown in the last count, was probably due to septic infection. It may be added that at first most of the lymphocytes were of the large variety, that soon after the benzol was started numerous degenerated cells, which could not be counted, were found in the films, and that later on the predominant lymphocytes were of the small variety.

Further points of importance in the case are as follows: Shortly after the benzol was started it was noticed that the lumps in different parts of the body were much lessened in size, and by the end of May the glands in the neck and axillae were completely gone. The subcutaneous nodules, with the exception of those under the eyebrows, also disappeared completely, and the facial ones became very much smaller. The groin glands became reduced to about one-third of their original size, but never completely disappeared. The discontinuance of the benzol on May 21st was due to the onset of an attack of right-sided abdominal pain, the diagnosis of which was uncertain, but which was believed to be either appendicular or due to gall-stones.
There was in addition much gastric disturbance, with thirst, so that it was thought possible that the benzol might be to blame. Subsequent examination, however, seems to show that the diagnosis of gall-stones was correct.

<table>
<thead>
<tr>
<th>Date</th>
<th>White Blood Cells</th>
<th>Red Blood Cells</th>
<th>Hb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 26...</td>
<td>222,500</td>
<td>2,475,000</td>
<td>58 %</td>
</tr>
<tr>
<td>May 2</td>
<td>277,500</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot; 6</td>
<td>261,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot; 9</td>
<td>237,500</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot; 12</td>
<td>198,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot; 16</td>
<td>57,000</td>
<td>2,500,000</td>
<td>62 %</td>
</tr>
<tr>
<td>&quot; 22</td>
<td>37,700</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot; 26</td>
<td>28,300</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot; 29</td>
<td>26,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>June 5</td>
<td>18,300</td>
<td>2,800,000</td>
<td>65 %</td>
</tr>
<tr>
<td>&quot; 11</td>
<td>10,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot; 20</td>
<td>5,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot; 26</td>
<td>6,100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>July 2</td>
<td>6,428</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>&quot; 7</td>
<td>7,000</td>
<td>3,500,000</td>
<td>60 %</td>
</tr>
<tr>
<td>&quot; 13</td>
<td>6,800</td>
<td>3,500,000</td>
<td>-</td>
</tr>
<tr>
<td>&quot; 24</td>
<td>9,500</td>
<td>3,400,000</td>
<td>-</td>
</tr>
<tr>
<td>Aug. 6</td>
<td>8,100</td>
<td>3,250,000</td>
<td>-</td>
</tr>
<tr>
<td>&quot; 13</td>
<td>7,200</td>
<td>2,725,000</td>
<td>62.5 %</td>
</tr>
<tr>
<td>&quot; 21</td>
<td>12,500</td>
<td>2,600,000</td>
<td>-</td>
</tr>
</tbody>
</table>
On recovery from this attack the patient felt much better. On admission he was with difficulty persuaded to leave his bed; he now got up, spent most of the day in the open air, ate well, and was anxious to go home. His urine still contained a trace of albumin, and during the period of benzol therapy got quite dark on standing.

While in this condition, in the beginning of July, he got a gumboil, and all his teeth rapidly became septic and loose. I urged him to have them removed, but he refused, and it was only after ten days' pain that he consented. From this time he went downhill. His temperature remained persistently about 100° F.; he developed a cough, with foul, purulent expectoration, and signs of a low septic pneumonia; and finally died on August 22nd. It is possible that the great diminution in number of his neutrophile cells rendered him an easy prey to septic infection.

Necropsy.—Only a partial post-mortem examination could be performed. The heart was flabby, and microscopically showed marked fragmentation; the lungs, especially the upper lobe of the left lung, showed much septic involvement, with gangrenous patches here and there; and several bronchial glands were enlarged to almost the size of a bean. In the abdomen the abnormalities noted were as follows:—Both kidneys were in an advanced cystic condition, and presented numerous uric acid crystals scattered throughout their sub-

<table>
<thead>
<tr>
<th></th>
<th>April 26</th>
<th>May 6</th>
<th>May 29</th>
<th>June 26</th>
<th>July 20</th>
<th>Aug. 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymphocytes (large and small)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutrophiles</td>
<td>97</td>
<td>98</td>
<td>83</td>
<td>95</td>
<td>78</td>
<td>65</td>
</tr>
<tr>
<td>Eosinophiles</td>
<td>3</td>
<td>1</td>
<td>17</td>
<td>5</td>
<td>22</td>
<td>34</td>
</tr>
<tr>
<td>Hyaline cells</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
By Dr. T. G. Moorhead.

stance; microscopically there was advanced chronic interstitial nephritis. The spleen was rather enlarged and soft, and was found on section to be packed with lymphocytes; the liver appeared normal macroscopically; the gall bladder contained one large gall stone, and there were very extensive adhesions between the colon and the gall bladder; microscopically islets of lymphoid tissue were found throughout the liver in the fibrous tissue of the portal system. The lymph nodes of the colon were rather prominent, but otherwise the intestinal tract was normal; numerous lymph glands, whitish in colour, and of about the size of a bean, were found in the gastro-hepatic omentum and along the vertebral column. The inferior vena cava was with difficulty discovered; it was completely obliterated as far up as the renal veins, and was represented by a cord of fibrous tissue; the iliac veins were also obliterated, and were calcified.

The most interesting fact about this case appears to me to be that although a very striking improvement was effected at the beginning of the case no real disappearance of the leukæmic symptoms was ever brought about. At the post-mortem examination excess of lymphocytes was found in several organs, and the blood throughout retained its leukæmic aspect as far as the differential count was concerned. At the same time the patient undoubtedly improved enormously coincident with the fall in total number of his white cells, and it was not till the septic infection alluded to had set in that his progress towards apparent recovery was interrupted.

Case III.—Lympho-sarcoma.—P. G., aged sixty-five, a farmer, was admitted on May 11th, complaining of lumps in his neck and of difficulty in breathing and swallowing. He stated that he had always been a healthy man until about seven months previously. He then noticed a swelling on the right side of his neck, and shortly afterwards found that his breathing at night was troublesome, so that he had to sit up
in a chair. He also began to be troubled with a cough, without expectoration, and by hoarseness, and before admission to hospital coughed incessantly day and night. Early in April he found difficulty in swallowing, and could only get down fluids.

On admission enlarged glands were found on both sides of his neck. On the right side these were very big, and practically filled up the entire space between the clavicle and the lower jaw; on the left side they were smaller. The veins on both sides were distended. In the thorax there was an area of dullness over the manubrium sterni, and extending slightly out on each side beyond the sternal margin. This dull area merged below with the cardiac dullness. The breathing was slightly stridulous, and on auscultation seemed very harsh all over the upper part of the thorax. An x-ray examination showed that the superior mediastinum was opaque to the rays, presumably due to the presence of a growth, and also showed an area of opacity extending on each side of the heart. In the abdomen nothing abnormal was found except slight splenic enlargement. The glands in the groins and axillae were palpable, and perhaps very slightly enlarged. Laryngeal examination by Dr. Graham showed slight paralysis of the right vocal cord.

The blood examination was as follows:—Red cells, 3,210,000; white cells, 11,660; haemoglobin, 65 per cent. Differential count:—Neutrophiles, 61 per cent.; lymphocytes, 31 per cent.; hyaline cells, 7 per cent.; eosinophiles, 1 per cent. Wassermann test negative.

The diagnosis made in this case was lympho-sarcoma. Not anticipating a favourable result, I did not have one of the neck glands removed for section. In consequence the diagnosis must remain open to doubt; but the picture of an intrathoracic growth, with enlarged glands in the neck and slight splenic enlargement, appears to me practically unmistakable, and in my own mind I have no doubt that the diagnosis was correct. Some may, perhaps, think that the case was one of Hodgkin's disease.

On May 13th benzol was started, and 60 minims were given daily up to June 2nd. The dose was then increased to 90
minims daily, and this was continued until July 3rd, when the drug was discontinued. An x-ray exposure was given every third day from May 13th to July 13th.

During the first three weeks in hospital the patient complained much of his breathing and of his cough, and felt a sensation of choking immediately on lying down. It was necessary to give morphine each night to give him relief. After the lapse of three weeks the glands in the neck were much smaller than on admission, and after a month they had completely disappeared. The dullness over the upper part of the thorax began to diminish, and a series of x-ray photographs seemed to indicate a gradual clearing of the intrathoracic opacity.

Symptoms also improved and by the middle of June the patient was quite free of cough, of hoarseness, and of difficulty of breathing.

On June 20th Dr. Graham again examined his larynx, and could then find nothing abnormal. On July 3rd a purpuric eruption suddenly appeared all over the body, with here and there urticarial wheals. This was regarded as a sign that the benzol had been pushed far enough; it was therefore discontinued, and the skin eruption rapidly cleared up. The patient left hospital on July 16th feeling and looking perfectly well.

A comparison of radiograms taken on May 13th and on July 15th, and now exhibited, I think, leaves no doubt that the thoracic opacity had largely cleared up. Some opacity undoubtedly remains in the latter x-ray, but this could only be expected, as some fibrous change would probably accompany the disappearance of a lympho-sarcomatous growth.

During the course of the benzol treatment the white cells sank from 11,660 on admission to 4,000 per c.mm., but increased later to 6,000 per c.mm.; no change took place in the differential count, the red cells increased from 3,210,000 to 4,300,000, and the haemoglobin from 65 per cent. to 75 per cent.

In recording this case as a cured case of lympho-sarcoma the following queries arise—namely: (1) Was the diagnosis correct? This question has already been dealt with. (2) Is the cure permanent? The answer to this lies, of course, in the future. The patient promised to
communicate with me at once if any symptoms returned, and so far I have not heard from him. (3) Was the benzol or the x-ray treatment the factor in bringing about the improvement? This question, of course, cannot be answered. My own previous experience of x-ray treatment in both Hodgkin's disease and lympho-sarcoma is uniformly unfavourable.

I am therefore inclined to think that the benzol was the more important factor. The case seemed so serious on admission that I did not feel justified in employing benzol alone, as I felt that in so formidable a disease everything that could possibly be of value should be at once put in action.

Case IV.—Osteo-sarcoma.—Encouraged by the result obtained in Case III., a course of benzol was given to a man sent me by Mr. Moore, with the statement that he was suffering from an inoperable osteo-sarcoma of the pelvis. The growth had spread into the groins and was rapidly advancing. The benzol was pushed over a period of four weeks, but no improvement was noted, and in consequence no further details of the case need be recorded.

In conclusion, I have contented myself with reporting these results without speculating on the way in which they are brought about. It appears to me probable, however, that the aetiology of the disease may before long be solved through the therapeutic channel now opened out.

Dr. Walter Smith said that the identity of the drug used and its purity was of the greatest importance, and if these points were not clear it was difficult to draw any definite conclusions as to the result of treatment. Owing to the position of the nomenclature applied to this drug pharmacists, he thought, could not be sure what was really meant by medical
men when ordering benzene. He said that the most important groups were hydrocarbons, and that the great source was the crude petroleum which came from the earth. It was an unfortunate thing, he thought, that the typical or fundamental member of the group was called benzene, which was spelled in such a variety of ways. The modern name was benzoI. He suggested that the variety required should be stated by calling it by its source, so as to indicate whether it was coal tar or petroleum that was required. The next point of importance was the purity. The commercial benzene only contained 70 per cent. of the liquid benzene, so that if at one time pure benzene was been given and at another something which contained 30 per cent. of other things the results could not be easily compared. He drew attention to the fact that paraffin had very little affinity for anything else, and that benzene (commercial) always contained a large amount of toluene and some xylene. An easy method of ascertaining the purity of the drug was demonstrated. It was shown by test tube experiments that pure benzene was not strongly attacked by nitric acid. Benzol Rectificatis B.P. when treated in this way turned a yellowish red, which showed it to be impure. Toluene, which was very like benzene, was then mixed with nitric acid, and almost immediately became red and so with xylene.

Dr. Peacocke recalled a case of acute lymphatic leukæmia treated by benzene, but the patient died before the end of the treatment. He used it in a case of pernicious anaemia, but the treatment in that case did not last long enough, as the white blood cells fell rapidly. He had given the drug an extensive trial in a case of myelogenous leukæmia, the patient being kept on benzol for several months. Blood counts were done every second or third day, but he could not say the results showed any marked change in the number of white cells. At times there was a gradual reduction, but they afterwards increased, and finally, when the treatment was stopped, the differential count was over 20,000, and the last count showed at least 20 per cent. myelocytes. The spleen showed no change. X-ray exposure was afterwards given, and when heard of recently the patient considered the spleen was reduced. He suggested that the combined treatment was the best, as
benzol alone had not much effect on the size of the spleen. Although the urine had been frequently examined not the slightest trace of discoloration was seen.

Dr. Boxwell said that he had given the drug in a case of leukæmia. When the patient came for treatment the white cell count was 180,000. After the treatment was started the count went up, and by degrees began to fall, but never fell to any great extent. The red cells went up five or six million and remained so for six weeks. There was no difference in the size of the spleen. X-rays did reduce it somewhat, but not very markedly. The patient was going steadily downhill. The urine was never changed in the smallest degree. The drug used was ordered by formula $C_6H_6$.

Dr. Moorhead, in replying to the remarks, said, having attended Dr. Walter Smith's lectures some years ago, he was aware of the two varieties of the drug, and before prescribing it he made sure that his patient would get the coal tar variety $C_6H_6$. 
A CASE OF CARCINOMA UTERI BENEFITED BY RADIUM EMANATION.

By Sir John Moore, M.A., M.D.;
Physician to the Meath Hospital and County Dublin Infirmary;
Professor of Practice of Medicine in the Schools of Surgery,
Royal College of Surgeons in Ireland.

[Read in the Section of Medicine, February 5, 1915.]

On Friday, October 2, 1914, I had the good fortune to be present at a lecture on radium delivered by Professor John Joly, Sc.D., F.R.S., to Post-Graduate Students of Medicine in the School of Physic in Ireland, Trinity College, Dublin. That discourse was intensely interesting and most instructive. It was published in the number of the Dublin Journal of Medical Science for November, 1914 (Vol. 138, No. 515, Third Series, page 321).

After hearing Professor Joly’s lecture I felt bound to ascertain whether radium therapy might not benefit a female patient who had been under my care in the Meath Hospital from September 24, 1914. She was suffering from malignant disease of the womb and neighbouring parts, and her case had been declared to be inoperable by my colleague, Dr. Frederick W. Kidd, Gynaecologist to the Hospital.

Accordingly, I spoke to Professor Joly on the subject. He referred me to Dr. Walter Stevenson, who kindly visited the patient with me, and, after examination, arranged to give radium therapy a fair trial in the hope that it would relieve the poor woman’s suffering.

Case.—Mrs. Ellen H., aged sixty-five years, wife of a sergeant in the Royal Irish Constabulary, was admitted to the
Meath Hospital on Thursday, September 24, 1914. She stated that she had enjoyed good health up to the middle of last June, when she was suddenly attacked by a profuse bleeding from the womb. This was soon followed by agonising pain in the lower part of the belly and about the private parts. She lost her appetite, had a bad taste in her mouth, and rapidly lost flesh and strength. When admitted, she was much wasted and very bloodless, and presented the aspect of one who had gone through much and long-continued suffering. She was of medium height, and weighed 6 stones 13 lbs. On admission the pulse-rate was 120 per minute, respirations 28, and temperature subnormal (96° F.). The bowels were constipated. The right side of the abdomen was prominent, and a tumour could be felt on palpation in the right iliac fossa. The urine, examined on September 28, was pale, faintly acid, and of rather low specific gravity. It contained some albumen, was turbid from the presence of both phosphates and pus and threw down a deposit which became viscid on the addition of liquor potassae.

To relieve irritability of the stomach, flatulence and pain, a mixture was prescribed containing solution of citrate of bismuth and ammonium, bicarbonate of sodium, tincture of nux vomica, and compound tincture of chloroform and morphine—the last-named in only 4-minim doses thrice daily. In consequence of loss of sleep through pain a hypodermic injection of morphine and atropine was given at night as required.

On October 6, my colleague, Dr. F. W. Kidd, examined the patient very thoroughly. He found the uterus and adnexa extensively involved in a new growth, which seemed already to have invaded the posterior wall of the bladder. The new growth was extremely vascular, and was partly disintegrating. Dr. Kidd’s opinion was that the condition of the parts precluded operative interference.

In view of this unfavourable opinion, and with a strong desire to relieve the patient in some way, I asked Pro-
Professor Joly about the feasibility of treating the case by radium emanation. At his suggestion, I conferred with Dr. Stevenson, who had been getting good results from radium therapy in various cases of superficial new growths. Dr. Stevenson very kindly visited the patient in the Meath Hospital, and on Friday, October 23, inserted six radium needles, each carrying an initial charge of 4 millicuries, into the growth. They were left in situ for twenty-four hours. There was scarcely any constitutional disturbance or reaction—for the three following evenings the axillary temperatures were 99.4°, 99.0°, and 99.3° respectively. The needles were inserted into the posterior lip of the cervix uteri in the first instance—that being the most difficult part to reach—then into the anterior lip, and finally into the left vaginal wall. The needles were inserted for the second time on the afternoon of October 28, and their position was changed on each of the three succeeding days. They were removed on November 1.

In connection with this second séance there was a somewhat decided constitutional reaction, the evening temperatures being 99.4° on October 29, 101.0° on the 30th, 101.2° on the 31st, and 100.5° on November 1. From the last-named date the temperature range became, if anything, subnormal, coincidently with a certain looseness of the bowels, which in turn was followed by improved appetite. The patient also was freer from pain, slept better, lost the haggard, dragged look which she had previously worn, and began to regain colour. This last change seemed to depend on a cessation of the bleeding which had been almost constant during October.

An interval of four weeks was now allowed to elapse before the third insertion of the needles, which took place on November 27. The position of the needles was
changed next day, and again on November 30, and they were removed on December 1. A longer-continued but less active febrile disturbance followed, but the highest reading of the clinical thermometer was only 100.4°.

Mrs. H. felt so much better after this third application that she consented to a fourth instalment of the treatment only after much persuasion. The needles were inserted for the fourth and last time on Christmas Eve. They were removed and re-inserted on Christmas Day, and again on December 27, and were finally removed on December 29. An irregular subfebrile temperature followed, lasting till January 6, when the body temperature became subnormal for a week. The patient left hospital for her home in the County Kildare on January 17, driving off in state in a taxi provided for the occasion by her sons.

I have already stated that the new growth became much less vascular as the treatment went on. This is confirmed by Dr. Stevenson, who tells me that the first insertion of the needles was followed by free hæmorrhage, but that later on there was less and less bleeding after their insertion.

The average amount of radium emanation introduced from each needle was estimated by Dr. Stevenson at three and a half millicuries—the initial strength of four millicuries ebbing quickly from day to day. He has very kindly furnished me with the following technical details as to the radium treatment:

Mrs. H., from October 23 to December 29, 1914 (sixty-seven days), was under treatment by an average of twenty millicuries for thirteen and a half days. During all this time she had six old capillaries in a little metal case inserted into the cervical canal. They contained an average
of 4.17 millicuries. She received altogether 6602 milligramme hours of radiation. Six needles were inserted eleven times, twenty-four each into the anterior and posterior lip of the cervix and fornix and eighteen into the vaginal wall. Posterior fornix and lip of cervix, treated for four days twenty-one hours, received 1872 milligramme hours—average 16 millicuries. Anterior fornix and lip of cervix, treated for six days twelve hours, received 2162 milligramme hours—average 13.8 millicuries. Vagina, treated for four days four hours, received 1218 milligramme hours—average 8.1 millicuries. Cervical canal and uterus, treated for thirteen days six hours, received 1350 milligramme hours—average 4.1 millicuries per hour.

The constitutional febrile disturbance which followed the various séances is noteworthy. Dr. Stevenson suggests that the rapid disintegration of the cells of the new growth and the absorption of the resulting débris may account for this.

Dr. Kidd has kindly furnished me with the following note as to the condition of the patient before and after the radium treatment:

"I was afforded the opportunity of making a pelvic examination in the case of Mrs. Ellen H. One examination was made before any treatment had been adopted, and on that occasion, even with the greatest care, the examination was followed by profuse hæmorrhage. I arrived at the conclusion that the case was inoperable as infiltration had taken place on both vaginal walls, and the posterior wall of the bladder seemed to be implicated along with the vesico-vaginal septum. I made a second examination after Dr. Stevenson had inserted the radium needles and certainly found a marked improvement. The infiltration seemed much diminished and the examination
was conducted very thoroughly without being accompanied or followed by any haemorrhage whatever."

In the Thirteenth Report from the Cancer Research Laboratories, published in the thirty-third volume of the *Archives of the Middlesex Hospital,* will be found a paper by A. Clifford Morson on "The Changes which occur in Malignant Tumours on Exposure to the Gamma Rays of Radium." This paper originally appeared in the "Proceedings of the Royal Society of Medicine" (1914, Vol. vii., Pathological Section. Pp. 97-108). I quote Mr. Morson at some length, as his observations throw such a light on the happenings in my patient's case. Mr. Morson writes:—

"For some months I have been carrying out an investigation into the changes which take place in the cells of malignant growths when exposed to the gamma-rays of radium. The procedure which I have adopted in this investigation is as follows:—A small portion of the growth is removed before exposure to these rays for the purpose of comparison between the radiated and the non-radiated cancer cell. On removal of the tube of radium, which in every case was embedded in the tumour for periods varying from fifteen to twenty-four hours, that part of the growth in actual contact with the tube of radium was excised. Further portions of the tumour were removed for microscopical examination at intervals of forty-eight hours to two months.

"The tissues submitted to the action of the gamma rays when removed by the scalpel appeared to be completely insensitive, and it was not found necessary to make use of either general or local anaesthesia in performing the operation. I have had personal experience of the anaesthesia..."
produced by the gamma rays, for last July, as a result of handling radium daily over a period of two months, changes occurred in the skin of the forefinger and thumb of my right hand, which caused a temporary loss of tactile sensation, but marked sensibility to heat and cold.

"Within fifteen hours of the commencement of radiation the malignant cells in the immediate vicinity of the tube of radium begin to degenerate. The nuclei become irregular in shape, and in places are broken up into two or more fragments. Twenty-four hours later all that can be seen is a structureless mass, embedded in which are a number of cells in various stages of degeneration. In the region of the growth where the intensity of the rays is less the cells may also be seen to be altered. Their normal arrangement is lost and the malignant mass is broken up into isolated groups of cells.

"In some microscopic sections a definite line of demarcation has been seen between fully degenerated cells and the relatively unaltered malignant cells. It is possible that this observation may assist in determining the radius of action of a known quantity of radium, when inserted into a growth whose microscopic characters have been previously investigated. If, three days following radiation, a part of what remains of the growth be removed, further changes will be noted. The connective tissue cells have commenced to proliferate, and those malignant cells which have escaped immediate death show apparent vacuolation with greatly enlarged nuclei.

"In a considerable number of cases, within fourteen days of the application of the radium, absence of cancer cells can be demonstrated. On the other hand, some growths appear more resistant to the action of the gamma-rays, and if microscopic examination be made as long as
two months after radiation, malignant cells will be detected, though changed from the normal. The cells show a peculiar vacuolated appearance, with swollen nuclei. Around the malignant cells will be observed dense fibrous tissue."

The radium emanations used in the treatment of my patient were obtained from the Royal Dublin Society's stock of radium from which the needles are charged under the skilful and skilled supervision of Mr. R. J. Moss.

In conclusion, I can but re-echo the closing words of Professor Joly's Address on "Radium," to which I have already referred. They are as follow:

"This—the first Radium Institute in Ireland—has already done good work for the relief of human suffering. It will have, I hope, a great future before it, for I venture, with diffidence, to hold the opinion that with increased study the applications and claims of radio-active treatment will increase."

Dr. W. C. Stevenson said that, with regard to the extract from Mr. Morson's paper in which it was indicated that it was the gamma rays that caused the effect, he had recently read a paper in the Practitioner," by Lazarus Barlow, in which it was questioned whether it was the gamma or beta rays which produced the effect in cancer. He (Dr. Stevenson) said the beta rays were present in any case, so that they could not be avoided. He referred to a paper by Abbé, who separated the beta from the gamma rays, and who proved to his own satisfaction that the gamma rays had very little effect, and that the beta rays had great effect in retarding cell growth.

He had noticed the effect of handling radium on the tips of the fingers, which became quite insensitive.

Dr. Solomons expressed regret that the paper had not been brought before the Section of Obstetrics. He was also sorry that Dr. Kidd, who had expressed the opinion that the case
was inoperable, was not present, as it would have been of interest to know his idea as to what was an inoperable case.

Dr. C. M. O'Brien said the whole virtue of radium depended on the action of radium emanation on the cancer cells and also on the stimulation of the connective tissue cells. He thought that Barlow, summing up in his last paper, said that no matter what might be the future of radium every operable case of cancer should be operated upon. He recalled a case of his which was treated in 1906 for epithelioma of the right cheek, which was looked upon as cured and remained well for six years, and at the end of that time the patient returned with large infiltrating glands absolutely inoperable from the surgical standpoint.

Dr. Crofton said that one would think that radium would produce a local effect only on the cancer, but it appeared that there was always a general reaction, and he suggested that part of this was due to the absorption from the cancer cells into the circulation, so that not only might the radium act as a destructor of the cancer cell, but that it might lead to a certain amount of immunity.

Dr. W. Geoffrey Harvey said Dr. Crofton's point should not be lost sight of. He found that when a tumour in a mouse disappeared after treatment with x-rays, it was almost impossible to reinfect that mouse with cancer. From that he considered that the absorption of the cancer did produce some kind of protective bodies.

Dr. Spencer Sheill said that if it was assumed that the diagnosis was correct without microscopic examination, Sir John Moore was to be congratulated. He had spent some time in studying the effects of radium, and had seen results with which he considered this case compared favourably. If nothing more than the cessation of pain and apparent improvement had been achieved, he considered that a distinct gain.

The President said the physics of radium was a complicated subject, and the question of its physiological action, which was of greater interest, was still more complicated. It seemed to him that the most fundamental thing as to the possible line of radio-activity was that it was a branch of photo-therapy, and might be brought into line with Finsen.
light. He suggested that it was a photo-electrical treatment influenced largely by the wave-length of the light, and possibly acting on the tissue. He considered that it was possible in all those radio-active elements there might be a stimulant action, and suggested the possibility of too feeble application of radium stimulating cancerous growths.
THE X-RAY TREATMENT OF RINGWORM.

By EDWARD J. WATSON, M.D. Dubl., F.R.C.P.I.:
Sir Patrick Dun's Hospital, Dublin.

[Read in the Section of Medicine, March 5, 1915.]

As there have apparently been a more than usual number of cases of ringworm of the scalp seen lately, and as I have been treating this condition with x-rays for a good many years, I thought that a short note on the cases I have seen and treated might be of some interest.

Since the year 1904 I have treated in all sixty-six cases of ringworm of the scalp, and since that time treatment of this condition has not undergone much modification. I have always used Sabouraud's pastille as the indicator of dosage, and had the infected areas and a good margin round them painted with tincture of iodine daily from the time of the x-ray exposure. The only risk of the treatment is that of producing permanent baldness, and this can, I think, be absolutely avoided with care. In one case which I treated a small patch of baldness resulted. It was about the size of a threepenny piece, and was due to the slipping of the protection shield, and so exposing this small area twice. I now use a thin filter of aluminium, and this, though lengthening the exposure a little, prevents the danger to a great extent.

The large proportion of cases in my series—forty-four in number—have had only one area over which the exposure was given. In thirty-eight of these cases the area was epilated on the twentieth to the twenty-first day, and no other part of the scalp became affected, so that after
sixteen days I thought the cases might be said to be cured, this being five weeks from the first exposure. In three of these one-area cases the hair did not come out, but at the end of three weeks no sign of ringworm could be discovered, nor did it subsequently appear. The supposition was that only affected hair became loosened. These three cases were ecto-endothrix in type. In the three remaining cases of the one-area series, though the areas first treated were completely epilated and cured, other areas of ringworm appeared some days after epilation of the treated areas had taken place. These areas were in turn epilated, and at the end of eight weeks these cases were passed as cured. In twelve cases two or three separate areas were treated to start with, and in this series eight cases were cured in five weeks. In four cases, however—and these were cases seen recently—ringworm appeared in the hair round the epilated areas, these cases are still under treatment, and perhaps Dr. Walter Smith who had seen them will make some remarks about them. In one of these cases, also, after epilation numerous red patches appeared over the bald places, each resembling ordinary ringworm of the skin, but arranged over the areas in a way that I have never before seen. Dr. Smith saw the case and said that it was undoubtedly ringworm. This condition was, Dr. Smith tells me, easily overcome by ordinary antiseptic methods.

In ten of the cases I have treated the whole scalp was epilated in each instance, taking from eleven to fourteen exposures. All appearance of the disease disappeared with the falling of the hair, and no recurrence was reported to me.

The hair generally shows signs of growing over the bare areas in about fifteen to twenty days after it falls, and
in six weeks to two months a very fair growth is seen, so that at the best a case should look fairly presentable in ten to twelve weeks after treatment, supposing the first exposure to be final.

I have found the treatment with tincture of iodine very useful in preventing the spread of the disease until the action of the x-rays has had time to remove the disease by the falling out of the hairs. I should like very much to hear the opinion of the Academy as to whether fourteen days is long enough to allow between the apparent disappearance of the disease and the pronouncement of the case as being free from infection; also as to the comparison between the length of time it takes to effect a cure by this means or by other means of treatment. The x-ray method has the disadvantage of causing considerable temporary disfigurement, and unless this were compensated by a corresponding gain in time the advantage claimed by the method might not altogether justify its use.

Of the series of sixty-six cases thirty-six were boys under ten years; sixteen were girls under ten years; two were girls of about twenty years (these two had only one area of the disease). Thirty-eight were, I believe, microsporon, and the remainder ecto-endothrix.

The President said the paper dealt in a very lucid way with a disease which was still a reproach to our therapeutics. As most people of experience knew, the duration of the disease was to be counted in years rather than months. He thought the whole point of x-ray treatment was that this method had reduced to weeks a period of treatment which was formerly measured in months. The effect of the disease on education in France was very serious, and he cited a case within his own knowledge in which a girl was prevented from attending school for a period of seven years.
The X-ray Treatment of Ringworm.

The only change in x-ray treatment in recent years seemed to be the substitution of frequent exposure to small doses for larger doses given at longer intervals. To epilate a child's head was a troublesome process, and he suggested that x-ray treatment was forceps treatment abbreviated. The real crux appeared to him to be knowing when a child was well. He maintained that no case of ringworm should be certified as safe so long as one diseased hair could be found.

Dr. Harvey was interested to hear that Dr. Watson used an aluminium screen. He himself had not done so, but he intended to do so, as it appeared to diminish the risk of permanent alopecia. He could support Dr. Watson's statement that occasionally cures occurred without epilation being complete. The diseased hairs were more freely epilated than the healthy. He had usually employed an antiseptic ointment, believing its effect to be mechanical in catching the diseased hairs, and so preventing dissemination of the parasite.

Dr. C. M. O'Brien said there was great diversity of opinion as to the effect of x-ray treatment on ringworm, but if the statistics of Paris were taken there should be no doubt as to the efficacy of the procedure. Sabouraud held that at the end of 1906, after three years' work, the municipality of Paris had gained financially two and a half million francs by the adoption of x-ray treatment. He regretted that Dr. Watson did not refer to his experience of children of the age of three, as he considered it a great crux as to whether they should be treated or not, and if they were treated, how it should be done. He had made it a sine quâ non before treating a child under the age of three to get the consent of the parents in writing. He adopted this procedure as it had been suggested in some cases treated in London that the exposure to x-rays had some effect on the brain of a child.

Dr. M. J. Hayes thought what worried the x-ray worker most was whether, as a result of the treatment, there would be any permanent alopecia. He, therefore, suggested that in the measuring of the dose scrupulous accuracy should be aimed at. He was always cautious in the use of old tubes in the treatment of ringworm, as one could not be sure of their vagaries. Tubes which had been used for many hours in a period of months would give off rays greater than one would expect. This he could not explain, but he had experienced
it on one or two occasions. He had used cataphoresis with copper sulphate ions, but this was somewhat troublesome, and was more painful.

Dr. E. J. Watson, replying, said his practice was to expose each area with the dose of one Sabouraud for a quarter of an hour. If one’s tube was new and working properly he did not think there was any danger of baldness even in very susceptible cases. He considered it would be very useful to cut the hair short. He had used cataphoresis in such cases as those mentioned by Dr. Hayes.
NOTES ON THREE CASES OF NERVOUS DISEASE.

By JAMES ALEXANDER LINDSAY, M.D., F.R.C.P.;
Professor of Medicine in the Queen's University of Belfast;
President of the Medical Section of the Royal Academy of Medicine in Ireland.

[Read in the Section of Medicine, April 23, 1915.]

(a) Case of Landry's Disease.

In the year 1859 the French physician Landry published a series of cases of a nervous syndrome which seemed to be new to medical science. The chief features of these cases were as follows:

(a) Paralysis of flaccid type beginning in the feet and legs and rapidly ascending to the trunk and upper extremities.

(b) Abolition of the superficial and deep reflexes.

(c) Absence of sensory changes, trophic disturbance, involvement of the sphincters or electrical abnormalities.

(d) No disturbance of consciousness.

(e) A normal temperature.

(f) Death usually in from one to two weeks.

(g) No definite post-mortem appearances.

Later observers have modified this description in a few points:

Slight pyrexia, some involvement of the sphincters, slight electrical changes, minute changes in the cord, especially in the anterior horns and Clarke's column, and also in the cerebral axis and peripheral nerves, have been recorded. The cortical neurons escape. The bacteriological findings are various and inconclusive.
These cases have remained something of a paradox and an enigma. The etiology and pathogeny are obscure, and it is difficult in any theory to correlate the severe clinical symptoms and usually rapid and fatal course with the negative post-mortem findings. It is still a matter of controversy whether Landry's syndrome is really an independent entity or whether these cases are not to be included in one or other of the following categories, viz.:

1. Acute ascending myelitis.
2. Acute poliomyelitis.
3. Acute toxic polyneuritis.

While the matter remains in doubt it seems desirable to put on record any case which seems to correspond to Landry's original description.

Case I.—Margaret M., aged thirty-six, spinster, no employment, was seen by me in consultation with Dr. Kevin, and was subsequently received as a patient into the Royal Victoria Hospital. Her previous health had been very good. There was nothing of importance in the family history. There was no history of syphilis, alcoholism, or other known causal factor.

She took ill suddenly on the night of Friday, October 2, 1913, with pains in the legs and back. Next day the legs felt weak, and on the following Sunday she could only walk round the bed with assistance. On Sunday night she had stinging sensations in the arms, and by Wednesday there was stiffness of the wrists, elbows and shoulders. A little later she complained of "a lump in her throat" and of difficulty in swallowing, and her breathing became embarrassed. The temperature remained normal, the sphincters continued competent, and intelligence was unimpaired.

The following was the condition of the patient when the disease was fully developed:

Psychical System.—Intelligence normal; consciousness undisturbed.

Motor System.—Complete flaccid paralysis of the lower
limbs; paresis of the upper limbs and of the respiratory muscles.

Sensory System.—Sensibility in all its forms was practically normal, but perhaps a little sluggish.

Reflexes.—The conjunctival, plantar, and palatal were lost, while the abdominal could be elicited; the deep reflexes were entirely lost; the pupillary reflexes were normal; the sphincters remained competent until about twenty-four hours before death, when incontinence of urine made its appearance.

Vaso-motor System.—There was profuse sweating.

There was no wasting or other trophic changes, and the temperature remained normal until a few hours before death, when it rose to 99.5°.

Owing to the patient's very grave condition when admitted to hospital, it was not thought desirable to make an adequate electrical examination or to perform lumbar puncture. The patient rapidly sank. The paralysis continued to extend and became more complete. Respiratory distress increased. Albumen, phosphates, and mucus appeared in the urine. The spleen was not enlarged. Consciousness remained clear until near the end. The patient died upon October 12—i.e., upon the eleventh day of the illness. No autopsy was permitted.

It is difficult to assign this case either to acute ascending myelitis, acute polyneuritis, or acute poliomyelitis. Acute ascending myelitis seems excluded by the absence of any definite sensory loss, the late involvement of the sphincters, and the practically normal temperature.

Polyneuritis may be excluded by the absence of any probable cause, the sudden onset, the trifling nature of the sensory symptoms, and the rapidly fatal issue.

There remains the possibility that this might have been a sporadic case of acute poliomyelitis, where death took place too soon for wasting to appear. It seems more probable that it was a genuine case of Landry's disease.
(b) Case of Myasthenia Gravis.

This condition was first described in 1878 by Erb, who regarded it as a variety of bulbar paralysis. It has been studied by Eisenlohr, Hoppe, Oppenheim, Buzzard, Bramwell, and other observers.

From bulbar paralysis it is distinguished by the following points, viz.:

1. The general muscular lassitude and sense of fatigue upon slight exertion, followed by temporary recovery after a short rest.

2. The early appearance of ptosis, paralysis of the orbicularis palpebrarum, and of the muscles of the neck.

3. The presence of electrical fatigue.

4. The irregular course of the disease, the occurrence of periods of remission, and the occasional apparent recovery.

5. The absence of any definite post-mortem findings.

The disease is very rare. The following are the notes of the first case to be recorded in the North of Ireland, so far as I am aware:

Case II.—George G., aged forty-four, furniture dealer, was seen by me in consultation with Dr. James Moore, and was subsequently admitted as a patient into the Royal Victoria Hospital.

Patient's History.—The patient's father was alcoholic and insane, and died in the Belfast District Asylum after detention there for a period of thirty years. His mother died of heart disease. He has several sisters, who are all healthy. He has no brothers.

Personal History.—The patient is an abstainer from alcohol, smokes moderately, and has not had venereal disease. He has been a great athlete, having played in International football for six or seven years, and undergone vigorous training for first-class swimming, cricket, Rugby, and hockey.
His health has usually been excellent. He had a serious shock four years ago in the sudden death of his wife by accident.

Present Illness.—Began about two years ago. The earliest symptoms were drooping of both upper eyelids and a "dead" feeling in the legs after walking. The eyes were examined by Mr. Craig and found to be normal. They recovered without treatment in five to six weeks. After a few months his speech became affected, but only towards evening. He had a lisp and difficulty in pronouncing certain words. He had no paralysis of the tongue, but the lower jaw became weak and fell away from the upper jaw when tired. He got into the habit of supporting the lower jaw with his hands. He found that smiling and whistling had become difficult. Deglutition became embarrassed and the food tended to lodge between the cheeks and the teeth. A little later tremor and paresis of the hands set in, and he was obliged to relinquish his occupation. Still later, he noticed stiffness, weakness, and tremor of the muscles of the neck. His walking power became much reduced, so that he was obliged to stop after walking a few hundred yards, but could always resume after a short rest. Palpitation was troublesome, and he began to lose weight.

All the above symptoms came on after exertion, and were relieved by rest. After a good night's sleep he often felt quite well, but in the course of the day his symptoms re-appeared. There were no mental symptoms, and intelligence was unusually good.

State on Admission to Hospital on November 10, 1914.—Patient is a well-developed man, but rather thin. His weight is 9 st. 3 lbs. 11 oz. His appearance is healthy. His temperature is normal. His pulse is somewhat accelerated and of low tension. His urine contains some mucus and phosphates, but is otherwise normal. His appetite is poor. The heart presents no abnormal physical signs, but the T wave in the electro-cardiogram is ill-marked.

State of the Nervous System.—Intelligence is very good; expression rather blank; whistling and smiling are imperfect. Patient's gait is normal in the early part of the day, but becomes weak and unsteady towards evening or after slight exertion.
There is passive tremor in the hands and arms, especially towards evening. All muscular movements—walking, chewing, swallowing, talking—soon become fatigued. The lower jaw tends to fall apart from the upper jaw, and is usually supported by the patient's hand. There is no paralysis, atrophy or tremor of the tongue.

Sensibility in all its forms is normal. There is no complaint of pain. The reflexes—superficial and deep—are normal when first tested, but soon get weak, and finally disappear. They re-appear after a short interval. The sphincters are competent.

The pupils contract to light, but quickly dilate again, and after repeated trials the reaction to light gets weak and finally disappears. There is no paralysis of any of the ocular muscles, no nystagmus, and no diplopia. The myasthenic reaction is present in the muscles—i.e., the muscles react at first to the faradic current, but the reaction soon gets weak and finally disappears, reappearing after an interval.

All the above symptoms abate after rest, and in the morning the patient sometimes declares that he feels quite well.

_Treatment._—The treatment consisted in rest, good feeding, massage, the use of the faradic current, and the administration of iron, strychnine, and arsenic.

_Course of the Case._—The patient remained in hospital until March 4, 1915—i.e., for a period of over sixteen weeks. His condition varied from time to time, but there was no substantial improvement. He lost four pounds in weight during his stay in hospital. He did not develop any typical bulbar symptoms.

Myasthenia gravis is now recognised as a definite clinical syndrome of doubtful pathology. It is clearly not to be confounded with bulbar paralysis. The differentiation from neurasthenia is equally obvious. The neurasthenic has a more or less constant sense of physical and mental fatigue, but he does not exhibit those extraordinary fluctuations characteristic of myasthenia gravis. His reflexes are usually exaggerated, and do not fail after a few trials. His muscles do not exhibit the myasthenic reaction. He
does not show the phenomenon of electrical fatigue. Ptosis is not a feature of neurasthenia. There are many other points of contrast.

Myasthenia gravis pursues an irregular but usually unfavourable course. Temporary improvement and apparent recovery may take place. Sudden death sometimes occurs. Treatment must be on general lines.

d) Case of Automatism.

Case III.—John L., aged sixty, consulted me on June 15, 1908. The patient was a gentleman in robust general health, weight 14 st. 7 lbs., of temperate habits and good health history. There was nothing noteworthy either in the family history or the personal record.

His story was that on several occasions he had found himself in the streets of Belfast, at a considerable distance from his office, without any recollection of what had occurred since leaving his place of business. There was no history of convulsion. He had never fallen or hurt himself, and his condition had never attracted the attention of those with whom he was associated. His acts during the state of unconsciousness had sometimes been apparently purposive—e.g., he had more than once found himself on his way to the railway station where he was in the habit of taking the train to his residence in the suburbs. Recovery from these attacks had been sudden and complete, and there had been no after phenomena. He had never passed water during an attack.

A course of bromide of sodium and belladonna was prescribed. The patient had three further attacks between June 15 and the following November 9, when the last attack occurred. He was not seen by me again until September 22, 1913, when he consulted me for some trifling digestive troubles. He had had no seizures during the intervening years.

Attacks of this kind, which are not very rare, are, no doubt, epileptoid in character, and should be treated on the usual lines.
Dr. Drury considered that the first two cases were without question, but the third reminded him of a case of his own, which he looked upon as of the nature of *petit mal*. He described his case and compared the symptoms with those in the case just reported. His patient afterwards developed coma and manifested the major form of the disease.

Dr. Parsons agreed that the third case was one of *petit mal*. He recalled the case of a patient of his which ended fatally. At the autopsy nothing could be discovered wrong with the brain.

Dr. Dawson agreed that the second case was not neurasthenia. In the third case, while listening to Professor Lindsay's account, he had made a diagnosis of *petit mal*. He inquired how long the treatment was continued. He considered the fact that the fits had ceased was an example of the good results produced by the combination of belladonna and bromide. The only similar case of which he had experience was one of *petit mal*, which was later followed by fits of *haut mal*.

Dr. H. Bewley said he was interested in the first case, as he had a similar one under his care some years ago. The patient was a man aged thirty, who complained of feeling his legs getting weak. He was admitted to hospital and gradually got worse, and it was thought that he was going to die, but after a week his symptoms improved and the paralysis got better, and he ultimately recovered completely. He did not look upon the case as hysterical, but suggested that it was one of Landry's paralysis with an unusually favourable termination.

Dr. Lindsay, replying to the remarks, said he believed that *petit mal* would be the better name for the third case. He had not a note of the length of time over which the treatment extended, as he gave the patient a prescription and then lost sight of him for a considerable time. This was the first case that had come under his observation in which the period of unconsciousness had been so prolonged. He was interested to hear of the recovery of a case from what was presumably Landry's disease.
ON URINARY CONCRETIONS AND THEIR MODES OF GENESIS.

By WALTER G. SMITH, M.D.;
President of the Royal Academy of Medicine, Ireland:
Ex-President, Royal College of Physicians, Ireland.

[Read in the Section of Medicine, April 23, 1915.]

In this communication I propose to deal only with the Genesis of Urinary Concretions. The interpretation of the book of Exodus remains, and will always remain, in the hands of the surgeon.

Some time ago my friend, Rev. Mr. Lavy, M.B. Trin. Coll. Dubl., who was formerly an Army Chaplain, was good enough to give me a collection of fragments of calculi which had been removed from patients in India. I know nothing of the details of the cases beyond the name of the patient and the weight of the stone, as indicated on the label attached to each specimen.

It occurred to me that it might be of interest to submit the results of a rough qualitative examination of these calculi, and then to offer some general remarks upon the nature and modes of formation of urinary concretions.

It will readily be admitted that all questions concerned with the parentage and occurrence of these troublesome tenants of our body are of supreme interest both to physicians and surgeons.

Physiology, chemistry, and pathology are, each and all, intimately bound up with the puzzling problems which quickly disclose themselves when we carefully look into
<table>
<thead>
<tr>
<th>Uric Acid</th>
<th>Oxalate of Calcium</th>
<th>Phosphates</th>
<th>Carbonate of Calcium</th>
<th>Water Ignition</th>
<th>Ash</th>
<th>Colour, &amp;c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Almost entirely; no NH₃; no P₂O₅; no molybdic acid</td>
<td>Pale blue, with P. M. acid; trace of NH₃</td>
<td>Terminal</td>
<td>Clay white; soft; gritty</td>
</tr>
<tr>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Deep blue, with P. M. acid; trace of NH₃</td>
<td>Trace</td>
<td>Reddish brown; hard; gritty</td>
</tr>
<tr>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Blue, with P. M. acid; murexide</td>
<td>None</td>
<td>Deep blue; soft</td>
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<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Blue, with P. M. acid</td>
<td>None</td>
<td>Deep blue, with P. M. acid; hard; gritty</td>
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<td>None</td>
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<td>Blue, with P. M. acid</td>
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<td>Deep blue; soft</td>
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<td>Blue, with P. M. acid; murexide</td>
<td>None</td>
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<td>Blue, with P. M. acid</td>
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<td>None</td>
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<td>None</td>
<td>Blue, with P. M. acid; murexide</td>
<td>None</td>
<td>Deep blue, with P. M. acid; hard; gritty</td>
</tr>
</tbody>
</table>

Note: P. M. = Phosphomolybdic acid solution.
the matter. Take, for example, the relations of gout to calculi, so commonly recognised, so badly understood.

It soon becomes apparent that our knowledge as to the origin and growth of these vexatious pests is defective, and that we are yet far from a solution of the many difficulties involved in a discussion of the subject.

For the sake of clearness, I will arrange the matter of this paper under certain headings, put in the form of queries.

I. Is there any real or essential difference between gravel (sand) and calculus?

II. Is there any general theory of calculus formation?

III. Is there a scale of relative frequency of the different species of calculi?

IV. What do we know as to the determining factors leading towards or producing calculi?

V. How far can we trace the co-operation or interaction of colloids and crystalloids in their production?

VI. Has the frequency of calculi sensibly decreased within recent times?

I. Is there any real or essential difference between gravel (sand) and calculus?

In other words, does a calculus differ from gravel only in size or degree of aggregation of crystalline or amorphous material? Bedford (*Urinary Analysis*, 2nd Edit., 1904) states that urinary calculi are merely agglomerated sediments.

Many people pass uric acid gravel (sand), or cystin, continuously or, at any rate, frequently for years without falling victims to calculus.

I am inclined to the view that the distinguishing marks of a calculus are 
(a) an organic colloid matrix or substratum,
independent, of course, of any chance surface contamination with organic matter. Dr. Ord believes that to build calculi of uric acid without colloids would be as hopeless a task as making ropes of sea sand (Med. Chir. Trans. LVIII., p. 175), and (b) a nucleus, either crystalloid or colloid, which serves as a centre of deposition or crystallisation like the stick in centre of a rod of lactose. Dixon Mann (Physiology and Pathology of the Urine, 2nd Edit., 1908) holds that calculi almost invariably include a nucleus. This starting point or nucleus may consist of crystals, a foreign body, or of various sorts of organic colloids—e.g., a blood-clot, ova of Bilharzia, a clump of bacteria, and so forth. In other words, a calculus usually consists of a mixture of colloids and crystalloids.a

II. Is there any general theory of calculus formation?

The answer to this question will appear from the sequel. The keynote is altered or perverted metabolism, influenced by a certain interplay between colloids and crystalloids. Spontaneous fracture or disintegration of a calculus, occasionally observed, may be due to dissolution of colloid matrix.

III. Is there a scale of relative frequency of the different species of calculi?

Upon this point there is, I suspect, a good deal of loose writing, based partly upon guess-work, like judging a book by its cover (B. Moore), and partly upon careless chemical examination.

Discrepant statements are made by various writers. Few complete quantitative chemical analyses are to hand.

Thus, Roberts (Urinary Diseases, 4th Edit., 1885) states that uric acid constitutes probably five-sixths of all renal concretions.

Urinary Concretions and their Modes of Genesis.

Yellowly gives the quota of uric acid for England as 72 per cent. Golding Bird is of opinion that uric acid and urates greatly predominate.

Dixon Mann believes that 85 per cent. of renal calculi are wholly or chiefly composed of uric acid, and that calcium oxalate comes next in frequency. Cadge, of Norwich, estimated that in his county uric acid made up nine-tenths of the calculi he met with. In only three cases he removed an oxalate stone from an adult. (British Medical Journal, 1874, ii.) It is unnecessary to multiply further examples.

On the other hand, listen to the testimony of Messrs. MacKarell, Benjamin Moore, and W. T. Thomas, who are expert chemists.

In a careful paper published in the Biochemical Journal, June, 1910, they show that the prevalent view of preponderance of uric acid in renal calculi is in their experience erroneous.

Per contra, calcium oxalate and tribasic calcium phosphate predominated and in considerable amount.

Out of 24 stones taken indiscriminately only two consisted almost wholly of urates. In most of them, the uric acid contributed about 2 to 3 per cent., and rarely exceeded 10 per cent.

In February, 1911, Dr. Benjamin Moore, Professor of Bio-Chemistry in the University of Liverpool, delivered the Hunterian Lecture at the Royal College of Surgeons.

He dealt in a most interesting and illuminating way with the chemical composition and mode of formation of renal calculi, and also with the metabolism of gout and allied conditions. Exact analyses are given of 24 calculi, mostly supplied from the practice of Mr. W. T. Thomas, of Liverpool, and derived from a wide area in Liverpool, West Lancashire, Cheshire, and North Wales, where the
### II.—RELATIVE FREQUENCY OF CALCULI.

<table>
<thead>
<tr>
<th></th>
<th>Roberts</th>
<th>Yellowly and Golding Bird</th>
<th>Dixon Mann</th>
<th>Cadge</th>
<th>Benjamin Moore</th>
<th>Abderhalden and Hashian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uric acid</td>
<td>Uric acid</td>
<td>Uric acid, wholly or chiefly, 85 %</td>
<td>Uric acid 10 %</td>
<td>(24 stones) Uric acid; infrequent; amount rarely up to 10 %. Two, from bladder, nearly pure uric acid</td>
<td>(22 stones) Urates, 5</td>
<td>Mixed components, 3</td>
</tr>
<tr>
<td>Calcium oxalate</td>
<td>—</td>
<td>Calcium oxalate, next most common</td>
<td>Calcium oxalate rare; only three cases</td>
<td>Calcium oxalate, all save 2</td>
<td>Oxalate and phosphates, evenly divided, 6 of each; carbonates, 2</td>
<td></td>
</tr>
<tr>
<td>Phosphates Ca. Mg.</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
drinking waters are usually soft surface water containing practically no calcium salts.

Space and time forbid going into details, but the main results are surprising and quite subversive of current notions. All, save two, yielded calcium oxalate in proportion of from 16.8 per cent. to 99 per cent. of total weight; only 3 were under 50 per cent., and more than two-thirds over 70 per cent.

A still more unexpected result was elicited from the two calculi which were devoid of oxalate. These were taken from the bladder, and were almost pure uric acid, free from any trace of calcium, either as oxalate or phosphate. These calculi were transparent to x-rays, and may perhaps have been produced in the bladder.

Another most remarkable and important fact emerges from Moore's table of analyses.

I refer to the strikingly low uric acid percentage in all save the 2 bladder stones. The figures approach 10 per cent. of the dry weight in only 4 out of 22 calculi.

A most instructive paper is contributed by Abderhalden and Haslian (Ztsch. f. physiolog. Chemie, 1912, Bd. 80, 113).

These gentlemen investigated a number of calculi taken from the practice of Dr. H. Vischer, of Urfa, in Asia Minor.

The stones came from individuals of different nationalities and of varying age. In more than half the cases (35 out of 63) the patients were five years old or under.

The authors were at the pains to test the ground water from the city of Urfa, the pipe water from the springs in the district, and also the wheat which is the chief food of the inhabitants. The proportion of Ca and Mg in the wheat was the same as in that used in North Germany. The
By Dr. Walter G. Smith.

Water was very hard, especially the ground supply. The temporary hardness of both kinds of water was high.

Sixty-seven (67) cases of calculus were examined. The urine was commonly acid in reaction (58 cases).

A few samples were alkaline and showed evidence of cystitis; 22 calculi were carefully analysed.

Not to weary you with details, suffice it to say that, of basic radicals, all the calculi contained Ca, K, and Na; and nearly all magnesium. PO₄ was detected in all, and uric acid in 18 out of 22. Reckoned according to their main constituent, there were 6 oxalate stones, 6 phosphatic, 5 urates, 3 mixed compounds, 2 carbonates. It is well known that few calculi are strictly homogeneous in nature. Dr. S. Rowland (Biochemical Journal, 1908) examined 22 calculi, derived from West Lancashire and North Wales, and found that calcium oxalate was the commonest constituent. Uric acid was absent in 19 out of 22 cases.

IV. What do we know as to the determining factors leading to or producing urinary calculi?

Here we come to the gist of the matter, and it becomes plain that popular notions on the subject as expressed in some text-books and in current medical teaching need revision.

All sorts of agencies have been invoked by writers—from the heavens above, the earth beneath, and the waters that are under the earth.

For example, climatic conditions, the relation to chalky soil, the hardness of drinking water, and so on.

A rapid glance at the geographical distribution of calculus throughout the world is sufficient to show the inadequacy of alleged geological or telluric causes. A few examples must suffice. (Hirsch, Handbook of Geogra-
Asia takes the first place both as regards the wide diffusion of the malady and the large number of cases. At one time India was supposed to enjoy a special exemption from calculus, but so far is this from being true that it has been said: "In the N. W. Provinces you might build walls with the calculi." (Balfour, *Edinburgh Medical Journal*, 1860). In China the malady is stated to be very local, and to be met with chiefly in the province of Canton, but the data are probably insufficient. As to Africa, Livingstone in his "Travels in Central Africa" says he never met with a case of stone in the bladder or gravel, yet stone is not uncommon in Egypt.

In Central Russia stone is common, and in Germany it seems to be most frequent in the south-west regions, whereas in Switzerland it is rare.

To come to our own islands, there is no satisfactory explanation of the well-known relative frequency of stone in the eastern counties of England (Norfolk and Suffolk).

Cadge's statistics give, in round numbers, 1 in 63,000 population for the eastern counties, as compared with 1 in 210,000 for the north-western counties. In North America, Osler states there do not appear to be special districts corresponding to the "stone counties" of England.

In Scotland and Ireland calculous affections are not very common.

I cannot give many reliable statistics about our own country, but I have referred to some of my surgical friends. Sir T. Myles tells me that his experience confirms the view held by the late Dr. Robert M'Donnell that calculus is rare in Ireland compared to England. Mr. Gunn has been
good enough to look over his cases for some years—14 males and 5 females. His cases were derived from the eastern counties. As to composition, he reports 5 cases each of oxalate and phosphate respectively, 2 uric acid, 3 mixed, 1 urates, 1 carbonate, and 2 cystin.

I am much indebted to Mr. W. Taylor for an elaborate table of the results of his practice since 1900.

Total number of cases, 25.

The age of Mr. Taylor's patients varied from six to seventy-six years. Of 11 renal cases, 10 were composed of uric acid and urates; 1 of pure oxalate.

Of 10 vesical cases, in those associated with prostatic enlargement, 3 out of 5 were mainly phosphatic; the others, mainly uric acid and urates. Of 5 vesical calculi, not associated with prostatic enlargement, 2 were oxalate, 2 mixed urates, and the other phosphatic.

On the whole, his experience is that calculi are comparatively rare in Ireland.

Some additional information has reached me from other parts of Ireland.

Sir W. Whitla, Belfast, writes that he sees only a very odd case of calculus.

Mr. Mitchell, Belfast, tells me that within the last fifteen years he has met with about 15 cases of urinary calculus. Of these, 10 were the subjects of enlarged prostate, and the calculi were phosphatic in nature. The remaining 5 were primarily renal. No special district was favoured. His cases came from the counties of Derry, Tyrone, Donegal, Antrim, Down, and Armagh.

Dr. Sinclair, Belfast, informs me that during the past twenty years he has not operated more than 36 times for urinary calculus (excluding the phosphatic stones in connection with prostatic disease). The majority consisted
mainly of uric acid and its salts. About 7 were composed of calcium oxalate.

Most of his cases came from Antrim, Down, and Derry. He never met with a calculus of cystin or xanthin.

Dr. C. Yelverton Pearson, Cork, finds that urinary calculus is very rare in the south of Ireland. He has had about 15 cases in fifteen years. 12 of these were vesical and 3 renal. Seven cases came from the city of Cork or its immediate neighbourhood.

Dr. E. MacDowel, of Sligo, writes me that calculus is extremely rare in his practice, and in twenty years he has never met with a case of primary calculus in children, in any rank or station of life, and had only 3 cases of phosphatic calculi in old men with prostatic trouble.

Having cleared the ground so far, let us now examine more closely what factors really bear upon the formation of urinary concretions.

These may be reduced to three groups:—

(a) Metabolic changes.
(b) Infective agencies.
(c) Conditions and relative solubility.

Leaving aside for the present the latter point, I submit a provisional table of primary factors, and invite your criticism upon it.

A.—ESSENTIAL (PRIMARY) FACTORS.

(i.) Primary errors of metabolism, of unknown origin, producing sparingly soluble substances, and unaccompanied by perceptible structural change in any organ, e.g.:—

(a) Cystin. Is α-amino-β-thiolactic acid or, strictly, is the disulphide of cystein, \( \text{HSCH}_2 \text{CH(NH}_2 \text{)} \text{COOH} \).
Cystin is the chief carrier of the sulphur-content of proteins. Uncommon. Sometimes hereditary. Entirely endogenous in origin, and is not influenced by diet. Sometimes in quantity sufficient to make a visible deposit.

(b) Xanthin (Di-oxy-purin) $C_5H_4N_4O_2$.

It contains one atom of oxygen less than uric acid (tri- oxypurin) to which it is chemically related. By methylation it yields theobromin (di-methyl xanthin) and caffein (tri-methyl xanthin). Very rare. Why so is not clear, for it is the most abundant of the purin bases normally present in the urine.

These rarities may be termed "chemical sports," and are to be placed in the same category as the curious vagary known as "Alkaptonuria," in which no insoluble body is formed.

(ii.) Errors of metabolism independent of diet, and usually associated with definite pathological lesions—e.g., certain diseases of the liver.

(a) Leucin. Is $\alpha$-amino-isocaproic acid $C_6H_{13}NO_2 = (CH_3)_2 CH CH_2 CH (NH_2) COOH$. So called from its glistening white appearance ($\lambda\varepsilon\nu\kappa\dot{\omicron}$).

(b) Tyrosin. Is $p$-oxyphenyl-alanin $C_9H_{11}NO_3 = C_6H_4 OH CH_2 CH NH_2 COOH$.

Derives its name from having been first prepared by Liebig (1846) from cheese ($\tau\nu\rho\delta\sigma$).

The sediment from Benger’s Liq. Pancreaticus is mainly tyrosin.

I have met with one, and only one, case of leucin deposit from urine sufficiently abundant to attract attention.

It is singular and inexplicable that there is no case on record of a calculus composed of either of these amino-acids, and, as a rule, they are first detected by the microscope, and then verified by chemical tests.
(iii.) Alterations in the urine, resulting in precipitations, and due to:

(a) Extra-renal changes in the composition of the blood, due to various influences—e.g., age, sex, diet, drugs, disease.

(b) Intra-renal processes—e.g., nucleus given by a degenerated renal cell, a clump of bacteria, and so on, or a tiny oxalate of calcium calculus.

(c) Intra-vesical (?) processes, independent of bacterial changes.

B.—INCIDENTAL (INFECTIVE).

Bacterial agencies, leading to production from urea of ammonium carbonate, and consequent deposition of ammonium urate and of ammonio-magnesium phosphate: Or, irritative and inflammatory processes set up by the presence of a small stone.a

It is, I think, clear that under Class III. we have to look for the main factors that may lead to the formation of urinary concretions—i.e., to changes in the urine brought about by antecedent alterations in the composition of the blood.

Let us consider some of these. First, a word or two in reference to:

(a) Age and sex.

The lesser liability of women and the marked frequency

a In regard to nomenclature, I wish to enter a protest against some commonly used terms.

"Earthy phosphates" is an archaic term, and should long since have become obsolete.

"Triple phosphate" is, chemically, incorrect. As well call ammonio-citrate of iron, "triple citrate."

There is no such thing as "fusible calculus," so styled. Ammonio-magnesia phosphate is the only constituent of a calculus which can be used into a glassy or porcellaneous bead.
of calculus in young children are generally recognised. It is also well known that in infants dying within the first two days of life, and in those that have not breathed, crystalline deposits of uric acid or urates are frequently observable in the collecting tubes of the medulla and in the apices of the pyramids.

To these uratic deposits the inappropriate term "uric acid infarcts" is often applied in text-books.

These deposits, which doubtless also occur in children who survive, appear to vanish speedily as a rule, perhaps by dissolution of the colloid matrix. But it may well be surmised that some cases of calculus in children, detected in later life, may be referred for their first rudiments to a very early period of the infant's existence.

But the more important alterations in the blood, which may be reflected in the urine, can be analysed into several possibilities.

(a) Increased supply from without (exogenous), or metabolic production within the body (endogenous) of certain compounds.

(b) Diminished or retarded excretion. Probably not of prime importance. Certainly over-estimated in regard to uric acid.

(c) Incomplete oxidation—*i.e.*, of uric acid into urea, or of oxalic acid. Diminished oxidation seems to be a chief factor in the formation of many renal calculi.

Each and all of these problems arise in connection with gout, and not one of them has been satisfactorily answered.

There is good reason for believing with Dr. B. Moore that embarrassed oxidation or increased reducing conditions are at the bottom of the genesis of most kinds of calculi.

Intimately bound up with these considerations is the

\[ T \]
wide subject of dietetics and of hygienic treatment which cannot now be discussed.

The influence of diet is well illustrated by reference to the lower animals, and in the *Transactions of the Pathological Society of London*, Vol. XXI., 1870, there is an interesting communication by Dr. E. Crisp on "Urinary Calculi in the Lower Animals."

Dr. Crisp and his brother, Mr. Thomas Crisp, found repeatedly that calculi were common, and often led to loss of life, in male sheep which were fed upon saccharine and carbohydrate food.

Cases of calculus have been observed in mammals, reptiles, birds, and fishes, and the Hunterian Museum contains a large collection of them.

The general result of chemical analysis showed that the carbonate of calcium calculus, so rare in man, is the most frequent among the lower animals, and that uric acid calculus is comparatively infrequent, for the majority of animals affected are herbivorous.

But, after all, the physiology of our own bodies concerns us more than the data of comparative physiology, which need caution in applying them to the interpretation of human phenomena.

What do we know as to the origin and fate in our urine of the three salts that are most germane to our present thoughts—viz., the phosphates, urates, and oxalates?

The phosphoric acid of the urine is exogenous, and springs almost entirely from the phosphates included in the diet. The amount produced by phosphorus metabolism is often misunderstood, for it is relatively very small and may be neglected. Phosphoric acid undergoes neither oxidation nor reduction in the body. About one-third of the PO$_4$ is combined with Ca and Mg, and two-thirds with
the alkali metals. All the phosphates of the alkalies are soluble, and hence do not contribute to the formation of calculi. The formation of phosphatic concretions is essentially a matter of urinary reaction.

On the other hand, the physiological questions as to the origin and fate of uric acid and oxalic acid respectively are in a very different position, and a complete answer is not yet forthcoming.

For example, we do not know why the chief end product of protein metabolism should be uric acid in birds and urea in mammals.

Uric acid is certainly not of direct exogenous parentage, and although we hear much nowadays of the significance of the so-called purin bodies, I think that Dr. MacLeod does not speak too strongly when he says that "nothing is perhaps so bewildering in the whole of bio-chemistry as the various hypotheses regarding the metabolism of the purin bodies." Uric acid is tri-oxy-purin. Purin bodies contain the nucleus C₅N₄. (Recent Advances in Physiology and Bio-Chemistry, 1906, p. 387.) The public is infatuated about the deadly significance of uric acid, and patients often tell us, with some pride, that they "are full of uric acid."

Pathology and therapeutics reflect this ignorance, and we all know how much crude speculation—not to say nonsense—is published and taught in reference to uric acid and its treatment by purin-free diet. See, e.g., the catamenial pamphlet distributed to the profession under the title of the Uric Acid Monthly, with a high-sounding list of topics. If we were to believe some writers, Nature...
is a clumsy chemist in burdening us with eliminating part of our nitrogen in the form of uric acid (½ to 1 grm. daily), which innocent compound is stigmatised by them as the author of innumerable ills. The advocacy of some of the worshippers of the uric acid fetish is as extreme as that of a rabid teetotaller or an angry theologian. Apart from its unlucky property of insolubility, uric acid is really a harmless substance, and its congener thein (caffein) is responsible for much more mischief to the health of the community. To label uric acid as the cause of gout is to put the cart before the horse. It is not improbable that an excess of uric acid in the body may be due to a lack or deficiency of a uric acid-destroying enzyme, and that the essential pathology of gout is of a negative rather than a positive character.

In the case of oxalic acid the amount daily eliminated is extremely small—only a few milligrams. Yet its pathological importance ranks high owing simply to the unfortunate fact of the great insolubility of calcium oxalate. All other possible urinary oxalates are soluble, and, therefore, are not met with in sediments or calculi.

Most physiologists agree in reckoning oxalic acid as mainly of exogenous origin. There is, however, good reason for believing that a small portion is endogenous, and this contingent may be derived from both proteins and carbohydrates—probably mainly from the latter. Still it must be confessed that our knowledge of oxalic metabolism is defective, and we do not know in what form or combinations oxalic acid circulates in the blood. Possibly, partly as alkaline oxalates and partly in colloid combination, or as a soluble double salt.

It is important to remember that calcium oxalate is the only urinary precipitate which is met with in all conditions
of urine—highly acid urine (preferentially), in urine neutral to litmus, and in alkaline urine—and crystals of the oxalate have been observed along with crystals of \( \text{MgNH}_4\text{PO}_4 \). If Mg be present in relatively larger amount than usual—\( i.e. \), in a diet which is poor in Ca, \( e.g. \), watered milk—a considerable amount of calcium oxalate will remain in solution.

Hence it follows that the quantity of calcium oxalate observed in a sediment (which is never a bulky one) is no measure of the actual amount of oxalic acid in the urine, and older estimates based upon the visible quantity of the sediment are devoid of value, and have led to futile therapeutics. The presence of calcium oxalate in a calculus is not sufficient proof that it was primarily formed in the kidney.

Oxaluria has been observed in connection with cases of gastric fermentation and chronic pancreatitis.

To turn now to the data relating to solubility. Let us first glance at the more important constituents of urine arranged thus:

<table>
<thead>
<tr>
<th>Acid Radicals</th>
<th>Basic Radicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine</td>
<td>Sodium</td>
</tr>
<tr>
<td>Phosphoric</td>
<td>Potassium</td>
</tr>
<tr>
<td>Sulphuric</td>
<td>Ammonium</td>
</tr>
<tr>
<td>Carbonic</td>
<td>Calcium</td>
</tr>
<tr>
<td>Uric</td>
<td>Magnesium</td>
</tr>
<tr>
<td>Oxalic</td>
<td>Urea</td>
</tr>
</tbody>
</table>

All the possible chlorides are very soluble, and out of this list those that most concern us are the compounds of phos-
phoric, uric, and oxalic acids, with the group of the alkalies, on the one hand, and with the Ca and Mg group on the other hand.

The solubility of CaSO₄ in water, cold or hot, is about 1 gr. in one fluid ounce, and I am not aware of any published case of calcium sulphate calculus.

Crystals of CaSO₄ are occasionally observed microscopically.

Among the basic radicals of urine, calcium is the most important, for it is the only one which yields four insoluble salts. The amount of calcium in the blood is very small—about 1 in 10,000. Total excretion of Ca per diem is about 0.7 grm. CaO.

Arranged in order of insolubility the calcium salts are:

1. Calcium oxalate.
2. Calcium phosphates.
3. Calcium carbonate.
4. Calcium urate.

It is for this reason that calcium looms so largely in the production of urinary sediments. It is a familiar and curious pathological fact that deposits of calcium salts are especially met with in retrogressive tissue-changes and in necrotic areas. The calcium salts are, mainly, phosphates and carbonate, but calcium soaps also occur. In pathological calcification the ratio of phosphate to carbonate is the same as in normal bone—viz., $3 \text{(Ca}_3 \text{P}_2\text{O}_7) : \text{CaCO}_3$.

Magnesium plays only a subsidiary part owing to the solubility of its oxalate.

From a physiological point of view uric acid invariably behaves as a monobasic acid, and forms only the monometallic or so-called acid (bi) urates. Normal—i.e., dimetallic—urates do not, and never could, occur in the
body, as some authorities erroneously assert. They are decomposed even by CO₂. The primary and fundamental property that governs the appearance or non-appearance of a urinary sediment is manifestly that of relative solubility under given conditions.

Hence, it follows, from the ordinary rules of solubility, that under no circumstances, however scanty or concentrated may be the urine, can we ever meet with a sediment or calculus of urea or of chlorides. Again, the daily output of kreatinin is approximately equal to, or even greater than, that of uric acid. But their relative solubilities in water are, approximately, kreatinin 1 in 10 and uric acid about 1 in 15,000 (or less)—say 1 grm. in 40 liters. Accordingly, we can never hope to see a case of kreatinin gravel, or calculus. We are still in the dark as to the metabolism of kreatinin, and there is no evidence that the creatin of muscle is excreted in the form of kreatinin (Poulton, Guy's Hospital Reports, Vol. 67, 1913).

Furthermore, solubility is affected not only by the absolute amount present of the substance in question, but also by certain subsidiary influences. Take, for example, temperature. Every one knows that the most frequent, the most abundant, and the least important of the urinary sediments is the group of urates—the common 'brick dust' sediment. These salts are very sensitive to changes of temperature—a fact utilised every day in the chemical testing of urine.

A urine which remains clear after cooling to the temperature of the air will often afford a precipitate of urates when artificially further cooled by ether. Further, urates are still more extraordinarily sensitive to
the grade of acidity of the urine, as familiarly illustrated in the formation of the sediment at one time of the day and its non-appearance at another time a few hours later.

The normal degree of acidity of the urine is not far removed from the line of neutrality, and the range of variation is limited. It waxes and wanes from hour to hour. It is surprising what a trifling increase of acidity may determine the precipitation of urates. I frequently demonstrate the curious fact that the addition of one drop of dilute acetic acid suffices to render opaque, by precipitation of urates, a test tube half full of limpid urine.

The reaction of the urine (Cf. Dr. L. de Jager, Ztsch. f. physiolog. Chem., Bd. 55, 481) is palpably influenced by diet, and the contrast between the acidic urine of carnivora and the alkaline urine of herbivora is one of the most familiar facts in comparative physiology.

Furthermore, in our own bodies, we recognise the curious phenomenon of the daily "alkaline tide" in the urine, noticeable soon after a full meal, and accounted for by the temporary withdrawal from the blood of the acidic chlorine ion required for the HCl of gastric digestion. The solubility of urates is also increased in presence of NaCl (Bence Jones). The precipitation of uric acid is favoured by high acidity of the urine, by concentration of the urine, and by an increased elimination of uric acid.

The phosphates of fresh urine are the only salts whose precipitation as Ca and Mg salts is essentially conditioned by a marked alkaline state of the urine. The formation of phosphatic calculi is practically independent of metabolic changes, except as regards factors of acidosis. The stratification of calculi is, I consider, largely due to frequent oscillations in the reaction of the urine, according as the balance shifts slightly to the acidic or the basic side,
and so alters conditions of solubility; or, at one time, a colloid layer is laid down, at another, a crystalloid layer.

Lamination may also be favoured by varying changes in the electric charges which are known to exist in colloids.

V. What are the mutual relations of colloids and crystalloids in relation to urinary sediments and calculi?

This is a wide subject, and demands, I am convinced, more attention than it has recently received.

Many years ago Mr. George Rainey and Dr. W. M. Ord were pioneers in this field, and published some important and highly interesting observations, which have been often overlooked by subsequent writers.

In this communication I must needs content myself with a very brief reference to them. (Cf. Dr. Ord, The Forms assumed by Uric Acid, St. Thomas's Hospital Reports, 1870; Urinary Crystals and Calculi, Med. Chir. Trans., Vol. LVIII. 1875.)

Every careful clinical observer must be familiar with two facts in relation to crystals of uric acid as seen under the microscope.

One fact is the extraordinary variableness in form of the crystals, which is not paralleled by any other urinary sediment.

The other is that uric acid crystals deposited from urine are almost always coloured red, brown, or yellow, in contradistinction to colourless oxalate and phosphatic crystals.

Now, the urinary pigments are all colloids, and uric acid possesses the special faculty of readily absorbing such pigments.

Moreover, it is seen that the faces and angles of crystals of urinary uric acid are usually curved and rounded.

If, on the other hand, one examines crystals of uric acid
prepared by acidifying solutions of K or Na urate with HCl, we find that the uric acid crystals are perfectly colourless, and occur commonly in rectangular tablets or in rhombs; sometimes in hexagons, resembling cystin, for example, in the crystals precipitated by diluting with water a solution of uric acid in strong sulphuric acid.

Whenever uric acid is artificially precipitated in the presence of albumen, gelatine, or other colloid the crystalline forms assumed by uric acid strikingly vary according to the medium in which they are thrown down.

Likewise, in cases of pathological albuminuria, crystals of uric acid always differ in form from that found in non-albuminous urine, and they differ remarkably among themselves. (See Plates in Med. Chir. Trans., Vol. LVIII.)

Schade has succeeded in experimentally imitating production of artificial calculi from mixtures of colloids and crystalloids. (Münchener medie. Wochensch. 1909 and 1911.)

VI. Has the frequency of urinary calculi sensibly decreased within recent years?

I am unable to give any definite information upon this point.

Abderhalden and Haslian (loc. cit.) consider there is no doubt that, in former times, vesical calculus was much more frequent than at the present time.

Dr. Sinclair, Belfast, is of opinion that, within the last fifteen years, stone has become more frequent in the North of Ireland, possibly due, he thinks, to immigration of English and Scotch artisans to the great shipyards and other industries of the North, bringing with them their own family and racial characteristics.
By Dr. Walter G. Smith.

Summary.

(1) Urinary calculi are varying mixtures of crystalloids and colloids.

(2) The chief factors involved in their formation are:
   (a) Altered or perverted metabolism.
   (b) Defective oxidation.
   (c) Alterations in the reaction of the urine.

(3) Calcium oxalate calculi are more frequent than is often stated.

(4) The relations between colloids and crystalloids—i.e., physico-chemical factors—are of prime importance in the aetiology of urinary concretions.

(5) The known geographical distribution of urinary calculi throughout the world lends little support to alleged geological or telluric causes.

(6) Bacterial infection is, probably, a potent factor, and operates both in the kidney and the bladder, and may occur either as a primary or a secondary factor.

Sir John Moore recalled his experience of forty years ago at the Meath Hospital, and said at that time the surgeons were almost constantly engaged in operations for the relief of stone in the bladder. He could not help thinking that the prevalence of stone had decreased in recent years. Personally he had always connected the subsidence of ordinary calculus with the introduction of the soft Vartry water into Dublin and its neighbourhood.

Prof. Mettam said that from time to time calculi are met with in the urinary passages of the domesticated animals, and for the most part these were oxalate, carbonate, or mixtures. Recently he had been looking into the question of calculi, and was surprised to find that sometimes he could get calcium reactions from sections cut from the kidney. He recalled a
specimen which he had shown at the Section of Pathology in which, on examination of the kidney, renal calculi were found in the lymphatic spaces outside the tubules. In the lower animals calculi of enormous size were met with, such as calculi developing in the pelvis of the kidney, and in some of these cases there was no clinical history. Extraordinary collections of calculi were also met with in the urethra. It had been observed that rams fed on mangels, which were very rich in sugar, frequently developed calculi.

Dr. Parsons asked if any explanation could be suggested for the frequent occurrence of calcium oxalate crystals in the urine of diabetics.

Prof. McWeeney, looking back on his personal experience during the past twenty years, said that during that time he had examined from 50 to 60 ordinary calculi, and the majority of them were calcium oxalate. He was struck very strongly by the extremely dark colour which these oxalate of lime calculi occasionally presented, and expressed surprise that this was not referred to in the paper. He recalled a case in which an oxalate of lime calculus was found in the pelvis of the kidney, which was absolutely jet black with a very polished surface, but it was not so well moulded as the occasional white calculi met with. He suggested that this dark pigmentation seen in oxalate of calcium calculi might be correlated with the fact that their surfaces are so rough that they produce small haemorrhages. He had found by microscopic examination that in cases which were afterwards proved by operation or x-ray examination to be calculus, usually only small quantities of pus and blood were present. He did not know that the presence of uric acid or of oxalate of lime in urine was the slightest indication as to whether calculi existed.

The President said that his experience in the North of Ireland was that calculus was rare, and he was disposed to the view that a decrease had come about in recent times. He suggested that the decrease might be accounted for by the extreme rarity of gout, which was much more common some years ago. He mentioned that during his eleven years’ experience at the Royal Victoria Hospital, Belfast, he had had only two cases of gout in his wards.
Dr. Walter G. Smith, replying to the remarks, said it would be new to him, and he would be glad to have confirmation of the statement that calculi were formed in the lymphatics. He thought that every careful observer had noticed the frequency of oxalates in cases of acute diabetes. He was sure that the dark colour of oxalate of calcium calculi was caused by haemorrhages which are originated by them.
ON A CASE OF LEPROSY.

By C. M. O'BRIEN, M.D.;
Physician to the City Hospital for Diseases of the Skin.

[Read in the Section of Medicine, May 21, 1915.]

It would be foreign to the purpose of this paper if I were to detain you with more than a mere résumé of the history of this most ancient and very historic malady. This résumé I conceive to be essential in order that the younger members of the profession and those of the seniors whose activities are directed along other lines—perhaps more extensive and more productive—may equally appreciate the advances which have been made and are being made in the study of leprosy.

In the struggle between man and disease from the dawn of regular history to the present there is no malady which has quickened popular sentiment, taxed human endurance, or aroused universal sympathy to the extent that leprosy has done. In the whole domain of Medicine, through every stage of its evolution, there is no single disease which engaged so many master minds of every nationality—poet, painter, physician, and divine. Yet the Bible, which is the beginning of wisdom as well as of truth and the foundation of most of the knowledge we possess, has added very little, if anything, of scientific value to the literature of leprosy. It reminds us how our Lord, the greatest physician of all times, being moved to pity at the sight of the lepers, performed one of His greatest miracles on their behalf. Leprosy, once the most generally diffused and still perhaps the most surely fatal of all maladies, was first observed in Egypt c. 1500 B.C. It raged in Italy during the time of Pompey, and subse-
quently extended from the Equator to the Poles. It was amidst the stir and movement of the Crusades that leprosy became epidemic in Western Europe. From the end of the 11th century for a period of 200 years, whole tribes, wandering to and from the East, were exposed to privation and want consequent on unceasing warfare, while many who were not actually so engaged were deprived of the necessaries of life, their lands laid waste by the armies of the Crusaders, and in many instances remained untilled for want of labourers. Thus, with repeated wars, the imperfect state of agriculture in Europe subjected the inhabitants to constant scarcity of food, want of cleanliness, mendicant misery, the too constant attendants of scurvy, scabies, and psoriasis, with which leprosy was erroneously classed.

No recent or even modern writer has described the symptoms of what we now call leprosy with greater precision than some of the Greek writers. Hippocrates seemed to have known it only by hearsay, and probably confused it with psoriasis; while Aristotle described it more fully. Aretæus in the first century described the same malady under the name Elephantiasis, because of some supposed resemblance of the diseased skin to that of the elephant, "for it is disgusting to the sight," says Aretæus, "and in all respects terrible, like the beast of similar name."

The description of leprosy by Aretæus in those far-off days corresponds so completely with the symptoms we now know in more modern times that I am induced to give it in detail thus: "Shining tubercles of different size, dusky red or livid in colour, on face, ears, and extremities, together with a thickened and rugous state of the skin, a diminution or total loss of its sensibility, and a falling off of all the hair except that of the scalp. The disease is described as very slow in its progress, sometimes
continuing for several years without materially altering the functions of the patient. During this continuance great deformity is generally produced. The alæ of the nose become swollen, the nostrils dilate, the lips are tumid, the external ears, especially the lobes, are enlarged and thickened and beset with tubercles, the skin of the cheek and forehead grow thick and tumid and form large and prominent rugæ, especially over the eyes; the hair of the eyebrows, beard, pubes, and axillæ falls off, the voice becomes hoarse and obscure, and the sensibility of the parts affected is obtuse or totally abolished, so that pinching or puncturing gives no uneasiness. This disfiguration of the countenance suggested the idea of the features of a satyr, or a wild beast; hence the disease was by some called satyriasis, or by others leontiasis. As the malady proceeds the tubercles crack and ultimately ulcerate. Ulcerations also appear in the throat and nose, which sometimes destroy the palate and septum, the nose falls, and the breath is intolerably offensive, the fingers and toes gangrene and separate joint after joint.” Aretæus and the ancients believed elephantiasis to be a universal cancer of the body, and spoke of it with terror. Aretæus prefixed to his description of the disease an account of the elephant in order, it is presumed, to point out the analogy between the formidable power of the beast and of the disease.

Guy de Chauliac, the celebrated surgeon of the 14th century, gave the following six symptoms as the most trustworthy of the malady: “Rotundity of the ears and eyes, thickening and tuberosity of the eye-brows, with falling off of the hair, dilatation and disfiguration of the nostrils externally, with stricture of them within and fetidness of the lips, fetidness of the breath and of the whole person.”

John of Gaddesden says no one should be adjudged a
leper and separated from mankind until the figure and form of the face are actually changed.

Glanville, another English author who wrote in the 14th century, remarks "that leprous persons have redde p힘iples in the face out of whom oftene runne blood and matter; in such the noses swollen, the virtue of smelling faileth, and the breathe styntkyth right fowle, the voys is horse, the infectyd are unclene."

A good representation of leprosy in the Middle Ages is to be seen in a picture at Munich, by Holbein, painted at Augsburg early in the 16th century. St. Elizabeth is depicted as giving bread and wine to a group of lepers, including a man whose bearded face is covered with large, round reddish knobs; an old woman whose arm is covered with brown blotches, the leg swathed in bandages through which matter oozes, the bare knee also marked with discoloured spots, and on the head a white cloth or plaster; and thirdly, a young man, whose neck and face (especially round the somewhat hairless eyebrows) are spotted with brown patches of various size. It will thus be seen that almost from its very invention the symptoms of leprosy were not only well understood but clearly defined both by pen and brush.

That leprosy was believed to be contagious may be inferred from the efforts made by the ancients to seclude the diseased and prevent their communication with the healthy. Lepers were enforced by law and popular sentiment to wear a special costume, usually a long grey gown with hood drawn over the face, and to carry a wooden clapper to give warning of their approach, to only indicate with a stick the articles they desire to buy in a market; they were forbidden to enter inns, churches, mills, or bakehouses, to touch healthy persons or eat with them.
to wash in the streams, or to walk in narrow footpaths. For the segregation of lepers, leper houses existed in France in the 7th century, in Germany in the 8th, and in England in the 11th century. Canonical laws were made in England preventing lepers from marrying. We have it on the authority of one of the most brilliant writers in connection with English mediæval history—the Benedictine monk Mathew Paris—that there were 19,000 leper houses in Christendom in the 13th century, and that an order of knighthood dedicated to St. Lazarus was instituted, the members of which had the care of lepers and the control of leper houses. The number in France is independently estimated at 2,000, while according to the late Sir James Simpson, there were in England 95 religious hospitals for lepers, besides innumerable smaller pest houses, in addition to several in Ireland and Scotland. It is interesting to note there were no new leper hospitals built in England after the 15th century, towards the end of which time scarcely a trace of tuberculated leprosy could be found in any of the more civilised parts of Europe. The disease has, however, existed in a few isolated spots, especially the west coast of Norway about Bergen, in Iceland, and in some parts of Spain. In 1890 there were in Norway 1,100 lepers; in 1906 there were only 500. According to Dr. George Pernet’s latest statistics there are about 40 lepers at present in the United Kingdom. It was not until the researches of Danielssen and Boeck, of Norway, who in 1842 began the study of the disease in their own country and elsewhere under the name of Spedalskhed, together with the co-operation of Hebra in 1852, and Virchow in 1859, that a serious endeavour was made to differentiate leprosy from a whole series of very different cutaneous affections with which it
By Dr. C. M. O'Brien.

had been for centuries confounded. The influence which bacteriology was beginning about this time to exercise on clinical medicine received an additional fillip in the discovery of the lepra bacillus by Hansen in 1880. From this time onwards the cause and communicability of leprosy became a scientific fact; the only missing link in Hansen's chain of evidence, and which link is still absent, is the inability to transmit with certainty, by inoculation or otherwise, the cultivated bacillus to animal or man. All attempts to transmit leprosy to man by inoculation have hitherto failed, with one exception, which is open to question. A Sandwich Island criminal named Keanu, apparently at the time free from leprosy, and whose sentence of death was commuted on the condition that he should submit to inoculation, was inoculated by Arning from a lepra nodule in 1884. Within six weeks he developed symptoms of leprosy. In about two years later he was a pronounced leper, and in six years from the date of inoculation he died of leprosy. The subject of the experiment was a native of a country in which leprosy was endemic, and members of his family had had leprosy. The short period of incubation and the previous communication with lepers discount the evidence of inoculation in this case.

It must be allowed that in our present knowledge of leprosy the mode of infection is obscure, whether by food, water, air, man, or beast, by the broken or unbroken skin, are questions respecting all of which much diversity of opinion still exists, and whether the infecting germ enters the body as a spore or a bacillus for the present lacks confirmation. That infection does take place is no longer open to controversy, and that the infection comes from another leper is equally well-established, for as leprosy is
a germ disease it cannot originate de novo; it must come from a pre-existing germ whose habitat is probably man, because so far its presence has only been demonstrated in human tissues. Thus the general statement may be made that neither climate, race, soil, nor food can by any possibility originate leprosy, but that in countries where leprosy is already endemic it may be perpetuated by any one or all of these.

The hereditary nature of leprosy, once so universally accepted, has but few supporters to-day; Virchow and Kaposi were amongst the first to point out this fallacy, by proving that the most the supporters of heredity could possibly claim would be an individual susceptibility. Manson disposes of the question of heredity in the following terse but forcible sentence: "Physiological peculiarities may be inherited but parasites never."

That leprosy is propagated by contagion and by contagion only is now almost universally accepted; the following case, in proof thereof, pre-eminently stands out:—

In 1872, Dr. (now Sir) Hawtrey Benson exhibited before the Medical Society of the Royal College of Physicians of Ireland (and published in the *Dublin Journal of Medical Science*, 1877) a man who had contracted leprosy in the West Indies, where he had lived twenty-two years. After remaining a certain time in the hospital he returned to his Irish home and died after about a year and a half. During this latter period his brother slept in the same bed with him and wore his clothes. His brother, who had never left Ireland except forty-six years before—when he had passed some time in England—became a leper, and was shown, in 1877, to the same Society. There had been no other cases of leprosy known in the family.
Probably the most historic case of individual infection is that of the Belgian priest, Father Damien, born in 1840 almost under the shadow of his much-loved and once famous Louvain University. With just a slight stretch of the imagination we in our own time can see Father Damien leaving the harbour of Honolulu, the capital of the Sandwich Islands, with his consignment of fifty lepers of all ages, creeds, and classes, en route for Molokai, one of the smallest islands of the Pacific which constitutes the Sandwich group. To this desolate spot the Hawaiian Government, in 1865, banished all the lepers, some of royal blood. Here they were doomed to live while life should last; here they were doomed to die. Father Damien gave himself to the lepers in 1873, and counted the cost, for he contracted leprosy in 1882 and died in 1899. There are forms of death from which human heroism has ever shrunk—there is a living death, slow, painful, and repulsive. It has fallen to my lot to have seen and examined a leprosy patient in the very last stages of this loathsome disease (the patient I now exhibit is by no means a good example). For those of you who have not had that experience permit me to give a description by an eye-witness: "A corner of the blanket was cautiously raised, a breathing object lay beneath, a face, a human face turned slowly towards us, a face on which scarcely a trace of humanity remained. The dark skin was puffed, a kind of debris, gummy and glistening, covered it, the muscles of the mouth had contracted and laid bare the grinning teeth, the thickened tongue lay like a fig between them, the eye-lids curled tightly back, exposing the inner surface, and the protruding eye-balls, now shapeless and broken, looked not unlike burst grapes."
I shall now consider briefly a few of the more important advances in the study of leprosy, to which clinical medicine and dermatology (especially the latter) owe to bacteriology. I prefer to take up these advances in the order in which they were applied, in the diagnosis of this case, rather than attempt a classification founded on their respective importance.

(a) The Tuberculin Test for Leprosy.—In 1891 Goldsmidt, among many others, observed that lepers reacted with a rise of temperature on injection with Alt-tuberculin. Jadassohn failed to produce any reaction with tuberculin in four cases experimented upon.

In the case under review I failed to get any reaction with Alt-tuberculin injected subcutaneously, or by von Pirquet’s method.

(b) The Wassermann Test for Leprosy stands thus, according to the conclusions of Howard Fox:—

1. A positive Wassermann reaction is frequently obtained in cases of leprosy giving no history or symptoms of syphilis.

2. The reaction occurs chiefly in the tubercular and mixed forms; rarely, if ever, in the anaesthetetic form.

Professor E. J. McWeeney applied the Wassermann test in this case, which was very markedly positive.

The Experimental transmission of leprosy to animals.—In 1912 Bayon injected four rats on two occasions in the testis with ground-up nodules from a case of leprosy. Two rats did not show any microscopic lesions even after four months. One rat, however, developed, four weeks afterwards, a nodule at the site of inoculation, which grew to the size of a small pea. On puncture it showed acid-fast germs and necrosed tissue, some of which, no doubt, represented the original cells injected. After five weeks
the rat died, but no acid-fast micro-organisms were found in the organs. The disease, if transmitted, was localised. The whole of the nodule was then injected subcutaneously into two other young rats. Three months after inoculation one of the rats developed small shotty nodules under the skin. The other rat developed, three months after the second injection, a nodule in the left testis. This broke down and was found to contain acid-fast rods in great quantity. This rat was killed four months after inoculation. At the site of injection and in the corresponding inguinal glands numerous acid-fast rods were found. One of these small glands was inoculated into the testis of another rat, and on killing it six months afterwards no acid-fast micro-organisms were found in the testis, but definite deposits were present in the inguinal glands, spleen, and liver.

In 1912-13-14, at Robben Island, Bayon made experiments on rabbits by means of the intraocular method. A single rabbit of the thirty inoculated has shown lesions in the iris and cornea.

Duval inoculated a series of animals—four rats, four white mice, and four Japanese dancing mice—with material taken from an acute case of leprosy. (0.5 cc.m. emulsified in 1 cc.m. normal saline solution.) Some were injected intraperitoneally, others subcutaneously. The two white mice which received intra-peritoneal injections died fourteen days later. At the autopsy both showed general infection of the peritoneum with leprosy.

These are some of the successful attempts to transmit leprosy to animals by means of inoculation or injection of leprous tissue. Mr. T. T. O'Farrell, F.R.C.S.I., Pathologist to the City Hospital for Diseases of the Skin and
Cancer, inoculated a mouse with leprous tissue of my patient. The animal so far shows no macroscopic symptoms.

*Rat Leprosy.*—In 1903 Stephansky, of Odessa, discovered, amongst the sewer rats of his city, a disease nearly akin to leprosy, not only clinically but histologically and bacteriologically. Its presence amongst the sewer rats of Berlin, Paris, and London has since been confirmed.

Dean, of London, succeeded in isolating a diphtheroid organism which showed filamentary forms and reacted specifically with the serum of lepers. Thus—

(a) Serum of rats inoculated with rat leprosy (*i.e.*, acid-fast bacilli) agglutinated the diphtheroid. Normal rat serum had no agglutinating properties for this micro-organism.

(b) Serum from a case of human leprosy agglutinated the acid-fast micro-organism from the rat. Normal human serum had no agglutinating power.

(c) Normal human serum and the serum from a tuberculous patient failed to agglutinate the diphtheroid, whereas the serum from a case of leprosy had distinct agglutinating properties.

The foregoing tests, in addition to its histological appearances and cultural behaviour of the micro-organism causing the disease in rats, suggests that rat leprosy is possibly related to human leprosy in a manner similar to that between bovine and human tuberculosis. Though rat leprosy seems spread over all the world, yet the 16,000 rats examined at Sandwich Islands and 1,378 at Cape Town gave negative results.

Rats are not the only animals affected by a disease akin
to leprosy. Acid-fast micro-organisms which belong to the tubercle group, cause disease in cattle, horses, and sheep. In cattle the disease is termed enteritis hypertrophica bovis specifica.

McFadyean, McGowan, and others have described Johnes' bacillus in the sheep, which differs from rat leprosy only in that the symptoms are confined to the digestive tract.

The Artificial Cultivation of Leprosy.—Sir Patrick Manson was the first to attempt the artificial cultivation of the micro-organism, and he was followed by Hansen, and later by Neisser in 1881, with equal want of success. In 1910 Kedrowsky published his experiments, which took ten years to complete. His first inoculations from the nodules of three lepers gave as a result two distinct bacteria, one a non-acid-fast filamentary, interlacing, branching organism, the other was a slightly acid-resisting diphtheroid. He injected these bacteria strains singly into mice and rabbits under the dura, intravenously and intraperitoneally, and observed the animals in some cases for two years. He found that whatever micro-organism he had injected the result was the same in all cases. Numerous acid-fast micro-organisms of the "Tubercle bacillus" type appeared in the viscera, from which they could be regained in pure culture, as acid-fast rods.

The resulting lesions resembled in some cases the type of tuberculosis induced in rabbits by injections of human tuberculosis; in others the lesions closely resembled those occurring in visceral leprosy of human beings.

Kedrowsky's acid-fast culture of "Hansen's bacillus" is a moist, creamy white culture which resembles avian tuberculosis. It grows only at incubator temperature on special media, such as placental juice agar, glycerine agar,
or any similar medium suitable for tubercle. Multiplication is generally apparent in ten days, but may take three weeks to reach a maximum. No growth takes place at room temperature or on gelatine. It is acid-fast, cannot be bleached by 20 per cent. nitric acid, in one minute, after staining for five minutes with warm carbol-fuchsine. It is alcohol-fast, and will withstand absolute alcohol for ten minutes.

Bayon confirmed Kedrowsky's results in 1911, and remarks that every experiment connected with leprosy should be repeated scores of times. He further points out that the crucial experiment to be carried out with any culture isolated from a leper is not only to get it to acquire the acid-fast properties, and the morphology of the "bacillus" seen in tissues, but also to succeed in producing lesions analogous to those seen in lepers and in rats spontaneously infected with B. leprae muris.

Bearing in mind the great difficulties encountered in transmitting leprosy to animals from the injection or inoculation of nodules teeming with bacilli, many series of negative results must be faced. But negative results, even numerous, can never destroy a single positive observation.

The history of the case, J. O'D., whom I now show, is as follows:—

In March, 1915, he was admitted to the City Hospital for Diseases of the Skin and Cancer, and the case diagnosticated for the first time by me. His father was a soldier, and served through the Indian mutiny, having reached the rank of colour-sergeant in the Hampshire Regiment. He retired after twenty-one years' active service, and died at the age of fifty-eight.

J. O'D., the subject of these notes, is thirty-eight years' old. He was born in Belfast, in 1877, and migrated to Birr
as a child, where he lived until 1895, when he joined the army and served in the Leinster Regiment for twelve years—two at home and ten abroad—retiring in 1906.

His foreign service included the following stations: Malta, one year; Bermuda, two years; Halifax, one year; Jamaica, one year; and South Africa, five years. He served through most of the South African campaign, and was present at the relief of Ladysmith. He always enjoyed excellent health. He developed synovitis of the right knee joint, the result of a kick in the football field, and was invalided home for months in 1899. Had colic in Malta for three weeks in 1897. Contracted gonorrhoea in Halifax in 1898. He definitely states he has never had syphilis, and I have failed to detect any signs of it.

He left the army in 1906, and worked as a farm labourer in the neighbourhood of Birr until 1911, when he dislocated his left elbow, and remained four months in Birr Hospital. In autumn, 1913, a crop of boils appeared on the back of his neck, and his eyes became red and somewhat swollen. He was admitted to Birr Hospital, where he remained about five months, after which he was able to work, and did so until August, 1914, when he sought to join the colours, but was rejected by the examining officer at Birr because of a skin rash. From August, 1914, he worked as a farm labourer until February, 1915. He was sent to Dublin in March, where he has since remained under my care.

J. O'D.'s mother died giving birth to her fifth child. Three sisters and one brother are alive and healthy. The brother is at present serving with the colours in France.

Patient complained of feeling weak on slight exertion, with occasional shooting pains in back and shoulders. At times sensations of heat and cold all over body. He thought the skin of his face, especially over the forehead, was becoming too tight and going to crack. Eyes are often bloodshot. Sleeping and appetite and digestion are good.

Face broader than normal; the skin thickened, dark brown and glistening, especially over the forehead, of which the furrows are very deep. The folds over the eyebrows are prominent and studded with tubercles, and over these the hairs are scanty, especially at the outer-side. Nose thick,
broad and flattened; chin broad and unusually prominent, the beard very scanty; lips thick. Infiltrations and tubercles on neck, shoulders, and nates—both grouped and disseminated. On the extremities the infiltrations and tubercles tend to be symmetrical.

In conclusion, I respectfully submit that the case which is the subject of this communication, and which you have seen, is not only instructive but interesting—

1. Because it possesses many of the clinical characteristics of tuberculated leprosy in the early stages, as insisted upon by both ancient and modern writers.

2. The case shows, as far as a single case can, that the Wassermann test for syphilis is not truly specific.

3. It shows, too, that the Wassermann test for leprosy is equally non-specific.

4. The case also shows that the tuberculin test in the diagnosis of leprosy carries with it but little conviction.

5. The portion taken from a leprous nodule of this patient and stained by Ziehl-Neelsen method, shows many bacilli, a few of which may be seen within the cells, while the majority are scattered about in the lymph spaces.

Unquestionably the study of leprosy, in its tout ensemble, shows marked advance, but this advance appears to me overshadowed by the tragedy of events, which testify that except those cases cured by the Holy of Holies, as recorded in Scripture, we have not, after all these centuries of expectancy and perseverance, a single cure of confirmed leprosy to the credit of scientific medicine.
In the preparation of this hurried paper I have borrowed freely from the experience and works of many; more especially is this the case as regards Bayon, Sir Patrick Manson, and Castellani. I am also much indebted to my colleagues, Sir Thomas Myles, F.R.C.S., who confirmed my clinical diagnosis; and Mr. T. T. O'Farrell, F.R.C.S., who prepared the slides shown, and who also carried out the inoculations. My indebtedness is in an especial manner due to Professor E. J. McWeeney, M.D., who kindly carried out the Wassermann test at his laboratory, University College, Dublin.

Sir John W. Moore said that the demonstration of the case was of extreme interest and value. He believed that Sir Jonathan Hutchinson had studied the fish theory regarding the disease at Bergen, but he thought that this theory had now been abandoned.

Dr. Drury said that the appearance of the patient was very typical. He had in his possession a picture of a patient suffering from leprosy, and it was very similar to the case shown. The fact that there was leprosy in this country at one time would be remembered by the names of some of our places, such as Leopardstown, Lazar Hill, &c., which were leprosy stations. He reminded the section that there was a case in Dublin in 1889.

Professor Mettam said that leprosy had been demonstrated in rats. A point of interest about this organism was that it had been recently cultivated on a medium which contained extract of the tubercle bacillus. A case had recently been described in America in which a patient had all the symptoms of leprosy, but when inoculated into animals symptoms of avian tuberculosis were produced. He suggested that cases of leprosy had been associated with scabies, and he inquired if there was any history of the condition in this case. He understood that in Nigeria, where leprosy is met with, the natives were under the impression
that they got it from eating fish. This aspect of the case was not referred to in the paper.

Dr. Crofton said that Jacob had pointed out that lepers did react to tuberculin. He had given some injections of iodoform and benzoyl chloride to a medical friend to try on cases of leprosy, and was informed that it softened the nodules, and a good deal of improvement was shown, but no results were produced by this treatment in the anaesthetic forms of the disease.

Dr. C. M. O'Brien replying said that Dr. O'Carroll had reported a case of leprosy to the Academy in October, 1889, and it was, he considered, a more pronounced one than his. The patient in that case also was a soldier, and the chances were that he contracted the disease in South Africa. There was distinct anaesthesia, paraesthesia and mutilation in Dr. O'Carroll's case. So far as he could ascertain neither nation, food, nor locality had any influence on the disease. There was no history of scabies in the case.
A NOTE ON VACCINES IN THE TREATMENT OF RESPIRATORY DISEASES.

By ROBERT J. ROWLETTE, M.D., F.R.C.P.I.;
Physician to Jervis Street Hospital, Dublin.

[Read in the Section of Medicine, May 21, 1915.]

Within the past few years vaccines have been gradually coming into more frequent use in the treatment of diseases of the respiratory tract. Our knowledge as to their applicability and its limits is still to a great extent tentative, and it is only by the accumulation and comparison of the experience of different observers that we can hope to advance our knowledge. I do not, in the present paper, intend to concern myself with diseases due to tuberculous infection.

In the early days of vaccine treatment it was thought that its scope was limited to localised diseases, and in particular to those of chronic course. We know now that neither the degree of acuteness nor the lack of localisation is a bar to successful treatment, and some of the most marked successes have been in the case of acute generalised diseases. The main difficulty of vaccine treatment is one of diagnosis—of bacteriological diagnosis—and this difficulty is specially great in the case of diseases of the respiratory tract. No clinical entity among the diseases of the respiratory organs—not even pneumonia—can be stated with confidence to be due to a constant bacterial cause. Pneumonia, though most commonly due to the pneumococcus, may be due to any one of half a dozen organisms. A similar statement might be made of the infective diseases of the rest of the respiratory tract. We
cannot, therefore, foretell from clinical considerations what organism we have to deal with in any particular case.

But this is only the beginning of our difficulties. The respiratory tract is part of the surface of the body, and it is open to constant bacterial soiling. In the upper part of the tract the mucous membrane is the normal habitat of a great number and variety of organisms, many of which are potentially pathogenic. In case of chronic infection the number of organisms may be indefinitely increased, and two or more of them may be simultaneously pathogenic.

Our problem is, therefore, not merely to discover the organisms present, but to select from among them that which is most likely to be causative, bearing in mind that more than one may be causative at the same time. With our present degree of knowledge of the bacteriology of the respiratory tract it is not easy to solve the problem. Indeed, in not a few cases the diagnosis is only settled by the result of treatment. This, however, is not peculiar to vaccine treatment.

This difficulty of diagnosis might not, it is true, be a great hindrance if we were merely engaged in studying a scientific problem, where we had ample time and material at our disposal. It is very real, however, in the conditions of practice, whether in hospital or in private. It is not easy to subject a patient to several series of inoculations with different organisms, B being employed when A has proved useless, and C in its turn replacing B. It is by an increasing knowledge of the relations of the several organisms which inhabit the respiratory tract to definite diseased conditions that vaccine treatment will be rendered at once more widely applicable and more efficacious in these diseases. When we are able to make as certain a
bacteriological diagnosis of the cause of a certain infective lesion of the nose, throat, or bronchi, as we are of the cause of a boil, vaccine treatment of respiratory diseases will be simple. In the meantime, we have high authority for believing that "probability is the very guide of life," and the same authority advises us, in matters of practice, to consider ourselves under an absolute and formal obligation, in point of prudence and of interest, to act upon a presumption or low probability, though it be so low as to leave the mind in very great doubt which is the truth.

Where no such presumption or probability can be found, the question arises whether it is better to treat with a vaccine of one organism only or with a combined vaccine. The former is the more scientific method, and is the line I usually prefer. If, however, treatment produces no effect in a reasonable time, then the presumption in favour of the selected organism diminishes, and may disappear, and another must take its place. In the conditions of practice, however, one cannot always choose the most scientific method, and in many cases one must from the start use a mixed vaccine, or, as I prefer, combined treatment by two or more vaccines. But the difficulties of administration are thereby greatly increased.

In vaccine treatment, two points are essential:—(1) proper dosage, (2) suitable periods. It is not always easy to form a just judgment on these points, even with a simple vaccine, and when two or more vaccines are employed simultaneously the difficulties are greatly increased. It is impossible to analyse the effect, and to assign to each vaccine its proper share. Where the infection is truly mixed, the negative phase of one organism may interfere with the positive phase of another, and the results are inextricably entangled. When, however, it is necessary to
treat with more than one organism, it is better to keep the vaccines separate than to use a mixed vaccine. By doing so one can keep a certain control of the respective doses, and one can at any rate give the vaccines at approximately suitable intervals.

Something can be done to simplify the problem of diagnosis by care in the collection and examination of material. As the seat of disease may be either the nose, the naso-pharynx, the larynx, trachea, and bronchi, or the lungs, our methods of collection will naturally vary. If the material is to be collected from the nose, the orifices of the nostrils should be well washed with soap and hot water, and swabbed with a pledget of wool moistened with alcohol. The patient, closing one nostril, should then blow his nose forcibly into a wide-mouthed sterile bottle; the process should then be repeated with the other nostril. If the bacteriological examination can be made without delay a sterile wipe or handkerchief may be substituted for the bottle, but the danger of contamination from the skin is greater.

In the case of the naso-pharynx, throat, or bronchi, attention must first be paid to the cleansing of the mouth. It should be well rinsed with hot sterile water, and the teeth thoroughly brushed. The patient is then directed to hawk or cough, as the case may be, and to spit into a sterile flask. In the case of the naso-pharynx, if secretion be plentiful, a culture may readily be obtained direct from the throat by the help of a platinum loop or a sterile swab. When the patient is entrusted with the collection of the specimen himself, he should be directed to collect it first thing in the morning. In every case, enough material must be obtained to permit of direct examination of smears as well as of cultural investigation.
Sputum, from whatever source, and whatever may be the methods employed in collecting it, should, before cultures are made, be cleansed by washing in clean water. A convenient method, devised, I think, by Dr. W. E. M. Armstrong, is to put the sputum in a gauze strainer, such as is used on the tea-table, and hang it for some time under a slow-flowing tap. This superficial washing will almost certainly wash off any organisms which merely adhere to the sputum, while it will leave behind those which have accompanied it from its source.

The next step is the examination of direct smears, and from the study of these smears more than from the cultures one forms opinions as to the relative importance of the organisms present. A preponderating number of one organism is important, but weight must also be given to the known causative power of each. The presence of an organism not known to be normally present in the region under investigation must receive special attention.

Cultures are next made. I rely almost entirely on agar and blood-agar plates and on broth tubes. The blood-agar is of particular use in the isolation of the streptococcus and the pneumococcus.

I next proceed to discuss the results obtained in treatment of various conditions.

I only purpose dealing with cases in which the treatment was given to such a degree as to permit of some judgment being formed as to its effects. I exclude, therefore, a number of cases in which its use was desultory or haphazard, as also a number in whose treatment I have only had a consultative or advisory duty. Some, however, are included in which, though a trial was given, it was hardly sufficient to come to a final judgment. The series finds itself reduced by these weedings to fourteen cases. They
were as follow:—Chronic naso-pharyngeal catarrh 4, recurrent acute naso-pharyngeal catarrh 4, recurrent acute general catarrh with bronchitis 3, chronic bronchitis 2, pulmonary abscess 1. The four cases of chronic naso-pharyngeal catarrh were of long standing, and all the patients had undergone local surgical treatment of various kinds. The infections were—in one case *pneumococcus*, in one *pneumococcus* and *micrococcus catarrhalis*, in one *streptococcus*, and in one *staphylococcus aureus* and *streptococcus*. The dosage employed was—*pneumococcus*, 10 to 60,000,000; *micrococcus catarrhalis*, 50 to 200,000,000; *streptococcus*, 10 to 25,000,000; *St. aureus*, 50 to 500,000,000. The number of injections varied from six to eighteen. The results in three of the cases were entirely satisfactory, in the fourth the treatment had no effect. In Case I., that treated by the pneumococcus alone, the condition had been very severe and protracted. The patient was unable to breathe through his nose, and at night the catarrh was so severe that he could not sleep more than a few minutes at a time. He used a dozen handkerchiefs in the day. Progress was steady, and after ten injections all his symptoms had disappeared. In case II., treated by streptococcus, relief was obtained at once, and only six injections were required. It is possible that this patient will need a further course. In Case IV., in which *St. aureus* was found, the treatment failed. This was a surprise to me, as the presence of a definite pathogenic organism such as *St. aureus* in the pharynx and nose offered good hope of cure; a further course with the streptococcus, which was also present, gave no result.

Four cases of acute recurrent nasal catarrh were
treated. In two the infection was of *m. catarrhalis* in one of streptococcus, and in one of *St. aureus*. In Case V. the nasal catarrh recurred nearly every evening, and was, I believe, dependent on pyorrhoea, for which condition the patient was sent to me for treatment. The vaccine was made from the pus of the gums; and it was only after a few injections had been given that I learned of the catarrh by the patient asking me whether the injections could have cured the condition, from which he unexpectedly found himself free. He had one or two relapses, but on the cure of the pyorrhoea the catarrh disappeared. In treating naso-pharyngeal conditions it is always necessary to search for pyorrhoea and to insist on adequate local treatment. Case VI. was that of a barrister very active in political work, who had frequently to speak in the open air, with the constant result that a violent attack of catarrh came on, and he spent a sleepless night. The condition had persisted for nine months. In all he got eleven injections, varying from 50 to 150,000,000 *m. catarrhalis*. He became perfectly well, and has remained so for three years. Case VII. (streptococcus) was that of a colleague who suffered much from sudden severe attacks of catarrh lasting a day or two, and recurring every few weeks. He did not permit me to carry out the treatment systematically, because after two injections of 10,000,000 he remained free of trouble for three months. One or two slight recurrences were easily relieved by further injections. Case VIII. of *St. aureus* was one of so-called "hay fever" occurring in a naval officer. He suffered from it every dusty day in summer, whether in town or country. He never had it in winter or at any time afloat. He received four injections in July, 1913, and remained entirely free from catarrh, though ashore, for the rest of
the summer. In 1914 he had a relapse, but I do not know the result of the treatment, which was then resumed.

Of the three cases of acute recurrent general catarrh, two were infections of \textit{m. catarrhalis}, and one of a staphylococcus. In case IX., or \textit{m. catarrhalis} infection, the patient received eight injections, varying from 7 to 20,000,000, with the view of giving immunity against future attacks. The course was given during the winter months, and the patient had no attack after the first injection. She had, however, a recurrence the following winter, and no permanent good resulted. I think that the doses given were too small. In Cases X. and XI. the patients were "always catching cold," as they put it. Short courses of four injections of a staphylococcus and two of \textit{m. catarrhalis} respectively have given them satisfactory protection for the past nine months.

I have only treated two cases of chronic bronchitis, one with \textit{m. catarrhalis} and one with streptococcus. I do not think that either case was benefited to any appreciable extent, but in neither case was a sufficient trial given. One of these patients has just asked me to treat him again by the same method.

The last case in the series was one of abscess of the lung. A young woman, aged 25, after the operation of removal of the tonsils and of adenoids in the end of June last, developed signs of inflammation in the lower lobe of the right lung. She was put under the care of Dr. T. G. Moorhead, and subsequently, during his absence from Dublin, of my colleague, Dr. F. N. Callaghan. The inflammation pursued a varying course for some four weeks; consolidation occurred, followed by abscess formation. The diagnosis was confirmed by the help of the \textit{x}-rays.
The expectorated pus was examined, streptococcus and a staphylococcus being found. Vaccines were prepared, and doses of 5 to 10,000,000 of the one, and 25 to 50,000,000 of the other given at two-day and four-day intervals. A few doses of anti-streptococcus serum were also given. The only other active treatment was the use, on Dr. Moorhead's advice, of an inhalant containing formalin, chloroform, menthol, and pine oil. This undoubtedly helped to empty the cavity and thereby to diminish toxemia. For three weeks (up to August 28) there was no improvement, and the cavity extended, becoming easily mapped out by percussion on the anterior chest wall. The propriety of operation was discussed from day to day, when improvement began and (September 4) the temperature settled to normal. For a long time the cavity was very obvious by percussion and auscultation, "cracked-pot sound" being very marked, and cough persisted throughout the winter, but otherwise the patient's health was good. I had the opportunity of examining her again a few weeks ago. The cavity is much shrunken; it cannot be detected by percussion, though cavernous breathing is heard; there is apparently a fair amount of fibrosis round the cavity: there is still some cough, but the expectoration is not foul. The patient's general health is excellent. I cannot attempt to assign to each part of the treatment its proper share of credit, but the prospect at one time seemed hopeless or nearly so, and the result has been very satisfactory.

I have not included in my series any cases of any form of pneumonia other than that just related, since in no other have I applied the treatment systematically. It
A Note on Vaccines.

appears to be of little use to employ vaccines in the treatment of pneumonia unless the case comes under observation very early, an event which rarely happens.

Taking my series as related, in ten of the fourteen cases treated the result was very satisfactory, in one there was a temporary improvement, and in three no result could be traced. In two of these latter, I am not satisfied that the trial was adequate. Classifying the cases treated according to infection, the results are as follows:—M. catarrhalis 5, of which three became quite well, one was benefited, and one unaffected; pneumococcus 2, both became well; staphylococcus 1, became well; streptococcus 3, of whom two became well and one was unaffected; streptococcus and staphylococcus 2, both became well; St. aureus 1, became well.

When one remembers that many of these conditions had already proved their obstinacy and that ordinary methods of treatment of chronic respiratory diseases are of very little avail, I think it may be claimed that the results of vaccine treatment are distinctly encouraging.

Dr. T. T. O'Farrell said there was no doubt that some cases were most intractable by ordinary methods, and any method which would improve them was a benefit. He suggested that either the opsonic index or complement fixation test would discover the infecting organism. He enquired if Dr. Rowlette considered these of any value. He suggested that a very good estimate could be got from smears as to what was the preponderating organism. He considered the case in which Staphylococcus aureus was found of much interest, as he had never found it in such cases. He suggested that the dosage of vaccines given by Dr. Rowlette appeared to be rather small.
By Dr. R. J. Rowlette.

Dr. Crofton said it was of interest to hear of the results produced in these cases in which the ordinary methods had failed. The more one saw of the treatment the more he would realise that while one organism might determine the disease, there were other organisms which might become pathogenic, and if only the first was tried it sometimes failed to produce good results. He considered that there was a great deal to be said for making two vaccines and giving separate doses at the same time, but it was exceedingly difficult to use one on one day and another in two or three days' time. He considered pyorrhoea alveolaris and post-nasal catarrh were very closely associated. He pointed out that the more chronic the case the larger the dose would have to be before good results could be produced.

Dr. Boxwell said that one of the difficulties in making a vaccine was the microorganism to take and the one to reject. His experience was that the Micrococcus catarrhalis affected every plate, and he was in the habit of including it. He was also anxious to know if there was a greater reaction from vaccines prepared by killing the organisms by antisepsics than from those prepared by heat. He considered the treatment of the greatest advantage in chronic cases.

Dr. Nesbitt said that he had examined a great many sputa, and from the appearance of the slides he was always in a dilemma as to what organisms were pathogenic, and he had come to the conclusion that no guidance could be obtained from the morphological appearance.

Dr. Rowlette replying said that he had not used opsonic methods for some years, as he thought that unless a series of estimations was made for each of the several organisms very little guidance was obtained, and such repeated estimations were not practicable. In nearly every case he tried to select the organism from examination of the smear. He placed no reliance on hæmolysis, but when growing streptococcus he endeavoured to get a variety of the chain organisms present. He admitted that the doses used were rather small, and he was inclined now to use larger doses. He was averse to using mixed vaccines, and preferred to use two vaccines where necessary and to give them on different days, as the intervals at which they should be
given differed so very much. Formerly he had been in the habit of using antiseptics entirely in the preparation of his vaccines, but when he could not personally supervise the manufacture he preferred heat. Theoretically heat might injure the effect of a vaccine. He considered that a one per cent. solution of lysol was sufficient to sterilize any vaccine if it was allowed to remain in it overnight.
ABSTRACTS.

SECTION OF MEDICINE.

Friday, November 20, 1914.

The President of the Academy (Dr. Walter G. Smith) in the Chair.

The Threshold of Disease.

The President of the Section (Prof. J. A. Lindsay) gave an address on this subject. See page 1, ante.

Friday, December 18, 1914.

J. Magee Finny, M.D., in the Chair.

Exhibits.

Friedreich's Ataxy.

Dr. Boxwell showed a boy aged between eight and nine years. No clear account of the previous history could be obtained, but so far as could be ascertained the family history appeared to be fair. The lad was sent for treatment because it was thought that for the last two years he was weaker than a boy of his age should be, and it was suggested that there was something the matter with his spine. The patient's gait when first seen was curious. He walked two or three yards unsteadily and then lurched to one side, and when asked to walk along a straight line he was very ataxic. No knee jerks could be detected, and he had well-marked nystagmus. He was quite sensitive to heat and cold. The plantar reflexes were on the surface, and sometimes gave no response, whilst at other times they were quite distinct. A peculiar grabby motion of his hands was demonstrated, and
it was shown that when picking up anything he frequently over-shot the mark. The well-marked lateral nystagmus present was also shown.

Syringobullia.

Dr. F. C. Purser said that the patient now shown was under constant observation for about two years. About two years ago he had nystagmus and slight paresis of the palate on the right side and a spastic condition in the lower limbs. At the time a diagnosis of spastic paraplegia was made tentatively. He developed a considerable amount of wasting in the tongue with paresis, but no marked paralysis. About a month ago the sensation was carefully examined, when very remarkable phenomena were discovered. The patient was never certain about the difference between heat and cold. Large burns were discovered on his thumbs which were unnoticed by the patient until the blisters rose. The ulcers, which were apparently healed, could be probed deeply with a pin without any signs of hurting being shown. The sense of touch appeared to be perfectly good. It was demonstrated that the tongue had wasted considerably, that there was marked nystagmus present, and that the corneal reflexes were gone. There was also paralysis of the left external rectus, and neither sides of the tongue moved as they ought. There was nothing of importance about the patient's legs except that the only part where sensation appeared to be present was that area which was covered by his socks. The spine was curved considerably to the right. The opinion was expressed that no lesion would satisfactorily account for the condition but syringobullia.

Unusual Ulcer of the Face.

Dr. Nesbitt said that in the patient now shown there was not much to be seen, but he produced photographs which gave a fairly good idea of the condition on November 1 last, when treatment commenced. The patient was a man aged thirty-two, who consulted him about the beginning of April with a small ulcer on the left cheek. If the patient had been an older man he would not have hesitated about
diagnosing rodent ulcer. The case looked suitable for excision, and a surgeon was called in who diagnosed tuberculosis and excised the ulcer. About ten days later a slight redness was noticed in the corner of the scar which looked like a recurrence. The patient was then put on small doses of tuberculin, and about half a dozen exposures of x-rays were given. The case did fairly well on the tuberculin, and at the end of July was looked upon as cured. The patient, however, returned after a few weeks and went from bad to worse until November, when the condition was as shown in the photographs. The patient was shown at another Medical Society, and it was suggested that the condition was probably tubercular and becoming malignant. Section was made, but nothing of importance was discovered. Wassermann was then done and a fully positive result was returned. The patient was put on mercury and potassium iodide on November 1, and continued up to a week ago. A point of interest in the case was that the patient had no history of syphilis.

The case seemed to be one that might be described as lupoid syphilis.

**Disseminated Sclerosis.**

Dr. Drury showed a case of which he had made a provisional diagnosis of disseminated sclerosis in which the main lesion was cerebral.

The boy shown was well up to eighteen months ago, and he then noticed weakness of his legs and something wrong with his vision. His voice and swallowing were then noticed to be affected, and when seen four months ago he had a well-marked spastic condition of the legs. There was paralysis of the left half of the palate and well-marked nystagmus which was not only lateral but vertical. The spastic condition of the legs had cleared up and the paralysis of the palate appeared to be getting better. There was a lump at his seventh cervical vertebra which could not be accounted for.

It was considered that the evanescence of symptoms was suggestive of disseminated sclerosis.
Section of Medicine.

Trichocephalus Dispar.

Dr. Drury read a paper on above. See page 21, ante.

Use of Benzol in Leukaemia and Lympho-sarcoma.

Dr. Moorhead described a case in which the drug was used. See page 29, ante.

Friday, February 5, 1915.

The President (Walter G. Smith, M.D.) in the Chair.

Exhibit.

Lupus Pernio.

Dr. T. P. C. Kirkpatrick showed a boy suffering from a condition which was described as lupus pernio. The patient was affected for three years with sore hands, sore ears, and at one time had a similar affection of his face. The hands were said to be a great deal better now, but there was still much thickening, swelling, and ulceration. When the patient was first seen the condition of the hands was much more of the chilblain type, but the face had quite recovered except for some little scarring. He was treated with emollients, and the hands were kept wrapped up.

Radium Therapy in Uterine Cancer.

Sir John Moore read a short note on above. See page 45, ante.

Notes on a Case of Chronic Septicaemia.

Dr. F. C. Purser said the patient was a widow, aged about sixty years. She was seen first on February 24, 1914, and admitted having been ill for a month previously. She complained of pains in the left shoulder and forearm and right leg. She had also a systolic (?) haemic) murmur. Her general condition was one of great weakness and flabbiness. The temperature ran between 100° and 101° F.; pulse 90 to 100. Dr.
Purser enumerated the various clinico-pathological examinations which had been undertaken during the sixteen following weeks. They were thorough and repeated, but neither they nor clinical investigation ever revealed a local condition of disease nor any circulating toxin. Yet for four weeks, beginning about the middle of May, inevitable death from weakness seemed the only outcome of the disease—its incidence seemed only a question of time. The temperature was more hectic now, rising to 101.5° or 102°.

Treatment had been symptomatic, directed to relieving any pain and strengthening the heart and patient generally.

Finally, having had explained to her the nature of vaccine treatment, and that its application in this instance was drawing a bow at very much of a venture, the patient accepted an inoculation of 5 million streptococci. There was an immediate drop in temperature to 99° F. This continued till three days later, when a similar dose was given with less result; but the patient had picked up a little strength. Six days later 5 million streptococci were again given, with the most alarming result. The temperature rose to 104.5°, the patient was collapsed and pulseless, and fainted more than once. This occurred thirty-six hours after inoculation. In two days the fever subsided. The patient then began a long and almost uninterrupted convalescence. The temperature seldom again rose above 99.5°, and finally settled on October 9th. The patient is now well except for occasional "muscular rheumatism." Dr. Purser ventured no comments.

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**Friday, March 5, 1915.**

Dr. W. G. Smith (President of the Academy) in the Chair.

**Exhibit.**

*An A Case of Lupus Vulgaris.*

Dr. C. M. O'Brien showed a boy, aged thirteen, who had been suffering from a very pronounced form of lupus for the last nine years. Although it was very widespread, the face of the patient was practically free; the mucous membranes were
also unaffected. The form of the disease was what is known as lupus non-exedens. When admitted on the 8th of October, 1914, the boy's weight was 6 st. 4 lbs., and he was now 11 lbs. heavier. The patient was under treatment at the London Hospital for almost three years, getting one hour's exposure of Finsen light on five days of the week. Since the 8th of October, 1914, he had had three sittings per week of seventy minutes each. The case did not appear to be a victory for the Finsen light, the most that could be claimed was that it stopped the spread. Dr. Griffiths, of Cambridge University, had made a bacteriological examination of the case, and about a week ago had inoculated a guinea pig from the lupus tissue with positive results.

X-ray Treatment of Ringworm.

Dr. E. J. Watson read a paper on this subject. See page 55, ante.

Prophylactic Inoculation against Tuberculosis.

Dr. W. M. Crofton read a paper on this subject, and said that practically every one who attains to adult years gets infected with tuberculosis. Two ways of preventing this disease existed—(1) preventing the microbe obtaining access to the patient; (2) making the patient's tissue an unsuitable environment for the development of the microbe. It appears to be impossible to prevent the microbe gaining access. Only a proportion of those infected develop the disease to a serious extent. The recovery of the majority is due to a normal resistance; therefore, the problem would be solved if the resistance of the minority could be made and kept normal. Low resistance is due to—(1) bad hygienic surroundings, (2) lowering of resistance by other microbes, (3) inherited low resistance. And a normal resistance may be overcome by a virulent infection. General sanitary measures, while they keep down morbidity and mortality to a certain level, will not entirely prevent disease. The only method is to render the soil unsuitable by prophylactic inoculation. The probability of the success of this measure and the method of carrying it out were discussed.
Dr. Moorhead said that he had come to the conclusion that tuberculin as a prophylactic remedy against tuberculosis was not of much value. As one looked around, two types of infective disease were recognised. Of one small-pox was the type, and of the other tuberculosis. The former was a disease which was unlikely to attack a person a second time, and was, therefore, a type of disease in reference to which one would expect vaccination to produce good results, and this was found to be so. But in tuberculosis it would seem that a sufficient amount of antitoxin was not produced to prevent a patient from getting a second attack. When a survey of remedies in use was made he thought it would be agreed that certain of them had been accepted as of use. For example, vaccination for small-pox and 606 for syphilis. The latter was the result of a long series of investigations, but once used was universally accepted, and vaccination was the same; but of tuberculin, although it had been before the profession now for over twenty years, the value had not been admitted, and at the Congress of Medicine much doubt was expressed as to its utility. The value, therefore, of its use as a prophylactic seemed to him at least doubtful, and even those who believed in it would insist on the fact that a long course was essential.

Professor Collingwood said a question which occurred to him was—Is it not possible that the liability to tuberculosis which exists in certain individuals is due to the fact that they do not possess the power to produce antibodies to prevent tuberculosis? He pointed out that it was well known that one attack of tuberculosis did not produce immunity against another attack, but rather predisposed to it, and that, therefore, one could not argue that a dose of tuberculin could produce immunity.

Friday, April 23, 1915.

The President in the Chair.

Exhibit.—Dermatitis Herpetiformis.

Dr. C. M. O'Brien showed a boy, aged fourteen, who was suffering from this affection since he was three months old. He was one of a family of nine healthy children, and up to the
time of vaccination he was in good health. He then developed a rash, which was still present. In its early stages the rash caused much itching, was multiform and well marked on the arms and legs. A peculiarity of the condition was its persistence and recurrence. It never totally disappeared.

The President (Dr. Walter G. Smith) said the disease was rare, but he had experience of a few cases of it. He suggested 'dermatitis multiformis' as a better name for the condition. Referring to the persistence and recurrence which Dr. O'Brien mentioned as peculiarities of the case, he (Dr. Smith) considered that these were its distinguishing marks. He looked upon treatment of these cases as of no avail.

**Short Notes on** (a) _A Case of Landry's Paralysis_; (b) _A Case of Myasthenia Gravis_; (c) _A Case of Automatism._

The President of the Section (Professor Lindsay) read the notes of three cases of nervous disease. See page 60, ante.

**Urinary Concretions: their Origin and Modes of Formation, with Illustrations.**

The President of the Academy (Walter G. Smith, M.D.) read a paper on above. See page 68, ante.

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**Friday, May 21, 1915.**

Sir John Moore, M.D., in the Chair.

**Case of Leprosy.**

Dr. C. M. O'Brien showed a case. See page 94, ante.

**Vaccines in the Treatment of Respiratory Disorders.**

Dr. R. J. Rowlette read a note on above. See page 111, ante.
INTESTINAL STASIS: A METHOD OF TREATMENT.

By ALEXANDER BLAYNEY, F.R.C.S.;
Surgeon to the Mater Misericordiae Hospital, Dublin.

[Read in the Section of Surgery, November 13, 1914.]

In the few remarks which I propose to make to-night I do not intend to make any attempt to deal with intestinal stasis in all its aspects; the subject is too vast, and would require several hours to deal adequately with it, if I were capable of doing so, or even to deal with it inadequately, as I should more probably do. The object which I have in view in this contribution is merely to relate the experience which I have had in carrying out one operation, which has been designed for the relief of symptoms which depend on a mechanical interference with the action of the large intestine and the consequent delay in the faecal stream.

In the course of my remarks I intend first to relate the history and symptoms usually given by patients for whom I believe this operation to be suitable, the conditions which are commonly present inside the abdomen, the details of the operation itself, and, finally, the results so far as I can speak of them. The operation has only comparatively recently been done by me, so that I cannot speak with any confidence of the ultimate results.

First as regards the history. In most cases the patients are women, who generally tell you that they can scarcely
remember the time when a regular daily action of the bowels was the rule with them. They frequently say that in early life they did not pay any particular attention to the action of the bowels, and were quite content with a motion every third or fourth day, or even once a week. I may say that I believe that frequently the origin of subsequent bowel trouble lies in the fact that most young people are ignorant of the importance of having a daily evacuation from the bowels, and are consequently careless about securing this result.

When the constipation has lasted for some time, some of the ill results which it entails begin to make themselves felt. They generally take the form of impaired appetite, lassitude, headaches, and discomfort after food, due to flatulent distention. Purgatives are now used, and for a time their regular employment affords some relief. Such, however, is not always the case. It is not unusual for a patient to tell you that the taking of a purgative has for its immediate result an aggravation of her symptoms, which would prevent her from using this remedy, were it not that she cannot procure an action of the bowels without its help. The further development of the symptoms varies. In some those referable to the stomach are more prominent, and not a few have been treated for gastric ulcer; pain after food, vomiting, and even hæmatemesis being present. In others pain referred to the right side of the abdomen is the most prominent feature. This pain is frequently diagnosticated as having its origin in the appendix, in the ovary, or in the right kidney, which in these cases is nearly always abnormally mobile. Not a few of these patients have had the appendix or ovary removed without obtaining any relief from the pain. In one case which came to me the patient had been operated on seven or eight
times. She had had her ovary removed, her appendix taken away, her kidney fixed, her gall bladder explored, and, in addition, had two or three operations for the separation of adhesions, with no relief. Lastly, in a few cases, the more aggravated condition described by Lane is met with. These patients suffer from continual lassitude, mental depression, want of appetite or even a disgust for food, clammy skin, cold hands and feet, and constant headaches.

Coming now to speak of the condition inside the abdomen, one generally finds a much dilated, movable cæcum, which is frequently dropped into the pelvis, and the hepatic flexure prolapsed downwards so as to be on a level with the iliac crest, or even lower. In most cases a well-marked Jackson’s membrane, stretching from the abdominal wall to the ascending colon and cæcum, is present, and not infrequently the lower end of the ileum exhibits the condition known as Lane’s kink. In one case on which I operated recently there was marked hypertrophy of the muscular coat of the lower end of the ileum, showing how much obstruction is caused by the condition I am describing.

The first part of the transverse colon lies parallel with the ascending colon, to which it is often adherent. The middle part of the transverse colon often reaches down into the pelvis, whence it ascends almost vertically to the splenic flexure, which is nearly always in its normal position.

The condition of the duodenum, especially in those cases where gastric symptoms are prominent, calls for notice. The first stage is often found to be elongated and dilated, while on turning up the transverse colon it is seen that the third stage is prolapsed downwards for a considerable distance behind the mesentery of the small intestine, some-
times as far as the pelvic brim or lower, whence it ascends to its termination, where it may be kinked. This condition of the duodenum is one which is of considerable importance. In my earlier operations I did not pay as much attention to it as I should have done, and the results were naturally affected.

In most cases the right kidney is found to be movable. The intestinal conditions I have mentioned can usually be discovered by the help of the x-rays, and this method of examination is one that should always be carried out.

This being the anatomical condition, the question arises what means we have at our disposal to deal with it surgically. I would emphasise that I am now considering only those severe cases where the evidence of mechanical obstruction is clear. The two extremes are represented—on the one hand by operations which have for their object the suspension of the displaced organs to some more or less fixed portion of the abdominal wall, on the other by complete excision of the large intestine, with the exception of the rectum.

With regard to the former, I have carried out suspension of the stomach and colon, according to both Rovsing's and Coffey's methods, and, while the immediate results obtained were encouraging, the ultimate results were disappointing. Invariably patients have come back after an interval of a few months complaining of a return of their old symptoms.

Lane's operation of ileo-sigmoidostomy has never been regarded with much favour by me, and I have only carried it out on two occasions—each time with discouraging results.

Operations having for their object the removal of the Jackson's membrane, or the straightening out of the Lane's kink, have been devised, but I regard such operations as
being unsound in principle. Jackson's membrane, whatever its origin, helps in suspending the cæcum, thus lessening the tendency to prolapse. It may by its attachment to the ascending colon give rise to narrowing of this part of the intestine in places, though I have never seen any case where I could say it gave rise to definite mechanical obstruction. Its division, while it may relieve kîlks, must tend to further prolapse of cæcum, to which it acts as a suspensory ligament—which prolapse would I believe more than neutralise any good effects produced by the straightening out of the intestine. With regard to Lane's kink, whatever the view held as to the origin of the band which produces it—whether it is a crystallised resistance or a persistent foetal fold of peritoneum—it also acts as a suspensory ligament of the cæcum, to which it tends to give support. Its mere division must have the effect of allowing a more marked descent of the cæcum.

The removal of the whole of the large intestine is a formidable operation, and, judging by the results of another operation, the details of which I am about to relate, it is unnecessarily severe.

This procedure, the one which I am concerned with this evening, is an operation suggested by Patterson, and consists of the removal of the cæcum, ascending colon and greater part of the transverse colon. It thus removes the part of the large intestine which is most frequently at fault, and in which, as shown by x-ray examination, delay of faeces most commonly takes place. At the same time it leaves behind a considerable length of colon, so that there is still sufficient of this to enable the absorption of the watery elements of the intestinal contents to take place, which absorption is probably the principal function of the large intestine.

Furthermore, by relieving the stomach of the drag pro-
duced by the weight of the loaded transverse colon it tends
to remedy the downward gastric displacement which is
frequently present.

The method which I have used in carrying out this
operation is briefly as follows:—The incision is made over
the outer border of the right rectus muscle, beginning at
the level of the umbilicus and extending downwards for
about four or five inches. This may seem a rather small
incision, but in most cases it will be found to be quite
ample. The anterior layer of the rectus sheath is divided
for the full length of the incision, the edge of the muscle
drawn inwards and the posterior layer of the sheath
divided. It is sometimes possible to avoid dividing the
nerves which run in the posterior layer, but generally one
of these has to be sacrificed. The caecum, the ascending
colon, and the adjacent part of the transverse colon can
now usually be drawn completely outside the abdomen.
If Lane's kink of the ileum be present, it will be necessary
to divide the membrane which binds down this part of the
intestine. Beginning above the situation of the kink, the
mesentery of the ileum, caecum, ascending colon, and
transverse colon, up to the point where the latter begins to
rise towards the splenic flexure, is transfixed and tied by
series of ligatures. The mesentery is then divided between
the ligatures and the intestine, so that the latter is com-
pletely free except at the two ends. In carrying out this
part of the procedure it is necessary to see that the liga-
tures are tied very tightly, and that the mesentery is not
divided too close to the ligatures, as otherwise one of the
latter may slip—an accident which happened in one of my
cases. The ileum is now crushed, and the crushed portion
ligatured. The distal part is then clamped, and the in-
testine is cut through just beyond the ligature. The end
to which the ligature has been applied is invaginated by a double row of Lembert sutures. A similar procedure is carried out with the transverse colon, thus completely freeing the part of the intestine to be removed. The ileum and transverse colon are now clamped as in the operation of gastro-enterostomy, and an anastomosis between these two portions of the intestine is done. The loop formed by the free edge of the mesentery of the ileum is then closed by suture. On now examining the back of the abdominal wall it will be found that there is a space denuded of peritoneum. This space can be considerably reduced by a suture, but in most cases some space will be left. I consider it advisable that a drainage tube be inserted to drain this area. This tube may be brought out through the wound or inserted through a puncture made in the loin. The abdominal wound is then closed in the usual fashion.

The operation is rather a tedious one; the shortest time in which I have succeeded in doing it is an hour and a half. Notwithstanding the time required, and the fact that the patients are always in a rather poor condition, the operation is usually very well borne. In only one case was the shock severe, and that was the case of a patient who had been bedridden for a number of years owing to rheumatoid arthritis. In some cases I have used novocain and quinine and urea hydrochloride, according to Crile’s technique, apparently with some benefit, especially in the reduction of subsequent pain. In a few cases I have thought it advisable to give an injection of pituitary extract to combat the shock.

The subsequent progress of the patients is usually uneventful. In a few cases some suppuration has occurred in the neighbourhood of the drainage tube.

A purgative is generally administered on the third day,
the one which I recommend being castor oil. In some cases where mist. senna co. was used the patient suffered from diarrhoea, which continued for some days.

I have now operated on twenty-one cases with three deaths, giving a mortality of 14 per cent. This is, of course, much too high, but I think the mortality is capable of being reduced almost to nothing. The three cases in which death took place were among my earlier cases. In one of these death was due to the slipping of a ligature, leading to haemorrhage. In another death resulted from shock. This was the patient to whom I have already referred who had been bed-ridden for some years previously. She was in a very weak condition, and in her case, I think, some less severe form of operation should have been tried.

In the third case the patient, after the operation, was found to be vomiting everything she took. At first I attributed this to the effects of the ether, especially as her symptoms otherwise were quite favourable. When the vomiting persisted after the second day, it was obvious that some other cause was at work. The vomiting was of the regurgitant character seen in intestinal obstruction, and the vomited matter consisted merely of bile mixed with whatever liquid she had taken previously. It never assumed a faecal character. I concluded that some obstruction had taken place in the duodenum and reopened the abdomen, doing a gastro-enterostomy, but she died of shock following this operation. No post mortem examination could be done, and at the time of the second operation, beyond determining that the stomach was much dilated and the jejunum contracted, I could not ascertain the exact cause of the obstruction.

I must express myself as being extremely well pleased with the results I have obtained by this operation. In
By Mr. Alexander Blayney.

In every case, as soon as the patient was able to be up and about, the bowels have begun to act regularly every day. Appetite improves, headache and vomiting, if previously present, disappear. The patients rapidly acquire a feeling of comfort and well-being, a feeling which in many cases they have not experienced for years previously. Improvement in appearance is often remarkable; the sallow complexion which they generally present is soon replaced by an aspect of vigorous health. In only one case have I been told, in reply to my inquiries, that the patient is still troubled with gastric disturbances. In that case the displacement of the duodendum, to which I have referred, was very marked. There was a very distinct kink at the junction of the duodenum and jejunum, and she will, I fear, require an operation to remedy this.

In conclusion, I would express the opinion that in this operation we have an efficient and comparatively safe method of dealing with a condition which is frequently met with, and is the source of much misery to those who suffer from it.

Mr. Henry Stokes asked how Mr. Blayney treated the great omentum. He considered it a pity that the greater omentum should be sacrificed, and that it would be a good thing if it could be saved. He was also at a loss to know how the bare end of the ascending colon was covered. He noticed that the kinks supposed to occur in the caecum were not referred to. He thought Mr. Blayney was to be complimented on the low mortality rate in these cases.

Dr. Euphan Maxwell said she thought the subject would become more important as time went on and methods became more exact. She suggested that the primary focus of many things would be discovered, such as inflammations of the eye, etc. She referred to one of the cases mentioned in the paper of which she had experience, the details of which were of
interest. A patient, aged thirty-eight, met with an accident to his eye; the day following she extracted a piece of iron, and he underwent a normal convalescence, but at the end of a year he returned with acute iritis of the right eye. The patient informed her that during that year he was receiving treatment for constipation and dyspepsia, and about this time Mr. Blayney resected a portion of the colon, and within five days the visual power was recovered, and within two months of the operation vision was as good as it had been before. She suggested the possibility of the infection having entered the eye at the time of the accident, and an account of his run-down condition becoming acute.

Dr. Crofton said the operation was a very severe one, and obviously, even in the most skilled hands, was attended by a very high mortality. The cases that had recovered were undoubtedly much improved and taught important lessons. There could be no doubt Lane had shown the importance of the intestine, especially the large one, as a source of infection. Referring to the operation he said he was not in a position to speak with authority, but it seemed to him that it was far ahead of complete removal of the bowel, because it left a good portion of the colon intact. Lane did not consider the colon of any great importance. He seemed to forget that it was a most useful organ of excretion.

Mr. Kennedy said he thought the cases reported might be taken as instances of general prolapse of the abdominal viscera. He would like to know if any peculiar formation of the abdominal cavity was noticed. He had seen a great many of these cases and was puzzled as to what to do. What struck him was that the upper part of the cavity was narrow, and that possibly one of the reasons for improvement was that the removal of this mass of colon and omentum gave more room for the other abdominal viscera. He had not always found x-rays satisfactory; even when taken by men of large experience the finding was not always verified at operation. He mentioned that Lane only looked upon the operation of ileo-sigmoidostomy as a preliminary procedure having for its object the improvement of the patient before the larger operation was undertaken. He suggested that another operation well worth trying was lateral anastomoses in ex-
exactly the way that ileo-sigmoidostomy was done. He inquired as to the necessity for the drainage tube being left in after operation.

Mr. C. A. Ball asked if the liver was practically always displaced downwards. His reason for making this inquiry was that a patient of his whose occupation was working a mowing machine complained of pains while at this work, but when lying down was free from it. He opened the abdomen to investigate and found his liver displaced down to the crest of the ilium. He would like to know whether, if he had removed the caecum and ascending colon as described, it would have benefited the man so far as the working of the mowing machine was concerned. He did nothing for the patient except to advise him to change his occupation or to wear a belt. He had no symptoms suggestive of displaced colon.

Sir John Lentaigne said if the value of this procedure was to be understood and the best means planned for treating these cases the causation of the trouble ought to be known. The ideas generally held about it were very vague. Some attribute it entirely to the dropping of intestine. Lane thought it was a matter of intestinal stasis with decomposition at and behind the place in which it occurred, from which poisons were absorbed. According to Professor Combe of Lausanne the essence of the trouble in all these cases was the absorption of poisons from the large intestine produced by the decomposition of nitrogenous portions of food, and numerous authors were quoted by him, showing that this decomposition occurred in the normal individual. It was beyond question that this bacterial decomposition of food occurred in every one, but in the normal individual there were safeguards by which it was checked, and it was only when these barriers broke down that ill-health ensued. There were many other conditions which were produced by absorption of these poisons, and he was convinced that a very large proportion of cases of ill-health with which they had to deal arose from them. He believed that none of these conditions should be allowed to go the surgeon; all of them at some time or other were amenable to medical treatment. He was not satisfied that even the procedure outlined by Mr. Blayney was a perfect cure for these troubles. Combe,
who treated an enormous number of cases, said they could be dealt with by medical treatment. Great improvement could be brought about in these cases by diet, but nevertheless there were a lot of cases which came to the surgeon sometimes owing to an acute attack and sometimes because they objected to restriction in diet, or perhaps because the patients were too poor to be able to get suitable dieting or to face the long and tedious, and more or less uncertain, medical treatment, and therefore had to be treated by a surgeon quickly. It was therefore necessary that the best treatment should be ascertained. Stasis or a slowing of the current is an extremely important factor in aggravating this condition when it existed, but stasis did not always cause it, for undoubtedly mere stasis alone was insufficient to explain these phenomena. But as a rule slowing of the functions anywhere in the body usually led to trouble.

As to the operation, he considered that the best plan where the surgeon must interfere was to get a free emptying of the bowel, and so relieve the stasis. He was entirely in agreement with Lane as to complete removal of the colon, but it was a very dangerous operation, and unless the technique was perfect the patient was very subject to sepsis. He mentioned that Lane gave saline very liberally in these cases both before and during operation. He had himself been doing a very much simpler operation which he was led to perform by reflection on the points he had just spoken of. The first patient upon whom he performed it had been suffering for twenty years, and was sent to hospital as having cancer of the stomach. He was x-rayed, and no evidence of cancer was discovered. Laparotomy was done. The cæcum, enormously distended, was found lying dragged across the abdomen, and the appendix, which stood out, lay underneath the left nipple line. Membranes covered the large intestine everywhere, so much so that it was difficult to know whether it was the cæcum or transverse colon. It was considered impossible to do colectomy, and it was therefore decided to perform lateral ileo-sigmoidostomy to allow an exit for the food. The result was very satisfactory. Since then 15 other cases had been treated in this way, and all except two were completely cured. These two were greatly improved, and
none of the patients had died. He looked upon Mr. Blayney's patients as likely to be improved but not cured.

Mr. Blayney said he had refrained from touching the question of the physiology of intestinal stasis, but he largely agreed with the remarks of Sir John Lentaigne as to the cause of the condition. Lane himself had pointed out that "in the evolution of man food had very much changed, and that man subsequently became a flesh-eating animal, for which he was not originally intended, and that the nitrogenous foods were largely the cause of the trouble." As to the criticism that the operation left behind part of the large intestine, he considered that it was hard to imagine that this organ was functionless, and it had been mentioned in the discussion that it was largely a secretory organ. The operation suggested by him was intended only for cases that could not be treated medicinally, and its object was to restore as far as possible the normal condition, and, as Sir John Lentaigne had pointed out, it was normal to absorb a certain amount of toxins.

Replying to a question put by Mr. Stokes he said that about half of the great omentum could be preserved. As far as possible he always tried to obliterate the raw surface of peritoneum, but this was not always successful. The operation could hardly be completely aseptic as the intestine must be opened, and while the peritoneum was capable of healing with infection the raw surface was not always capable of doing this, and in the first two operations he did there was suppuration in that area. He generally examined the sigmoid flexure, and if there was a marked kink relieved it; but as a matter of fact in cases where he had not removed kinks the bowels acted regularly every day. The case referred to by Dr. Euphan Maxwell was one of his earlier ones. He considered that in cases of stasis absorptions occurred which reduced the resistance of the body generally. If these cases came to be treated sufficiently early they should never come under the charge of the surgeon.

Naked eye examination of the intestines removed showed no signs of catarrhal inflammation, nor was there any evidence of thickening of the wall of the intestine.

Referring to Mr. Kennedy's remark, a type of malforma-
tion of the abdominal cavity had been described which nearly always occurred in tall people. X-rays might not always be reliable for discovering kinks, but they do give evidence of prolapse. The objection to the operation of ileo-sigmoid-ostomy was that it still left a chance of retention. He had no experience of lateral anastomoses, but thought that if the cæcum was prolapsed, and there was a difficulty in emptying, if this operation was done the probability was that the cæcum would fill up again.

Replying to a question put by Mr. Ball he said that in these cases the liver is prolapsed.
THE THEORY AND TECHNIQUE OF A NEW METHOD OF RADIIUM THERAPY: WITH NOTES ON CASES TREATED DURING THE LAST NINE MONTHS.

By WALTER C. STEVENSON, M.D., B.C.H., D.P.H.; Surgeon and X-ray Officer, Dr. Steevens' Hospital; Surgeon, Orthopaedic Hospital, Dublin; Captain R.A.M.C. (Temporary).

[Read in the Section of Surgery, January 29, 1915.]

As the physical properties of radium and the application of radiation in medical science generally have been dealt with recently at the post-graduate course in Trinity College by Professor Joly, and have been published in the November number of the Dublin Journal of Medical Science, I do not propose to more than touch on that subject to-night.

Briefly, I may say that for therapeutic purposes radium, per se, is of no value. It is not till radium breaks down, and the third and fourth generations of the series of elements that come into existence are reached, that therapeutic effects are produced. The therapeutic agents are the penetrating $\beta$ and $\gamma$ rays which are given off during the disintegration of radium B and radium C. Fortunately for our purposes the disintegrating radium atom at ordinary temperatures turns into a gaseous element—radium emanation—a gas that can be collected in a physical laboratory by means of a mercury vacuum pump, and utilised as a much more convenient source of radium B and radium C than the solid radium salt.

The disadvantage of using a radium salt is that, owing to its great costliness, it cannot be changed from one form
of receptacle to another to suit the requirements of different cases without serious loss of time and valuable material. This latter loss is more obvious when we consider that fifty milligrammes of radium chloride, which is at present worth at least £1,000, has approximately the same bulk as a grain of calomel.

The only serious disadvantage of radium emanation as a source of radiation is that, owing to there being no parent radium present to go on producing it, it is dissipated comparatively rapidly, its activity being reduced to half in 3.85 days (see Genealogy of the Radium Series of Elements. Table I.).

Table I

<table>
<thead>
<tr>
<th></th>
<th>Half Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uranium I</td>
<td>$\rightarrow a$</td>
</tr>
<tr>
<td>Uranium II</td>
<td>$\rightarrow a$</td>
</tr>
<tr>
<td>Uranium X</td>
<td>$\rightarrow \beta$</td>
</tr>
<tr>
<td>Ionium</td>
<td>$\rightarrow a$</td>
</tr>
<tr>
<td>Radium</td>
<td>$\rightarrow a$</td>
</tr>
<tr>
<td>Emanation</td>
<td>$\rightarrow a$</td>
</tr>
<tr>
<td>Radium A</td>
<td>$\rightarrow a$</td>
</tr>
<tr>
<td>Radium B</td>
<td>$\rightarrow \beta$</td>
</tr>
<tr>
<td>Radium C</td>
<td>$\rightarrow \beta$</td>
</tr>
<tr>
<td>Radium D</td>
<td>$\rightarrow \beta$</td>
</tr>
<tr>
<td>Radium E</td>
<td>$\rightarrow \beta$</td>
</tr>
<tr>
<td>Radium F</td>
<td>$\rightarrow a$</td>
</tr>
<tr>
<td>(Polonium)</td>
<td></td>
</tr>
</tbody>
</table>
At the end of any and every hour there is 0.75 per cent. less emanation present than at the beginning of that hour. This works out at a loss of 4.4 per cent. per six hours, of 16.5 per cent. per day, and of 71.6 per cent. per week. It must not be lost sight of that for the first four hours after emanation—without radium—is confined in a receptacle its activity, as measured by the electroscope, increases—that is, till radium C equilibrium is established. It is by measuring the rate of discharge of the electroscope by the very penetrating rays of radium C and comparing it with the rate of discharge of a standard quantity of radium—i.e., of radium C—that the quantity of radium emanation present is calculated.

The advantages of radium emanation are:—(1) It has very much less bulk than radium metal. (2) It can be supplied from institutions at a reasonable cost, while the price of radium is prohibitive for general use. (3) It can be collected in capillary tubes or flat applicators, or in any shape or size of glass or other vessel suitable for the requirements of the case to be treated, and this without risk of loss or permanent diminution of the value of the parent radium. (4) The loss of a tube of emanation is of comparatively little consequence.

As a knowledge of the amount of emanation present during treatment is essential for proper dosage, I append Table II., from which the amount present at any hour can be calculated if the particulars and time of measurement are available.

Rationale of Radium Therapy.—In the treatment of deep structures, and especially malignant growths, the great advantage radium possesses over x-rays is that the source of radiation can be inserted among the actual cells to be treated, and the rays, before they reach their goal,
TABLE II.—Showing Rate of Decay of Radium Emanation. (To enable the amount of emanation present to be calculated at various intervals after it was measured.)

<table>
<thead>
<tr>
<th>Interval after Measurement</th>
<th>Per cent. emanation remaining</th>
<th>Per cent. emanation decayed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days</td>
<td>Hours</td>
<td>%</td>
</tr>
<tr>
<td>—</td>
<td>1</td>
<td>99.25</td>
</tr>
<tr>
<td>—</td>
<td>6</td>
<td>95.6</td>
</tr>
<tr>
<td>—</td>
<td>12</td>
<td>91.4</td>
</tr>
<tr>
<td>—</td>
<td>18</td>
<td>87.4</td>
</tr>
<tr>
<td>—</td>
<td>24</td>
<td>83.5</td>
</tr>
<tr>
<td>—</td>
<td>30</td>
<td>79.9</td>
</tr>
<tr>
<td>—</td>
<td>36</td>
<td>76.3</td>
</tr>
<tr>
<td>—</td>
<td>42</td>
<td>73.0</td>
</tr>
<tr>
<td>2</td>
<td>—</td>
<td>69.8</td>
</tr>
<tr>
<td>2.5</td>
<td>—</td>
<td>63.7</td>
</tr>
<tr>
<td>3</td>
<td>—</td>
<td>58.3</td>
</tr>
<tr>
<td>3.85 or, 3</td>
<td></td>
<td>50.0</td>
</tr>
<tr>
<td>4</td>
<td>—</td>
<td>48.7</td>
</tr>
<tr>
<td>5</td>
<td>—</td>
<td>40.6</td>
</tr>
<tr>
<td>6</td>
<td>—</td>
<td>33.9</td>
</tr>
<tr>
<td>7</td>
<td>—</td>
<td>28.4</td>
</tr>
<tr>
<td>8</td>
<td>—</td>
<td>23.7</td>
</tr>
<tr>
<td>12</td>
<td>—</td>
<td>11.5</td>
</tr>
<tr>
<td>16</td>
<td>—</td>
<td>5.6</td>
</tr>
<tr>
<td>21</td>
<td>—</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Note.—As emanation grows at the same rate as it decays; the last column also shows the amount of emanation which will collect in the radium solution during the interval after it has been pumped off, as shown in col. 1. Thus, in 3.85 days 50 per cent, will collect, while it will take 21 days for the amount of emanation to collect which will be approximately in equilibrium with the radium present in solution.
are, therefore, not expended on the skin and healthy tissues.

By burying radium the cells that require radiation are primarily and principally affected, and these cells protect the skin and healthy tissues by screening or filtering off from them the less penetrating rays. With the surface application of radium, or by using x-rays, the reverse is the case; the skin also receiving a greater dose than the deep parts because it is nearer the source of radiation.

For example, by using a soft and unscreened x-ray tube the skin may be burnt, while the deep structures being so effectually screened by the superimposed tissues may not be radiated at all.

In x-ray therapy this undesirable state of affairs is to some extent overcome by using a hard tube which will give off for the most part hard or penetrating rays; and also by interposing filters of various density and thickness according to the depth of the tissues to be radiated. The filter cuts off the soft rays which would otherwise act on the superficial structures alone. The same considerations obtained in the surface application of radium, with this difference—that the quality or penetrating power of the rays from a given amount of radium is constant. The $\beta$-rays (corresponding to kathode rays) and $\gamma$-rays (corresponding to x-rays) of radium B and radium C may be roughly divided, according to Rutherford, into three groups:

1. Very soft gamma rays, softer than the softest x-rays.
2. $\beta$-rays and $\gamma$-rays which will penetrate three millimetres of lead (or about three centimetres of human tissue).
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3. The very hard rays of radium C (which will not be stopped by several human bodies).

In treating deep structures by the surface application of radium, only group 3 can be used. Groups 1 and 2 are cut off by filters of three millimetres of lead, or about half that thickness of platinum. Surface application of radium is also very wasteful, as the rays go in every direction, and only about one-third of them would be directed towards the deep structure.

Filtering is also necessary when radium is buried, that is, when one of two tubes containing anything from 25 to 400 milligrammes of radium are inserted in the tissues, as should the soft rays not be filtered off the parts nearer the tube will be greatly over-exposed if the more distant parts are to be sufficiently radiated.

The deduction I wish to draw from these considerations is that:—*All filtering in radio-therapy is simply and solely a method of obtaining uniformity of radiation.*

---

**Fig. 1.**

Diagram of a tumour treated by unfiltered rays from an x-ray tube. The softer rays are stopped by the skin and superficial tissues, which are over-exposed, and do not reach the tumour, which is under-exposed.

**Fig. 2.**

Diagram of a tumour being x-rayed, with a filter in use to cut off all but the hardest rays. There is greater uniformity of radiation than in Fig. 1. The skin that is nearer the anode still receives a larger dose, per unit area, than the tumour.
By Mr. W. C. Stevenson.

Fig. 3.—Diagram of a tumour radiated by (a) a radium or emanation tube in platinum case, with wall 2 mm. thick to cut off all but the hardest gamma rays of radium C; (b) a tube which will allow beta rays and the gamma rays of radium B to pass. Radiation will not be uniform. If the tubes are left in long enough for the tumour to be sufficiently radiated by (a), there will be over-exposure from soft rays round (b) in the area indicated by heavy lines. If (b) were filtered to the same extent as (a), there might still be sloughing round both tubes, though, at the same time, it would be possible for the periphery of the tumour not to be sufficiently radiated.

Fig. 4.—Tumour treated with six emanation needles placed parallel to and within "soft ray range" of one another. Much greater uniformity of radiation is obtainable than in Fig. 3, without screening off and wasting any of the rays it is possible to use. The softest beta and gamma rays, which it would be impracticable to use without local over-exposure, are intercepted by the 0.3 mm. steel walls of the needle. An almost perfectly uniform radiation of the tumour can be obtained by withdrawing the needles and reinserting them in intermediate positions. This procedure, which is quite practicable with fine needles, is hardly justifiable when the incisions necessary to bury comparatively large tubes have to be made at frequent intervals of time and space.

Filtering or screening is not an ideal method of obtaining uniformity of radiation, because the intensity of radiation is, approximately, inversely proportional to the square of the distance from the source of radiation. It is not an economical method, as it cuts off the soft or generally considered "injurious rays" which compose a large proportion of the total rays given off by radium B and radium C. It is not economical either, because these soft rays are the most active therapeutically. Every x-ray worker knows the reaction of the skin produced by a soft tube. This reaction is undesirable in a healthy skin.
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which we do not want to treat, but it is just what is required in diseased cells which we do want to treat.

There is no innate objection to using soft rays, as they are employed in a routine manner for surface conditions. In addition, as pointed out by Professor Joly, it is probable that hard rays do most of their therapeutic work by means of secondary soft $\beta$-rays, which result in the cells they traverse.

If it is a fact that screening is merely a method of obtaining uniformity of radiation, and if soft rays are not in themselves injurious, it is obvious that they may be utilised legitimately, provided that there is not over-exposure near the source of radiation, i.e., that uniformity of radiation is secured. It is obvious, also, that a technique which will allow the soft rays to be used will greatly increase the therapeutic value of a given quantity of radium. The principle of such a technique is the use of a number of sources of "illumination."* 

I shall briefly contrast the method of burying radium or radium emanation in general use with that which I have been employing for the last ten months, as described in the British Medical Journal, July 4, 1914. In the former, one or two tubes containing at least twenty-five milligrams of radium, usually a great deal more, or an equivalent quantity of emanation, are buried. In the latter, six, twelve, or any number suitable for the size of the tumour, of fine serum needles, each containing four or five milli-curies of radium emanation in glass capillaries, are utilised. In the former, the soft rays are wasted; in the latter, they are not only not wasted, but play an important part in the treatment. In the former, uniformity of radiation is

obtained by screening off the soft rays; in the latter, by using a number of sources of radiation within "soft-ray-range" of one another (the very soft rays of group (1) are cut off by the walls of the needle—that is, by .3 mm. of steel). I may add that in the former method the patient has usually to be anaesthetised and an incision made into the tumour (a procedure which is not without risk of causing dissemination). In the latter the skin is only punctured by fine needles which transfix the tumour, and the patient can immediately go home with the emanation needles in situ.

Quite apart from theory, my cases have convinced me, at least, that a great deal of good can be done in malignant growths by the use of such small quantities of radiant matter as would be of little service if other methods were employed. The general opinion expressed by those who work with radium is—that very little can be effected in the treatment of malignant disease, excluding superficial conditions, with less than fifty milligrammes of radium. I have never used more than twenty-four millicuries. Some of the patients are present, and I have lantern slides illustrating other cases. As the Royal Dublin Society were good enough to supply me with the emanation to investigate a new technique, I am particularly glad to have this opportunity of letting the Surgical Section of the Royal Academy of Medicine in Ireland judge of the efficiency, or otherwise, of this method of dealing with cancer. I value the kindness of members of the various hospital staffs for opportunities of treating their inoperable cases with emanation needles, which treatment I have carried out in several Dublin hospitals, though most of my work was done at Dr. Steevens' Hospital. I am much indebted to Professor M’Weeney
for his histological reports on the cases, as an independent opinion as to whether the tumour was malignant or not increases the value of the investigation of this technique for treating cancer.

The method of radium treatment affects us somewhat intimately in this city; as you are aware the Royal Dublin Society, aided by the munificence of some of our citizens, especially Lord Iveagh and Sir John Griffith, have recently started a radium institute for supplying emanation to the medical profession in Dublin. We are also very fortunate in having Mr. R. J. Moss, the Registrar of the Society, who has taken unlimited trouble to devise and make suitable apparatus for collecting emanation in fine capillary glass tubes, which he makes himself, to fit the fine needles used, and fills with emanation. Personally I am most grateful to him for his invariable kindness and for the great interest he has taken in the work.

The price the Radium Committee have at present fixed for emanation is four pence per millicurie for free hospital patients, and one shilling and sixpence per millicurie for private patients.

If the result of the technique which I have been employing appeals to others, the cost of treatment will be less, and more patients can be dealt with.

Emanation is so valuable that I endeavour to keep it in constant use until it is practically exhausted. For instance, in a case of cancer of the cervix uteri with involvement of the vagina, I have used an initial dose of twenty-four millicuries in six needles for four days. I leave them in the first position, usually the posterior lip, as it is the hardest to get at, for twenty-four hours; in the anterior lip for thirty hours, and lastly, in the vaginal wall for forty hours. The emanation will be reduced by that
time to twelve millicuries, so that the patient would receive an average dose roughly equivalent to 18 milligrammes of radium for ninety hours, or 1,620 milligramme hours. I have then used the same needles for malignant glands, or a large rodent ulcer, for two days, and for a small rodent ulcer for two more; so that the capillaries are in constant use for eight days, until only five millicuries remain. Frequently, when treating such a structure as the cervix, I collect the capillaries a week old into a cannula and insert it into the os uteri, using them for three or four days longer.

As an example of the ordinary method of using radium I may say that when I visited the Middlesex Hospital last February and March they were using as one dose 144 milligrammes of radium in three platinum tubes inserted into the cervical tissue, after incision, for twenty-four hours. A case of parotid sarcoma which I reported in The British Medical Journal, and which did very well with the needles, has a recurrence, mostly in the glands of the neck. She went to the Radium Institute, London, recently, and Mr. Pinch, the Director, tells me he is using 400 milligrammes of radium by surface application with her. I never used more than twenty-four millicuries, and only that much on one occasion. When I saw her last April she could not separate her teeth, and in less than two months afterwards the patient could open her mouth normally, and the tumour was hardly noticeable. I simply wish to point out that in this case, so far as I went, and in a number of others, very encouraging and definite results were achieved.

From the practical point of view needles are most convenient to work with, as they are so easily inserted, withdrawn, and re-inserted. The dose, which of course is a
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matter of experience, is under perfect control. A short capillary tube and needle are used for a tonsil or palate; long ones for a large tumour. The béte noir of radium treatment is over-exposure. This risk is at a minimum when only small quantities of emanation are used in each needle, as there is a considerable margin of safety in the length of exposure. It is somewhat like comparing the latitude of exposure which is permissible in taking a photograph in a very strong sunlight and in a dull diffuse light—in the one case the exposure must be measured in tenths of a second, while in the other half a minute might not make any great difference.

The exploring needle is charged by slipping the capillary glass tube containing emanation into it and then placing the needle in a dish of melted hard paraffin. The needle is taken out, its outside wiped, and the paraffin allowed to set inside. The needle is then examined with a fluorescent screen to make certain of the position of the capillary, which should be towards the sharp end, and to see that it has not slipped out, as sometimes happens with a new needle. I use a glass tube of willemite to see the glow, but have found that the needles immersed in boric or carbolic lotion, or if placed on a white marble table, will show fluorescence also.

The needles are then inserted into the tumour parallel to one another, and not more than one inch apart, usually a good deal closer. The time the needles are left in depends on the size of the tumour, the amount of emanation in each capillary, and the distance apart; but is independent of the number of needles used if the area is correspondingly larger, because using more needles at the same distance apart simply means that a larger area is being treated.
The treatment and dosage are best illustrated by briefly citing Mr. B.'s case. He had malignant polypi of the nose removed by Mr. Graham on March 17, 1914, when the growth was microscopically examined. It recurred in the antrum, the anterior wall of which was removed on April 21 last. The tumour continued to grow, and when first seen by me on June 27 projected forward to the level of the bridge of the nose. Mr. Graham told me it had grown very much since he had dismissed him, three weeks' before, after informing him that nothing further could be done for him surgically. The tumour was hard, immovable, and about the size of a plum, and caused proptosis of the eye. He had glands at both angles of the jaw, those at the left side, which were the larger, being about the size of a hen's egg. A few days before I saw him the patient lost a pint of blood from the nose. For a month he had been taking opium every night. He was losing flesh, was cachectic, very weak and depressed, and obviously going rapidly down-hill.

The following Table will give an idea of the treatment he received:—

<table>
<thead>
<tr>
<th>Date</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 27</td>
<td>The first séance in the face reduced the tumour appreciably, and almost completely</td>
</tr>
<tr>
<td>Date</td>
<td>Dose in MilliCuries</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>From</td>
<td>To</td>
</tr>
<tr>
<td>29th June</td>
<td>27th June</td>
</tr>
<tr>
<td>25th July</td>
<td>27th July</td>
</tr>
<tr>
<td>30th Aug.</td>
<td>31st Aug.</td>
</tr>
<tr>
<td>24th Aug.</td>
<td>23rd Aug.</td>
</tr>
<tr>
<td>18th Dec.</td>
<td>17th Dec.</td>
</tr>
</tbody>
</table>

Table III.—Showing Particulars of Dosage in Mr. B.'s Case of Malignant Polypus with Glands on both sides of the Neck and in the neighbourhood of the Left Lower Jaw.
relieved pain, so that the patient was able to do without hypnotics altogether. He was also able to read, which he appreciated very much, as he had not done so for several months. The needles, always buried at right angles to the skin and parallel to one another, were first inserted in an equilateral triangle, with its apex outwards. They were next arranged, six of them in a line 4.8 cm. long, immediately under the orbit, my object being to thoroughly radiate, and, if possible, inhibit the growth increasing upwards and pressing on the eye-ball. This I think I succeeded in doing most satisfactorily. This systematic radiation of a growing edge is only possible by the needle method, and is one of its great advantages.

The third insertion was in intermediate positions in the triangle. It will be noticed that in the second séance the needles were used for eight days consecutively, and the result was most beneficial in the reduction of the growth. The third séance was necessitated by some recurrence in the neighbourhood of the nose. The fourth because there was still a distinct lump, which had started to grow rapidly, near the eye in the neighbourhood of the nasal duct. As the six needles were inserted into an area of about the size of a sixpence they were left in for only ten hours on this occasion, and then for thirteen hours over the slightly larger area. Those who have looked at the patient just now can verify that the left side of his face and by the edge of his nose is distinctly less prominent than the normal side, and that there is no sign of a tumour apparent at present. The result was produced without any disfigurement, the entrance wounds not being noticeable, except on very close scrutiny. There is hardly anything to be felt in the original site of the glands in the neck, but there are the remains of some swelling which
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became evident about a couple of months ago in the neighbourhood of the left jaw.

Since the beginning of April, 1914, I have treated altogether twenty-two cases of inoperable malignant disease, viz.:

Four cases of cancer of the uterus; two cases of cancer of the breast; two cases with glands in the neck; one abdominal tumour; three cases of cancer of tongue, tonsil, and pharynx; two epitheliomata of the face; one parotid tumour; one lympho-sarcoma of the neck; four rodent ulcers; one epithelioma of the palate (with Dr. Murphy); and the case quoted above.

The misfortune under which I laboured was, that I had too many urgent cases and too little radium. Up to the beginning of this year I could procure only from fifteen to twenty millicuries once a week. In only one case did the treatment, as far as I can ascertain, do absolutely no good, and that was an angioma of the palate, on which treatment was carried out with Dr. Dempsey on a Mater Hospital patient. Although radiation was followed by a very marked reaction in this case, Dr. Dempsey tells me that no improvement at the site of the tumour followed.

In all the cases of uterine cancer, haemorrhage and discharge had ceased when the patient was last seen. A patient of Sir Andrew Horne's, whom I treated at Holles Street Maternity Hospital for extensive cancerous infiltration of the vagina and cervix, improved wonderfully both locally and in general health. Sir Andrew Horne reported her case and showed the patient at the Clinical Club. Similar cases at the Rotunda and at the Meath Hospitals have done very well. All the patients have returned home and consider themselves cured, but they will probably require further treatment.
By Mr. W. C. Stevenson. 161

One case of glands in the neck, who, I thought, would never be able to leave Steevens' Hospital after an unsuccessful attempt to remove them, has returned to work after radium treatment.

I have showed the Section a patient who had a well-marked epithelioma of the tonsil, which is now replaced by scar tissue, and though he has a number of glands under his jaw he was able to resume work as a lighthouse-keeper.

Most of the other cases are still under treatment and, except a patient with epithelioma of his tonsil and pharynx, are greatly benefited by the treatment. This last patient has recently been treated, and up to the present has not shown much signs of improvement.

The different localities in which cancerous afflictions have been attacked show how convenient the method is. No surgeon would have had any hesitation in saying that the cases I have treated were quite beyond operative interference, and, indeed, they were sent to me as a last resort to see if, by radium treatment, anything could be done to relieve their distress. Under such circumstances, and with this small amount of radium available in Dublin, it seemed hopeless to expect dramatic results, but it is a great satisfaction to me to have been able to bring about the improvement and relief of pain exhibited in the patients whom I have brought down to this Section. Even though one cannot speak of cures of cancer, that I have prolonged some of the patients' lives I have no doubt.

One great advantage of this method is, that you can go on and on treating a patient and combating each accessible manifestation of the disease as it appears, and that without inflicting any undue inconvenience on the patient.

I may add that I have also used these emanation tubes.
for tubercular sinuses and disease of the carpus and tarsus. The patients were treated by other methods as well, but I think the radium hastened the cure.

The President said the paper opened up a subject which was only in its infancy, and every contribution to it was of great importance. The paper divided the subject into two parts—the technique and the character of the success or otherwise which attended the treatment of practically inoperable cases. He had no practical experience of the treatment.

Dr. C. M. O'Brien said he was indebted to Mr. Stevenson for the privilege afforded him of examining the cases exhibited, and also to Mr. Maunsell for a similar privilege. He suggested the advisableness of bringing these cases before the Section from time to time in order that the success or otherwise of the treatment might be followed. This was the only method by which trustworthy statistics of such cases could be produced, and he thought that the most that could be claimed for these cases was that they justified them in hoping on. The therapeutic use of radium entirely depended on its destructive power on cancer cells. The actual question of cure was, of course, outside the discussion. It was, he considered, no discredit to the method that although it had been used for ten months a cure had not been effected as every case was an inoperable one; but he thought it justified him in saying that the most that could be claimed for it in deep affections was hope. He suggested that there was no class of case in the whole domain of Medicine more discouraging as regards cure or treatment than those shown at that meeting. He thought that the method described was open to the objection that a cancerous growth was being penetrated, and that the patient might thus be exposed to the risk of the dissemination of cancer cells, but he admitted that the method exposed the patient to this danger in a lesser degree than any other method that he knew of.

Mr. W. I. de C. Wheeler said he thought the whole profession and the Academy must feel a debt of gratitude to Professor Joly and to Mr. Stevenson. His experience of
radium treatment extended to five cases—one was a spindle-celled sarcoma in which there was recurrence. Radium tubes were inserted, and the patient is now practically well. The second was one of parotid tumour, and the third was an inoperable tumour of the vulva. The fourth case was a sarcoma of the lower end of the tibia, which seemed to be unaffected by radium, and the leg had to be amputated. The fifth was an inoperable tumour of the breast, and Mr. Stevenson's method was applied to it. The patient, however, was lost sight of.

Mr. Murphy said he had treated two cases by Mr. Stevenson's method. The first was an extensive epithelioma of the edge of the palate. The specimen was examined by Dr. McWeeney. Five needles were inserted round the edge of the palate, and the sixth was put in crosswise. The patient was able to endure them for six hours, but refused to have them inserted next day. The patient, however, returned in a week's time, as he felt better, and asked for further treatment. In about three or four weeks after the first application more than two-thirds of the growth had disappeared.

The second case was that of an old clergyman who had cancer of the floor of the mouth. The glands were removed, and there was recurrence. Twenty millicuries were applied for five or six hours, and the patient has shown signs of improvement. The tongue was more moveable. A point about Mr. Stevenson's method as explained was that it appeared that the insertion of the tubes was done without an anaesthetic. It seemed to him (Mr. Murphy) that if the insertion was to be made inside the mouth some form of anaesthetic was necessary, as the pain caused was very great. In his cases he was afraid to use ether on account of the risk of coughing or vomiting on recovery, and that the needles might be disturbed. He suggested the injection of a few minims of a weak cocaine solution.

Professor McWeeney said, as a member of the Committee of the Royal Dublin Society entrusted with procuring a supply of radium, he took a deep interest in the results, and, by arrangement with Mr. Stevenson, he had obtained specimens of the growths. Four or five of them were typical squamous epitheliomata, and others were squamous sarcoma.
There could be no doubt as to the malignancy of the growths; he considered that they would have killed the patients speedily. He had not yet had an opportunity of examining them histologically after radium, but he had seen two microscopic sections cut from Mr. Maunsell's case, and they showed a most remarkable change.

He suggested that, of course, a very hesitating attitude must be adopted, and further results awaited before passing judgment on the matter; but he considered that the results showed clearly that, whatever the outcome might be, a great amount of suffering had been alleviated by the treatment. There was one thing that might, he thought, be said with certainty—viz., that the present contribution by Mr. Stevenson constituted a distinct advance in the surgical technique of the treatment of cancer carried out by these tubes with a small amount of emanation in each. At the same time, he wished to acknowledge the very great technical skill placed at their disposal by Mr. Moss, who devised the method of condensing the emanations at the temperature of liquid air, and having it sealed up in these tubes in determined quantities.

Mr. M. R. J. Hayes said he wished to endorse what Prof. McWeeney had said—viz., that they were very fortunate in having placed at their disposal the amount of radium which the Royal Dublin Society had. It would be hard to surpass the ingenuity displayed by Mr. Moss in devising an apparatus for collecting the emanation. The instructions covering the supply of the emanation stipulated that the supply should be used for the particular patient for which it was obtained, and not for any other case, and it seemed to him a pity that on this account a great amount of emanation should be lost, and he suggested that if the Society could make some arrangement by which this waste of emanation could be utilised in other cases it would be an advantage. Referring to the subject of the paper, he said if there was any type of case that one approached with misgivings or want of hope it was the type shown at that meeting, and in his experience he thought there was no case more hopeless to treat by any form of radiation, except by radium, than recurrence of malignant disease of the tongue.
There was one matter which he considered they should be definite about, and that was the question of dosage by emanation. In x-ray therapy this question had been definitely settled, and it was just as well to realise that the remedy (radium) in ignorant hands was dangerous, and unless some definite idea in the matter of dosage was formed as a guide he feared accidents would happen. He strongly urged the absolute necessity of fixing definitely what the dose should be in millicurie minutes.

Referring to the influence of the recuperative power of the patient on treatment, he had at present under treatment a case which had brought this home to him. The patient was aged eighty, and suffered from multiple rodents on the face. He had tried radium treatment, but so far there was no sign of cure, and he attributed the failure to two things—viz., the age of the patient and want of recuperative power.

He doubted if there was any danger of dissemination of cancerous cells by the introduction of the needles into the growth, as the destruction in the tumour itself was relatively small; and, moreover, he believed that as a result of the immediate effect of the radium emanation occlusion of the lymph channels took place, and it was, therefore, unlikely that dissemination of the growth would occur. He had experience of a case of sarcoma of the neck similar to one shown, which seemed to be a lympho-sarcoma, and the mediastinal glands were much enlarged. He declined x-ray treatment, and suggested radium, with the result that the patient appeared to have been cured. He thought that in Dublin they could not yet claim to have cured any cases as the time was too short; but in all these cases he was convinced that there was no method of treatment that could have been employed that could produce the amount of good that radium had achieved. He considered that there was not one of the cases then shown that would not have died within a few months had they not undergone the treatment, and now their lives seemed to be prolonged for a number of years, and this, he maintained, was something.

Mr. R. C. B. Maunsell said he wished to join in thanking Professor Joly, Mr. Moss, and Mr. Stevenson. He suggested to the Royal Dublin Society that before giving a
supply of radium, microscopic examination should be made of the growths, unless such a specimen could not be obtained. He considered it only fair that accurate records should be kept of the dosage and the time for which it was applied. No sensible surgeon could claim a cure by operation, because recurrence sometimes took place thirteen or fourteen years afterwards, and all that could be said was that they welcomed this method as the most rapid and promising thing that had come before the profession. Even if it never cured a case, he thought that cancer of the mouth clearing up and remaining so for some months was a promising thing. He suggested that it should be given a trial in early cases, and thought that by doing so no injustice would be done the patient, as the action was very rapid, and deferring operation for forty-eight hours, or even for several days, would do no harm. It was his intention to carry out radium treatment first in future cases, and to operate afterwards if necessary. In his cases the whole thing cleared up in twenty-four days, and he considered that even if the patients had waited that time much injury would not have been done.

Mr. Blayney said it had been learned that radium could apparently destroy cancerous cells, and that the place occupied was taken up by fibrous tissue. This process had already been pointed out as the natural devolution in cancer. It has been pointed out in cases of cancer of the breast the older and more central portion of the growth was replaced by fibrous tissue, or, in other words, that a spontaneous cure had taken place.

He did not consider that even in the case shown by Mr. Maunsell they were in a position to say that the radium had checked the outline of the cancer, or that it kept it from spreading in the glands. It might be that in radium they had an agent which hurried this process. It was known that the effect of radium on proliferating cells varied with the strength, and until the question of dosage had been settled one could not be sure in a case of early cancer whether the amount of radiation might not stimulate the cancer, and lead to more rapid dissemination. He did not think they were yet in a position to give up the surgical method of treatment of early cancer growths. He looked upon the results achieved
By Mr. W. C. Stevenson.

by radium treatment as marvellous, especially the case shown by Mr. Maunsell, and considered that even if it only achieved the relief of pain and suffering caused by such growths it had done a great deal. To reach the correct dosage—i.e., that which will destroy the cancerous cells—required a good deal of experiment, but if this destruction could be brought about it might act as an opsonin.

Mr. W. C. Stevenson, replying to the remarks, said the dosage was an extremely difficult problem in radium treatment, but he thought with the needle method one was more likely to get accurate dosage than by any other. In London, where large amounts of radium were used, a very few minutes might make the difference as to whether the case would do well or not. Referring to the vaccine theory, he said there seemed to be an idea that the products of radium had some effect on metastasis, and at the Middlesex Hospital it was said that definite effects were found on metastasis when the primary growth was radiated. He considered that with any ordinary length of exposure, and any considerable amount of emanation, such as he had been using, there was no tendency to increase the rapidity of the growth. What radium did had been well brought out by Mr. Blayney—i.e., it helped a spontaneous cure—and if a patient was too run down they could not react to bring about such a cure. As to the quickness of the reaction he thought when the soft rays were used they were more therapeutically active. There appeared to be a sort of opsonic effect from the disintegration of the cancerous cells. All his cases were perfectly hopeless, and some of them would most likely have been dead had they not been treated. He was aware that emanation had been used in London in one glass tube containing 80 millicuries, but this would necessitate much screening and considerable bulk. He did not think there was any chance of disseminating cancer by the insertion of the needles. He had latterly used coacain on mucous membranes as a local anaesthetic, when inserting needles, but never as a general anaesthetic.
CANCER OF THE TONGUE AND FLOOR OF THE MOUTH TREATED BY EMANATIONS OF RADUIM.

By R. CHARLES B. MAUNSELL, M.B., F.R.C.S.I.; Senior Surgeon to Mercer's Hospital, Dublin.

[Read in the Section of Surgery, January 29, 1915.]

Treatment by means of radium is yet in an experimental stage, and all properly observed cases should therefore be recorded. If further reason were necessary for bringing the subject forward, I need only mention the fact that reports from many workers specially draw attention to the hopelessness of the treatment of cancer of the mouth by means of radium applied by any of the previously known methods. I think I am also right in stating that this is the first case which has been recorded of the disappearance, to clinical examination, of an extensive cancer of the tongue and floor of the mouth by any method of treatment other than excision.

The method of treatment adopted is that which was originally and ably described by Professor John Joly and Mr. W. C. Stevenson (The Medical Press and Circular, March 11th, 1914), and consists in the introduction into the diseased area, by means of ordinary hollow metal needles, of known quantities of radium emanations, without screening of any kind. The glass tubes and needles can be made of various lengths to suit individual cases.

For intra-oral work I have had special needles made with
an eye instead of the mount at the end, so that they may be held in position by a suture. Other long needles I have had made, with blunt, occluded points, for use in deep situations, where sharp needles might injure large vessels or nerves. These needles were made for me by Messrs. Fannin & Co., of Dublin. The radium emanations used in this case, as in all my other cases, have been supplied to me, through the kindness of Mr. R. J. Moss, from the Radium Institute, recently established by the Royal Dublin Society.

Notes of the Case.

October, 1914.—P. L., aged sixty-one, was sent to me by Dr. J. A. M'Kenna, of Ballylinan, to see whether any operation could relieve his distress, as it was obvious that no curative operation would be possible.

The patient stated that in April, 1913, he first noticed a hard nodule on the under surface of his tongue, to the left side of the frenum. This hard area gradually increased, and for some months it had ulcerated and spread rapidly, causing much pain locally, and in his left ear and in the left side of his head. The patient looked thin, and was obviously cachetic.

Local examination showed that all his incisor and premolar teeth in the lower jaw were carious, ragged and extremely septic. When the tip of the tongue was turned up an extensive ulcerated area could be seen, reaching from close to the right margin of the tongue across to and involving the left margin in the middle third. The frenum was completely destroyed, the tongue being dissected from its anterior attachments by the ulceration. The floor of the mouth, over an area exactly corresponding with the disease on the tongue, was also ulcerated right up to the muco-periosteum of the jaw. The whole ulcerated area had the typical appearance and induration of an epithelioma. Glands could be felt, slightly enlarged, in the left submaxillary region.
I removed a piece of the edge of the ulcer, under local anaesthesia, and submitted it to Dr. Wigham, at the Pathological Laboratory of Trinity College, who reported as follows:—

"The section consists of masses of cancer cells lightly supported by fine strands of connective tissue. A small patch of epithelium appears to be directly continuous with cancer masses situated below it. The cancer cells are large, oedematous-looking cells, mostly of the squamous type, which show many mitoses. It is undoubtedly an actively growing cancer."

Owing to unavoidable causes the Royal Dublin Society could not supply emanations until December 1st, by which time the cancer had spread further and the glands were obvious in both right and left submaxillary regions.

On December 2nd I inserted six needles which contained 25 millicuries of emanations at the time of insertion. I may here state that all the doses mentioned in this paper were calculated, allowing for the known rate of leakage, before insertion. Of the six needles two short ones were inserted into the tongue, one on either side of the former position of the frenum; the other four, longer needles, were pushed up through the skin in the submental region, until the points could be felt in the floor of the mouth. All these needles were withdrawn in 23½ hours. On December 4th the four longer needles, containing 11 millicuries, were inserted in submaxillary regions. These were removed in 24 hours. On December 6th six needles, containing 11 millicuries, were again inserted, four being placed in the tongue and two in the floor of the mouth. These were removed in 24 hours.

When inserting the needles in the mouth a light ether anaesthesia was maintained.
The only reaction noted was an evening rise of temperature to 100° on the first two occasions on which the needles were introduced intra-orally.

Within a few hours of the first introduction of the needles the neuralgic pains in the ear were relieved. Within forty-eight hours the growth felt softer and looked less fungating.

On December 18th, the submaxillary glands on both sides were very much diminished in size.

On December 24th, twenty-two days after the beginning of the treatment, the whole cancerous area in the mouth was covered over by normal-looking epithelium, but an examining finger could still feel considerable induration. On this date I had the patient anaesthetised, had the carious teeth removed, and inserted six needles, containing 24 millicuries, four being placed in the tongue and two in the floor of the mouth. These were left in for 24 hours.

On this occasion there was no reaction observed.

On December 28th the patient went home to the country to transact some business, and returned to me on January 18th, 1915, looking and feeling in the best of health and spirits. Nodules of subcutaneous infiltrations could be felt at the site of the needle punctures, but the glands could not be distinguished. The cancerous area in the mouth looked perfectly healthy, but was still firm to the touch, like the scar after an extensive excision of the tongue.

On January 23rd, I inserted six needles, containing 12½ millicuries, in the upper part of the anterior triangle of the neck on the left side, two being driven through the origin of the sternomastoid muscle, in order to radiate the glandular area behind the angle of the jaw. These needles
Cancer of the Tongue and Floor of the Mouth.

were withdrawn in twenty-four hours. On January 26th, six needles, containing $\frac{8}{2}$ millicuries, were inserted in the lower part of the posterior triangle on the left side. On January 27th, five needles, containing 12 millicuries, were inserted in the upper part of the neck on the right side in a similar manner to those on the left side. These needles were taken out on January 29th, having been in position for 48 hours.

The present condition, fifty-eight days after the commencement of treatment, is as follows:

He is free from pain, and shows no clinically demonstrable sign of cancer. His speech is somewhat thick, as his tongue is held down by cicatrisation, which also causes the floor of the mouth to feel somewhat indurated.

On January 23rd—that is fifty-two days after the first introduction of radium emanations—I removed a small piece from the under surface of the tongue, taking care to cut across the edge of the sunken area where the cancer had been. This specimen I submitted to Dr. Wigham, who reports as follows:

January 28th.—"Over the previously cancerous part the epithelium is scarcely to be distinguished from the neighbouring normal surface layer; it is, however, thinner in some places, and the papillae are rather flatter. Immediately below the surface epithelium is a layer of fairly firm fibrous connective tissue with many vessels and some patches of small round cells. Embedded in this fibrous tissue are many isolated striped muscle fibres, some of which show marked degeneration, and occasionally only appear as necrotic masses with ill-defined nuclei. There are also present, even in the part which had previously been cancerous, several collections of mucous glands with their ducts, in places surrounded by small cell infiltration. In
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one spot, near the cut end of the section, there is a small mass of cancerous cells, differing from those of the former section in that the bodies are much smaller in proportion to the size of the nuclei. There are no mitoses, and the cells are surrounded by giant cells, of the foreign body giant cell type, consisting of large masses of protoplasm in which many nuclei are embedded. The nuclei of the giant cells are distinctly smaller than the nuclei of the cancer cells."

It is obvious to any surgeon who has examined this patient, that a very short course of treatment has removed pain and ulceration, without danger or mutilation, in an otherwise distressingly hopeless case; whilst, to those who have compared the microscopic sections, expressions of hope for the future will be moderated by caution, for, although the previously ulcerated area is covered by normal epithelium, and large masses of cancer cells have disappeared, and there is unmistakeable evidence that other cells are being destroyed and removed, yet there are some still present, and only careful observation can guide us as to our further action.

Further Note.—On the day following the reading of this paper, I introduced sixteen millicuries, in six needles, into the tongue, in the vicinity of the part from which the section had been taken. These needles were removed in 44 hours. A month later I saw the patient again, and he appeared to be free from any sign of disease, either in the mouth or neck.

April 26th.—The patient returned to hospital on 21st inst., looking weak and anaemic. He stated that on the 4th inst. he had a severe attack of haemorrhage from his mouth, and several recurrences during the following week. Upon examination the tongue and neck appeared all right, but on
lifting up the tongue a cavity as big as a pigeon's egg was seen in the floor of the mouth on the left side. This cavity was full of soft, grey slough. I scraped out the slough with a blunt gallstone scoop, and have irrigated the cavity twice daily since. The patient is now taking his food well, is feeling and looking almost all right again, and the cavity is gradually filling in with granulations. I do not consider that any recurrence of the cancer has taken place, but I attribute the haemorrhage to the sloughing, and it is obvious that the last dose of radium might have been omitted or at least the period of application considerably reduced.
THE ROLE OF THE HIGH FREQUENCY CURRENT IN THE TREATMENT OF TUMOURS OF THE BLADDER.

By ADAMS A. McCONNELL, M.B., F.R.C.S.I.; Surgeon to the Richmond Hospital, Dublin.

[Read in the Section of Surgery, February 26, 1915.]

This communication is to be regarded in the light of a preliminary report, as the number of vesical tumours I have treated by the high frequency current is small, and of these some have not yet been under treatment for a time sufficient to produce a definite result.

The results I have obtained, however, bear out the conclusions formulated by those who have had large experience in this method of treatment, and they indicate the possibility of obtaining a permanent and complete cure in cases which, until recently, have been most unsatisfactory, both from the point of view of the surgeon and of the patient.

Case I.—A labourer, aged fifty-six, who came to the Richmond Hospital in February, 1914, complaining that for some months he had been troubled with frequent and urgent micturition, especially at night, and on two occasions had passed a small quantity of blood in the urine. Cystoscopic examination revealed a typical villous papilloma, situated immediately above the orifice of the left ureter. It covered an area of the bladder corresponding in size to half-a-crown. The growth appeared to be pedunculated, and there was no evidence of infiltration of vesical wall. The prostate was not enlarged.

On February 19 I began to treat the tumour with the
high frequency current, and I repeated the treatment a fort-night later. There was no appreciable difference in the appearance of the tumour. The third application was made on March 12, and that night the patient came to hospital suffering from complete retention of urine. A large catheter was passed, and several clots washed out of the bladder. Next morning when I saw him he was suffering from the same condition. I passed an alligator forceps and withdrew several firm blood-clots. What apparently had happened was that a portion of the tumour had been burned, and on separation left a bleeding point. After this I carefully inspected the tumour after each application, and if I saw any bleeding I applied the spark to the point; in all cases I succeeded in stopping the haemorrhage.

On March 19 and 26, I repeated the treatment. The tumour was then considerably smaller than when I first saw it. I then told the patient to come back in a month's time. I next saw him on May 14, when the tumour had lost all its villi, and was represented simply by a small nodule about the size of a pea. I applied the current to this for about half a minute.

A fortnight later the nodule was reduced in size by one-half. I let the current run for about sixty seconds. When I examined the patient on June 11 the only vestige of the growth remaining was a small scar occupying its original site. Since then I have examined the patient three times at intervals of two months, and there has been no recurrence. The frequency and urgency of micturition disappeared altogether after the third application and have not returned.

Case II.—The patient, a farmer, aged thirty-five, had been operated on a year before, and multiple papillomata covering practically all the mucous membrane of the bladder removed by the suprapubic route. He returned to hospital in the middle of July, 1914, suffering from profuse haematuria. On July 27, I spent nearly an hour trying to get the bladder sufficiently free of blood to inspect the intravesical condition. The whole surface of the bladder was covered with papillomatous growths, the villi of adjacent growths interlacing, and giving the appearance of one large
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tumour. I applied the current eleven times for ten seconds each. The fluid in the bladder became fogged, and I was forced to stop. On August 7 I gave the tumour nine applications of twenty seconds each; it was still bleeding, but not so profusely as at first. Again, on August 13, I repeated the treatment, giving three applications of fifteen seconds each and seven of twenty seconds. I simply buried the electrode in the tumour, and where I saw bleeding points there I directed the current. After this—the third time of treatment—the bleeding stopped, and the patient, who was considerably exsanguinated, rapidly improved in appearance and in general health. Soon after this he left hospital, and I lost sight of him. The next I heard of him was that he had been operated on and survived only for a few days.

Case III.—An engine-driver, aged forty, fat, flabby and short-necked, who had been suffering from attacks of profuse haematuria, was admitted to hospital as Mr. Conway Dwyer’s patient. He was very anaemic as a result of the copious bleeding. On September 22, after spending over an hour washing out blood and pus, I succeeded in discovering a large tumour covering the whole base of the bladder. The cystoscope ran easily into the middle of it, and it was impossible to determine its point of origin; moreover, the fluid in the bladder rapidly became fogged, increasing the difficulty of diagnosis. The villi of this growth were short and stunted; this appearance, combined with cystitis (which was not due to instrumentation) made me strongly suspect the tumour to be malignant. However, the anaemic condition of the patient rendered it necessary to make some attempt to check haemorrhage, as any surgical procedure would have been fraught with grave danger. With this end in view, Mr. Conway Dwyer asked me to treat the case with the high-frequency current. On September 22, I gave the tumour six applications of twenty seconds each, and repeated the treatment on an average once a fortnight.

After he had been treated twice the bleeding stopped and has not returned. From that time the periods of individual applications were not determined by the watch, and I merely allowed the current to run here and there over the tumour.

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for ten or fifteen minutes in all, keeping the electrode at one point till that part became white. This patient is still under treatment. He has quite recovered from his anaemia, the cystitis has disappeared, and on February 1 the tumour, instead of occupying most of the bladder, had dwindled down to a growth apparently about the size of a hazel-nut, with its pedicle attached just above the opening of the left ureter. An interesting point is that when the tumour diminished in size a well-marked diverticulum was revealed just behind it.

I examined the patient on Monday last, and found that I could get the whole growth into the cystoscopic field; hitherto I had not been able to see more than a small portion of it at a time.

Case IV.—A tradesman, aged thirty, healthy and well built, who had been operated on in May, 1914, and a single tumour of the bladder removed supra-pubically, returned to hospital in October with an acute epididymitis. When the latter complaint had been treated, cystoscopic examination was made in order to determine the presence or absence of recurrent tumours. Though the patient had had no symptoms since the operation, four papillomata were found—one large one on the trigone in the middle line, and three smaller growths on the right side of the bladder.

I began the treatment of these growths on October 5, 1914, and have been continuing it at fortnightly intervals ever since. On Monday last I could find three of these growths considerably reduced in size, and the fourth had almost disappeared. These four cases illustrate some of the spheres of usefulness of the high-frequency current in the treatment of vesical tumours. The current may be used as a method per se or as an adjunct to operative procedures.

The first case illustrates the curative effect of this treatment. I would suggest that it is the simplest, safest, and most efficient method of treatment for tumours that are to all appearances benign in nature, and of relatively small size, and for those occurring in patients who are not good subjects for an anaesthetic. To analyse these
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statements we must compare this method with the ordinary method of removal by operation. The latter entails an anaesthetic which, in itself, is often the most serious part of the procedure, especially in patients of the fat, plethoric, thick-necked type, such as Case III. High-frequency current treatment can be carried out in all cases without a general anaesthetic; in the majority without even local anaesthetisation. Again, by no operation known to me can a surgeon be certain that some of the cellular elements of the growth are not left behind, later to become adherent to the vesical mucous membrane and to form the nucleus of one or more recurrent tumours, as had happened in two of my cases. That such a sowing of neoplastic elements does result in the growth of multiple tumours cannot be doubted by those who have watched the post-operative course of many cases. The point of recurrence is not necessarily at the site of the original tumour, but may be elsewhere in the bladder. Whether the action of the high-frequency current result in so-called desiccation of the growth, or whether it be analogous to cauterisation, the result is that the fragments of the tumour are necrotic before they separate, and, therefore, are not likely to be grafted on to healthy mucous membrane and originate a new growth. By operation, a tumour may be removed rapidly; the high-frequency treatment is slow. In my first case the patient underwent treatment seven times in the course of three and a half months, but each application lasted only from 10 to 15 minutes.

This form of treatment is, I think, the only one which can afford relief to patients with inoperable carcinomata of the bladder.

While in America I saw several cases in which the
symptoms were greatly alleviated; pain had disappeared, and haematuria had been absolutely checked. The carcinomata were not cured, but the patient was relieved. It is, however, as an adjunct to operation that I consider the high-frequency current most clearly indicated. The tumour should be removed surgically, and afterwards the bladder examined with a cystoscope every month for some years; and any recurrence treated immediately with the current. By such a routine procedure the recurrent tumours can be dealt with when of minute size; and one application of the current is sufficient. In this regard I have to emphasise the fallacy of waiting for symptoms before making a diagnosis of recurrent neoplasm. One of my patients had four growths of considerable size three months after an operation for a single papilloma. He was to appearance absolutely well, and had no urinary symptoms whatsoever. A surgeon is optimistic who says that an operation for vesical papilloma is successful because the patient has had "no trouble" six months or a year afterwards. The symptoms of tumours are complications of tumours, and no one is justified in asserting the absence of a growth until the bladder is examined cystoscopically. We have no data to guide us as to how long a vesical papilloma may be present before symptoms arise; after operation the onset of symptoms may be long deferred.

As after-operation, the high-frequency current has its sphere of utility; so may it be of extreme value before operation. Case III. illustrates this point amongst others. The patient was very anaemic, and cystitis was present. In the course of two months an operation might have been performed with relative safety.

We may sum up, therefore, by saying that the rôle of the high-frequency current consists—first, in its employ-
ment as a curative method in small tumours, and as a palliative method in malignant growths; secondly, combined with surgical procedures both as a means of preventing a recurrence after operation and as a method of preparing the patient for operation.

The technique is simple. The 200-volt city current is led to a transformer, where it is reduced to 100 volts, and from this to the high-frequency machine, which gives off a unipolar spark. This is conducted by a heavily-insulated fine wire through a catheterisating cystoscope into the bladder. It is wise to have rubber pads under the feet of the table to insulate the latter. The operator should also wear gloves for the same reason. I have often got an electric shock by touching the patient or the cystoscope with the naked hand. The end of the electrode is pushed into the substance of the growth and the current turned on. Immediately one sees bubbles appear.

In my earlier cases I adhered strictly to what had been written on the subject and only allowed the current to run for 10 to 20 seconds at each part of the growth. Now I keep it going until the part in contact with the electrode becomes white. The electrode is then applied to another portion of the growth, and so on until the whole mass is treated. The point of the electrode often sticks to the growth, and it is then necessary to withdraw it somewhat to free it before passing on to another point. One often sees considerable portions of the growth become necrotic and come away adherent to the electrode. An interval of ten days or a fortnight is left between each application in order to allow the necrotic portions of the tumour to separate. Large growths, however, I usually treat once a week, as one can always find parts that have not been thoroughly cauterised before. If it is possible to apply
the electrode to the base of the growth the time is greatly shortened, as the whole tumour may slough.

The only precaution necessary is to see that the electrode is not applied to the normal vesical mucous membrane—for cases of perforation of the bladder have been reported. When the normal bladder is touched the patient feels it and promptly says so. For this reason it is better not to give an anaesthetic. If the passage of a cystoscope gives pain a few cubic centimetres of a 4 per cent. solution of alypin, or a discoid 1½ grain of alypin deposited in the posterior urethra renders the patient quite comfortable. The bladder is always washed out before treatment and filled with sterile water; it is again washed out after the operation to remove any pieces of growth. It is not necessary to keep the patients in hospital. My patients come up, stay half an hour for treatment, and go home again. In private cases, the whole process can be completed in the consulting-room.

In conclusion, I would point out the necessity of cystoscopic examination in all urinary affections for the purpose of excluding tumours. All tumours of the bladder tend to kill. Tumours, therefore, must be first excluded from our diagnosis.

The President said he believed this to be the first communication on the treatment of the bladder by this method, and if the treatment fulfilled all it was likely to fulfil it would bring about a revolution in bladder cases. The surgical treatment of these cases was not satisfactory, and no matter what method was adopted one was never certain of the complete removal of these tumours. All would, he thought, admit that removal of tumours on the inside of the bladder was not a class of case they liked dealing with. He recollected, some years ago, removing a villous tumour from the
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bladder, and was very dissatisfied with the operation; but the patient never had a recurrence. In another case, where it was considered that the tumour had been removed with a fair amount of completeness, there was recurrence.

Mr. Pringle recalled a paper brought forward by him some years ago on the trans-peritoneal method of approaching bladder tumours. At that time it was felt that there was a difficulty about working at these tumours, and it was proposed to open the bladder well in order to see what was being done, and a great advance was made. He had brought forward a case of trans-peritoneal removal of tumour in the bladder, but a year afterwards the patient came back with six tumours. The operation was very nice, and there was perfect control, but still cells seemed to become detached. He had treated one patient by this method whose tumour occupied practically two fields of the cystoscope, and it was now over a year since the treatment, and there was as yet no recurrence. The treatment did not disturb the patient, and did not cause pain. He would advocate its use in all cases of clinical epithelioma as a curative measure, not as a pre-operative method.

Mr. C. A. Ball congratulated Mr. McConnell on the intravesical photographs shown. On one occasion he removed a tumour with the intention of sparking a recurrence if it took place, but no recurrence had taken place, although the case was one in which recurrence was to be expected as the tumour was proved to be malignant. With regard to the question of recurrence of these tumours after operation, he mentioned a valuable suggestion—i.e., washing out the bladder with an antiseptic strong enough to kill any cells that may be left after the removal of the tumour. This, he thought, might diminish the possibility of recurrence. Observation sometimes suggested that these tumours grow rather slowly. He recalled one case in which the bleeding first occurred five years previously. In another of his cases the patient bled two years previously, and again twice at the end of two years, and the tumour in this latter case was scarcely the size of a walnut. He considered that a tumour might be present for a long time before it produced bleeding.

Dr. Crofton asked if radium tubes had been used for
treatment these tumours, as it struck him that they might be malignant.

Mr. Blayney joined issue with Mr. Pringle as to the ease of the trans-peritoneal operation. The ease depended upon the constitutional habit of the patient. If the patient was thin it was easy enough, but in a fat subject it was a difficult procedure, and the suturing was difficult. He considered that the high frequency method should be recognised as the one for dealing with papillomatous tumours.

Mr. McConnell, replying, said the method had some disadvantages—the principal one being that one could not assert definitely by cystoscopic examination whether a tumour was malignant or not, and to use the method for malignant tumours would be criminal, except that it was considered that operation was not feasible. In all cases where the diagnosis could not be made sure of the patient should be operated upon. The method was a slow one, but he hoped to shorten the time in future by following his own method. He thought the right procedure would be to cook the tumour all over, until it was white, at one sitting. This he intended to do in future. He had seen Young operate on many tumours (he used the apparatus before operation), and his procedure was the trans-peritoneal for tumours anywhere in the bladder, except in the vicinity of the ureters or trigone. He considered that the difficulty in the practice of this method was to keep the intestines out of the way. He had not so far used any apparatus to fix the cystoscope and camera in position, but he was making arrangements to do so. The real value of the photographs was to show the position of the tumour and its extent. He thought the amount of bleeding was not in proportion to the rapidity of the growth. It was, he suggested, as important to look for the tumour afterwards as to operate in the first instance. Radium tubes had been used for these tumours. He recalled a case treated by the high frequency current in which the tumour recurred and became malignant. The patient was then treated with radium which eased the symptoms, but a cure was not claimed.
THE LOCALISATION OF MODERN PROJECTILES, WITH REFERENCE TO A SPECIAL METHOD OF SURGICAL TECHNIQUE IN THEIR REMOVAL.

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At the present time, when every Hospital Surgeon has had, or will have, some of our wounded soldiers under his care, one of the questions of the moment is the accurate localisation of modern projectiles, whether they be rifle bullets, shrapnel bullets, or fragments of shell casing.

This would, therefore, appear an opportune time to bring under the notice of the section some conclusions based on nineteen years' experience of special study in this branch of work. It is just nineteen years last February since I had the pleasure of starting "x-rays" under my revered teacher, Professor George Francis Fitzgerald, and shortly afterwards I had the privilege of introducing to many members of the medical profession in Ireland the application of "x-rays" in medicine and surgery.

During the course of this experience, it has been my lot to examine by "x-rays," and treat surgically, a large number of gunshot and rifle bullet wounds, both in civilian and military cases, as well as a number of shrapnel wounds from the South African War—in which
war, I am proud to think, I had a number of "x-ray" pupils who did good work.

My first "x-ray" pupil, Col. Battersby, R.A.M.C., was also the first military surgeon to apply "x-rays" successfully in a large number of cases wounded at the battle of Omdurman during Lord Kitchener's campaign in Egypt. The first Mackenzie-Davidson localiser to be actually used in warfare, and thus used by him, I have the honour to exhibit here to-night. (See Plate II.; right hand top instrument).

As the result of experience in gunshot wounds, certain conclusions force themselves on surgeons and "x-ray" workers alike, which may be summarised as follows:

1st. That the removal of a metallic "foreign body" often proves a much more difficult operation than it would appear at first sight, especially when viewing a good "x-ray" negative, which shows clearly the shadow of the "foreign body." This may arise either from the fact that the method adopted for localisation was not sufficiently precise or that the surgeon under-estimates the difficulty of removal, being deceived by the apparent clearness of the skigrams. I have only to quote the oft-repeated illustration of a quest in pursuit of the "elusive needle" hiding itself amongst tendons in the palm of the hand.

2nd. That the "x-ray" man, of necessity, gains a much clearer conception than anyone else of the precise anatomical relations and position of the "foreign body."

This follows from the definite train of thought, and the application of practical mechanics, necessary in arranging the limb (or other part), the point of view, and in the disposition of the "x-ray" apparatus, all in a proper sequence for precise localisation.
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3rd. That it is often a difficult matter to convey this conception of localisation to another person. By this I do not mean that "x-ray" men are poor demonstrators or that surgeons are slow to grasp details, but rather that the radiographer, by his training and the work done on each case, must concentrate more on the mechanics of localisation. Incidentally the surgeon who is fortunate enough to be able to make his own "x-ray" examination gains thereby much knowledge of the case before him, and starts his operation for removal of the "foreign body" with very decided advantages.

4th. That the necessity exists for some practical and simple gauge to be applied during the "x-ray" examination which may be used to test the accuracy of the "x-ray" measurements before operating. To meet this necessity I have devised a little arrangement, which possesses the merit of being simple, and answers two purposes simultaneously—i.e., (a) as a test for accuracy, (b) a landmark for operating. I shall have occasion to refer to this device later, and need only state here that it consists of a piece of soft lead wire—2 inches long—strapped on to the skin with rubber plaster, either in the middle line of body or limb, or preferably on that part of the skin which lies nearest to the bullet (as roughly determined by preliminary screen or photographic examination) and in the neighbourhood of the proposed incision for removal of projectile. This latter point is very important.

5th. That in every difficult case there exists the necessity for some good chart or system of landmarks, to "pilot" the surgeon to his destination. This leads to the question, "What is a difficult case?" Well, an easy case is one in which the foreign body is relatively large and the limb (or other part of the body) relatively small;
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for instance, a large piece of shell casing or bullet in one of the limbs. In a recent gunshot wound of this nature the foreign body can frequently be touched with a sterilised probe passed down the track of the bullet, and this, by direct metallic contact, forms the best "pilot" of all.

The case is very different, however, where a bullet or piece of "shell casing" is lodged in a thick part of the body, such as the thorax, abdomen, buttock, or thigh. Here accuracy is required.

Still greater accuracy is demanded where the foreign body becomes lodged in a district of highly specialised functional value, such as the head, neck, eyeball, or brain.

Localisations in the eyeball make the highest demand of all on the radiographer's skill.

It was while considering this problem in relation to the eyes, that a distinguished oculist and "x-ray" pioneer, Mackenzie-Davidson, devised the most accurate localisation which has yet appeared.

Incidentally in this device Sir James Mackenzie-Davidson discovered the stereoscopic principle of "x-rays." This is a very beautiful and wonderful thing in itself, which, as you all know, means that from "uniplanar" projection of "x-ray" shadows perspective in many planes can be produced, by the assimilation in the brain of two different retinal images, as seen in the two negatives in the Wheatstone stereoscope, which have been taken by a proper binocular method.

Some years ago, while recording the entire human skeleton, in conjunction with Professor A. Francis Dixon, by this method of stereoscopic "x-rays," I had the good fortune to demonstrate, I believe for the first time, the
"spiral structure" of long bones, which, of course, explains both oblique and spiral fractures. 

A preliminary study of the stereoscopic skiagrams before operating in a gunshot case gives the surgeon a most convincing conception of the position of a bullet, as you can judge for yourselves in the case I am demonstrating here to-night. (See Plate V.)

In the early days, each pioneer of "x-rays" was a law unto himself. In my first attempts at "localisation of metallic foreign bodies" I devised a very simple and obvious method, which was devised independently by other workers. It may be termed "the Rectangular Method."

It still is the favourite method with many surgeons, because it yields an obvious and clear conception of the position of the projectile.

This method consists in taking two views at right angles to one another.

The first view gives the relations in "length" and "breadth" of the limb or trunk. And the second view at right angles to the first gives the "depth" of the foreign body from the surface of the skin. Thus completing the "third dimension in space."

It can be applied in three ways:

(1). By "fluorescent screen" only, marking the position of the foreign body on the skin by ink, pencil, or caustic.

(2). By photography only.

(3) By a combination of both—e.g., in the case of a needle in the hand.

One antero-posterior skiagram is taken showing the

relations of needle to bones of the palm. Then a lateral view on screen is observed, and the superficial end of the needle noted, and its depth from the skin of the palm or dorsum of the hand is duly recorded.

In operating for the removal of such a common foreign body as a needle, the only safe rule to follow, and one which has given me uniform success, is to cut transversely to the middle of the needle, so far as anatomical considerations permit; grasp the needle in an artery forceps, and then proceed to free the superficial end by a careful and gentle dissection or retraction of the tissue holding it.

The "Rectangular Method" just described still holds its own, and for simple cases as defined above is quite good enough. But in difficult cases something more precise is demanded. And it is in such cases that Mackenzie-Davidson furnishes the necessary precision with his "cross thread" or "stereoscopic method."

This is, in my opinion, the most accurate method yet devised, and as I have used it in more than 400 cases without a single failure, I am in a position to speak from experience.

Subsequent methods which possess any merit are modifications of Mackenzie-Davidson's, and all those I am familiar with, which aim at shortening or simplifying his method, do so only by a corresponding sacrifice of accuracy. His method is simple, but must be fully grasped and definite details carried out. It requires no special apparatus beyond some form of tube holder capable of sliding the tube in a horizontal direction parallel to the plane of the photographic plate.

I shall now describe Mackenzie-Davidson's method of localisation with the help of a diagram on the board. (See diagram 1.)
PLATE I.

MR. HAUGHTON—"The Localisation of Modern Projectiles."
In this diagram the four points P.P.P.P. represent the corners of a photographic plate. Immediately over this plate two steel wires, W.W., W'.W', are stretched over plate holder accurately at right angles to one another. These wires cast a shadow on to the plate which serves a basis for all subsequent measurements and orientation.

At a known height (H) above these wires the centre of the anode of the x-ray tube is caused to slide along a line (T.T.) which is vertically over and parallel to the wire W.W., so that in every position of the tube the centre of the anode (or "focal point" of x-rays) is always vertically over the wire W.W.

The centre O. of this line T.T. may be called the "zero position" of the x-ray tube. It is vertically over X, the intersection of the cross wires, and is of course at a known height (H.) above them. The shaded circle (C.C.C.) represents a section of the limb or trunk placed on the photo plate P.P.P.P. in contact with the cross-wires W.W., W'.W'; and this section contains a bullet (or other projectile) at the point B.

The problem is to locate the exact position of this bullet B. in relation to the cross wires and their intersection on skin of patient. Above the patient's limb thus situated on the plate and cross-wires the x-ray tube is caused to slide from its zero position (O.) a known distance (O.R.) (say 3 c.ms.) to the right. This is called the "right-hand" position of the tube. With the tube in position (R.) a skiagram is taken in which the shadow of the bullet (B.) falls upon the plate at (r).

Without moving the patient or cross-wires the tube is now moved through its zero position to the left until the centre of anode comes to lie at (L.), 3 cms. to the left of O. (its centre position). This is called the "left-hand"
position of tube. With the x-ray tube in this position (L.) a second skiagram is taken in which the shadow of the bullet (B.) now falls on a different part of the plate at (l). It will be noted that the tube has thus been caused to slide an equal distance, 3 cms., to either side of its 'zero position.' Its total displacement (O.R.-O.L.) between the first and second skiagrams is, therefore, 6 cms. This distance has been selected by Mackenzie-Davidson because it approximately represents the distance between the human eyes, and is, therefore, correct for giving true perspective in the Wheatstone stereoscope.

Personally I use a greater tube-displacement (8 or 10 cms.) because it makes measurements easier, and therefore more accurate.

The data for localisation measurements are now obvious on reference to the diagram (I.). (1) We know the displacement of the tube (L.O.R.) (6 cms.); (2) We know the height (H.) from anode to plate; and (3) We find the displacement (r.I.) of shadows of bullet (B) by measuring from their centres to the 'up and down' cross-wire (W.W.).

With these data before us several solutions occur: (a) By Trigonometry (b) By reconstruction model to scale. (c) By mechanical drawing to scale.

Before alluding to these solutions of the problem there are one or two points in the x-ray technique which should be mentioned.

It is of course possible to take the two skiagrams on one plate, but this practice is objectionable for photographic reasons. Therefore some form of "changing box" is desirable by means of which a second plate can be substituted for the first without disturbing the patient, the cross-wires, or the x-ray tube.
PLATE II.

MR. HAUGHTON—"'The Localisation of Modern Projectiles.'"
A very simple and efficient changing box is seen in Plate II. (right hand, bottom instrument, lying on lower white shelf of instrument table). In this pattern a rectangular, flat, mahogany box has an aluminium lid transparent to x-rays. Over this lid are tightly stretched two steel wires at right angles. Inside the box there is an inclined plane on which slides a hardwood board, or brass plate, carrying the photographic plate in its black and orange paper bags. This plate can thus be slid up to the under surface of the aluminium lid, and is there held firmly by a wedge. For changing plates between the first and second skiagrams it is merely necessary to remove the wedge and carefully replace the first plate by a second.

I do not propose to discuss in detail the relative advantages and disadvantages of working with the tube under or over the x-ray couch, but I am strongly of opinion that greater stability as between the patient, cross-wires, and photographic plate are obtained by utilising the weight of the patient resting upon the plate. A necessary and most desirable consequence of this stability is greater accuracy.

Another point making for accuracy (alluded to above) is utilising a larger displacement of the tube, 8 or 10 cms., instead of the original inter-ocular distance of 6 cms.

Returning now to the solution of the problem of localisation, Mackenzie-Davidson has devised his most ingenious and world-famous "cross-thread localiser" to utilise the data before us—i.e., (1) displacement of tube; (2) Height of tube; and (3) Displacement of shadows of bullet.

This localiser may be described as a "reconstruction model" to scale of the conditions obtaining during the taking of the two skiagrams. It consists essentially (see Plate II., left hand instrument) of a mahogany table
carrying a sheet of plate glass on which are marked two lines accurately at right angles. Immediately above these intersecting cross-lines there is a horizontal arm capable of being raised or lowered, its height (H) from the glass plate being recorded on a scale attached to a vertical pillar carrying the horizontal arm. The centre of the horizontal arm is vertically over the centre (X) of the cross-lines and represents the "zero position" of the x-ray tube. On either side of this "zero position" there is a slot exactly 3 cms. from the centre. The total distance between these slots is, therefore, 6 cms., which represents the "displacement" (LOR) of the x-ray tube's anode. The "right hand" slot thus representing the right hand position of anode (R.), and the left hand slot represents (L.), the "left hand" position of anode.

To apply this localiser to the data obtained above the following technique is necessary: First take a sheet of tracing paper and rule on it two lines accurately at right angles. Then apply this tracing paper to skiagram No. 1, taken with tube at (R) so that the cross-lines superimpose on the shadow of cross-wires, and carefully trace the indicated position and outline of the projectile. This represents shadow (r) (see Plate 1.). Next place the tracing paper similarly on skiagram No. 2 taken with tube in position (L) and trace off the second position of shadow of projectile (l). The tracing paper should in both cases be placed on the film side of negative, marking the top right hand corner for reference.

All that remains now is to place this tracing paper on the glass plate of localiser (pencilled side uppermost) with the cross-lines in register on those of glass plate. Next raise horizontal arm to the height (H) at which skiagrams were taken. Then place two weighted silk threads, one
In each slot, on either side of "zero position," and leading these threads down to the eyes of two weighted needles, place the thread from (R) in centre of shadow (r), and similarly thread from (L) in the centre of (l). These two threads now represent in the reconstruction model the paths traversed by the x-rays from the tube, in positions (R) and (L) respectively, when casting the shadows (r) and (l) respectively. And it is now obvious that the only position in space which the projectile (B) could occupy, with regard to the cross-wires, when viewed from (R) and (L) respectively, is the intersection of these threads. Hence the name "Cross Thread Localiser."

This point in space (the intersection of threads)—i.e., the centre of bullet—can be permanently recorded by bringing up a long pointer on a stand, with a universal joint, placing its point accurately at intersection of threads, and then dropping a perpendicular on tracing paper, by means of a scale set up perpendicularly on a square foot.

Conclusions:—

(1) The scale measures depth of bullet from plane of cross-wires, which represent plane of surface of skin.

(2) The foot of perpendicular scale marks the point on skin vertically over bullet (B).

(3) This point on skin can be accurately found by its distance

(a) from longitudinal wire (WW'), and
(b) from transverse wire (WW).

N.B.—The position of cross-wires on skin of patient must be marked, at the time of taking the two skiagrams, by five dots of a stick of "silver nitrate." One dot in centre of cross-wires, and four other dots, one on each limb of the "cross-wires."
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Kenzie-Davidson's method of localisation is as follows (see Plate III.):—

A sheet of good paper, 26 inches by 16 inches, is pinned down on the drawing board.

Then the line (WW) is ruled across the paper to represent the plane of the photo-plate and transverse cross-wire (WW) all in one.

Next, the perpendicular line (H) is erected from (X) to (O) to represent the exact height to scale of centre of "x-ray" tube's anode from cross-wires during the taking of the two skiagrams.

The line (TT) is next ruled through (O) and parallel to the plane of photo-plate and wire (WW).

This line (TT) represents the travel of the centre point of anode of tube, in its excursions to either side of its "zero-position" (O).

The distance (OR) is then laid off with a pair of compasses, in which (R) represents right hand position of tube, and an equal distance (OL) is laid off on opposite side to represent (L) the left hand position of tube. For purposes of increased accuracy the displacement I personally prefer is 5 cms. on either side of "zero-position," making a total tube displacement of 10 cms.

With these lines set up to scale, it now only remains to prick off on the base line (WW) the distance right or left of (X) occupied by the displaced shadows of "projectile" and "gauge wire."

These distances are obtained by holding first negative No. 1 up to light and measuring with a pair of compasses the actual distance of centre of shadow of "projectile" to the vertical or longitudinal wire (WW), represented in the accompanying drawing (Plate III.) by the point (X).
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When thus found the distance is pricked off on base line (WW) of drawing.

The same process is then repeated from negative No. 2.

Finally, the point representing centre of left hand shadow (r) is joined by a line to (R), which line represents the actual path (to scale) of the rays producing the left hand shadow (r).

And similarly the point (l) is joined to (L).

Now it is obvious from this drawing (a) (Plate III.) that the intersection (B) of these two lines (Rr and Ll) represents the actual position in space of the centre of the shrapnel bullet (B) in this sergeant’s neck, measured with regard to the intersection of the cross-wires (X).

Conclusions.

(1) Its depth from plane of cross-wires is found by dropping a perpendicular (Bb) on the base line (WW).

(2) Its distance to left (in the drawing) from longitudinal cross-wire (W'W') is obviously (bX).

(3) Its distance up the sergeant’s neck from transverse cross-wire (WW) is found by a simple drawing (β) (Plate III.) at right angles to the first (a), in which (X) and (O) are the same points; but the base line (still in the plane of cross-wires) now represents the vertical (or longitudinal) (WW').

In this drawing (β) the distance (Xb') is found by holding either negative to light (the position of shadow of bullet with regard to wire (WW) should be the same in both negatives if patient has not moved), and measuring off with compass from centre of bullet shadow to (WW). The point (b'), so found, is then joined to (O) by a line representing the path of the rays in profile. A second line is then drawn from (B), parallel to base line (W'W'), and
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where it cuts the line \((Ob')\) is the position of centre of bullet \((B')\) viewed in profile, with regard to \((X)\), the intersection of cross-wires.

The perpendicular distance from \((B')\) centre of bullet to the line \((OX)\) is obviously the distance at which it lies *up* the sergeant's neck, *from transverse cross-wire* \((WW)\). And this distance is the "third dimension in space" always required for accurate localisation.

In the above representation of Mackenzie-Davidson's method of localisation, it is *assumed* that the plane of the cross-wires is identical with that of the skin surface, and it follows from this that the skin must be *touching* the cross-wires.

There are, however, anatomical difficulties in the realisation of this convention, which sometimes come into play. As, for instance, in the case of the sergeant's neck before us. Here the bullet lay opposite the level of the seventh cervical vertebra (see Plate V.). But owing to the prominence of the occipital pole above and that of the scapulae below (see drawing \((\beta)\) in Plate III.), it was impossible to bring the skin of the patient into contact with the "cross-wires" at the critical level—namely, opposite the "shrapnel bullet" and seventh cervical vertebra.

The frequent recurrence of this difficulty led me a long time ago to resort to a little device which has never failed me—namely, the adoption of a secondary wire for measurements. This wire I have christened the "gauge-wire," because, in addition to furnishing

\((a)\) An infallible "chart" for measurement on the skin, it also provides

\((b)\) A "gauge" to check the accuracy of the x-ray measurements *before* operating.
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This is of no mean value, and gives the surgeon decided confidence as to the success of his operation.

The sample of wire I use is common "electrical fuse wire" ¼ inch thick.

The arbitrary length I use is two inches.

The technique of its use is as follows:—

First, the approximate position of bullet is determined by screen or otherwise, and its nearest point to the skin surface is noted. This site naturally represents the shortest route to the bullet, and, if anatomical considerations permit, is the one invariably preferred by the surgeon.

This site having been determined, the next procedure is to fix the two-inch "gauge-wire" to the skin of the selected site (see Skiagrams of Ankle in Plate VI, showing "gauge wire" strapped in position over "shell splinter" in front of ankle joint), as near as possible to the proposed incision for surgical removal, by means of a large strip of rubber plaster.

The "gauge-wire" is best laid in long axis of body or limb, and therefore at right angles to the travel of displacement of x-ray tube between the two exposures.

With the gauge wire in this position, the patient is arranged over cross-wires and plate, and the usual pair of exposures are made.

Using this system, the pair of skiagrams produced will show displacement of the shadows not only of the bullet, but also of the "gauge-wire" (see Plate V.). And what we now set out to do is to measure the position of the "gauge-wire" (GG) in relation to Mackenzie-Davidson's "cross-wire" as well as that of the bullet.

When that is done in the drawing (Plate III.) by an easy reference the position of the bullet (B) can be referred to the position of the "gauge-wire" (GG) on the skin.
The plotting of the two ends of the "gauge-wire" (GG) in the drawings (α) and (β) (Plate III.), is accomplished in precisely the same manner as that by which we found the localisation of the bullet (B).

On completing the two exposures and before removing the "gauge-wire" from the skin of the patient, it is absolutely necessary to mark the position of the two ends of the "gauge-wire" on the skin by means of two dots, produced by a pointed stick of "caustic" moistened for the purpose. This must never be forgotten, otherwise the "chart" and "landmarks" for accurate removal will be lost to the surgeon.

The importance of this "gauge-wire" (GG) is that it accurately marks the level of the skin, at a selected site, in the immediate neighbourhood of the proposed incision (see Plate (V.), ankle skiagrams), whether the skin happens to touch the "cross-wires" or not. And, further, that it puts into the hands of the surgeon a reliable guide to the landmarks for removal.

A further advantage is that it furnishes a test of accuracy in our x-ray measurements before operating. Amongst other things we set out to estimate the length of this "gauge-wire" by x-rays. We start by knowing that it actually is two inches long. And then if our estimated length proves to be exactly two inches, a similar degree of accuracy pervades all our localisation.

As a result of the actual measurements made in the two drawings (α) and (β) (Plate III.) in the sergeant's case before us, the following conclusions were arrived at:—

Centre of shrapnel bullet lies
(1) ¼ inch to right of "gauge-wire."
(2) One inch above lower end of "gauge-wire."
(3) At a depth of 1½ inches beneath skin.

Provided with this "chart" and system of "land-
marks," the surgeon proceeds to the operation for removal of bullet.

I will now describe a very simple device in surgical technique which has always yielded me success in the removal of metallic projectiles. As I have said above, X-rays and Mackenzie-Davidson's method of localisation provide the surgeon with a perfectly accurate chart and system of landmarks. But as every sailor knows, there are many positions of difficulty and intricate channels in which, in spite of good charts and clear landmarks, he is well advised to "take a pilot."

This "pilot" can be provided in the shape of a long, straight needle, four or six inches long. These needles I have specially made for me by Messrs. Young, of Edinburgh.

The surgical procedure is as follows:—

The patient being anaesthetised, and the skin prepared for operation, the sterilised sheets are secured round the area under operation (in the case before us it was the posterior surface of the neck; see Plate IV.). Then—

(1) The two caustic marks on skin are noted, and the sterilised "gauge-wire" is accurately laid with either end in the centre of its corresponding mark.

(2) A file mark previously made on the "gauge-wire" represents the distance up from the lower end, opposite which the bullet lies; in the case before us it was one inch up from the lower end. Opposite this file mark a slight scratch is made in the skin, with the point of scalpel, to represent level of bullet on skin.

Next a sterilised pair of compasses is opened out to the exact distance at which the bullet lies (in this case to the right) from the "gauge-wire." In the sergeant's case the distance was \( \frac{1}{2} \) inch. This distance is now pricked off on the skin, in the first scratch made by scalpel.
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Through this compass point a second scratch in the vertical direction is now made with scalpel at right angles to the first. This cross-shaped scratch now represents the exact point on the skin under which the bullet lies.

(4) The "pilot needle" now comes into play. Prior to sterilising, a "clove hitch" is tightly made with stout silk on this "pilot needle" at the exact distance from its point which represents the estimated depth of bullet beneath surface of skin. In the sergeant's case this depth was \( \frac{1}{2} \) inch. (When wet this "clove hitch" tightens up and never slips.) With left hand still holding the "gauge-wire" in its correct bearings on the skin, the "pilot needle" is now grasped in the right hand, and its point is entered accurately in centre of cross scratch over bullet; the needle is then carefully steadied perpendicularly to the skin and plunged gently onwards in the estimated direction of bullet. (Anatomical risks will, of course, modify the direction and freedom with which this "pilot needle" may be used. But they will also modify the predetermined route selected for the removal of bullet).

Now if the bullet actually lies where it is estimated to be, it follows that when the silk hitch on the needle is approaching the skin, the point of the "pilot" must be approaching the bullet. And therefore, when the silk touches the skin (or before it), the point of the needle touches the bullet. In the case under consideration this actually happened, and it was afterwards found that the "pilot" scratched the leaden shrapnel bullet exactly in its centre! (So much for Mackenzie-Davidson's accuracy.)

If the "pilot needle" does not meet the projectile at this first attempt, it is at any rate somewhere near it. And usually after a few gentle probings in the neighbourhood metallic contact is established. This feeling is unmistake-
able, and when once established the rest of the operation is simple and certain.

(5) Now, holding the "pilot" in contact with the projectile with left hand (or transferring it to the grasp of a trusty assistant), an incision is made with scalpel along-side of the "pilot," and following it down as a guide with a succession of short incisions, the projectile must surely be found and extracted.

In this sergeant's case, the shrapnel shell burst in the air to his right front. The leaden bullet entered his neck just below the angle of the jaw on the right side, and inclined downwards and backwards to the level of the seventh cervical vertebra, which bone it partly crushed without fracturing it through. In this situation I located it as described, found it where expected, and the time required for its removal was fifteen minutes.

Plate V. shows two skiagrams taken for stereoscopic purposes in the case described. It gives a good stereoscopic representation of the relation of the bullet to the vertebrae. In this pair the "gauge-wire" was omitted and a looped wire placed with its point in centre of "wound of entrance."

Plate VI. is from the case of another soldier, and shows the "gauge-wire" in position over a piece of "shell splinter" which entered the front of the ankle joint.

In conclusion I may be permitted to emphasise a few points as the result of a somewhat extensive practice of these methods.

The time required for the operation for the removal of metallic projectiles need seldom exceed fifteen minutes, and is often much less, provided that proper care is taken in

a From this pair of Mackenzie-Davidson skiagrams was estimated the position of the shell splinter, and my colleague, Mr. R. L Swan, removed it successfully in five minutes.
PLATE V.

MR. HAUGHTON—"The Localisation of Modern Projectiles."
PLATE VI.

Mr. Haughton—"The Localisation of Modern Projectiles."
the manipulative part of the $x$-ray examination, and that careful measurements are based thereon.

It is often contended that Mackenzie-Davidson's method is too troublesome and too tedious. With regard to the first objection, it is not troublesome with practice, and it is the most accurate method I know. With regard to the second, the actual time consumed in taking a localising pair of skiagrams (with apparatus set up) need not exceed half an hour. And a further half hour in my hands completes the drawings.

One hour is thus spent in producing a very accurate localisation, in consequence of which the surgical operation need not exceed fifteen minutes.

Surely this is a much more profitable distribution of the time than to speed up the $x$-ray part by methods less accurate, which involve the surgeon and patient in prolonged and sometimes fruitless search.

Further, it must be remembered this degree of accuracy is only demanded in difficult cases.

In this communication I have attempted to bridge the gap between the $x$-ray man and the surgeon, because in my own personal work both specialities are linked. My sympathies are, therefore, equally extended to both, and if I have succeeded in helping either the object of this paper is fulfilled.

Mr. M. R. J. Hayes said if Mr. Haughton had succeeded in spanning the bridge between the radiologist and the surgeon he was to be thanked, as in no department of their work was the gap so great between the radiologist and the surgeon as in the localisation of foreign bodies. He agreed with Mr. Haughton that the most accurate method of localisation was the Mackenzie-Davidson method. It was more complicated than the methods usually employed, but
The Localisation of Modern Projectiles.

he considered that the additional labour was fully repaid by the results. He considered Dr. Henderson's method, which was very expeditious, and if properly carried out was fairly accurate, not at all as good as the Mackenzie-Davidson. He suggested that in the localisation of bullets which were fairly large, what was wanted was to get a fairly accurate method which was at the same time easy of employment, and he thought that with further experience of the triangular method it was quite probable that the results would be better than they had hitherto been. In looking for fairly large foreign bodies, if one could get within two or three millimetres there would be no difficulty in finding them, and it was only in the case of foreign bodies in the eye that one would be driven to the use of the more difficult method of Mackenzie-Davidson.

He suggested that there were a great many foreign bodies which would be far better left alone, and he had seen cases in which the attempts at removal had done far greater damage than would have arisen had they not been interfered with. Referring to the interpretation of radiograms, he agreed with Mr. Haughton that no one was in as good a position to know the exact site in the limb of a foreign body as the radiographer. He suggested that even the expert radiographer, if given a perfect skiagram and asked to locate the foreign body, would experience as much difficulty as the surgeon who had not the experience. A point which should not be lost sight of in attempting to find a foreign body was the position which the limb was in at the time of localisation, and it should also be remembered that the approximation of depth are always open to error as the substance being dealt with was subject to alteration by gravity and pressure. Another point of importance which should be attended to by surgeons was that when cutting down upon a foreign body it was very easy at the commencement of the incision to follow a line which one believed to be in the direction of the bullet, but one might go a little to one side, and by the time the object was reached, if it was deeply situated, he would be well to one side or the other.

Mr. W. I. de C. Wheeler said that a point that struck him
was that if the bullet was localised and not found, the whole fault lay with the surgeon, and with this he agreed to a certain extent.

Dr. Hayden agreed with Dr. Hayes that failures are often due to the deepening of the wound not being done quite in line where the incision is made. He suggested that a very valuable help in avoiding this mistake was to first mark the sites on the skin at either end of the wound. In deepening the wound it was advisable to look along these marks.

Mr. Benson also referred to the difficulty of cutting down straight upon the foreign body, and suggested that this difficulty was removed by Mr. Haughton's idea of putting down a long sterile probe, and he thought that if two of them were used one could be absolutely certain of going in the right direction without being dependent on the eye to correct any retraction on the wound.

Mr. Haughton, replying to the remarks, said he agreed with Dr. Hayes that in some cases very accurate methods of localisation were not required. He also agreed that if a bullet was lodged in a muscular pad it might safely be left there, but in his paper he assumed that the cases to be dealt with were those in which it would be considered desirable to operate. The influence of gravity in the localisation he had not lost sight of, and he considered it an important point which should be taken into account. He avoided suggesting any screening methods which involved length of time, on account of the evil results of excessive exposure, and he would earnestly exhort everyone to keep away from screening as much as possible. He considered that the "gauge-wire" and the "pilot" needle demonstrated by him would be of the greatest assistance to the surgeon.
THE BRIDGE METHOD OF GRAFTING SKIN.

By H. de Lisle Crawford, B.Ch., F.R.C.S.I.; Assistant Surgeon to the Richmond Hospital, Dublin.

[Read in the Section of Surgery, May 14, 1915.]

In the last three years I have treated six cases of badly scarred hands, and have employed the bridge method of grafting in all with considerable success. These hands were deformed by contracted scars, which were the result of burns during infancy. In no case were the tendons directly affected, so that the treatment necessary was to dissect away or divide the scar tissue, undo the deformity by stretching the shortened tendons and fascia and cover the raw area with skin.

There are two factors of the utmost importance that apply particularly to skin grafting of the extremities in such patients. The first is that the whole limb has for years been useless to the child, is therefore ill-developed, and is supplied with a circulation much less active than normal. The second is that the graft must be thick and pliable, and must adhere quickly to be successful.

For these reasons the ordinary methods of grafting were not adopted, but grafts were raised from the thigh and abdomen, left attached at each end, and the raw area of the hand placed underneath for a week, before finally detaching the graft from its original site.

The method and technique are best illustrated by taking my last case in detail.

M. T., a boy æt. 12, was admitted on September 28th,
PLATE I.

MR. CRAWFORD on "The Bridge Method of Grafting Skin."

Fig. 1.

Fig. 2.
PLATE II.

MR. CRAWFORD on "The Bridge Method of Grafting Skin."

Fig. 3.

Fig. 4.
By Mr. H. de Lisle Crawford.

1914, to the Richmond Hospital. His right hand was badly scarred on the palm and flexor aspect of the ring and little finger as the result of a burn when he was one year old.

From Fig 1 it is obvious that the thumb is extremely adducted and the fingers flexed. The boy could flex his fingers very slightly, but no extension beyond that shown was possible. On September 30th I cut through the scar tissue across the palm and made a second vertical cut at right angles to the first on the thumb side. Both cuts were made down to the tendons and muscles of the palm. The fingers were then forcibly extended, and the thumb abducted. This necessitated partial rupture of the adductors and flexor brevis pollicis. The raw area exposed occupied about two-thirds of the palm.

Its floor consisted of tendons and its edges of fibrous tissue.

Two incisions were made through the skin and superficial fascia across the front of the right thigh from within out beginning 2½ inches apart and ending 1 inch apart. The intervening area of skin and fascia was raised and the hand slipped underneath. I then sutured the upper and lower edges of the graft to the fibrous edge and anchored each finger at its tip as well as the wrist to the thigh with interrupted sutures of silkworm gut. (Fig. 2.)

The operation area was surrounded with thick wool pads arranged to support the parts in proper relation to one another, and finally a plaster bandage was applied. In this way only slight independent movement was permitted to the thigh and hand. (Fig. 3.)

Eight days later under ether the dressings were taken off, and the next figure shows the condition of the parts before they were touched. (Fig. 4.)

T. O
The two bridges were then divided and the hand removed from the thigh. All that remained to be done was to suture the raw edges of the graft to the neighbouring edges of healthy skin at each side of the hand, and close the wound in the thigh by undercutting and suturing.

The boy was then put to bed with his hand and fingers extended on a wooden splint.

I removed the splint a week later, and the after-treatment consisted in massaging the limb and encouraging the boy to use his hand.

We found that the only way to induce him to forego the habit of his lifetime was to bandage up his good hand and insist on his dressing and feeding himself with the right hand alone. After five weeks' persistence he could button his clothes, hold a pen and carry a walking stick, and as by that time he was keener than anyone else about his progress we allowed him to return home.

The next figure shows the condition four weeks after the second operation, when healing was complete, except for a line of granulations 1 mm. wide on the inner edge of the graft. (Fig. 5.)

The only complication after operation was the development of oedema on the back of the hand and wrist, due to the sluggish circulation and the difficulty found in inducing the boy to use the arm at all. Two or three days' massage removed this entirely and it never recurred.

In this description of the technique there are five points which demand amplification and emphasis:—

1. My cases were all the results of healed burns, and therefore could be treated by iodine sterilisation. I would prefer to allow an ulcerating surface to heal before treating it by the bridge method, rather than run the risk of infecting the freshly exposed tissue of the thigh or abdomen.
PLATE III.

MR. CRAWFORD on "The Bridge Method of Grafting Skin."

Fig. 5.
By Mr. H. de Lisle Crawford.

Infection would be disastrous in these cases, and therefore the method should only be used in healed cases, and less frequently in quite recent lacerated wounds.

2. The use of a tourniquet is advisable, for it is always important to have the dissection quite free from blood.

3. The contraction deformity must be over-reduced by stretching and cutting.

4. Immobilisation by interrupted sutures and plaster is essential.

5. The size of the graft should be made as small as possible, and in most cases this question resolves itself into removing as little tissue as possible—that is, the scar should be divided and the hand stretched until the deformity is reduced. There is usually no need to remove any tissue at all except at the corners. Further, and most important of all, if the wrist and forearm are also affected, on no account should the condition be remedied at one sitting.

One of my cases terminated fatally three months after operation chiefly through ignorance of this principle, which I had not at that time formulated. The patient was a child, æt. 2, with such bad scarring of the right hand and forearm that the backs of the first three fingers were glued to the extensor aspect of the forearm. The hand was about half the size of the other, so that the graft required was no bigger than that used in the case described. Its relative size, however, was much greater, and the child was weakly.

For a month the case was promising, but then, without a sudden change for the worse, the wound on the abdomen, which had almost healed, became less healthy looking, its granulations sloughed, and the area gradually enlarged. This condition developed about two months
after the first operation, and was due, I think, not only to the child's poor general condition, but also, and to a greater degree, to the fact that the demand made on its tissue-building powers was excessive. The graft took perfectly, while the abdominal wound would not heal.

In a similar case now I would not attempt to relieve the deformity by one operation, and I would take the graft from the thigh rather than the abdomen.

In conclusion, while this method is now new, I have thought it was worth while to fill out the very meagre accounts of it hitherto written by a more complete description of its uses and pitfalls.

The President expressed the indebtedness of the section to Mr. Crawford for bringing forward this effective method of treatment. This method of grafting, which left the graft on the exposed raw surface, evidently yielded good results. He considered the technique described as one that ought to be followed. The frank admission of the error which occurred in the second case was to be commended, as it was from such errors that much was to be learned.

Mr. M'Connell said he had done one case by this method—viz., a very extensive formation of scar tissue on the thumb. In that case he cut through the scar tissue so as to allow the thumb to be abducted freely, which left the raw area about one inch in width. The thumb was then buried in the lower end of the thigh. The case pleased him very much, and the patient had very good abduction in the thumb afterwards. It struck him that skin grafting on the hand was absolutely different from other parts of the body, as in other parts a good blood supply was to be had, whereas the supply in the hands was bad. He recalled a case of a child with a scar on the chin, which was drawing it down on the neck. By cutting across the scar in certain places and inserting a Wolff graft taken from the thigh in the spaces after about six months the child was able to hold the
head straight. In ordinary cases he suggested that Wolff grafts were more convenient, as the resulting wound could be closed up. In all cases of grafting about the hands and feet he looked upon the Bridge method as the only one. One of the worst cases he had seen was a bad scar over the left heel. This was treated by putting the sole of the foot on the other leg and lifting up a large flap from the right calf and stitching it to the heel. He had seen the case in three weeks after it was done, and it was completely healed. He attributed the success to the good blood supply. He suggested that all methods might be used in their proper places.

Mr. H. de L. Crawford replying to the remarks said that the method which should be used entirely depended upon the site on which the graft was to grow. He had seen various methods of grafting used with success, but when one had to deal with a hand which was burned at the age of one year, and the patient was now twelve, it was obvious that the limb would be much atrophied, and when the scar was divided nothing was found but tendons. He suggested that it would be difficult to get skin to grow on such a site if it were cut off from its blood supply, and he therefore considered that the only procedure that could be adopted was the Bridge method.
ABSTRACTS.

SECTION OF SURGERY.

Friday, November 13, 1914.

The President (Mr. F. Conway Dwyer) in the Chair.

Presidential Address.

The President read an address on "The Treatment of Perforating Gastric and Duodenal Ulcers." He stated that he selected this subject as he had recently under his care in hospital and in private practice several cases of this sort. He pointed out that for many years he had given up the use of lavage, which he believed to be extremely harmful and responsible for many untoward results. He removed the septic fluid with large swabs and relied on pelvic drains for getting rid of any fluid left behind. He further stated that although formerly he was of opinion that gastro-enterostomy should be done, if the patient's condition permitted it, in the cases to be detailed he had performed it only in one case, and then only because the perforation was so large and the edges so friable that when the rent was sewn up he feared the lumen of the bowel was too much narrowed.

Details were then given of 12 cases which had been under his care during the past fourteen months. Eight made a complete recovery, three did not survive operation more than a few days, and one died a fortnight after operation from pneumonia.

Living Exhibits.

1. Regeneration of Ruptured Sciatic Nerve.

Mr. H. Stokes showed a case of regeneration of ruptured sciatic nerve. The case was one of arthritis of the hip-joint
accompanied by intense pain. Operation was performed for excision of the hip joint, in the course of which the sciatic nerve was accidentally ruptured. The injury to the nerve was not discovered for two or three weeks after operation. Two and a half years had elapsed since the operation, and the patient was shown to demonstrate the amount of regeneration that had taken place. The suturing of the nerve was done about three weeks after the excision. The small loss of sensation now present in the case was most remarkable.

2. Radium Therapy.

Mr. W. C. Stevenson showed some cases treated by radium emanation needles. The first patient was suffering from a malignant polypus which was removed by Mr. Graham about the end of May last. It subsequently grew again, and the whole of the anterior wall of the antrum had to be removed, but not withstanding this the tumour began to grow again. The patient came under Mr. Stevenson's care in the end of June with a large gland on one side and a smaller one on the other, accompanied by considerable proptosis of the eye. He inserted six needles into the gland, and two or three days afterwards six more needles were put in, and left in for about twenty-four hours. After about six weeks the tumour got smaller and redder. When the needles had been inserted four times the tumour showed considerable diminution. A recurrence of the swelling having taken place six weeks after the first application, further needles were applied, and the patient showed the effects of the radiation. He had put on a considerable amount of weight. Although he had to take hypnotics regularly before the treatment, since the radiation was started the man was able to get on without hypnotics.

The second patient shown had not yet been treated, and the opinion of the meeting was invited as to whether the case was considered suitable for surgical interference. The object of showing this patient before treatment was to give an opportunity to those present to observe the present condition, as it was his intention to bring the patient forward again after treatment.

The third patient shown had been pronounced by Professor McWeeney to be suffering from epithelioma of the palate.
The condition seemed to be much improved, and it was pointed out that the ulcer now seen was only about half of its original size.

**Intestinal Stasis.**

Mr. A. Blayney read a paper on intestinal stasis. See page 131, ante.

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**Friday, December 11, 1914.**

**Sir John Lentaigne in the Chair.**

**Card Specimens.**

(a) **Portion of Resected Intestine showing Congenital Absence of Cecum and Appendix, with Atrophied Ascending Colon.**

Mr. D. Kennedy said this intestine was removed from a girl aged between twenty and twenty-one. The history was that four years ago she had a sub-costal abscess on the right side, which seemed to be shut off from the abdominal cavity. The opinion formed was that it was a localised tubercular abscess, and on opening it she made a good recovery. Two years afterwards she developed a faecal fistula, which was operated on about three weeks ago. The abdomen was opened away from the fistula and a resection done, followed by lateral anastomosis. The portion of the large intestine anastomosed was about the middle of the transverse colon. The opinion of the pathologist who examined the specimen was that it was a congenital malformation, and that the atrophied ascending colon was the result of inflammatory trouble, probably of tubercular origin. Some re-arrangement of the muscle fibres was discovered which practically proved the condition to be congenital.

(b) **Urethral Calculus removed from Bladder.**

Mr. Kennedy showed a stone removed from the bladder of a child. It was impacted towards the fundus of the bladder, and part of the calculus projected into the right ureter.
Prostatic Calculi.

Mr. A. Blayney showed a number of small stones removed from inside the capsule of the prostate. There was a history of pain and frequency of micturition, and blood was said to have passed. The patient stated that an attempt had been made to cystoscope him in America, and he was informed the bladder would not hold sufficient urine. On a cystoscopic examination being made a tumour could be seen. The patient stated that urine occasionally came through the rectum. On examination of the rectum with the finger a mass the shape of the prostate could be felt, somewhat like the stone. The question of malignancy arose, but the history, which extended back over ten years, was against it. A diagnosis of prostatic calculi was made and perineal operation was done, when the stones shown were removed from the prostatic urethra.

Friday, January 29, 1915.

The President in the Chair.

Living Exhibits.

Case of Recurrent Cancer of the Cervical Glands treated by Radium.

Mr. M. R. J. Hayes showed a man aged forty-five years, a plumber, part of whose tongue was removed in June, 1912, by Mr. Seton Pringle on account of malignant disease. Subsequently, it was Mr. Pringle's intention to remove some enlarged glands at the side of the neck, but the patient would not permit these to be excised. The tumour gradually increased in size, and in the autumn of last year (1914) the patient came to the dispensary of the Mater Hospital and was referred to him for x-ray treatment, but it was considered that
this would not do him any good, and it was decided to try radium emanations. The needles were inserted in the middle of December. When the patient was first treated by radium there was a swelling on the side of the neck about the size of a goose egg, or almost three times the size of the condition now shown. The growth was soft about the centre, and appeared to be breaking down. Three needles were inserted from above downwards and three from below upwards. They were left in for twenty-four hours, when they were re-inserted at right angles to the former positions. They were again inserted in a position which might have escaped radiation in the previous two insertions. There was no general reaction, but there was a slight local reaction. When the needles were withdrawn there was no haemorrhage, and from that time the patient showed improvement. The man was again seen after Christmas, when the tumour was only half of its original size. Another insertion was made on the 13th of the present month (January), but the patient could tolerate the second emanation for only a few hours. The condition has shown vast improvement. The primary growth was in the tongue, and the submaxillary gland was at no time involved. The swelling now to be seen was only one-third of the original size.

The Theory and Technique of a New Method of Radium Therapy (with lantern slides).

Mr. Walter C. Stevenson read a paper on the theory and technique of a new method of radium treatment. See page 145, ante.

Cancer of the Tongue treated by Radium Emanations.

Mr. R. C. B. Maunsell showed a case of the above. See page 168, ante.

Primary Cancer of the Neck under Radium Treatment.

Mr. R. C. B. Maunsell showed a patient suffering from primary carcinoma of the neck. The lump, which was a large one, had been radiated twice, and was said to have reduced considerably in size. The interesting point in this case
was that the patient had a reaction each time, whereas the other patient shown had not. The treatment in this case was being continued. Subcutaneous thickening was noticeable when the needles were removed, but this thickening afterwards disappeared.

_Cases treated by Radium Emanation Needles._

**Dr. Walter C. Stevenson** brought forward four patients.

The first case was that of a man who had been shown before two months ago. He had a large lump, and at that time had some recurrence which was treated, and it was now pointed out that the affected side of his face was flatter than the other side.

The front wall of the antrum was removed by Mr. Graham last April. The patient was bad when first seen in June last, and as an operation had recently been performed, nothing further could be done for him, and it was, therefore, decided to try radium treatment. The patient had been under this treatment off and on since. He had had fifteen radiations of six needles. The growth was considered to be a sarcoma. The opinion was expressed that sarcoma did better than carcinoma under radium treatment.

The second case was that of a man who had considerable enlargement of his tonsil. Six needles were left in for about twelve hours. The patient afterwards got some swelling in front which was also treated. Attention was drawn to the puckering which took place where the needles had been inserted. The scar in the mouth was pointed out on which no ulceration was apparent. Some extensive glands were still to be seen.

The third patient was a man who was brought forward for observation before treatment. He had been radiated within the last few days. It was suggested that there was a primary affection of the tonsil. Six needles had been put in. There was still some inflammation of the tonsil to be seen.

The fourth patient had a tumour of considerable size on the face. He was x-rayed about six years ago. Radium was tried, and the lump which was there had disappeared. The lump was considered to be an epithelioma following x-ray treatment for lupus.
Friday, February 26, 1915.

The President in the Chair.

Living Exhibits.

Case of Double Congenital Dislocation of Hip treated by Lorenz' Method.

Mr. W. S. Haughton, in showing the patient, said the treatment had extended a little over two years, which was about double the normal time required. The delay was due in the first instance to gastric attacks, and then to an attack of measles. Double dislocation cases always take longer to treat, as the stages have to be gone through more gradually.

Case of Double Congenital Dislocation of Hip treated by Lorenz' Method.

Mr. W. C. Stevenson showed a child who had been treated for double congenital dislocation by the Lorenz' method. He said that the left hip was easier to reduce than the right, and it was also found easier to keep it in position. The right hip had only recently been taken out of plaster. Massage treatment was now being carried out in order to develop the strength of the leg.

Case of Arthroplasty of the Knee for Bony Ankylosis.

Mr. Seton Pringle, in showing this case, said he believed it was the first one of the kind done in Dublin, and it had been a hopeless failure. The man, some two years ago, had accidentally stuck a penknife into his knee-joint. The joint became septic, and nine months afterwards he had bony ankylosis, and his leg was almost at a right angle. He had been reading of Murphy's work, and he decided to try arthroplasty. The technique was carefully followed. The essential points of the operation were to remove the old articular surface and remodel the bones, and then turn in from the tibia and femur flaps to cover the bones. The leg is then put
up with an extension of 20 lbs. on it for from three to five weeks, after which time the patient should be allowed to develop active movement. When the patient shown was allowed out of hospital he had a fair amount of movement in the joint. He wore a splint and used crutches for some time, but about four months after operation he gave the joint a wrench. There was now very little movement in the joint, and it was very painful. X-ray photographs of the joint before and after operation were shown.

He believed the operation could be done with a successful result. Murphy had not published a long list of results, but stated that a large number of cases did well, and that others did not do well.

The Rôle of the High Pressure Frequency in the Treatment of Tumours of the Bladder (illustrated by intravesical photographs).

Mr. Adams A. McConnell read a paper on the above subject. See page 175, ante.

Friday, April 9, 1915.

Dr. H. Stokes in the Chair.

Living Exhibits.

Ankylosis of Elbow treated by Capsulotomy.

Mr. W. I. de C. Wheeler exhibited a case of limited extension of the elbow joint, the result of a fracture of the lower end of the humerus, caused by a bullet wound. The capsule was divided (capsulotomy) with a tenotome, introduced above the humeral condyles. When this simple procedure was carried out the arm "fell" into the straight position, and the patient now had unlimited flexion and extension.

Mr. Wheeler thought that capsulotomy for impeded extension of the elbow joint was the operation of choice in the majority of cases.
Case illustrating treatment of Claw Foot.

Mr. W. I. de C. Wheeler also showed a case of claw foot treated by subcutaneous tenotomy of all the flexor and extensor tendons of the toes, except that of the great toe. The tendon of the extensor longus hallucis was transplanted into the head of the metatarsal bone. Thomas’s wrench, after the division of the tendons and plantar fascia, completely corrected the deformity. A point of interest in the case was that the patient suffered from thyroid insufficiency and an ununited fracture of the tibia and fibula united rapidly after the administration of thyroid extract.

Two Cases treated by Radium Emanation Needles.

Mr. Walter C. Stevenson showed a patient who had suffered from lupus for twenty-four years. She underwent x-ray treatment five years ago, and about eighteen months ago a scab developed and an ulcer formed, which went on increasing. In November last six needles were inserted underneath the base of the ulcer for twenty-four hours, followed by two radiations in different positions. In about a month afterwards she was again radiated. After the first séance she suffered from pain, but in a few days was able to work. The ulcer was now completely healed.

The second case shown was that of a man from whose nose a piece of growth had been removed which proved to be a very malignant form of cancer. There was considerable inflammation and proptosis of the eye which had now subsided to a considerable extent. In the first instance six needles were inserted above the orbital bone. The needles were inserted at 11 p.m., and at 7 a.m. they were pulled out about one-quarter of an inch, so as to radiate a greater area of the growth. At about 11 a.m. they were removed and re-inserted in intermediate positions. About 1,251 milli-curie hours of radiation were given in all. Since the radium emanation was inserted into the nose all obstruction had disappeared. In this case the haemostatic action of radium emanation was demonstrated by the fact that the nose could
be cleared out after radiation without any bleeding, whereas before radiation bleeding was profuse.

The Localisation of Modern Projectiles with reference to a Special Method of Surgical Technique in their Removal.

Mr. W. S. Haughton gave an account of the different methods of localisation in use, and described in detail the method which he recommended. See page 185, ante.

Friday, May 14, 1915.

The President in the Chair.

Living Exhibits.

Myeloma.

Mr. D. Kennedy when showing this patient said that although he called the condition myeloma he was not at all sure of the diagnosis. The trouble commenced in the elbow some eleven years ago; and atrophic changes developed in the hands after the condition in the wrist. The hand was very much deformed, although there was no disturbance of sensation.

Arthroplasty of Elbow.

Mr. D. Kennedy showed a girl who, some nine or ten months ago, injured her elbow by a fall. Since then there was complete ankylosis. The case was first seen about a month ago. X-ray showed that the humerus was not normal, but was somewhat battered. It was decided to operate and do an arthroplasty or whatever treatment was suggested by the condition found. A projection was found on the inner side of the articular end of the humerus. The projection was removed off the ulnar aspect of the humerus and the end of the humerus was put level. A flap was then taken partly
from the lateral aspect of the arm, and almost entirely consisting of fat, and turned over the humerus, leaving the ulna and radius as they were.

Skiagrams of Congenital Syphilis of the Hands and Feet.

Mr. H. de L. Crawford showed photographs of four cases of the above. The skiagrams were brought forward, as congenital syphilis of the hands and feet was considered a rather rare condition. Three of the cases were met with in the last month at the dispensary of the Richmond Hospital.

The first was the case of a boy, aged eleven, who came with a very large swelling on the outside of the left foot and a good deal of thickening in the soft parts. The teeth were well-marked J. Hutchinson’s. The condition further developed, and when the photographs were taken it had spread to the proximal phalanges of the big toe. The x-ray pointed to the condition being gummata underneath the bone. He suggested that what appeared to be small sinuses were really pieces of dead bone. The patient was given a half dose of "606" without effect. Under continued treatment with mercury and K.I. the gummata healed up.

The second case was that of a boy who had also well-marked Hutchinson’s teeth. The patient was the only living child in the family, and there was a history of six miscarriages. The thumb was very swollen, and the phalanges showed small areas of rarefaction. There was no pain, so the condition was not looked upon as tubercular. There was no sign of ordinary or syphilitic rickets.

The third case was one of a baby, aged one and a half years. The child was an adopted one, and no definite family history was forthcoming. There was much metacarpal thickening. The child had a typical syphilitic forehead, and the absence of increased heat, tenderness or pain made it positive that the case was not one of tuberculosis.

The fourth case was a child with swollen ring finger on the left hand. The swelling was chiefly due to the enlargement of the soft parts. The skin was redder and warmer than in the previous case, but there was no tenderness. Amputation of the finger was advised. On cutting down to the
periosteum, though apparently fibrous tissue, the extensor was found to be involved, and a rather soft, gritty substance was seen, which was apparently new bone. The wound was closed up aseptically, and it healed. In a week later there was slight enlargement of the other hand. The case was considered syphilitic. The family history was very bad. There had been three previous miscarriages.

In conclusion he said that this condition appeared to be more common than was expected, and he had therefore decided in future not to label any of these cases as tubercular until they had been well examined.

*Abstracts.*

Mr. Crawford said this was the case of a girl aged nine who came with a limp. At the age of five she fell, and after a few days pain she started walking again. She was noticed soon afterwards to be lame, and there was one and a half inches shortening. There was no sign of disease whatever until the shortening occurred. X-ray showed two acetabulums. The ramus of the os pubis on the one side was about half the length of the other side. The diagnosis of traumatic dislocation was made for want of a better designation for the condition.

The Bridge Method of Skin Grafting, illustrated by lantern slides.

Dr. H. de L. Crawford read a paper on the above subject. See page 208, ante.
The prognosis for the pregnancy, as also for life, is serious where the kidneys become diseased in a pregnant woman whose heart is also diseased. Heart lesions or kidney lesions do not usually make the prognosis grave unless very advanced. This is particularly true for uncomplicated valvular heart lesions in which even repeated pregnancies do not necessarily render a grave prognosis justifiable. What is it then that tends to make the combination of heart and kidney lesions so serious?

Before dealing with this question I thought it would be both helpful and instructive to consider briefly each of the following headings:—

1. The influence of pregnancy on the normal circulatory system.
2. The influence of pregnancy on a diseased circulatory system.
3. The effect produced on the circulatory system of (a) the non-pregnant, (b) pregnant woman by the so-called pregnancy kidney.
4. The influence of a diseased condition of the kidneys developing during pregnancy, on a previously diseased heart.

I will now deal with these headings in turn.

Influence of Pregnancy on the Normal Circulatory System.

In the later months of pregnancy the blood pressure often becomes slightly elevated. It has also been shown by Professor Juntz and others that the total blood volume is increased. The heart has, therefore, to deal with a larger quantity of blood. The peripheral resistance and the rate of the ventricular contractions undergo no compensatory diminution. Such a condition of affairs necessarily determines an increase in the work to be performed by the heart. Its activity becomes greater, and as a result the left ventricle hypertrophies to a varying degree. The existence of this hypertrophy and increased activity have been confirmed by the electrocardiographic observations so carefully carried out by Rubner. Gradually but surely, from day to day, the heart becomes trained and strengthened to withstand the sudden strain to which it will be subjected during parturition. The view that where during pregnancy the heart shows signs of breaking down, this is due solely or even in chief part to some special pregnancy toxin cannot be true. Mechanical factors brought into existence by altered conditions of work must also play a very important part.

Of investigations dealing with the effects of pregnancy on the blood vessels there are but few. Pankow, reporting the results of his inquiries in the Archives of Gynecology, drew attention to the arterio-sclerotic changes during pregnancy. The changes start in the outer coat-
ings of the arteries, and consist chiefly in a hypertrophy of the elastic fibres. The muscular layers of the larger arteries become hypertrophied. No one yet has brought forward work sufficiently complete to decide satisfactorily whether similar changes take place in the arteries of the body generally. Pregnancy may cure congenital hypoplasia of the vascular system.

Taking next the second heading:—

**Influence of Pregnancy on an Abnormal Circulatory System.**

Chief among these abnormalities will be the various forms of heart lesions, whether involving the valves, myocardium, or both together. In valvular lesions the changes induced by the additional complication of pregnancy will be merely a repetition of those processes by which compensation becomes established where valvular lesions exist uncomplicated by pregnancy. The heart muscle, being unimpaired, is still capable of very considerable hypertrophy. There is nothing unexpected in finding that in pregnancy also some valvular defects are more serious for the patient than others.

Where the muscular tissue is the seat of the cardiac disease in pregnancy the gravity of the case is greater. It is, however, more difficult to gauge them in dealing with valvular lesions. A heart whose musculature is found post mortem to be extensively diseased may have worked most admirably up to the time of death. The converse is undoubtedly also true that where post mortem slight myocardial lesions were demonstrable, ante mortem evidence of such were prominent. It would seem as though the only trustworthy way to form anything approaching a definite opinion where the suspicion of myocardial disease
exists, is to have the patient under prolonged observation under varying conditions of strain. Chronic myocarditis sometimes results from protracted septic poisoning. A history of such in connection with child-bearing or other circumstance would help to confirm suspicion in a doubtful case. Particularly difficult to judge from the point of view of prognosis are cases combining valvular disease with myocardial degeneration. Fortunately in the majority of cases in which valves and myocardium become simultaneously affected the latter eventually recovers, the former alone sustaining alterations that are permanent. In rather less than 1 per cent. of all heart lesions is the disease so grave as to cause breakdown or death during pregnancy and parturition. I have seen but one fatal case.

Concerning conditions in which the blood-vessels are diseased I will only mention that the strain of parturition is liable to determine the giving way of vessels whose walls are extensively weakened by syphilitic or other poisons.

Coming next to the heading which I mentioned third in order:

**Influence of a Diseased Condition of the Kidneys on the Circulatory System during Pregnancy.**

One of the most frequent kidney lesions met with in pregnancy—pyelitis—is of no special interest in this connection. It but seldom determines pathological change in the heart except when neglected, and then merely as would any other septic condition existing for a long time. The important kidney lesions from the point of view of this paper are those associated with increased pressure
within the blood-vessels, those lesions which determine before long the exaggerated apex beat and ringing aortic second sound so characteristic of increase of arterial tension. In such cases the walls of the left ventricle have become hypertrophied. Much has been said and written as to the exact nature of the changes in the kidney tissue which cause the increased arterial tension. It would seem to be primarily determined by physiological changes in the functioning of the renal arterioles. Later develop the better understood and more obvious anatomical changes. However induced, the increased blood pressure plays a useful rôle in helping to excrete against the exaggerated functional or anatomical renal resistance.

The changes that may develop in the kidneys during pregnancy are extremely varied. They may be of the most trivial nature—a mere catarrh of the epithelium lining the renal tubules—whilst in other cases there may be necrotic areas of considerable size. Daily examination of the urine of pregnant women will show that albuminuria exists in about 15 per cent. of cases. In a certain percentage of these the albumin is not of renal origin but comes from the mucous membrane of the bladder. In the later months of pregnancy the bladder wall is often greatly congested and extremely oedematous. It exudes a serous discharge whose albuminous content mixes with the urine. In only some 5 per cent. of cases is the albuminuria constant during the later months of pregnancy. As a rule the quantity of albumin is not large. Hyaline tube casts may also be met with. In about 1 per cent. of cases the quantity of albumin is really large. In such the daily excretion of urine is diminished, both granular and epithelial casts being also present. The clinical signs and symptoms are usually found to corre-
The Kidneys and Heart in Pregnancy

spond in intensity to the degree and extensiveness of the renal changes. In the cases of slight intermittent albuminuria symptoms may be completely wanting, and the albuminuria is only discovered in the course of a routine urine examination. Where, on the other hand, the quantity of albumin in the urine is large, there is usually well-marked œdema of face, hands, legs, vulva, &c., and the patient often presents, in addition, obvious evidence of toxæmic poisoning in the form of severe headache, vomiting, abdominal pain, disturbance of vision, &c., ending not infrequently with eclamptic convulsions. One must assume that the mildest cases with intermittent albuminuria result from a fleeting functional disturbance of the renal epithelium. The term pregnancy kidney is applied to the kidney found associated with the type of albuminuria which is persistent during the last two or three months of pregnancy. Leyden it was who first accurately described the changes undergone by the kidney, and emphasised the degenerative nature of these changes, consisting as they do in cloudy swelling and fatty infiltration of the protoplasm of the epithelial cells in the glomeruli and convoluted tubules. The non-inflamma-
tory toxic nature of these lesions renders it easier to understand the extremely rapid recovery which often takes place post partum in even the severest case of albu-
minuria during pregnancy. Rarely are the changes deter-
mined by pregnancy permanent. It is quite the exception for the kidney of pregnancy to become replaced by a permanent chronic parenchymatous or interstitial nephritis. Such an ending does, however, sometimes occur, and this is, perhaps, most likely to be the case where, owing to rapidly succeeding pregnancies a pregnancy kidney has not sufficient power of recovery to resume its normal con-
dition within the short interval separating the pregnancies. Purely toxic cases recover rapidly post partum.

Attempts are made to differentiate different groups of cases, but no sharp line of demarcation exists to divide any group absolutely from another. All grades of kidney disturbances are met with. Every attempt at classification into sharply defined clinical groups can only be unsatisfactory and unnatural. Intermediate conditions, transition forms, mixed or complex cases exist as links, rendering all such strict classification misleading.

Dealing next with the behaviour of the blood pressure, the cases characterised by intermittent albuminuria exercise very little effect in this direction. They are seldom associated with any marked rise of blood pressure, and cause no hypertrophy of the left heart. A very considerable albuminuria may exist with a very slightly elevated blood pressure reading, both returning within physiological limits after a brief course of dietetic treatment. These, the mildest cases, pass insensibly into the cases presenting the picture of the acute pregnancy kidney. Chloride elimination estimations will, to some extent, help to separate borderline cases. The chronic pregnancy kidney invariably causes the blood pressure to be markedly elevated. Indeed, characteristic for this condition is a marked elevation in the blood pressure, in conjunction with persistent albuminuria, both tending to increase as pregnancy advances. casts will be numerous in the urinary sediment, and there will be extensive oedema of face, hands, legs, vulva, &c.

Very great importance should be attached to the significance which a marked rise in blood pressure existing for a considerable period would be likely to possess for the heart. From a practical point of view, a useful division
The Kidneys and Heart in Pregnancy

can be made clinically into the cases which are favourably influenced by treatment, and those in which, in spite of milk diet, rest in bed, purgatives, &c., the blood pressure continues to remain highly elevated, registering 200 mm. of Hg. or more, and the other signs also show no tendency to improve.

Where the blood pressure remains persistently high, one is led to the conclusion, from what general pathology teaches, that, in addition to the alterations in the cells of the renal parenchyma, changes have also taken place in the interstitial tissues. Anatomical observations do not support the idea of a primary structural alteration of the blood-vessels. It would rather seem as if at the beginning one had to deal with a diminished sensibility of the renal arterioles. Less urine is passed, and the excretion of chlorides is diminished. What is it causes this lowered sensitiveness, this diminished power of reacting to stimuli? Perhaps pregnancy products, complex proteids, foreign to the maternal organism, which play the rôle of toxins. Many of these kidney changes start in the first half of pregnancy. The patients, however, do not die; consequently the exact condition of the kidneys is a matter of surmise. In such there may be hydatidiform degeneration of the chorion.

Schlayer and his co-workers showed that certain poisons pick out in particular the renal blood-vessels, lowering the sensitiveness of their reactive power: others act chiefly on the tubules, and with such the secretion of fluid by the kidney is uninterfered with. The increased arterial tension would seem to have, as at least one of its objects, to help in the excretion of effete materials by a kidney whose arterioles are not reacting normally to physiological stimuli. In so far as this is the case, increased blood pressure is beneficial to the patient.
Clinically one meets with cases in which the increase in the blood pressure is but slight, the excretion of urine practically normal although albumin is present in it, and yet the kidney condition shows no tendency to clear up under treatment. In such cases the parenchyma of the kidney must be chiefly at fault, as the blood-vessels are apparently functioning efficiently. Such cases seldom develop eclampsia. In two that I have had an opportunity of watching, the history suggested a possible relationship between the renal disturbance and a rather recent infective illness. Recurrent attacks of septic tonsilitis are liable to determine degenerative changes in the renal epithelium, and the existence of these lesions may first attract attention when the patient becomes pregnant.

Jasche suggests, without being able to offer satisfactory proof, that the rise in blood pressure which develops in association with the chronic form of pregnancy kidney does much to prevent the development of eclampsia. With such, excretion is undoubtedly less likely to be dangerously impaired. The more attentively one studies these renal cases the stronger grows the conviction that the full significance of blood pressure changes in connection with renal complications during pregnancy requires a great deal further investigating. The view sometimes advanced that a patient whose kidneys are eliminating a quantity of urine considerable below normal and whose blood pressure registers 180-200 mms. is necessarily on the verge of eclampsia is not in accordance with my own experience. I can recall two recent cases where no such complication ensued, the renal secretion improving with rest in bed, milk diet, &c. It would seem to me that an attempt to recognise and describe a definite pre-eclamptic condition must, with our present incomplete understanding of such obscure processes, be unwise. I am rather
inclined to believe that a moderately high blood pressure reading of, say, 180, in association with the other symptoms and signs of chronic pregnancy kidney, is favourable to the patient and renders the onset of eclamptic convulsions more remote. Quite recently in hospital I saw a patient whose blood pressure reading was only 160 mm. develop ante partum extremely severe convulsions. The convulsions ceased with the birth of her baby. By strange coincidence there was in the Coombe Hospital at the same time a primipara, whose tissues were extremely oedematous, and her urine loaded with albumin. The blood pressure registered ante partum, and for a long time post partum, 200-210 mm.: and yet at no time did she show any symptoms of eclampsia or of the so-called pre-eclamptic state.

Is there obvious evidence of poisoning? Are there signs of toxaemia present? These are the questions one keeps asking oneself whilst watching a patient whose pregnancy is complicated by evidence of renal insufficiency. The answer, sometimes obvious, is often one of greatest uncertainty. Too much weight, however, must not be attached to a fall in the urinary secretion accompanying even a marked rise in blood pressure. Such a condition is often compensatory, and so far favourable to the patient's recovery. Its significance for the lasting power of the heart has, however, to be borne in mind. This I will deal with under the fourth heading—the effect exercised by diseased kidneys on a diseased heart.

Provided the heart lesion is thoroughly compensated the development of renal complication does not necessarily render the patient's condition precarious. Where the heart muscle is already in difficulties and signs of cardiac embarrassment have developed, the outlook is, of
course, very different. Where the history suggests that primary degeneration or chronic inflammatory changes have developed in the cardiac muscle fibres prognosis should be particularly guarded. In such a heart is peculiarly liable to fail suddenly. The other factors of importance from the point of view of prognosis are the nature and duration of the kidney changes. In other words, how long has the heart been subjected to the increased strain associated with the renal condition, and in what state has it left the cardiac muscle fibres?

Briefly restating what I have said so far:

Heart lesions or kidney lesions complicating pregnancy comparatively seldom prove fatal. Occurring together their association with pregnancy is usually extremely serious in its consequences.

Pregnancy determines an increased cardiac activity. The heart slowly hypertrophies to withstand the sudden strain of parturition. Its accommodating power is subjected to a severe test at this time. Such a test will be more serious for a heart that is diseased.

Experience shows that the gravest cardiac lesions in this connection are those affecting the cardiac musculature.

Uncomplicated valvular lesions do not in the large majority of cases endanger either the pregnancy or the mother's life. Even successive pregnancies, if separated by an interval of some years, can be successfully passed through without aggravating the cardiac condition. In the case of muscular lesions a pregnancy may or may not have serious consequences. The result will be influenced by the aetiology of the muscle changes, the length of time they have been present, their extent, whether they involve particularly vital areas of the heart, &c.
The recognition and proper appreciation of degenerative changes in the myocardium demand experience and careful observation in conjunction with repeated functional testing.

Where the kidneys are diseased the behaviour of the blood pressure is of great importance. Should it become markedly elevated the heart will have greatly increased work to perform. After some weeks the walls of the left ventricle will be found hypertrophied.

The acute form of pregnancy kidney is not usually associated with much increase in blood pressure. The slight elevation met with rapidly responds to treatment.

The chronic form of pregnancy kidney is associated with a rise of blood pressure, which seldom exceeds 190 mm. of Hg. It is difficult, often impossible, to reduce the blood pressure in such to normal limits. Further, not improbably, to attempt to do so would be unwise. In some 6 per cent. to 8 per cent. of such cases eclampsia supervenes.

A fatal termination is more often determined in eclampsia by the intense strain to which the convulsions subject the heart than to the action of any special toxin.

At best difficult, it is often impossible, to distinguish between a case of chronic pregnancy kidney and one where the symptoms are the sequence of pregnancy supervening in a patient already the subject of chronic nephritis.

This difficulty is due to the existence of intermediate cases and transition forms, which act as links between the various clinical types. No sharp line of demarcation exists clinically or anatomically to separate one group from another.

Cases of pregnancy kidney are met with in which treat-
ment is unavailing in lowering the markedly raised blood pressure which has succeeded in attaining a level usually regarded as characteristic for chronic nephritis complicated by the patient becoming pregnant. Even an initially sound heart is liable to collapse when exposed for a number of weeks to a pressure within the circulatory system of 200 to 220 mm. of Hg. with the added strain of pregnancy. 

Post partum in the acute toxic cases, the blood pressure rapidly falls to normal limits. Where pregnancy supervenes in a patient whose kidneys are already chronically diseased, the blood pressure remains elevated post partum.

I cannot conclude my paper without specially referring, though necessarily very briefly, to eclampsia. I have already introduced the subject in connection with blood pressure readings and their possible significance. Comparatively little work dealing with the metabolic changes induced by the earlier stages of pregnancy kidney has been undertaken. The patients are usually not sufficiently ill to seek advice at the out-patient department of our maternity hospitals. Even when they do present themselves and are admitted, it is very difficult to keep them in hospital for any considerable time. In this way the opportunity of satisfactorily observing the changing picture of their disease in its earliest stages is seldom available. We do not see them until the more urgent and frightening symptoms of eclampsia at length compel them to seek assistance. Especially amongst hospital patients one is not infrequently surprised with a history that absolutely no symptoms preceded the onset of the eclamptic convulsions. The patients believed themselves to be in most excellent health. At this late stage when convulsions have already become established, one is no longer even certain how far the albumin, blood, casts, &c.,
present in the urine have resulted from the convulsions, and not from the original kidney lesions. I suppose we will eventually find that at least two if not more toxins are responsible for the eclamptic condition, and that not all of them, perhaps, have the same origin. One may be intestinal, another foetal, still another derived from autolytic changes in placental infarcts. Fehling and Winter have particularly drawn attention to the placental lesions found associated with disease of the kidneys in pregnancy. They take the form of extensive intra-placental haemorrhages, white infarcts, haemorrhage behind placenta and in the uterine wall. These changes are sometimes sufficiently extensive to bring about the death of the child, and its premature expulsion from the uterus. A possible causal relationship between such placental lesions and eclampsia has been advanced by several observers.

A very little experience convinces one of the difficulty in foretelling what patient will develop eclampsia and what patient will not. Some women would seem convulsion-proof. Their urine is loaded with albumin, epithelial and granular casts are present in large numbers, their limbs, face, abdominal wall are extensively oedematous, the tension in their arteries greatly exceeds the normal, and yet they do not develop convulsions. With another group of patients just the converse is true, eclampsia developing with quite unexpected suddenness, and in spite of the apparently normal condition of their kidneys up to the time of onset of the first convulsions. The seasonable variation shown in the number of hospital cases and the severity of the disease amongst such cases is interesting and mysterious. Why robust, well-developed women should be more susceptible than those who are weakly and anaemic is also difficult to explain. Eclampsia is a disease
of surprises. There still remains a great deal to learn about it, and the renal complications of pregnancy generally. The very complexity of the problems exercises a fascination.

Sir William Smyly said he did not remember any patients with which he had anything to do actually dying from heart disease during pregnancy or labour. In practice one had to go according to symptoms much more than physical signs; if the heart was competent it might be left alone, but if it became incompetent it would be necessary to try to restore it by the administration of strophanthus and digitalis, and if not successful the patient should be delivered. Speaking of affections of the parenchyma of the kidney which he thought Dr. M'Allister said do not occur during the first few months of pregnancy, he had at present a patient who was three months pregnant and who showed very marked signs of kidney disease. He was not sure at first as to whether it was disease of a chronic nature or disease peculiar to a pregnant woman. He tried the patient on a milk diet, but she grew worse, and he, therefore, felt inclined to end the pregnancy on account of the size of the uterus and the fact that there was no quickening which indicated that it was, perhaps, a molar pregnancy. The patient also developed ocular symptoms of an alarming kind. Taking all the signs, together with the fact that she was passing very little urine, he decided to empty the uterus of what appeared to be a hydatidiform mole. The dropsical symptoms afterwards disappeared and the patient recovered. He thought the fact that patients improved rapidly after the removal of the ovum suggested that the ovum was the cause of the toxæmia, and hence one would imagine that to remove the ovum was the best cure. He always advocated that in cases which do not improve under treatment the uterus should be emptied. He understood Dr. M'Allister to suggest that increased blood pressure was a good thing, but in eclampsia he had always considered that greatly increased blood pressure was the chief danger.

Dr. Hastings Tweedy said he approached the conditions
discussed from a different standpoint to that of Dr. M'Allister, whom he congratulated on the excellence of his communication. The latter considered that the kidney and the heart disease must be held accountable for the grave prognosis and for the associated toxic state. He (Dr. Tweedy) held on the other hand that all the pathological conditions found in association with toxæmia arose as a consequence of the poison, and in no instance was the poisoned state the result of the kidney lesions. He was glad to understand that the deleterious influence of milk and other foods had become recognised, at all events in Dublin, as a causal agency in the outset of eclamptic fits. It appeared to the speaker as absolutely proved that food-stuffs acted as partial poisons to almost all pregnant women. He thus accounted for the presence of morning sickness. A tolerance against these food poisons became established in the majority of instances, but when this was not so, acute toxæmic degeneration resulted. Hydæmia seemed an exception to his rule. This condition he found nearly always associated with a dead or imperfect ovum and a diseased placenta. All the other forms of pregnancy degeneration of organs could be arrested by abstention from all forms of food, combined with free purgation, and the ingestion of large quantities of alkaline water. In this way will be brought about the cure of the kidney and special form of heart disease so much feared by Dr. M'Allister.

Dr. Crofton said there were several points that might be suggested for investigation, the first being the bacteriology of the urine. In certain cases of eclampsia he had found the urine to be badly infected with micro-organisms. He suggested that it might be well to examine the urine bacteriologically in order to see if this was a common occurrence. Another point not to be lost sight of was the influence of diet on the flora of the gastro-intestinal tract. He thought it quite possible that in these cases part of the vicious circle was produced by septicæmia brought about in this particular way.

Dr. Solomons said although it was fairly well recognised that hypertrophy of the heart occurred in pregnancy there were some cases, he considered, in which what appeared to be
hypertrophy was really displacement. He would like to know whether Dr. M'Allister had noted at what time during pregnancy this hypertrophy commenced, and whether it occurred all through the pregnancy. It appeared to him that everybody accepted the food theory as advanced by Dr. Tweedy. He mentioned a case of eclampsia where the patient was well for twenty-four hours, but when milk was given a fatal result ensued. He recalled a case of toxæmia of pregnancy reported by him when Assistant Master of the Rotunda in which the patient had general anasarca with all signs of kidney disease, and a mitral murmur. All these symptoms and signs disappeared when labour had been induced.

The President said that regarding heart conditions he had seen a certain amount of trouble, even in ordinary uncomplicated disease of the heart. The increase of blood pressure during pregnancy or labour tells on a diseased heart. In cases of the toxæmia of pregnancy he considered the blood pressure of great importance. It was of benefit because it helped excretion, but the evil effect of continued high blood pressure on a poisoned heart shows itself after convulsions supervene when the pulse is the best index of the gravity of the case. When, in spite of treatment for the toxæmia, the blood pressure continues to increase, it is usual to find corresponding evidence in the urine and general condition of the patient that the toxæmia is increasing. In some of these cases the patient has practically no symptoms of toxæmia before the onset of convulsions or coma, and in these cases most information is to be derived from the blood pressure and urine. Sometimes the auto-intoxication becomes extreme, apparently the anterior cerebral cortex being unusually irritant proof, and finally the patient dies without convulsions, or after one or a few. If in cases of toxæmia the patient's condition did not rapidly disimprove, absolute rest, purgatives and nothing but water might be tried for four days. The blood pressure, urine and general condition of the patient decide the progress of the case. He failed to see how food could produce the toxæmia of pregnancy, but when toxæmia is present, food, and particularly milk, should be withheld until the toxæmia has definitely
decreased. By throwing extra work on the injured liver and kidneys, food aggravates the disturbances in them.

Dr. M'Allister, in replying to the remarks, said Sir William Smyly’s case was of exceptional interest, as it bears out the relationship supposed to exist between disease of the kidney and hydatidiform mole. A particularly interesting point was that the case had not sufficiently advanced for the fetus to have been preserved, and this would support the idea that if it was a poison within the uterus that was responsible, then that poison was not a foetal poison but one derived from the other intra-uterine tissues. As to the relationship between blood pressure and eclampsia, he considered it more favourable for a patient to have a moderately high blood pressure if she had or was going to get eclampsia. He thought that possibly many patients did not get eclampsia because their blood pressure was high. Dealing with the idea as to whether a toxæmia brings about the kidney condition or vice versa—bearing in mind those cases where eclampsia develops very rapidly and the urine is found to have altered tremendously within twenty-four hours, such a rapid change suggested some reflex nervous force interfering with the circulation through the kidney, and in that way with the excretion of certain poisonous substances. In some such way one must explain these rapidly developing cases. Referring to the infarcts recently described by Professor Young, he thought the idea suggested was that it was not these infarcts as seen that are responsible for eclampsia, but that it was their early stages that were responsible, as in these stages there was localised interference with the circulation in the placental tissue, and it was in this stage autolytic poisons were absorbed by the surrounding blood vessels, thus causing symptoms of toxæmia. He agreed that a rise in blood pressure made one anxious, but the mere fact that the blood pressure was rising would not justify interference. He considered it well to wait until the blood pressure had risen to 190 or 200 mm. of mercury, and that even then one should be guided by the effect of the rise on the patient. In reply to Dr. Crofton he could hardly agree that bacteriological examination was easy on account of the difficulty of getting urine from the bladder without contamination occurring.
ÆTIOLOGY AND TREATMENT OF HYPER-EMESIS AND OTHER FORMS OF PREGNANCY TOXÆMIA.

By E. HASTINGS TWEEDY, F.R.C.P.I.;
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[Read in the Section of Obstetrics, November, 27, 1914.]

I desire to report the brief records of a case of pernicious vomiting, for they furnish another proof of the close relationship which exists between this form of pregnancy toxæmia and the ingestion of milk or other foodstuffs, whether carbohydrates or proteids.

Towards the latter end of July last I was asked by Dr. Rice, of Portarlington, to see one of his patients, with a view, if necessary, of inducing abortion, in consequence of the severe condition of hyperemesis from which she suffered. The lady presented the usual features associated with this condition—foul breath, dry skin, temperature slightly above normal, quickened pulse, scanty and high-coloured urine, dry tongue and emaciation, whilst vomiting and retching occurred on an average every twenty minutes. She was surrounded by the ordinary accompaniments of such a condition. A portion of unfinished milk and soda still remained in the tumbler, a tin of partially consumed Brand's Essence, an empty champagne bottle, brandy, biscuits, and, of course, a sponge cake, whilst hidden away in a cupboard, and smuggled in without the
knowledge of the medical attendant, a bag of cherries was found.

The patient was about eight weeks pregnant, and there was no discoverable abnormality in her pelvic organs. Directions were given to discontinue all food and drink, and to give instead rectal injections of weak bicarbonate of soda solution to the extent of 9 ounces at intervals of three hours. An ounce of castor oil was also ordered, and a hypodermic injection of one-sixth grain of morphia. It was suggested that sago water should be the first food given, and this not for twenty-four hours. Owing to the absence of skilled nursing it was evident that much difficulty would be experienced in carrying out these orders. From what I subsequently learned I know that they were not adhered to completely. On the third day I received a letter from Dr. Rice stating that some improvement had taken place, but a few days later the patient's condition became so much worse that he was compelled to resort to rectal feeding. A trained nurse was employed to carry out this treatment, and she continued it for several weeks. On September 6th the patient's condition became so critical that she was sent up to a private home under my care. I found her aspect such as to cause me the gravest uneasiness and to preclude the possibility of a successful effort to terminate the labour. The temperature was subnormal, pulse 140 and thready, skin dry, conjunctiva yellow, lips cracked, tongue bright red, dry and cracked, urine high-coloured and scanty, sordes on the teeth, whilst there was incessant retching of blood-stained mucus. This train of symptoms I associate with deficiency of fluid in the blood, and, accordingly, rectal injections of weak soda solution were ordered in the manner already described. Food and fluid by the mouth were discontinued; a full dose of castor
oil and a peroxide mouth-wash constituted the entire drug treatment. The oil was partially retained and procured a free movement. On the following day I thought I could discern a slight improvement in her condition, and retching was much less severe. This improvement was marked within another twenty-four hours. The tongue and skin had become moist, the breath less offensive, urine was voided in larger quantities, retching had subsided. She was ordered a small quantity of albumin water, and, on this being found not to disagree, a table-spoonful of milk was given. Rectal injections of alkaline water were continued for several days after the re-establishment of normal digestion. Injections given in the manner indicated are much less irksome than the continuous proctoclysis and in most instances are quite as efficient. The pulse fell to normal on the fifth day, and before a week had elapsed my patient was eating three daily meals of the ordinary hospital diet. She returned to her home within a fortnight and has since remained in good health, free from a recurrence of the disorder, and has passed through a normal delivery.

I have notes of many similar cases, and I record this one simply to emphasise again the rational treatment of toxæmia.

It is satisfactory to know that in Dublin at least the harmful effect of milk and other foods on pregnancy toxæmia is admitted, but few amongst us have carried our beliefs to their logical conclusions. The mere admission that food may possibly be deleterious is not sufficient, but we should also pursue by every means at our disposal the further investigation of this fact, striving to ascertain the extent of its harmful influence and the nature of the poisonous effects.
The primary questions to which a reply should be sought for are three in number:—

1. Is the harmful effect of food due to mechanical irritation in a patient whose nervous centres are in a condition of extreme irritability? Is it, in fact, comparable to the conditions of infantile convulsions induced by the presence of worms?

2. Is it due to absorption of the ferments which result from decomposition of food in the intestines, or to some changed condition of the blood or lymph, which results in failure to deal with the constituents of normal food?

3. Are food poisons the direct and only cause of toxæmia, or are they but a small addition to the already saturated system, an addition which can under certain circumstances induce a nerve storm, as a cold blast of air can induce a convulsion in a patient suffering from tetanus?

The accumulation of clinical observations can alone answer these questions in a satisfactory manner, and it has been my endeavour for many years to direct attention to the importance of the following clinical facts:—

1. Food irritation is not a factor in increasing toxæmia of pregnancy, for croton oil has no tendency to aggravate symptoms.

2. While toxæmic exacerbations may possibly arise from absorption of intestinal ferment, in practice this is found to be the exception rather than the rule, for violent vomiting may be induced, or eclamptic seizures started in a few minutes after milk has been given, and before it could by any possibility have undergone fermentative change.

The conclusion is forced on us that absorption of food
By Dr. E. Hastings Tweedy.

particles during the earliest stages of their digestion are the responsible agents in hyperemesis and eclampsia.

When once it is admitted that food can, to some extent, poison, he would be rash to claim a measurement of the extent of its influence. If it can add one, two, or twenty per cent. of poison to the blood, why is there any hesitation in accepting the conclusion that it may add an indefinitely greater amount? Clinical experience points to its undoubted harmfulness, and this experience has established the prevailing custom of feeding the pre-eclamptic on a whole milk diet—the simplest and most harmless of foods.

I shall now consider the manner in which I conceive that food under certain conditions may produce untoward results. Sterile milk, or other food-stuffs, if injected directly and repeatedly into the blood is apt to exercise a poisonous effect. It is said that this poisonous effect is due to an absence of specific anti-bodies, for those present in the blood are incapable of rendering harmless the food particles until they have been modified by first passing through the mucous surfaces of stomach or intestines. We now know that in early pregnancy a foreign albumin appears in the blood, and I suggest that the normal food anti-bodies are interfered with thereby. Thus the early sickness of pregnancy becomes understandable, for it may be considered nature’s effort to reject food incapable of proper neutralisation. It is also probably eliminatory in its effects, for its occurrence in the early morning will remove from the system the digestive excesses of the previous day. When it fails to do this thoroughly, toxæmic symptoms arise. In most instances tolerance to food is eventually established, but the extent of the failure of the food particle to unite with its antibody is the measure of the severity of the toxæmia. The fact that kidney inflam-
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Vomiting is rarely seen in the early months of pregnancy may be due to the efficient eliminatory action of morning vomiting. In the worst cases of hyperemesis the alarmed stomach fails to discriminate between harmful and harmless stimuli, and endeavours to reject everything. Even the presence of spring water can no longer be borne, and, indeed, retching can be induced by mere suggestion.

In a case of hyperemesis treated by me in the spring of 1914 I tried the effect of giving olive oil before food was taken. The treatment was based on the popular belief that oil taken before a meal will prevent the most unwholesome banquet and the worst wines from disagreeing. It is supposed to do so by preventing, or at least lessening, the rate of absorption. The patient aborted before any data could be obtained in respect of the efficiency of the method. She is now again pregnant, and in no way suffers from untoward symptoms. She attributes her immunity to the taking of petroleum in the early morning, and declares if she omits to do so vomiting recurs. I do not attach much importance to these observations, and merely mention them as a possible path of new research.

There is one form of toxæmia of pregnancy which seems to be little influenced by food. I allude to the condition known as hydæmia. This condition may cause very alarming symptoms, and may kill as a result of œdema of the lungs or pericardial effusion. It is seen in connection with accidental hæmorrhage, with a dead or abnormal foetus or abnormal ovum. Vomiting and fits are neither characteristic nor common complications of the condition. I have seen rapid recovery follow from the mere rupture of the membranes, and I believe it will be found to conform closely with the toxæmia described by Professor Young as due to portions of dead placenta.
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Dr. FitzGibbon said he thought it was the toxins produced by the decomposition of food that were the primary cause of the toxæmia. By not allowing constipation to develop, toxæmia could be prevented, and where there was toxæmia the administration of purgatives rapidly got rid of it. He considered that the experience in most cases of eclampsia was that the patients have also a history of constipation, and, in his opinion, if the constipation was prevented, the number of cases of eclampsia would be diminished. The excreting organs of the pregnant woman become over-taxed in the effort to excrete the waste products of the pregnancy plus the abnormal products of decomposition of food, and consequently toxæmic symptoms developed.

Professor Alfred Smith said most of them recognised the causes of hyperemesis as reflex, neurotic and toxæmic. The latter was looked upon as coming on later than the second month. He noticed that Dr. Tweedy's patient vomited every twenty minutes, and, therefore, all food was rejected; hence, he could not think that food determined the condition. The symptoms pointed out were that the patient was jaundiced and showed extreme collapse. He suggested that the cause of the toxæmia was of fætal origin. In this class of case he would administer distilled water, and would consider the exhibition of bicarbonate of sodium or anything of that nature wrong. The ordinary enemata ought also to be given. He considered the patient would function better and would get rid of the toxins quicker by simply giving distilled water.

Dr. Solomons said that the greatest difficulty in these cases was to know how long to leave the patient before inducing labour. He considered that Dr. Tweedy must have had a great temptation to empty the uterus when he found the patient so ill. He did not know if the patient was a primipara, but if so he suggested that she would require careful watching for signs of eclampsia when approaching confinement. He inquired if there was any reason why nine ounces especially were given every three hours; he would also like to know if stomach lavage was resorted to, as it was a most satisfactory mode of treatment. He also asked if examination was made for erosion of the cervix. He recalled a case of severe vomiting in which there was marked erosion present,
and whether it was the treatment of this condition that ameliorated the symptoms, or whether it was the general treatment, the vomiting lessened after treatment of the erosion with caustics.

Dr. Madill said it seemed to him that during the early months of pregnancy an equilibrium was established which became upset in later months. He suggested the possibility of the condition being found to be due to the absorption of poisons from the intestinal tract, aided by excessive secretion of some of the ductless glands. He was sorry nothing had been said about the influence of the ductless glands on hyperemesis, as they were known to be hypertrophied during pregnancy. He did not think the so-called ammonia-nitrogen co-efficient in these cases would be of much use as a diagnostic sign. He asked if any other way of estimating the amount of toxæmia was known, as he did not consider the symptoms gave sufficient clue.

He agreed as to the harmful effects of the giving of food prematurely in cases of toxæmia. He recalled a very serious case exemplifying this danger, where a severe attack of toxæmia followed a mild attack owing to the premature administration of a little milk.

The President said that the majority of these cases are hysterical, and, for them, treatment such as that given by Dr. Tweedy was satisfactory. From his own cases of toxæmic hyperemesis he had concluded that the best results are got by terminating the pregnancy when the patients do not react within a reasonable time to the usual treatment for the toxæmia. His opinion was that while it is obvious that food is injurious to a patient suffering from severe toxæmia of pregnancy, it is difficult to see why food alone should be the cause of the toxæmia.

Dr. Tweedy, replying, said he brought the paper forward to get an expression of opinion as to the exact rôlé of food in these cases. If food could lend its aid to poisoning a patient he would like to know how much aid it could lend. He referred to a paper which he read in London four years ago, in which he brought forward striking clinical evidence in favour of the belief he held. He believed that hysteria acted largely in these cases, but thought that even in the most hysterical
case the toxic effect must take first place. The primary cause of the vomiting in every case was the toxæmia, and he maintained that the toxæmia was due to the food. During his experience at the Rotunda Hospital he had never seen a death from hyperemesis. He mentioned milk as the most harmless of all foods. He selected it for the purpose of showing that even it would poison the patient. If the cause of toxæmia was of fætal origin, he was at a loss to know how a cure could ever be brought about by a milk diet.
CHRONIC FIXED RETROVERSION OF THE UTERUS: A PLEA FOR OPERATION.

By BETHELM SOLOMONS, M.D., F.R.C.P.I.;
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[Read in the Section of Obstetrics, January 15, 1915.]

There has been a great deal written during the last half-century about backward displacement of the uterus. There seems, however, to have been a certain lack of literature dealing with chronic retroversion fixed by adhesions.

It is a very notable fact that retroversion alone is more significant than retroversion with retroflexion. In the former case there is nearly always some inflammatory fixation, the most usual being bands which fix the fundus and back of the uterine wall to the intestines and posterior pelvic wall. Occasionally the condition is caused by cicatricial anterior parametric bands, which draw the cervix forward. Where retroflexion is present there is seldom any inflammatory fixation, but there is usually to be found a large flaccid uterus with stretched ligaments or a tumour in the posterior uterine wall or else some adnexal abnormality.

Different gynaecologists hold different views regarding the best definition of retroversion. Schultze, in his "Displacements of the Uterus," says: "Retroversion of the uterus is the stable inclination of the fundus uteri backwards, the shape of the organ being extended or sometimes slightly anteflected." Other gynaecologists
define retroversion as the backward deviation of the cervical axis from the vertical.

To the student studying for examination exact definitions are important. To the practitioner who understands the positions of the uterus, such exactitude is unnecessary.

The patient who is usually anaemic or (if the expression may be used) "liverish" usually complains of menstrual abnormalities. Excessive menstruation with the passage of clots, metrorrhagia, leucorrhœa of a varying degree, a frequent desire to micturate, backache, constipation, with a general feeling of weight and bearing down in the pelvis are the symptoms most commonly complained of. There may be intermittent abdominal pain due to the adhesions.

On bimanual examination the os uteri is found pointing slightly forwards, no flexion is discernible, whilst with the fingers in the posterior fornix the uterus is found between them and the abdominal hand.

When an effort is made to replace the uterus, in some cases partial replacement occurs, but immediately the fingers in the posterior fornix are removed the uterus falls back to its old position; in other cases no replacement can be effected. What then are the possible treatments?

1. Palliative Measures.—These are numerous. Vaginal douches, vaginal tampons of cotton wool lubricated with various emollients, rectal massage, electricity, enemata twice or thrice weekly, Schultze's method of replacement after filling the rectum with water are all unsatisfactory. First, they seldom or never cure. Secondly, they keep the patient a chronic invalid, a nuisance to herself and her family, and the slave of her genitalia for the very long time which it takes even to relieve. Thirdly, if the adhesions are so loosened that replacement can be effected and a pessary inserted, the patient is in a position very
little better than the first. Is it to be believed that such palliative measures will open closed tubes? I have had some opportunities of performing laparotomies where patients had been treated in some of the ways herein described. The results obtained, as seen in the abdomen, condemn the treatment. What then should be done?

2. Operative Measures.—These may be carried out by the vagina or by the abdomen. Strassman performs all such operations by the vagina. There is, to the aseptic surgeon, no advantage in this method, whereas the disadvantages caused by the small amount of space in which to work, by the difficulty of hemostasis and by the danger of bowel injury are great. There is no doubt that the abdominal route should be chosen. Before opening the abdomen, the uterus should be curetted. In such cases, there is always marked endometritis. The advice of the late Dr. Herman and that of several present-day operators who advise against the preliminary curettage seems most illogical. Any other necessary vaginal plastic work should also be done. With the patient in the Trendelenburg position, the abdomen is opened by an incision from the pubes to near the umbilicus, the uterus is caught in a uterine forceps or else by means of a stitch inserted deep in the fundus. The use of a bullet forceps is to be avoided, for it is liable to tear out and leave a gaping wound in the uterus. Having steadied the uterus, the adhesions are separated. Light adhesions may be divided from behind forwards with the hand. Dense adhesions must be incised with blunt-pointed scissors, those containing vessels of any size being ligated. Raw surfaces, wherever possible, should be oversewn. The intestines must be handled gently. Unless care is taken, large openings may be made in the rectum by careless handling
of the adhesions. In some cases injury to the bowel is unavoidable, and the operating surgeon must be ready for such contingencies. Where pus tubes are present they must be removed or the tubes must be resected as seems best. Pus should be taken for analysis in a sterile test tube, or on a sterile wipe, with a view to vaccine treatment. The appendix must be examined, and removed if necessary. Lane's kinks and Jackson's membranes should be sought for.

When all the adhesions are separated, when the adnexa are examined, and repaired if necessary, the uterus must be suspended by the method favoured by the operator. I should like to express an opinion here that from post-operative cases I have seen I do not believe it matters what suspension operation is performed—so long as it is done effectively. Ventral suspension, according to Kelly's directions, or any of the numerous intraperitoneal operations for shortening the round ligaments are all useful when correctly performed.

Drainage.—The question of drainage is a vexed one. When there has been exudation of pus or where there is much oozing from separated adhesions, drainage should be employed. This may be carried out by means of iodoform gauze brought through an opening in the posterior fornix and out through the vagina, or else by means of gauze through the abdominal wound. The former is to be preferred for the following reasons:—

1. There is less pain in the removal of the gauze.
2. There is no opening left in the aponeurosis; hence hernia is less likely.
3. When brought through the skin wound the convalescence is, as a rule, longer.
4. Drainage is equally good in either direction.
The post-operative treatment in these cases should not differ in any way from that followed in other abdominal sections. The Fowler position should be maintained for three or four days. The gauze in purulent cases should remain in for forty-eight hours. Where it has been inserted because of oozing it may be removed in twenty-four hours.

**Fixed Retroversion and Pregnancy.**—Fixed retroversion is usually regarded as a predisponent to sterility. When this malposition is complicated by pregnancy what may happen?

1. Abortion may occur. This is the most common outcome.
2. The adhesions may separate, the uterus may right itself, and full-term delivery may result.
3. The adhesions may separate and symptoms of haemorrhage or perforation of the bowel may arise.
4. Anterior development, with its serious consequences, may occur.
5. Incarceration, with all its dangers, may result.

Bearing in mind these sequelae of the condition, what is the practitioner to do when consulted by a patient who is found to have a fixed retroverted uterus which is pregnant?

There are four courses to be considered.

1. Leave the patient alone and trust to luck. This in the face of the eventualities would be nothing short of criminal.
2. Induce abortion. This is recommended by some. In my opinion there is nothing to necessitate such a serious step.
3. Endeavour to separate the adhesions by means of
Schultze's method and insert a pessary. The disadvantages of this method have already been enumerated.

(4) Open the abdomen, separate the adhesions, and suspend the uterus. There is nothing against this procedure, and it seems to me to be the only treatment possible in a case of fixed retroverted pregnant uterus.

A patient consulted me eighteen months ago complaining that she had had two abortions, the latter being two weeks before she came to see me. I examined her, found a fixed retroverted uterus, and told her to return for operation in four weeks. She returned in three months, when I found that she had in the meantime become pregnant, and I diagnosed the two to three months pregnant uterus to be still in a fixed retroverted position. I advised immediate operation, to which she consented. Having opened the abdomen, I separated the adhesions, many of which were dense and required ligating, and suspended the uterus. She had a normal convalescence. The remainder of the pregnancy was uneventful, and she was delivered without any complications of a full term child. I intend to treat every case of this sort in a like manner. There is always the remote possibility of abortion occurring, but the chance of grave sickness, if the patient is left alone, is far greater.

Conclusion.—The only satisfactory treatment of chronic retroversion of the uterus fixed by adhesions, whether the uterus be pregnant or not, is to free the adhesions by the abdominal route and to suspend the uterus. The prognosis, both immediate and remote, is excellent.

Dr. Spencer Sheill said he did not think that all the operations were equally satisfactory. He admitted that they were satisfactory if done in a satisfactory manner, as each
case had its own indications. The choice of the case was of importance. All cases with which he had to deal were capable of being replaced, but in a case of markedly adherent uterus he would certainly agree that laparotomy was necessary, but he did not agree that ventral suspension should follow because the amount of irritation produced by suturing was likely to bring about abortion. As far as the operation of suspension was concerned, they all knew that a new adhesion formed by suspension would stretch in pregnancy and become a ligament, and he, therefore, failed to see the good of ventral suspension in such cases. He would sooner let the patient go to the end of pregnancy and give the matter attention at that time by the insertion of a pessary as soon as it was considered safe to do so.

Dr. Gibbon FitzGibbon said that the matter of drainage in the case of pus tubes being met with was a difficult point to decide. He always felt that by fixing the fundus of the uterus, and then draining the pelvis through the lower angle of the wound, one ran the risk of making the suspension into a fixation, and in these cases, therefore, he thought there was a distinct reason for selecting the Gilliam operation; then, if adhesions were produced they would not cause fixation in the same way as if the uterus was fastened to the peritoneum. He preferred drainage through the abdomen where there was any real necessity for drainage. He had followed up several cases of pregnancy after ventral suspension had been done, and he had never found that they had any difficulty in pregnancy or delivery, but he had found that in some of the cases retroversion recurred three or four weeks after delivery, but this was easily cured by replacement and retention in place by a pessary for six or eight weeks, and then remained in place without any further treatment.

Dr. Madill said he did not think all cases of fixed uterus required operation at all. Most cases that he had seen operated on in Berlin were done by the vagina, and there was no doubt that this method prevented the handling of the intestines, but he thought the abdominal route was preferable. He suggested that these cases were all due to infection, and if any intra-peritoneal fluid could be obtained a culture should be taken. An adequate pelvic floor was
By Dr. Bethel Solomons.

essential in any operation for retroversion, and if not present should be made. When the uterus was brought forward out of the retroverted position he considered that the strain was too much to be suspended straight away, and thought a pessary should be worn for a couple of months.

Dr. E. H. Tweedy said he thought Dr. Solomons had well described the modern method of treating retroversion. He had never heard of pregnancy in a retroverted uterus being liable to cause rupture of the intestines, and he asked Dr. Solomons to quote his authority for such a statement. Abortion was not unavoidable even in a fixed retroverted uterus, and he therefore thought it was a serious step to open the abdomen in such cases whilst the woman was pregnant. The word "criminal" was entirely too strong to apply to the conduct of a man who refused to operate. He asked if any one present had known of a case where a pregnant woman died from rupture due to fixed retroversion. If there was an infected area, peritoneal adhesions formed round the gauze and shut off the peritoneal cavity, and when the gauze was withdrawn it formed a channel by which the septic discharge would come away.

He was satisfied that the results were good in ventral suspension, and he had never seen any difficulty in delivery after it. The suggestion that the ligament stretched and would not contract seemed to him outside the question. His object was to fix the fundus of the uterus to the bladder, and by that means he obtained an absolutely mobile uterus which was free from danger in pregnancy and delivery. When he heard of relapse after ventral suspension he knew the operation had not been properly performed.

Dr. M'Allister said the exact position and shape of the backwardly displaced uterus was of importance when such a uterus became pregnant. A pregnant uterus which was not only retroverted, but also markedly retroflexed, would even in the absence of adhesions have very little chance of righting itself spontaneously. He agreed with Dr. Madill that there were old-standing cases of fixed retroversion which were symptomless. He was sceptical about the statement that all cases of acquired retroversion were complicated by some degree of prolapse. Appendicitic inflammation could, he
Chronic Fixed Retroversion of the Uterus.

thought, drag the uterus backwards without any uterine descent occurring. The presence or absence of uterine descent would guide him, amongst other things, in his selection of an operation for restoring the uterus to its proper position. The Alexander-Adams operation did not lift the uterus to any great extent. It merely drew it forwards. He always ended up these cases by doing this operation provided there seemed to be no reason for attaching the uterus higher up on the abdominal wall. The disadvantage of suspension operations was that, owing to the traumatism of the peritoneum, apart from the question of sepsis, a considerably broader attachment to the uterus might occur than had been intended. Were the uterus very large he would excise portion of its anterior wall. He referred to Pestalozza's operation. Were the tubes distended with pus and the infection gonorrhæal, he would remove the uterus with the appendages.

The President said that these cases of chronic fixed retroversion were always due to infection, and there are no symptoms which can be associated with the malposition alone. Symptoms which can be attributed to the pelvis are due to the persistence of the pelvic inflammation or to the adhesions. Pain rarely exists if a sufficient interval has elapsed since the infection occurred. The fixation of the uterus and adnexæ may cause dyspareunia and difficulty or pain during defaecation, but the most usual causes of complaint are sterility or abortion. In the management of these cases the nature of the infection must be ascertained if possible. The relief of fixation of the uterus and adnexæ should be considered only when any of the symptoms already mentioned are present. Laparotomy should be performed. After the adhesions are divided and salpingostomy in cases of sterility, the round ligaments should be shortened. When symptoms due to the inflammatory condition persist or recur after a sufficient interval from the time of infection in spite of thorough expectant treatment, as is most likely in gonorrhæal cases only, removal of the uterus, tubes, and ovaries gives the best results. Removal of the tubes and cure of the malposition rarely give permanent relief in these cases.

Dr. Solomons, replying, said he recalled a case which he
had met recently which was a most striking contradiction to the remark that symptoms were seldom met with in fixed retroversion. In this case the patient had been bleeding profusely for a fortnight, and this was her only symptom. Fixed retroversion with tubal disease was diagnosticated. In separating adhesions pus exuded which on examination was found to be sterile. The appendix was also involved in this case. He made it a rule if any pus could be obtained to take it for examination. He always followed Dr. Tweedy's teaching never to operate on fixed retroversion if there were no symptoms, but it seldom happened that patients consulted him if they had no symptoms. One should chose the operation which best suited the case, and the one chosen should be done perfectly. He had not seen any case of fixed retroversion in which the uterus was so big that it would have been in any way improved by performing utriculoplasty, thus making a simple operation a serious one. The statistics of cases of operation for displacement were rather elusive, as patients were usually examined within a year afterwards, and it seemed to him that for statistical purposes patients should be examined after a longer period in order to form any conclusion of value. He did not agree with those who said that when a ventral suspension was performed it went back afterwards. It did not go back unless the operation was badly performed. Referring to the suggestion that instead of doing a ventral suspension after separating the adhesions in the pregnant case reported, a pessary should have been inserted, he said that pessaries sometimes slipped, and he did not wish to run any risk in this case.

He thought that drainage, either vaginally or abdominally, was good. The idea of using gauze was, of course, to cut off the infected area. It seemed to him that where there was a fixed retroversion there was always endometritis, and that was the reason that he thought curettage should be done as well as some suspension operation. He did not agree that a post-operative pessary was necessary where the operation for retroversion was effectively performed. He had done several cases of shortening of the round ligaments according to the Alexander-Adams method after the performance of treatment in the abdomen.
FATAL GASTRO-INTESTINAL HÆMORRHAGE IN THE NEW-BORN.

By SPENCER SHEILL, F.R.C.P.I.;
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[Read in the Section of Obstetrics, February 12, 1915.]

I think all will agree that a disease which exacts a mortality of from 50 to 80 per cent. deserves the closest study and attention. It is true that the ailment with which this paper deals is not a very common one, but nevertheless it adds appreciably to our already overhigh infant mortality; moreover, so little appears to be known of the pathology of the disease, that it is not a matter for much surprise if our treatment of it, when the occasion arises, has, up to the present, been of little avail. It must be understood that I am not dealing with mere melâna neonatorum, with hæmorrhage of syphilitic origin, with that directly due to injury, nor with cases in which blood has been taken into the mouth. The lesion is what I prefer to look upon as a definite clinical entity, a disease so far of unknown origin, the principal symptom of which is severe gastro-intestinal hæmorrhage, which, in the large majority of cases, proves rapidly fatal.

Before giving the details of my own case, I will briefly sketch a picture of a typical case, and refer to what students of the disease have already recorded in the literature, regarding its possible causation.

Although cases have been recorded in which the birth of the child affected was fraught with much difficulty, and
difficult labour has even been suggested as a possible cause of the hæmorrhage, due presumably to trauma of body or brain; yet, in a number of instances, the birth was easy, and the child apparently perfectly normal, in which state it has remained for, perhaps, twenty-four hours. Then a little vomiting of brownish material, or of blood in small bright clots, occurs, and at the same time the stools become blacker than meconium usually is, and sometimes a little red blood is visible in them. Rapidly and progressively, both stools and vomit contain more and more blood, until both almost entirely consist of it in a more or less altered condition.

The infant shows all the signs and symptoms of loss of blood. The most prominent of these are: progressive weakness; the lusty cry changing to a whine or feeble moan; the skin becoming dry and dull yellow, although not actually jaundiced; the respirations shallow; the pulse weak, and the extremities cold. Death usually occurs in about five days with a convulsion. The disease appears to be more common in boys, in the proportion of about 2 to 1, and this fact has been quoted in support of the theory that the disease is allied to, if not actually a phase of, hæmophilia. Careful examination of the blood and organs in fatal cases, and the after-history of non-fatal cases, have shown, however, that such is not the case. One case had a circumcision done a little later without ill-effect. In others, there has been no after undue tendency to bleed, or no inclination to spontaneous hæmorrhages such as nose-bleeding, &c. Again, we should expect umbilical hæmorrhage if the child were a hæmophiliac, but this has rarely, if ever, been recorded.

The malady is not likely to be mistaken for Winkel's hæmoglobinuria, a disease most probably of infective
origin, in which cyanosis, jaundice, and somnolence are well marked. In common with all ailments, a microbe has been “discovered,” and credited with being the causative agent. Ten years ago, Gärtner described a melāna bacillus, which he found in two of his cases, but up to the present day his finding remains unconfirmed.

Ulceration of the stomach and duodenum has been looked upon as a cause, as well as marked congestion of the mucous membrane of these organs without actual lesion.

In one case at the autopsy a small ulcer was found, which had opened into an artery at the cardiac end of the greater curvature of the stomach. In another case, an ulcer was found which had opened into a duodenal artery.

Landau advanced his ingenious theory as to the cause of these ulcers, stating that an embolus became detached from the umbilical vein or ductus arteriosus, and being swept into a branch of the gastric or duodenal arteries, occlusion occurs, followed by necrosis and ulceration, with further tissue necrosis and involvement of blood-vessels with hæmorrhage. This is not a very probable explanation, for the disease does not appear to be merely local, because, in the last case I referred to, infarcts were found in the lungs and other organs. Capillary defects have been suggested as a cause, but they have never been demonstrated. Syphilis has not been found associated with the disease.

As I have previously stated, the disease under consideration is a definite condition whose cause is unknown. The name melāna neonatorum should be discontinued, as it merely indicates a condition which might as readily, or more so, be due to blood coming from badly cracked nipples in the mother, or from other situations. The
black motions are due to the haemoglobin of the blood being changed into haematin, which, in contact with the $H_2S$ of the bowel, becomes a black sulphide of iron. Tarry stools, therefore, only indicate that blood has lain for some time in the intestine. If doubt exists about black motions being due to blood, microscopic examination will reveal some blood-corpuscles if present.

Needless to say, in a disease characterised by so obscure a pathology, the treatment resolves itself of necessity into a symptomatic one. One must endeavour to check the bleeding, whatever its source, and to treat the symptoms due to loss of blood. The latter is the more easily disposed of, because it is called for so frequently in many other types of case, and at all ages. I would lay particular stress, in this connection, upon the necessity of maintaining the body-heat of the infant, and upon saline infusions. For the checking of the haemorrhage, many measures have been tried, most of them with a doubtful degree of success. Prominent amongst them are styptics, by the mouth and by the rectum, and preparations designed to increase leucocytosis and the coagulability of the blood. The principal ones are:

- Liq. ferri perchlor., in doses of 2 to 3 mins. diluted, every two hours.
- Adrenalin, 1-1000 solution, 1-2 mins. in water every hour for three doses, then every 2-3 hours.
- Or 3-5 mins in 2 drachms saline solution per rectum.

Ergot has been used too.

The doubtful possibility, that any of these preparations will reach the bleeding point or area with any degree of certainty, makes their employment of little value in an urgent case. Better, perhaps, is the use of gelatin by
mouth, and some good results have been reported from drachm doses, given hourly, of a 2 to 5 per cent. solution, or by 1-2 oz. of the solution by rectum.

A good formula for its administration is as follows:

\[
\begin{align*}
\text{Gelatin alb.} & \quad - & \quad - & \quad \text{gr. xxx.} \\
\text{Sodii Chloridi} & \quad - & \quad - & \quad \text{gr. ii.} \\
\text{Aq. destil.} & \quad - & \quad - & \quad \text{\textfrac{3}{3}} \text{m. solve.}
\end{align*}
\]

Calcium chloride has been given in doses of 2 grs. in water, every two hours, and nucleic acid, thymus gland extract, yeast, &c., have been suggested as producing a marked leucocytosis by reason of the nuclein contained therein.

Again, gelatin has been recommended for subcutaneous injection, and if made absolutely sterile in order to avoid risk of tetanus, and used with the utmost antiseptic precautions, it seems to be the best suggested treatment. From two to six drachms of a 10 per cent. solution are injected two or three times daily, the needle puncture being immediately sealed with care.

The drawback to oral medication is the vomiting, which is usually troublesome. It is desirable even to avoid milk as nourishment, at any rate cows' milk fresh or preserved; rather is it preferable to keep up nutrition by means of whey and albumen water, administered almost cold in small amounts at frequent intervals.

In my case, I would not permit suckling, lest the exercise entailed should distress the weakly infant or raise its blood-pressure, and thereby increase the bleeding.

**Case.—** In briefly outlining the principal features of the case which lately came under my care, it will be seen that it is a typical example of the disease, and differs in no essential detail from the average case reported in the literature on the
subject. The labour was somewhat tedious, by reason of a persistent occipito-posterior presentation in a primipara, and forceps were required to effect delivery. How far these facts support the theory of harmful pressure upon internal organs, or of a central nervous system lesion as a cause of the haemorrhage, will never be known any more than has been alleged in the few cases reported. The child was fairly large, and, contrary to the rule, was a girl. Without any doubt, pressure greater than normal was experienced by the infant. In every way the child appeared normal at birth; there was a caput and moulding of the head, but no haematoma.

The day following its birth, the child vomited a little bright red blood with smallish clots at intervals, and the stools showed both black and red blood in quantity. The third day, blood was copious by vomit and motions, and the child's condition was becoming grave as a result. The mother's breasts were pumped, and the child spoon-fed with the milk. The child was with difficulty kept warm with the aid of wool and artificial heat, and was failing rapidly. I gave a gloomy prognosis, and obtained permission from the parents to adopt any treatment which I thought might be of use.

The urgency of the case, and, being a Sunday, the added difficulty of getting and sterilizing gelatin, prompted me to think that horse serum by injection would hold out a hope as great as, if not greater than, that to be anticipated from the use of gelatin. I was willing to use anti-diphtheritic serum, if I failed to obtain the plain variety, believing that the diphtheria element would be harmless even if no value. However, I was fortunate enough to obtain the plain horse serum in a 10 cc. phial.

With fullest precautions, I injected 5 cc. under the right axilla, about the horizontal nipple-line, and with the fear of not being able to obtain more serum, should I require it next day, and of possible anaphylaxis resulting from a second dose, together with the difficulty of keeping sterile the 5 ccs. remaining in the flask, I determined to give an heroic dose, and promptly injected the second 5 cc. under the left axilla. The punctures were duly sealed with care. I should have said
that, for 24 hours prior to this, the infant had been given 2 mins. of adrenalin solution, every two waking hours.

The following day, no blood whatever was vomited, the child took more nourishment and seemed a little stronger. There was still marked melena, but no red blood by the bowel. On the sixth day, there was no blood of any sort coming by vomit or by bowel. On the seventh day, some tarry blood was visible in the motions, but still some of the latter was normal in colour. That was the last blood seen. From thenceforward the child progressed favourably and rapidly, considering its grave condition on the third and fourth days, and is now a normal healthy infant.

I would also like to allude to the fact that Glendinning has shown that a minute quantity of blood may be a normal constituent of infant faces during the first few days of life. It is considered by him to be caused by the sudden circulatory changes following an independent existence, which lead to minute haemorrhages into the intestinal canal. It has been suggested that too early ligation of the cord may be a factor in the case, but investigation of this point has not confirmed the theory.

With regard to the serum injection, I am not aware of any previous instance of its use in such a case, although Dr. Müller, of Tubingen, has used human serum with success in cases of infantile eczema. I am forced, in spite of the single instance, to the conclusion that the favourable and rapid result was directly attributable to the serum injection.

Sir William Smyly said he had used horse serum with an infant some months old, and it certainly appeared to do some good, but the case did not terminate so satisfactorily as the one now reported. It was administered hypodermically and
by the mouth. His case was not, however, a similar one to that of Dr. Sheill, but the treatment was the same. It was a case of purpura hæmorrhagica.

Dr. Tierney recalled three such cases. The first was rapidly fatal. In the second he tried the gelatine prescription mentioned in Dr. Sheill's paper, using commercial gelatine instead of Merck's gelatine. This was given by the mouth in drachm doses every hour, and the patient gradually got better. The third case was a milder one, and, with similar treatment to the second case, the result was quite good.

The President said he remembered two cases such as Dr. Sheill had reported, but of a less severe type; both recovered without any special treatment. In a bad case he had no doubt the serum would be of the greatest benefit. He inquired as to Dr. Sheill's impressions regarding the injection of saline into a patient who was bleeding.

Dr. Spencer Sheill, replying to the remarks, said, whether the result was due to the treatment or not he could not say. The patient might have got well in any event. He did not like to claim definite results from a single instance. The disease he looked upon as comparatively rare. He had seen a good many cases of melæna neonatorum which might be looked upon as the same disease, but in a lesser degree. He was interested in the use of horse serum in typhoid. He thought that the presumption was that it increased the coagulability of the blood by increasing leucocytosis. Saline injections were given to prevent collapse from the want of blood, and gelatine was given to prevent further loss, whether it was absolutely scientific to administer both together he could not say. The child had, he considered, reached the limit. The pulse could not be felt at the wrist, so he thought it would be safe to use saline injections to prevent the child from dying, in spite of the chance of raising the blood pressure. The same applied to adrenalin. The serum injected showed a definite result within two and a half hours. He had no experience of human serum; but he could find nothing in the literature to suggest that it had a better effect than the horse serum, and the latter was more readily obtained. As to an ounce of human serum being necessary, that might be so, but his case, he thought, tended to show that such an amount
of horse serum was not required, he considered that the horse serum had more than an effect on the coagulability of the blood. It acted as a hormone. His case could hardly be considered parallel to Sir William Smyly’s if the latter was one of purpura hæmorrhagica.
A NOTE ON THE "DUBLIN METHOD" OF CONDUCTING THE THIRD STAGE OF LABOUR.

By T. PERCY C. KIRKPATRICK, M.D., M.R.I.A.; Fellow and Registrar of the Royal College of Physicians of Ireland.

[Read in the Section of Obstetrics, March 12, 1915.]

On May 25, 1900, Dr. Henry Jellett made a communication to the Obstetric Section of the Royal Academy of Medicine in Ireland, in which he set out to prove the following three propositions:—

"1. That the method of effecting the delivery of the placenta by external manipulations, as opposed to its manual removal or its delivery by traction on the funis, was originated in Dublin.

"2. That Credé's method, when introduced de novo in Germany, was identical in principle with the Dublin method, and it rapidly came to assimilate itself to the Dublin method in its most important details.

"3. That, consequently, there is no difference between the Dublin method and the Credé's method, and that inasmuch as the method originated in Dublin many years before the time that Credé discovered it for himself, its name is and ought to be the 'Dublin Method.'"

(1) Dr. Jellett appears to have proved quite satisfactorily his second proposition, and so much of the third proposition as depends on the second. With this matter, which is one for the decision of obstetricians, I do not feel competent, and do not propose, to deal. The first proposition and that part of the third which depends on it are, how-
ever, historical questions, and with your permission I should like to make a few observations concerning the conclusion at which Dr. Jellett arrived.

The first work on midwifery by an obstetrician of the Irish School was that published in Dublin by Fielding Ould, "Man-Midwife," early in 1742. In this work, which is entitled "A Treatise on Midwifery, in three parts," the following method is recommended for the management of the third stage of labour:—"The Child, as was said before, must be laid on the Operator's Lap, or on the Bed, as far from the Mother as the Length of the Funis will admit; which he must take in the right Hand, about six Finger's Breadth from the Pudendum, and roll it twice or thrice about his Finger; then the first and second Fingers of the left Hand must be thrust into the Vagina, by its Direction; and the Patient stopping her Breath and forcing as if she were at Stool, the Navel-string must be gently pulled forward as she forces, the Operator rather waiting for her Expulsion of it, than being too desirous to extract it; for pulling the Funis so as to extract the Placenta forcibly, may probably cause a Flooding; or perhaps break the Navel-string whereby the Placenta would be very difficultly brought forth; therefore let him just pull it sufficiently to make it incline forward, still insisting on the Patient's forcing down, which if she be not able to do of herself she must be compelled to it, by putting a Finger into her Throat, which will cause a Pressure of the Diaphragm, and the Muscles of the Belly, by her Efforts to vomit; by these Means it is commonly brought forth in about five Minutes. When it comes away by Expulsion, it is always whole, but it is subject to be broke, and Part of it left in the Womb, if any Violence be used for its Extraction.
Most Authors give a strict Charge to lose no Time in the Extraction of this extraneous Body lest the Orifice of the Womb should contract and obstruct its Passage; and for this Reason they advise the Introduction of the Operator's Hand into the Matrix; and by insinuating the Fingers between it and the Placenta, to cause their Separation, the Manner of doing which shall be presently described. This Fear of the Womb closing makes many Operators too Hasty, which often produceth fatal Accidents.'

Ould then proceeds to consider what these accidents are. The first is breaking of the funis, which leads to "an immoderate flux of Blood by the Umbilical Vein; the great difficulty of extracting the Placenta without its Direction and Assistance; the intolerable Pain caused by the (then necessary) Introduction of the Hand into the Womb, and the Danger of not removing the whole Substance entirely; and lastly, whatever Disorder the Patient may be subject to, during her Lying-in, will certainly be imputed to this Mischance." The second danger is uterine hemorrage, and the third "Prolapsus Uteri." Ould then proceeds to say: "The Reason why we Operators run the Risque of committing these Errors, is, lest the Orifice of the Womb should refuse a Passage to the Placenta, by its speedy Contraction. I shall therefore endeavour to prove that the Orifice is not capable of so speedy a Contraction, as is generally imagined. It is universally allowed, that the Efforts of the Mother in the Time of the Travail, tend chiefly to the Dilition of the Orifice; it is also undeniable that these Efforts continue after the Child is born, until the Expulsion of the Placenta is compleated; hence it follows, that till after this time the Orifice is incapable of absolute Contraction. Besides it is well known that the
Placenta has often been extracted, one, two, or three days after the Birth of the Child, when it has been left behind by some Malpractice of the Female Midwife; and this Extraction performed by the Introduction of the whole hand, through the Orifice into the Matrix. Hence it must follow, that if the Orifice be wide enough to receive the Hand, some days after Birth, there certainly will be very little Danger of its closing in a Quarter of an Hour, so as to hinder the Expulsion of the Placenta. I shall beg the Reader's Leave to add one Circumstance more to confirm this Argument, which seems to put it beyond all Controversy; namely, that Nature designed its Expulsion by the Efforts of the Mother; which is proved by real Matter of Fact; for there are constant Instances of Women bringing forth both Child and Burthen without any other Assistance than that of Nature. This happens chiefly to those who have Bastards, Women at Sea, and in Camps."

Next Ould considers the objections of Deventer, "whose Authority has universal Approbation," and who "strenuously adviseth the constant Extraction of this Burthen by the Introduction of the Hand; and very much condemns the pulling it forth by the Funis." Deventer considered that the soft parts were so much dilated immediately after the birth of the child that the introduction of the hand did not cause pain, if it was done as soon as the child was born. Ould says the pain is caused by passing the hand through the bony inlet of the pelvis which does not dilate. Deventer said that there was a danger of the uterus contracting on the placenta, "so that from a flat, soft cake, it become hard and oblong, and as it were contained in a Purse with running Strings drawn up tight about it." In reply, Ould says "all this could not possibly happen in the longest Time that is necessary for its Expulsion;
which, if it cannot be brought to pass in a reasonable Time, suppose ten Minutes, which perhaps does not happen to be one Woman in five hundred, it is then time enough to put the miserable Patient to the Torture of introducing the Hand and thereby separating it from the Fundus Uteri." (5)

Deventer had urged that the introduction of the hand into the uterus for the removal of the placenta had the further advantage of informing the practitioner "whether there be more Infants to come forth; if there be a Mole or other extraneous body." Ould replies that this information can as well be obtained "by searching with two or three Fingers, immediately after Delivery." He further points out "that in the Expulsion of the Burthen, the Action is entirely in the Matrix, by means of the Diaphragm and abdominal Muscles pressing it, which forces out the Placenta as excrementitious; and as this Action is uniform, all Parts of the Placenta are equally pressed, therefore it comes out one intire equal Body, with its Surface next the Womb perfectly smooth; which shows that there is no Part of it left behind." With manual removal, on the other hand, parts of the placenta are very apt to be left in the uterus. Finally, he concludes as follows:—"Though this Practice of Extraction must be condemned, as constantly used in natural Cases, yet where the case is preternatural it is absolutely necessary; namely, when by injudicious Management the Funis is broke; when the Patient is so weak as to be incapable of giving any Assistance, and that the Operator does not think it safe to depend on the Strength of the String; when the Child has been some Time dead, and the String thereby become rotten, and the Placenta corrupted; and besides these, in many other circumstances that may
occur to the prudent Operator: always observing, that it is better to depend on Nature, while there is any reasonable Hopes of Success, than too precipitately to have Recourse to Art." (6)

I have given these extracts from Ould's work at some length, because on this work, I believe, the claim of the Dublin School to be the originator of the method of the management of the third stage of labour, must stand or fall. On November 2, 1759, seventeen years after the publication of his Midwifery, Ould succeeded Moss as the second Master of the Dublin Lying-in Hospital, a post which he held for seven years, and though he lived till November 29, 1789, we have no record of any further writing by him on the subject of Midwifery. The next Dublin Midwifery published was that by Edward Foster in 1781. Foster was Assistant Master to Ould's successor, William Collum, from 1772 to 1775. Foster, however, does not give any clearer description of the Dublin Method than did Ould. Ould certainly recognised that a *vis a tergo* was useful in the delivery of the placenta, and, further, that its manual removal was open to serious objection, but he does not give up the traction on the funis, and nowhere can he be said to describe the "Dublin Method." The principles that he advocates were not originated by him, for they appear to be older than the history of Midwifery. Engleman, writing on Parturition among primitive People, says: "The placenta usually follows the child, but unless this is the case, massage and expression are invariably resorted to. It may again be remarked that primitive people, odd as it may seem, rarely pull on the cord, but in most instances use the *vis a tergo*, stimulate the activity of the womb by friction of the fundus, and press out the contents. Massage com-
bined with expression of various kinds, never very forcible, is used in this stage of labour." (7) Thus we see the practice of ancient and primitive people is nearer to the modern practice than that advocated by Ould.

In the year 1767, just a year after Ould's mastership terminated, John Harvie, M.D., Teacher of Midwifery, published, in London, a pamphlet of forty-eight pages with the following title: "Practical Directions, shewing A Method of preserving the Perinaum in Birth, and of Delivering the Placenta without Violence, illustrated by Cases." (8) This little pamphlet has lately come into my possession, and the description given in it of the method of conducting the third stage of labour seems well worthy of attention.

Harvie points out that there are two general methods of delivering the placenta. "The first, and perhaps the most general, method has been to deliver the placenta immediately after the child. To perform this, some have recommended an immediate introduction of the hand; others have advised pulling by the navel string; and some again say that the woman should be brought to sneeze, cough, or vomit. The second method is to leave this business principally to nature." (9) He objects to manual extraction on account of the pain caused to the patient, and on account of the damage that is likely to be done to the uterus. But, even apart from this, he dreads the "inflammation with the fever which it produces; a fever indeed so fatal that few survive it, though attended from the beginning by the most eminent and the most able physicians." He concludes: "We may therefore flatter ourselves that this method will in time be entirely exploded, as I know it to be at present by a few of the most skilful in our profession." "Pulling on the umbilical
cord to bring down the secundines is," he says, "a practice, in my opinion, extremely dangerous, and likely to produce an inversion of the uterus."

Harvie proceeds then as follows:—"Several authors have recommended, and I am sorry to say it is a most general practice, to make the patient sneeze, cough, or vomit; and the last is even produced sometimes by making her smoke tobacco." (10) This plan he strongly objects to, and he states that he had seen one patient whose life, for some days, was endangered by uncontrollable vomiting induced in this way. Further, by such convulsive efforts "the circulation is quickened, and at the same time the blood is with force expelled from the vessels of the uterus. Many women have been destroyed in half an hour by this loss of blood." He then goes on to show that the uterus will, if left to itself, almost always expel the placenta without danger to the patient. There may, however, be considerable delay, perhaps as much as three days, but such delay is not necessarily attended with danger. He says: "My pupils, who deliver many poor women, according to my instructions, have, of late, left the delivery of the placenta to nature. In general, it comes away soon; but if, after waiting an hour, there is no unusual discharge, they order the woman to be carefully put to bed, and then leave her. In such cases, I have not known of any placenta that has remained longer than nineteen hours; and all the women thus treated, have recovered to great advantage." (11) This method he finds open to the objection that the women are more distressed and frightened by delay in the delivery of the placenta than in delivery of the child, and in consequence he makes the following recommendations: "In the following manner nature may be greatly assisted; and without any
addition of pain. After the child is delivered, the navel-string tied, and the child given to the nurse's care, take the navel-string in your left hand, gently pull down its loose part, till you feel that it is a little tightened, and by it guide the fore-finger of your right hand; thus you will commonly feel that a part of the placenta is fallen into the os uteri, and often that portion of it into which the navel-string is inserted. In either case by gently pressing the finger against the part felt, and continuing the pressure in the direction of the axis of the pelvis, that is, downwards and backwards, it will presently fall out of the uterus; and then it may be safely slipt out of the vagina, by the same finger. . . . There is another safe method of assisting nature in the delivery of the placenta, and which, for these five or six years last past, I have found to answer generally very well in practice. As soon as the child is committed to the care of the nurse, let the accoucheur apply his hand upon the belly of the woman, which is then very loose, and he will readily feel the contracting uterus; having then placed the flat of the hand over it, by a light and gentle pressure, bring it downwards, or towards the pubes, and he will feel the uterus sensibly contracting, and often feel it so reduced in size, as to be certain that the placenta is expelled. By this method we will seldom have any thing to do afterwards, but to help it through the os externum, if even so much remains undone." "After the placenta is thus delivered, it may be advisable to apply the hand, as before, upon the belly; and if the uterus is found to be too large, the pressure cautiously repeated, will expel the greatest part of the coagula, which produced this increase of bulk." (12)

From these extracts we see that we have in Harvie's work, published in 1767, as clear and as exact a descrip-
tion of the management of the third stage of labour as was given in any Irish midwifery before the publication of M'Clintock and Hardy's work in 1848. Robert Wallace Johnson, in his "New System of Midwifery," published in London in 1769, recommends Harvie's method, and says: "I have used this method for some time; and have the pleasure to find the propriety of it confirmed by the practice of Dr. Hunter and Dr. Harvie; the latter of whom appears to have been the first who recommended it in his lectures." (13)

While, then, we give every credit to the Dublin School of Midwifery for its early recognition and its consistent teaching of this method of conducting the third stage of labour, we must, we fear, abandon the claim of its having originated that method. Dublin has a prior claim to Crede, but Harvie has a prior claim to both.

John Harvie was a man of some note in his time. He had married a niece of Smellie, and it was to him that Smellie handed over his lecture-room and the good-will of his class when he gave up practice and retired from London in 1759. It was John Harvie also that Smellie appointed joint executor with Mrs. Smellie of his will. To John Harvie and his wife came also eventually the bulk of the Smellie property. (14)

REFERENCES.


(3) Ibid. P. 59.
(1) Ibid. P. 60.
(5) Ibid. P. 63.
(6) Ibid. P. 68.
Dr. Purefoy said he thought the idea of robbing the Rotunda Hospital of the credit of producing a practice which obstetricians all the world over admitted was a markedly safe practice might have been left to some one else. That Dr. Kirkpatrick had succeeded in the task he for one was very unwilling to admit. He was the happy possessor of Ould's book; he had not studied it with sufficient care to be aware of his views on the management of the third stage, but at any rate the Dublin School has been credited for a very long time with being the originators of this method of management of the third stage. In Spiegelberg's Midwifery that author alludes to it as the Dublin method, and his allusion to it left no doubt on his (Dr. Purefoy's) mind that it was generally recognised as such. The fact that Dr. Harvie described the method did not at all prove (although he must be given full credit for having used it in his own practice) that it originated in England. Whether Dr. Kirkpatrick had tapped all the sources of information on this point he did not know, but he could not help thinking that this practice had been known for a very long time, and in those early days they were not so
keen to support their claims as the originators of many excellent practices in midwifery because it was considered that those claims were generally admitted. He hoped that he might obtain evidence that this method of treating the third stage was in general practice in Ireland very shortly after Sir Fielding Ould’s book was published. He thought it should be possible to find that this was the practice, although not specially alluded to, because it was generally recognised. He was still unwilling to give up the practice of speaking of this as the Dublin method, and he considered it a pity that they should be deprived of the credit of what he believed to be the practice of the Dublin School for a very long time. Many of our most cherished and widely received beliefs and opinions are based on tradition, and ecclesiastical writers have often pointed out the danger of depending on ex silentio arguments.

Sir William Smyly said they should feel very much indebted to Dr. Kirkpatrick for his careful research into this question, and there was no doubt that the description published by Dr. Harvie was what was now generally known as the Dublin method; but he thought that in most of the discoveries in Medicine the credit was more often given to the person who popularised the method than to the person who first described it. The method appeared to be only mentioned by Dr. Harvie, and he did not even appear to attach much importance to it, as he placed two other methods before it in his book. Whereas in Dublin it was exclusively and systematically taught for generations. He mentioned that when Spiegelberg visited this country he wrote a report in which he said that the two things which impressed him most were—the Dublin method of the delivery of the placenta and the use of chloroform in Edinburgh. He did not think Credé’s method was the same as the Dublin method, as his method was much more active and designed to get rid of the placenta as soon as possible; and he advised that it should be expelled with the third pain. Sir William Smyly thought the very best method was the one referred to as being practised by primitive people—i.e., sitting in the crouched position and rubbing the hypogastrium with the hand, and he suggested that the Dublin method was an adaptation of that. He added that after having tried different methods for the
management of the third stage, he had come back to the Dublin method as the best.

Dr. Tweedy said that all Dublin obstetricians had been accustomed to look upon Sir Fielding Ould as the founder of the Dublin method of dealing with the third stage of labour. The method is not described in Ould’s book. This book was, however, written when the author was only twenty-one years of age, and before he had acquired any practical experience in obstetrics. He did not become Master of the Rotunda Hospital for sixteen years afterwards. It is, therefore, quite possible that the method described by Harvie originated with Ould, and he (Dr. Tweedy) thought they would be fully justified in believing in the tradition as to the origin of the method.

Professor Smith said the late Sir Arthur Macan had asked him some years ago to go through the literature to ascertain the claims of Dublin to this method, but he could get nothing but tradition to support it. Sir Arthur Macan, although very much in favour of German methods and literature, was convinced that this method originated in Dublin. Harvie’s book did not come under their notice at the time. He agreed with Dr. Purefoy that the case was not proven. He pointed out that Crede had found that expressing the placenta quickly after birth was followed by hæmorrhage, and in order to prevent this he recommended that at the tenth uterine contraction the placenta should be expressed. At the same time the practice which is known as the Dublin method of managing the third stage was carried on in Dublin by Sir Fielding Ould.

Dr. Ashe said he did not think it made very much difference whether the case was proven or not. He considered that when a method was taught in a place and the name of the place was attached to it, that place deserved the credit. This method was known throughout the world as the Dublin method.

Dr. Kirkpatrick, in reply, said it was no pleasure to him to take away any credit from the Dublin School or from the Rotunda Hospital. The record of the Dublin School of Midwifery was one that any country might be proud of, and was, he believed, one of the best records of any department of Irish Medicine. Historical accuracy was, however, a thing
greatly to be desired, and the Rotunda Hospital does not need to base its claims to greatness on a suppression of the truth. Many of those who have written on this subject appear never to have seen Harvie's book. M'Clintock mentioned the book, but said he had never seen a copy of it. Jellett makes no mention of it at all. Had this method of conducting the third stage of labour been the teaching of the Rotunda Hospital when Ould was Master, from 1759 to 1766, it would almost certainly have been described by Foster, who was Assistant to Ould's successor in the Mastership—William Collum. Foster, however, does not describe the method.
CLINICAL REPORT OF THE ROTUNDA HOSPITAL FOR ONE YEAR, NOVEMBER 1st, 1913, TO OCTOBER 31st, 1914.

BY RICHARD E. TOTTENHAM, M.D. (DUBL. UNIV.),

AND

ERIC C. CRICHTON, M.B. (DUBL. UNIV.),
Assistant Masters.

[Read in the Section of Obstetrics, April 30, 1915.]

Great difficulty has been experienced in compiling portions of this year's report. In the first place, the absence of the Master, Dr. Jellett, who has personally supervised the whole of this year's work, has been much felt. Secondly, Dr. Madill's and Dr. Allan's terms of office expired during the last months of the year. Dr. Allan left shortly before his time to take charge of a large hospital in Boulogne. We wish to express our very best thanks to them for the clear and concise way in which the details of the various cases have been recorded, and in so doing enabling the statistical sequence to be maintained.

During the year ending October 31st, 1914, 2,083 patients were delivered under the care of the Hospital in its Extern Department, and 2,303 patients were admitted to the Maternity Wards. Of the latter number 367, who were not in labour, were discharged undelivered, and 1,936 were delivered. Thus a total of 4,019 labours in all were attended by the Hospital Staff, being a decrease of 117 on the previous year. Five deaths occurred in the Extern
Department and 17 in the Intern, a percentage mortality of 0.24 per cent. in the former and of 0.87 per cent. in the latter. Two deaths, in the Extern Maternity, occurred from ante partum haemorrhage, one from unavoidable haemorrhage and the other from external accidental haemorrhage; death occurred in the latter case while a densely adherent placenta was being removed. One death resulted from acute sepsis; the fourth from inversion of the uterus—the uterus was replaced, but death followed shortly afterwards; the fifth from post partum haemorrhage with adherent placenta in a twin pregnancy.

The morbidity rate is appreciably lower than in the previous year, and is represented by the figure of 4.43 per cent. as against 6.07 per cent.

The different complications of labour met with during the year have been duly tabulated. It is as well, however, to briefly refer to some of them here.

There were twenty cases of eclampsia, many of which were of a very severe type.

The treatment introduced by Dr. Tweedy was continued in the main, but certain minor points of his treatment have been omitted. There were two fatal cases.

There were six cases of unavoidable haemorrhage, in one of which the placenta was situated centrally; in all cases the mother recovered, two of the six children being born alive. Braxton Hick's bi-polar version was employed in five of these cases, in the sixth forceps was applied, the os being fully dilated and the head presenting and the foetal heart being audible.

There were four cases of external accidental haemorrhage; the vagina was plugged in two; in one case, the os being three-quarters dilated and the patient in labour,
By Drs. R. E. Tottenham and E. C. Crichton. 289

a foot was brought down; in the fourth case the rupture of the membranes proved sufficient, the patient being in labour. All mothers recovered, and one child was born alive.

There were three cases of concealed accidental haemorrhage, which it is well to refer to more fully here:—

Case I.—B. C. Patient was very weak on admission; pulse 150; temperature 97.4°; uterus was large, tense and painful; no foetal heart was heard; patient said uterus had got larger since previous day. The abdomen was opened and the uterus was removed with fœtus in situ; there was some trouble with the bleeding in the oedematous parametric tissue; this was controlled, and abdomen closed. Patient was put on continuous saline, strychnine, &c.; she died ten and a half hours after the operation. Post mortem—Nothing abnormal.

Case II.—E. D. Patient admitted at 5 p.m. on 15th September very pale and debilitated; vomiting a good deal; pulse 120; no labour pains; no external haemorrhage and uterus perfectly normal, neither enlarged nor tender; at 11 p.m. membranes ruptured, and some blood came away with the liquor amnii; the os was two fingers, head unfixed and no placenta felt; bleeding ceased after this gush; tight binder applied; pituitrin 1 c.c. and morphine ¼ given at 4 15 a.m.; there was another gush; head on perinaeum; child expressed; uterus and vagina plugged; patient weak; strychnine, sub-mammary infusions, hot bottles, &c.; patient died at 5 30 a.m.

Case III.—A. R. Patient was sent in from the city with the vagina plugged; history of bleeding that morning; period of pregnancy doubtful, about 6–7 months (?); when admitted, at 12 40 p.m., patient looked fairly well; pulse 104; plugging removed, and os one finger; head presenting, unfixed; no placenta felt; no haemorrhage, so patient left alone, as it was thought she might be coming into labour; three hours later a little blood escaped vaginally, and patient looked much worse, she was pale and restless, and pulse 120; patient was emphatic that uterus had got much larger since previous day;
uterus felt hard, but not tender; fœtal heart not heard. For these reasons hysterectomy was decided on, abdomen was opened, the parietes were found to be very pale, and there was very little hæmorrhage from cut vessels; blood was very watery; uterus size of nine months' pregnancy; supravaginal hysterectomy was done. Convalescence normal.

There were eight cases of prolapse and presentation of the cord; all the mothers recovered, but only three of the children were born alive.

Forceps were applied on sixty-four occasions.

In six cases Caesarean section was performed; all the mothers recovered, and all the children were born alive.

In four cases pubiotomy was performed:

Case I.—Aged thirty-four; pregnancy, first; conj. vera., 8 cms.; transverse, 9.3 cms. Owing to the early rupture of the membranes Champetier de Ribes bag was inserted. The bag was expelled in five hours. An attempt to deliver with forceps in Walcher's position failed. Bumm's pubiotomy performed and child delivered alive with forceps. Placenta expressed twenty minutes later. Lateral tear in vaginal wall on left side, plug inserted. Patient collapsed and died in half an hour.

Post-mortem.—Fatty degeneration of heart; tear in bladder wall.

The second and third cases do not present any points of special interest; they left hospital 26 and 27 days respectively after the operation, walking well.

The last patient gave a history of perforation at her first confinement. C.V. 7.5 cms., T. 14 cms. As she was barely nine months pregnant a prophylactic pubiotomy was performed. Three weeks after the operation labour set in and ended spontaneously after a somewhat protracted labour. Child weighed 6½ lbs., and patient left hospital walking well in 14 days.
The following cases of special interest are briefly referred to here:—

Case I.—M. C., aged twenty-eight, second pregnancy. Membranes ruptured early in labour, and, as little progress was being made, Champetier de Ribes' bag was inserted: four hours later head no lower in spite of good pains. As membranes had been ruptured twenty-two hours, it was thought advisable to deliver, though foetal heart all right, and head still unfixed. Forceps applied high, but failed to pull head through. Forceps again tried; during a pull there was a slight crack heard, and symphysis was found to have ruptured. Head came through easily. Uterus and vagina plugged. (N.B.—Vertex 1—apparently little or no pelvic contraction, and the forceps pull was not a vigorous one.) Patient gave a definite history of having delivered herself naturally of an 11lb. baby at previous labour. Patient got very jaundiced and died on fourth day of the puerperium. Acute yellow atrophy was diagnosed and confirmed at the post-mortem.

Case II.—M. K., aged nineteen, first pregnancy. On admission patient was conscious; there was oedema of legs, abdomen, back and labia. She was admitted with a history of three fits; fourth fit shortly after admission; fifth fit three hours later—both these fits were very slight; sixth fit six hours later. After the sixth fit patient fell into labour. Next day forceps were applied, and a large macerated child delivered. Lochia foul; hot douche. On the third day of the puerperium, abdomen enlarged, ascites, patient restless, refused to swallow, good quantity of urine passed and bowels free; fourth day comatose, with incontinence, strabismus, opisthotonos; fifth day, patient died.

Post-mortem Findings.—Cloudy swelling of kidneys; enlargement of liver with small hæmorrhages.

Case III.—M. B., aged twenty-eight, first pregnancy. On admission foetal head was found floating high above the brim, and appeared to be of very large size. On vaginal examination
a tumour blocking the pelvis was found posterior to the cervix. The patient was in strong labour. The abdomen was opened. Two ovarian tumours were found, that from the left ovary lying behind and to the left of the cervix, and about the size of a small football; that from the right ovary was the size of an orange. Double ovariotomy was performed. The abdomen was closed, and patient delivered herself four and a half hours later of a dead child. Placenta left to natural efforts for four and a half hours, then expressed under anaesthetic, with slight pressure. The tumours were both definitely dermoid in character.
APPENDIX A.

STATISTICS OF THE MATERNITY DEPARTMENT.

EXTERN MATERNITY.

Table No. I.—Nature and Number of Cases Treated.

| Total Number of Labours | 2,083 |
| Abortions and Miscarriages | 256 |
| Hydramnios | 10 |

| Presentations— |   |
| Persistent occipito-posterior | 11 |
| Face | 9 |
| breech | 72 |
| brow | 1 |
| Transverse | 16 |
| Twins | 35 |
| Prolapse of cord | 11 |
| Placenta prævia | 4 |
| Accidental hæmorrhage | 9 |
| Post- or & hæmorrhage | 11 |
| Lacerations of perineum | 309 |
| Inversion of uterus | 1 |
| Rupture of uterus | 1 |

| Operations— |   |
| Version | 9 |
| Forceps | 53 |
| Manual removal | 21 |
| Episiotomy | 2 |

| Children stillborn | 110 |
| (Fresh, 76; macerated, 34) |

<p>| Infantile Conditions— |   |
| Hydrocephalus | 1 |
| Anencephalus | 8 |
| Spina bifida | 1 |
| Meningcéle | 1 |</p>
<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Para</th>
<th>Date of Delivery</th>
<th>Date of Death</th>
<th>Cause of Death</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. T.</td>
<td>38</td>
<td>7</td>
<td>Dec. 7, 1913</td>
<td>Dec. 7</td>
<td>Ante-partum haemorrhage</td>
<td>Vagina plugged; 3 hours later, patient getting good pains, presentation transversely brought down; patient delivered soon afterwards; placenta manually removed; patient collapsed, and died almost immediately</td>
</tr>
<tr>
<td>E. G.</td>
<td>20</td>
<td>3</td>
<td>Feb. 14, 1914</td>
<td>Feb. 14</td>
<td>Shock</td>
<td>Acute inversion of uterus; placenta still attached to uterus on arrival of clinical clerk; uterus replaced; patient very collapsed; died 2 hours later</td>
</tr>
<tr>
<td>M. S.</td>
<td>34</td>
<td>5</td>
<td>May 17, 1914</td>
<td>May 17</td>
<td>Unavoidable haemorrhage</td>
<td>Patient very collapsed on arrival of clinical clerk; pelvic version performed; patient collapsed, and died shortly afterwards</td>
</tr>
<tr>
<td>E. B.</td>
<td>38</td>
<td>2</td>
<td>June 2</td>
<td>June 2</td>
<td>Cerebral haemorrhage</td>
<td>Twin pregnancy; shortly after birth of 1st child patient became unconscious, pupils dilated, teeth clenched, frothed at the mouth, pulse became feeble, and patient died without regaining consciousness</td>
</tr>
<tr>
<td>L. M.</td>
<td>32</td>
<td>8</td>
<td>Sept. 1</td>
<td>Sept. 1</td>
<td>Post partum haemorrhage</td>
<td>Twins; after birth of 2nd child pulse got very feeble; uterus soft and flabby; one placenta expressed, the other had to be manually removed; patient got very collapsed and was still losing, so uterus plugged; shortly afterwards patient died</td>
</tr>
</tbody>
</table>
By Drs. R. E. Tottenham and E. C. Crichton. 295

<table>
<thead>
<tr>
<th>Table No. 1 — Total Admissions and Deliveries.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Month</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Total admissions</td>
</tr>
<tr>
<td>Total deliveries</td>
</tr>
<tr>
<td>Patients admitted not in labour</td>
</tr>
</tbody>
</table>
## Table No. II.—Nature and Number of Cases Treated.

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total admissions</strong></td>
<td>2,303</td>
</tr>
<tr>
<td><strong>Total deliveries</strong></td>
<td>1,936</td>
</tr>
<tr>
<td><strong>Primipare</strong></td>
<td>715</td>
</tr>
<tr>
<td><strong>Multipare</strong></td>
<td>1,221</td>
</tr>
<tr>
<td><strong>Presentations</strong></td>
<td></td>
</tr>
<tr>
<td>Vertex, normal rotation</td>
<td>1,814</td>
</tr>
<tr>
<td>&quot; face to pubes</td>
<td>30</td>
</tr>
<tr>
<td>Face</td>
<td>10</td>
</tr>
<tr>
<td>Brow</td>
<td>1</td>
</tr>
<tr>
<td>Breech</td>
<td>58</td>
</tr>
<tr>
<td>Transverse</td>
<td>5</td>
</tr>
<tr>
<td><strong>Twins</strong></td>
<td>18</td>
</tr>
<tr>
<td><strong>Complications of pregnancy</strong></td>
<td></td>
</tr>
<tr>
<td>Hyperemesis</td>
<td>3</td>
</tr>
<tr>
<td>Hydramnios</td>
<td>2</td>
</tr>
<tr>
<td>Abortions and miscarriages</td>
<td>58</td>
</tr>
<tr>
<td><strong>Hæmorrhages</strong></td>
<td></td>
</tr>
<tr>
<td>Unavoidable</td>
<td>6</td>
</tr>
<tr>
<td>Accidental, external</td>
<td>5</td>
</tr>
<tr>
<td>Accidental, internal</td>
<td>2</td>
</tr>
<tr>
<td>Post-partum</td>
<td>8</td>
</tr>
<tr>
<td><strong>Lacerations of genital tract</strong></td>
<td></td>
</tr>
<tr>
<td>Perineum</td>
<td>356</td>
</tr>
<tr>
<td>Cervix (serious)</td>
<td>2</td>
</tr>
<tr>
<td>Uterus, complete</td>
<td>1</td>
</tr>
<tr>
<td><strong>Contracted pelvis</strong></td>
<td>22</td>
</tr>
<tr>
<td><strong>Placental abnormalities</strong></td>
<td></td>
</tr>
<tr>
<td>Adherent</td>
<td>25</td>
</tr>
<tr>
<td>Prævia</td>
<td>6</td>
</tr>
<tr>
<td>Battledore</td>
<td>2</td>
</tr>
<tr>
<td>Succenturiate</td>
<td>1</td>
</tr>
<tr>
<td><strong>Abnormalities of cord</strong></td>
<td></td>
</tr>
<tr>
<td>Vælamentous insertion</td>
<td>2</td>
</tr>
<tr>
<td>Prolapse</td>
<td>8</td>
</tr>
<tr>
<td><strong>Accidental complications</strong></td>
<td></td>
</tr>
<tr>
<td>Epilepsy</td>
<td>3</td>
</tr>
<tr>
<td>Phthisis</td>
<td>4</td>
</tr>
<tr>
<td>Myomata of uterus</td>
<td>1</td>
</tr>
<tr>
<td>Edema of vulva (renal)</td>
<td>2</td>
</tr>
<tr>
<td>Cardiac disease</td>
<td>3</td>
</tr>
<tr>
<td><strong>Accidental complications—cont.</strong></td>
<td></td>
</tr>
<tr>
<td>Eclampsia</td>
<td>19</td>
</tr>
<tr>
<td>Crural phlegmasia</td>
<td>3</td>
</tr>
<tr>
<td>Mastitis</td>
<td>3</td>
</tr>
<tr>
<td><strong>Operations</strong></td>
<td></td>
</tr>
<tr>
<td>Pelvimetry</td>
<td>15</td>
</tr>
<tr>
<td>Induction of labour and miscarriage</td>
<td>3</td>
</tr>
<tr>
<td>&quot; toxemia and dead fectus</td>
<td>2</td>
</tr>
<tr>
<td>Episiotomy</td>
<td>7</td>
</tr>
<tr>
<td>Impacted shoulders</td>
<td>2</td>
</tr>
<tr>
<td>Suture of perineal lacerations</td>
<td></td>
</tr>
<tr>
<td>Complete</td>
<td>2</td>
</tr>
<tr>
<td>Incomplete</td>
<td>354</td>
</tr>
<tr>
<td>Suture of cervical lacerations</td>
<td>2</td>
</tr>
<tr>
<td>Forceps</td>
<td>64</td>
</tr>
<tr>
<td>Version</td>
<td>10</td>
</tr>
<tr>
<td><strong>Cæsarean conservative</strong></td>
<td></td>
</tr>
<tr>
<td>(classical)</td>
<td>7</td>
</tr>
<tr>
<td>Radical</td>
<td>1</td>
</tr>
<tr>
<td>Pubiotomy</td>
<td>4</td>
</tr>
<tr>
<td>Manual removal of placenta</td>
<td>25</td>
</tr>
<tr>
<td>Excision of thrombosed ovarian vein</td>
<td>1</td>
</tr>
<tr>
<td><strong>Laparotomy for intestinal</strong></td>
<td></td>
</tr>
<tr>
<td>Perforation</td>
<td>1</td>
</tr>
<tr>
<td>Panhysterectomy</td>
<td>1</td>
</tr>
<tr>
<td><strong>Supra-vaginal hysterectomy</strong></td>
<td></td>
</tr>
<tr>
<td>associated with the Cæsarean Section</td>
<td>1</td>
</tr>
<tr>
<td><strong>Morbidity (B. M. A. standard)</strong></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>1 in 22.51</td>
</tr>
<tr>
<td>Percentage</td>
<td>4.43</td>
</tr>
<tr>
<td><strong>Mortality</strong></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
</tr>
<tr>
<td>Average</td>
<td>1 in 113</td>
</tr>
<tr>
<td>Percentage</td>
<td>87</td>
</tr>
</tbody>
</table>
By Drs. R. E. Tottenham and E. C. Crichton. 297

**Table No. II. — Nature and Number of Cases Treated. — con.**

<table>
<thead>
<tr>
<th>Fetal abnormalities —</th>
<th>Infantile complications—</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascites —</td>
<td>Cephalhæmatoma — 6</td>
</tr>
<tr>
<td>Anencephalus —</td>
<td>Cerebral hæmorrhage — 1</td>
</tr>
<tr>
<td>Cleft palate —</td>
<td>Fractured clavicle — 1</td>
</tr>
<tr>
<td>Exomphalos —</td>
<td>Imperforate anus — 1</td>
</tr>
<tr>
<td>Patent foramen ovale —</td>
<td>Melena — 5</td>
</tr>
<tr>
<td>Congenital syphilis —</td>
<td>Ophthalmia — 4</td>
</tr>
<tr>
<td>Spina bifida —</td>
<td>Hernia — 1</td>
</tr>
<tr>
<td>Meningocele —</td>
<td>Icterus neonatorum (fatal) — 1</td>
</tr>
<tr>
<td>Talipes —</td>
<td></td>
</tr>
<tr>
<td>Hydrocephalus —</td>
<td></td>
</tr>
</tbody>
</table>

**Table No. III. — Pelvic Presentations.**

<table>
<thead>
<tr>
<th>Para</th>
<th>Total</th>
<th>Dead Children</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primipare</td>
<td>19</td>
<td>Recent 1</td>
<td>Four occurred in twin pregnancies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Macerated 2</td>
<td>One associated with prolapse of the cord</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total 3</td>
<td>One associated with fractured clavicle</td>
</tr>
<tr>
<td>Multipare</td>
<td>39</td>
<td>Recent 4</td>
<td>Three occurred in twin pregnancies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Macerated 3</td>
<td>One impacted breech</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total 7</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>58</td>
<td>Total 10</td>
<td></td>
</tr>
</tbody>
</table>

**Table No. IV. — Twins.**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Both males</td>
<td>-</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Both females</td>
<td>-</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Male and female</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>-</td>
<td>-</td>
<td>18</td>
</tr>
</tbody>
</table>
### Table No. V.—Accidental Hemorrhage.

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Period</th>
<th>Para</th>
<th>Variety</th>
<th>Result to Mother</th>
<th>Result to Child</th>
<th>Presentation</th>
<th>Treatment and Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. K</td>
<td>24</td>
<td>8</td>
<td>5</td>
<td>External</td>
<td>Alive</td>
<td>Dead</td>
<td>Footling</td>
<td>Foot down; os 3 fingers. Patient delivered herself in one hour</td>
</tr>
<tr>
<td>M.M.D.</td>
<td>31</td>
<td>7</td>
<td>13</td>
<td>External</td>
<td>&quot;</td>
<td>&quot;</td>
<td>Vertex</td>
<td>Patient in labour; membranes ruptured; delivered herself in 12 hours</td>
</tr>
<tr>
<td>E. T</td>
<td>36</td>
<td>8</td>
<td>4</td>
<td>Concealed</td>
<td>Dead</td>
<td>&quot;</td>
<td>&quot;</td>
<td>Pulse 120; membranes ruptured; 1 cc. pituitrin; gush of blood; patient delivered herself in one hour; uterus and vagina plugged; patient collapsed, and died in a short time</td>
</tr>
<tr>
<td>A. R.</td>
<td>25</td>
<td>7</td>
<td>6</td>
<td>Concealed</td>
<td>Alive</td>
<td>&quot;</td>
<td>&quot;</td>
<td>Sent in from city with vagina plugged; plug removed; 3 hours later a little blood came away vaginally; uterus hard and larger than period of pregnancy; fetal heart absent; patient pale, restless, with quick pulse. Hysterectomy</td>
</tr>
<tr>
<td>Name</td>
<td>Age</td>
<td>Period</td>
<td>Para</td>
<td>Variety</td>
<td>Result to Mother</td>
<td>Result to Child</td>
<td>Presentation</td>
<td>Treatment and Remarks</td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
<td>--------</td>
<td>------</td>
<td>---------</td>
<td>------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>K. S.</td>
<td>35</td>
<td>Term</td>
<td>4</td>
<td>External</td>
<td>Alive</td>
<td>Alive</td>
<td>Vertex</td>
<td>Hæmorrhage for 2 days previous to admission; os ⅔ dilated; started to loose freely a few hours later; vagina plugged; labour set in after 19 hours; plugs removed; membranes ruptured; child born in 4 hours</td>
</tr>
<tr>
<td>E. L.</td>
<td>23</td>
<td>7</td>
<td>1</td>
<td>&quot;</td>
<td>&quot;</td>
<td>Macerated</td>
<td>&quot;</td>
<td>Plugged by country doctor; very slight hæmorrhage after plug removed; child born 15 hours after admission</td>
</tr>
<tr>
<td>B. C.</td>
<td>36</td>
<td>Term</td>
<td>9</td>
<td>Concealed</td>
<td>Macerated</td>
<td>Dead</td>
<td>&quot;</td>
<td>Admitted in very feeble condition; pulse 150; no fetal heart; pan-hysterectomy; died 12 hours after the operation</td>
</tr>
</tbody>
</table>
### Table No. VI. — **Unavoidable Hæmorrhage.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Para</th>
<th>Variety</th>
<th>Period</th>
<th>Initial Presentation</th>
<th>Result to Mother</th>
<th>Result to Child</th>
<th>Treatment and Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. M.</td>
<td>36</td>
<td>9</td>
<td>Marginal</td>
<td>Term</td>
<td>Transverse</td>
<td>Alive</td>
<td>Alive</td>
<td>History of bleeding for some days; os 1 finger; patient left for some time for os to dilate; later, as hæmorrhage recurred, bi-polar version done; child delivered in 8 hours</td>
</tr>
<tr>
<td>G. B.</td>
<td>45</td>
<td>8</td>
<td>Lateral</td>
<td>9 months</td>
<td>Vertex</td>
<td>..</td>
<td>Dead</td>
<td>Bi-polar version; morbid</td>
</tr>
<tr>
<td>A. F.</td>
<td>36</td>
<td>7</td>
<td>&quot;</td>
<td>Term</td>
<td>&quot;</td>
<td>..</td>
<td>Alive</td>
<td>Os fully dilated; forceps</td>
</tr>
<tr>
<td>M. F.</td>
<td>42</td>
<td>8</td>
<td>&quot;</td>
<td>9 months</td>
<td>&quot;</td>
<td>..</td>
<td>Dead</td>
<td>Bi-polar version; pituitary extract; child born in 2 hours; no fetal heart heard at any time; morbid</td>
</tr>
<tr>
<td>A. C.</td>
<td>30</td>
<td>1</td>
<td>Central</td>
<td>8 months</td>
<td>&quot;</td>
<td>..</td>
<td>..</td>
<td>Bi-polar version</td>
</tr>
<tr>
<td>A. B.</td>
<td>27</td>
<td>3</td>
<td>Lateral</td>
<td>9 months</td>
<td>&quot;</td>
<td>..</td>
<td>..</td>
<td>&quot;</td>
</tr>
<tr>
<td>Name</td>
<td>Age</td>
<td>Para</td>
<td>C. V.</td>
<td>Trans.</td>
<td>Presentation</td>
<td>Mode of Delivery</td>
<td>Of Mother</td>
<td>Of Child</td>
</tr>
<tr>
<td>-------</td>
<td>-----</td>
<td>------</td>
<td>-------</td>
<td>--------</td>
<td>--------------</td>
<td>----------------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td>C. L.</td>
<td>25</td>
<td>1</td>
<td>10 1/4</td>
<td></td>
<td>P.O.P.</td>
<td>Forceps</td>
<td>Alive</td>
<td>Alive</td>
</tr>
<tr>
<td>C. C.</td>
<td>23</td>
<td>2</td>
<td>7,3</td>
<td>9</td>
<td>Vertex</td>
<td>Spontaneous</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>M. N.</td>
<td>30</td>
<td>3</td>
<td></td>
<td></td>
<td>Caesarean section</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>M. H.</td>
<td>31</td>
<td>5</td>
<td>6,5</td>
<td>13,5</td>
<td>Vertex</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>E. L.</td>
<td>31</td>
<td>5</td>
<td>6,5</td>
<td>10</td>
<td>Bumm's pubiotomy</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>M. C.</td>
<td>37</td>
<td>5</td>
<td>8</td>
<td>11</td>
<td>P.O.P.</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>M. B.</td>
<td>36</td>
<td>1</td>
<td>10 1/4</td>
<td></td>
<td>Vertex</td>
<td>Forceps</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>B. M.</td>
<td>27</td>
<td>1</td>
<td>9,4</td>
<td>10,4</td>
<td>Posterior Fontanelle</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>M. O.'S.</td>
<td>29</td>
<td>1</td>
<td>9 1/2</td>
<td>11 1/2</td>
<td>Vertex</td>
<td>Spontaneous pubiotomy, Bumm's</td>
<td>&quot;</td>
<td>Dead</td>
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**Table No. VII. — Contracted Pelvis—continued.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Para</th>
<th>Measurements</th>
<th>Presentation</th>
<th>Mode of Delivery</th>
<th>Result to Mother</th>
<th>Result to Child</th>
<th>Weight of Child</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. G</td>
<td>29</td>
<td>6</td>
<td>--</td>
<td>--</td>
<td>Casarean section</td>
<td>Alive</td>
<td>Alive</td>
<td>7½</td>
<td></td>
</tr>
<tr>
<td>A. G</td>
<td>25</td>
<td>1</td>
<td>9.5</td>
<td>Vertex</td>
<td>Spontaneous</td>
<td>..</td>
<td>..</td>
<td>8½</td>
<td>Head unfixed commence-ment of labour</td>
</tr>
<tr>
<td>A. R</td>
<td>24</td>
<td>1</td>
<td>10½</td>
<td>Forceps</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>8½</td>
<td>Head unfixed commencement of labour; fixed later; fetal distress; os ¾: cervix incised</td>
</tr>
<tr>
<td>M. M.T</td>
<td>26</td>
<td>3</td>
<td>7½</td>
<td>Casarean section</td>
<td>..</td>
<td>..</td>
<td>8½</td>
<td>First and 2nd labours, transverse position; children dead, Casarean section</td>
<td></td>
</tr>
<tr>
<td>E. M.</td>
<td>25</td>
<td>1</td>
<td>--</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>8</td>
<td>Admitted in strong labour; no fixation of head; Casarean section</td>
</tr>
<tr>
<td>M. D.</td>
<td>31</td>
<td>1</td>
<td>10</td>
<td>Forceps</td>
<td>Dead</td>
<td>Dead</td>
<td>8</td>
<td>Membranes ruptured for 12 hours on admission; head not fixed in largest diameter; os ¾ dilated; Charnley bag; fetal distress 30 hours later; head fixed, but high up; child dead; patient died 16 hours later; acute lobar pneumonia. See Table XIII.</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Age</td>
<td>Para</td>
<td>Measurements</td>
<td>Presentation</td>
<td>Mode of Delivery</td>
<td>Result to Mother</td>
<td>Result to Child</td>
<td>Weight of Child</td>
<td>Remarks</td>
</tr>
<tr>
<td>--------</td>
<td>-----</td>
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<td>-----------------</td>
<td>------------------</td>
<td>-----------------</td>
<td>----------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>M. G.</td>
<td>21</td>
<td>1</td>
<td>9 1/4</td>
<td>Vertex</td>
<td>Forceps</td>
<td>Alive</td>
<td>Alive</td>
<td>7</td>
<td>Head unfixed beginning of labour</td>
</tr>
<tr>
<td>M. G.</td>
<td>28</td>
<td>4</td>
<td>-</td>
<td>&quot;</td>
<td>Pubiotomy followed by forceps</td>
<td>&quot;</td>
<td>&quot;</td>
<td>10 1/2</td>
<td>First and 3rd, forceps, dead; 2nd, spontaneous, dead; membranes ruptured early; Champetier de Ribes' bag; forceps in Walcher's position failed; Doderlein's pubiotomy</td>
</tr>
<tr>
<td>A. F.</td>
<td>19</td>
<td>1</td>
<td>10 1/2</td>
<td>&quot;</td>
<td>Spontaneous</td>
<td>&quot;</td>
<td>&quot;</td>
<td>7</td>
<td>Head unfixed beginning of labour</td>
</tr>
<tr>
<td>E. W.</td>
<td>29</td>
<td>2</td>
<td>10 1/2</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>&quot;</td>
<td>6 1/4</td>
<td>Previous labour, forceps, dead child</td>
</tr>
<tr>
<td>K. O'B.</td>
<td>27</td>
<td>4</td>
<td>8 1/2</td>
<td>&quot;</td>
<td>Forceps</td>
<td>&quot;</td>
<td>&quot;</td>
<td>9 1/4</td>
<td>First and 3rd, dead born, forceps; 2nd; alive; forceps applied with head high on account of fetal distress</td>
</tr>
<tr>
<td>M. C.</td>
<td>28</td>
<td>2</td>
<td>-</td>
<td>&quot;</td>
<td>&quot;</td>
<td>Dead</td>
<td>&quot;</td>
<td>9</td>
<td>Membranes ruptured early; Champetier de Ribes' bag; forceps applied with head high; symphysis ruptured; patient died 4th day of puerperium</td>
</tr>
</tbody>
</table>
### Table No. VIII.—Prolapse and Presentation of Cord.

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Para</th>
<th>Weight of Child</th>
<th>Presentation</th>
<th>Treatment</th>
<th>Result to Mother</th>
<th>Result to Child</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. E.</td>
<td>30</td>
<td>6</td>
<td>$8 \frac{1}{2}$</td>
<td>Vertex</td>
<td>Forceps</td>
<td>Alive</td>
<td>Alive</td>
<td>Os $\frac{2}{3}$; forceps applied quickly</td>
</tr>
<tr>
<td>F. K.</td>
<td>20</td>
<td>1</td>
<td>$8 \frac{1}{4}$</td>
<td>Head and Hand</td>
<td>Internal version</td>
<td>..</td>
<td>Dead</td>
<td>Os fully dilated; head unfixed; membranes ruptured; hand and cord prolapsed</td>
</tr>
<tr>
<td>K. B.</td>
<td>23</td>
<td>2</td>
<td>$7 \frac{3}{8}$</td>
<td>Vertex</td>
<td>Expression</td>
<td>..</td>
<td>..</td>
<td>Head in perineum; cord beside it; pulseless; cord not felt at previous P. V.</td>
</tr>
<tr>
<td>M. L.</td>
<td>29</td>
<td>6</td>
<td>8</td>
<td>..</td>
<td>Forceps</td>
<td>..</td>
<td>..</td>
<td>Os 3 fingers; cord prolapsed at vulva; pulseless; 10 hours later forceps; in with cord prolapsed</td>
</tr>
<tr>
<td>E. W.</td>
<td>40</td>
<td>7</td>
<td>$8 \frac{1}{4}$</td>
<td>Shoulder</td>
<td>Internal version</td>
<td>..</td>
<td>..</td>
<td>Os $\frac{3}{8}$ dilated; membranes ruptured; cord prolapsed and pulseless on admission; morbid</td>
</tr>
<tr>
<td>A. G.</td>
<td>34</td>
<td>8</td>
<td>$7 \frac{1}{4}$</td>
<td>Head</td>
<td>Expression</td>
<td>..</td>
<td>Alive</td>
<td>Head low down; patient in strong labour; child asphyxiated, but recovered</td>
</tr>
<tr>
<td>B. C.</td>
<td>27</td>
<td>3</td>
<td>$6 \frac{1}{2}$</td>
<td>Shoulder</td>
<td>Internal version</td>
<td>..</td>
<td>..</td>
<td>Patient in hospital short time when membranes ruptured and cord prolapsed, pulsating; internal version and delivery</td>
</tr>
<tr>
<td>M. D.</td>
<td>39</td>
<td>11</td>
<td>$9 \frac{1}{2}$</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>Examined on admission; cord prolapsed and pulsating; os 3 fingers; head presentation, unfixed; version immediately done, during which cord ceased to pulsate; patient delivered herself</td>
</tr>
<tr>
<td>No. of Fits</td>
<td>Before Labour</td>
<td>During Labour</td>
<td>After Labour</td>
<td>Remarks</td>
<td>Condition on Admission</td>
<td>Age Par</td>
<td>Name</td>
<td>Remarks</td>
</tr>
<tr>
<td>------------</td>
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<td>------------------------</td>
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<td>---------</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Morphia; stomach washed out; purgatives; salines</td>
<td>21</td>
<td>E. S.</td>
<td>III. Conscious</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Morphia; stomach washed out; purgatives; salines</td>
<td>30</td>
<td>B. K.</td>
<td>L.</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Morphia; atropine; large quantity of albumen</td>
<td>18</td>
<td>R. D.</td>
<td>L.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Morphia; purgatives; salines</td>
<td>35</td>
<td>C. M. D.</td>
<td>II.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Morphia; purgatives; salines</td>
<td>34</td>
<td>F. B.</td>
<td>L.</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Morphia; stomach washed out; purgatives; salines</td>
<td>28</td>
<td>A. H.</td>
<td>L.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Alive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Age</td>
<td>Para</td>
<td>Condition on Admission</td>
<td>No. of Fits</td>
<td>Treatment</td>
<td>Urine</td>
<td>Result to Mother</td>
<td>Result to Child</td>
</tr>
<tr>
<td>-------</td>
<td>-----</td>
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<td>------------------------</td>
<td>-------------</td>
<td>-----------</td>
<td>-------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>M. D.</td>
<td>26</td>
<td>1.</td>
<td>Comatose</td>
<td>9</td>
<td>Morphia; stomach washed out; purgative left; bowel washed out; salines</td>
<td>Large quantity of albumen</td>
<td>Dead</td>
<td>Dead</td>
</tr>
<tr>
<td>L. A.</td>
<td>27</td>
<td>1.</td>
<td>&quot;</td>
<td>4</td>
<td>Morphin; stomach washed out; purgatives by stomach tube; bowel washed out</td>
<td>Large quantity of albumen</td>
<td>Alive</td>
<td>Alive</td>
</tr>
<tr>
<td>A. H.</td>
<td>26</td>
<td>1.</td>
<td>&quot;</td>
<td>3</td>
<td>Morphin; stomach washed out and purgative left; bowel washed out</td>
<td>Large quantity of albumen</td>
<td>Alive</td>
<td>Alive</td>
</tr>
<tr>
<td>A. F.</td>
<td>21</td>
<td>1.</td>
<td>Conscious</td>
<td>4</td>
<td>Morphin; atropine; purgatives</td>
<td>Fair quantity of albumen</td>
<td>Alive</td>
<td>Alive</td>
</tr>
<tr>
<td>M. C.</td>
<td>24</td>
<td>1.</td>
<td>&quot;</td>
<td>5</td>
<td>Morphin; purgatives</td>
<td>Solid with albumen</td>
<td>Alive</td>
<td>Alive</td>
</tr>
<tr>
<td>M. C.</td>
<td>24</td>
<td>1.</td>
<td>Comatose</td>
<td>7</td>
<td>Morphin; atropine; stomach washed out and purgative left; bowel washed out</td>
<td>Small quantity of albumen</td>
<td>Alive</td>
<td>Alive</td>
</tr>
<tr>
<td>Name</td>
<td>Age</td>
<td>Para</td>
<td>Condition on Admission</td>
<td>No. of Fits</td>
<td>Treatment</td>
<td>Urine</td>
<td>Result to Mother</td>
<td>Result to Child</td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
<td>------</td>
<td>------------------------</td>
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<td>-----------</td>
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<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>M. K.</td>
<td>19</td>
<td>I.</td>
<td>Conscious</td>
<td>6</td>
<td>Morphia; purgatives; salines</td>
<td>Solid with albumen</td>
<td>Dead</td>
<td>M.</td>
</tr>
<tr>
<td>M. L.</td>
<td>34</td>
<td>II.</td>
<td>,,</td>
<td>1</td>
<td>Morphia; purgatives; salines</td>
<td>Solid with albumen</td>
<td>Alive</td>
<td>Alive</td>
</tr>
<tr>
<td>M. M.</td>
<td>25</td>
<td>II.</td>
<td>,,</td>
<td>1</td>
<td>Morphia; purgatives; salines</td>
<td>Large quantity of albumen</td>
<td>Alive</td>
<td>Alive</td>
</tr>
<tr>
<td>Name</td>
<td>Age</td>
<td>Par</td>
<td>Condition on Admission</td>
<td>No. of Fits</td>
<td>Treatment</td>
<td>Urine</td>
<td>Result to Mother</td>
<td>Result to Child</td>
</tr>
<tr>
<td>-------</td>
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<td>-----</td>
<td>------------------------</td>
<td>-------------</td>
<td>--------------------------------</td>
<td>------------------------------</td>
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<td>----------------</td>
</tr>
<tr>
<td>J. B.</td>
<td>22</td>
<td>I</td>
<td>Comatose</td>
<td>— 5 —</td>
<td>Morphia; purgative; salines</td>
<td>Solid with albumen</td>
<td>Alive</td>
<td>Alive</td>
</tr>
<tr>
<td>S. L.</td>
<td>19</td>
<td>I</td>
<td>Conscious</td>
<td>— 2 10</td>
<td>Morphia; stomach washed out; purgative left; bowel washed out; salines</td>
<td>Solid with albumen</td>
<td>Alive</td>
<td>Alive</td>
</tr>
<tr>
<td>M. K.</td>
<td>26</td>
<td>III</td>
<td>Conscious</td>
<td>— 3</td>
<td>Morphia; purgatives; stomach washed out; purgatives left; bowel washed out</td>
<td>Large quantity of albumen</td>
<td>Alive</td>
<td>Dead</td>
</tr>
<tr>
<td>E. B.</td>
<td>32</td>
<td>III</td>
<td>Comatose</td>
<td>23 —</td>
<td>Morphia; stomach washed out; purgative left; bowel washed out</td>
<td>Large quantity of albumen</td>
<td>Alive</td>
<td>Dead</td>
</tr>
<tr>
<td>Indications</td>
<td>Number of Cases</td>
<td>Result to Mother</td>
<td>Result to Child</td>
<td>Remarks</td>
<td></td>
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<td></td>
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<tr>
<td>-----------------------------------------</td>
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<td>---------------------------------------------------</td>
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<td></td>
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<td>Recovered</td>
<td>Dead</td>
<td></td>
<td></td>
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<td>Delay in second stage</td>
<td>30</td>
<td>29</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Delay in second stage, persistent</td>
<td>8</td>
<td>8</td>
<td>—</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>occipito-posterior</td>
<td></td>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay in second stage, face turned</td>
<td>1</td>
<td>1</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to vertex</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eclampsia</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prolapsed cord</td>
<td>2</td>
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<td></td>
<td></td>
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<tr>
<td>Contracted pelvis</td>
<td>11</td>
<td>8</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In one case cord tightly round neck; in another child macerated.

Child macerated. See Table IX.

Cord pulseless on admission.

See Table XIII.
Table No. X. A.—Number of Pregnancy of Patients in whom the Forceps was applied.

<table>
<thead>
<tr>
<th>Para</th>
<th>Number of Forceps Cases.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>44</td>
</tr>
<tr>
<td>II.</td>
<td>4</td>
</tr>
<tr>
<td>III.</td>
<td>4</td>
</tr>
<tr>
<td>IV.</td>
<td>3</td>
</tr>
<tr>
<td>V. and over</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
</tr>
</tbody>
</table>

Table No. X. B.—Ages of Patients in whom the Forceps was applied.

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of Forceps Cases.</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-25</td>
<td>33</td>
</tr>
<tr>
<td>26-30</td>
<td>20</td>
</tr>
<tr>
<td>31-35</td>
<td>6</td>
</tr>
<tr>
<td>36 and over</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
</tr>
<tr>
<td>Date</td>
<td>Nature of Operation</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>20/3/14</td>
<td>Classical</td>
</tr>
<tr>
<td>25/3/14</td>
<td>Conservative</td>
</tr>
<tr>
<td>13/4/14</td>
<td>Classical (Classical)</td>
</tr>
<tr>
<td>25/8/14</td>
<td></td>
</tr>
<tr>
<td>28/9/14</td>
<td></td>
</tr>
<tr>
<td>25/9/14</td>
<td></td>
</tr>
<tr>
<td>M.M.</td>
<td>20</td>
</tr>
<tr>
<td>M.H.</td>
<td>31</td>
</tr>
<tr>
<td>E.L.</td>
<td>31</td>
</tr>
<tr>
<td>M.G.</td>
<td>29</td>
</tr>
<tr>
<td>M.MT.</td>
<td>26</td>
</tr>
<tr>
<td>E.M.</td>
<td>25</td>
</tr>
</tbody>
</table>

By Drs. R. E. Tottenham and E. C. Crichton.
THE STANDARD MORBIDITY.

The following is the definition of Morbidity as laid down by a Special Committee of the British Medical Association:—A temperature is to be regarded as morbid which reaches 100°F. on any two occasions between the beginning of the second and the end of the eighth day. All deaths are to be included as morbid, irrespective of temperature; and as some Maternity Hospitals do not admit abortions, these are eliminated from the morbid statistics. The temperature is to be taken in the mouth twice daily, as close as possible to the hours of 8 a.m. and 5 p.m.

N.B.—The mortality percentage and average in the Intern Maternity Department is calculated on the total deliveries—not as last year on the total admissions.

Table XII.—Morbidity—B. M. A. Standard.

<table>
<thead>
<tr>
<th></th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Deliveries</td>
<td>160</td>
<td>156</td>
<td>164</td>
<td>168</td>
<td>178</td>
<td>161</td>
<td>164</td>
<td>176</td>
<td>145</td>
<td>152</td>
<td>159</td>
<td>153</td>
<td>1936</td>
</tr>
<tr>
<td>Cases Morbid</td>
<td>7</td>
<td>2</td>
<td>12</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>4</td>
<td>10</td>
<td>8</td>
<td>86</td>
</tr>
<tr>
<td>Percentage</td>
<td>4.37</td>
<td>1.28</td>
<td>7.25</td>
<td>5.06</td>
<td>3.93</td>
<td>3.72</td>
<td>4.93</td>
<td>3.95</td>
<td>4.06</td>
<td>3.55</td>
<td>6.22</td>
<td>5.22</td>
<td>4.43</td>
</tr>
</tbody>
</table>

Total number of morbid cases - 86
Total percentage morbidity - 4.43
Total average morbidity 1 in 22.51
**TABLE XII. A.**

*Comparison of Morbidity in Primiparae and Multiparae.*

**PRIMIPARÆ.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total deliveries</td>
<td>65</td>
<td>58</td>
<td>68</td>
<td>47</td>
<td>63</td>
<td>54</td>
<td>71</td>
<td>64</td>
<td>68</td>
<td>47</td>
<td>47</td>
<td>63</td>
<td>715</td>
</tr>
<tr>
<td>Cases Morbid</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>6</td>
<td>41</td>
</tr>
</tbody>
</table>

**MULTIPARÆ.**

<table>
<thead>
<tr>
<th></th>
<th>95</th>
<th>98</th>
<th>96</th>
<th>121</th>
<th>115</th>
<th>107</th>
<th>93</th>
<th>112</th>
<th>77</th>
<th>105</th>
<th>102</th>
<th>90</th>
<th>1211</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total deliveries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cases Morbid</td>
<td>4</td>
<td>—</td>
<td>9</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>45</td>
</tr>
<tr>
<td>Percentage</td>
<td>.42</td>
<td>—</td>
<td>9.34</td>
<td>4.95</td>
<td>4.33</td>
<td>1.86</td>
<td>4.30</td>
<td>4.46</td>
<td>2.59</td>
<td>1.89</td>
<td>3.92</td>
<td>2.22</td>
<td>3.71</td>
</tr>
</tbody>
</table>

**TABLE XII. B.**

*Extra-genital Causes of Morbidity*

<p>| | | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Phthisis</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mastitis</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Intestinal perforation</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lobar pneumonia</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tonsillitis</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cellulitis of foot</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Total - 10
TABLE XII. C.—Operative Cases showing Morbidity.

<table>
<thead>
<tr>
<th>Nature of Operation</th>
<th>Number of Cases of each Operation</th>
<th>Morbid</th>
<th>Mortal</th>
<th>Morbidity</th>
<th>Morbidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application of forceps</td>
<td>64</td>
<td>1</td>
<td>3</td>
<td>1 in 3.2</td>
<td>1 in 3.2</td>
</tr>
<tr>
<td>Manual removal of placenta</td>
<td>25</td>
<td>1</td>
<td>3</td>
<td>1 in 3.3</td>
<td>1 in 3.3</td>
</tr>
<tr>
<td>Induction of labour</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>16.67</td>
<td>16.67</td>
</tr>
<tr>
<td>Unavoidable hemorrhage</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>75.00</td>
<td>75.00</td>
</tr>
<tr>
<td>External accidental hemorrhage</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>60.00</td>
<td>60.00</td>
</tr>
<tr>
<td>Concealed accidental hemorrhage</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>60.00</td>
<td>60.00</td>
</tr>
<tr>
<td>Pubiotomy</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1 in 1.5</td>
<td>1 in 1.5</td>
</tr>
<tr>
<td>Version</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1 in 1.67</td>
<td>1 in 1.67</td>
</tr>
<tr>
<td>Sterilization of incised peritoneum</td>
<td>356</td>
<td>31</td>
<td>2</td>
<td>8.71</td>
<td>8.71</td>
</tr>
<tr>
<td>Cæsarean section</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>28.57</td>
<td>28.57</td>
</tr>
</tbody>
</table>

Remarks:
- Two associated with pubiotomy, See Table XIII.
- Three deaths, See Table XIII.
- One death, See Table XIII.
- One death, See Table XIII.
- Eighteen associated with forceps, See Table XIII.
- One death; acute sepsis. See Table XIII.
Table XII. D.—Duration of Stay in Hospital of Morbid Cases.

<table>
<thead>
<tr>
<th>Duration</th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10 days</td>
<td>47</td>
<td>12</td>
</tr>
<tr>
<td>10-19</td>
<td>26</td>
<td>1</td>
</tr>
<tr>
<td>20-29</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Over 29</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>87</td>
<td>17</td>
</tr>
</tbody>
</table>

* Three of these patients died within a few hours of their admission.

Table XII. E.—Duration of Temperature.

<table>
<thead>
<tr>
<th>Duration</th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5 days</td>
<td>63</td>
<td>11</td>
</tr>
<tr>
<td>5-9</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>10-19</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Over 19</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>87</td>
<td>17</td>
</tr>
</tbody>
</table>

Table XII. F.—Highest Temperature Recorded.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>100°-100.9°</td>
<td>26</td>
<td>1</td>
</tr>
<tr>
<td>101°-101.9°</td>
<td>23</td>
<td>1</td>
</tr>
<tr>
<td>102°-102.9°</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>103°-103.9°</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>104° and over</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>87</td>
<td>5</td>
</tr>
</tbody>
</table>

Table XII. G.—Treatment of Morbid Cases of Genital Origin.

- Utero-vaginal douching: 27 patients
- Administration of vaccine: 23
- Exstirpation of thrombosed ovarian vein: 1 patient
- Laparotomy and drainage: 1

Table XII. H.—Utero-Vaginal Douches.

<table>
<thead>
<tr>
<th>Number of Douches</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
</tr>
</tbody>
</table>
316 "Clinical Report of the Rotunda Hospital."

**Table XII. I.—Number of Injections of Vaccine in each Patient.**

<table>
<thead>
<tr>
<th>No. of Injections</th>
<th>No. of Cases</th>
<th>Results</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>1 Death</td>
<td>From pulmonary embolus</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>&quot;</td>
<td>Ligature of ovarian veins</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>1 Death</td>
<td>Acute sepsis</td>
</tr>
<tr>
<td>7</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>9</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

**Table XII. J.—Nature of Infection and of Vaccine in Cases in which Vaccine was used.**

<table>
<thead>
<tr>
<th>No of Cases</th>
<th>Infection</th>
<th>Vaccine Used</th>
<th>Results</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Streptococcus</td>
<td>Rotunda Stock and autogenous</td>
<td>2 Deaths</td>
<td>One from acute sepsis one lig. of ovarian veins</td>
</tr>
<tr>
<td></td>
<td>and <em>St. aureus</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td><em>Staph., St. aureus</em></td>
<td>Rotunda Stock and autogenous</td>
<td>1</td>
<td>Recovery</td>
</tr>
<tr>
<td>1</td>
<td>and <em>B. coli</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td><em>Gonococci</em></td>
<td>Rotunda Stock</td>
<td>1</td>
<td>Recovery</td>
</tr>
<tr>
<td>1</td>
<td>Undiscovered</td>
<td><em>Strept. and S. aureus</em></td>
<td>1</td>
<td>Recovery</td>
</tr>
</tbody>
</table>

"Clinical Report of the Rotunda Hospital."
<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Para</th>
<th>Admitted</th>
<th>Delivered</th>
<th>Died</th>
<th>Cause of Death</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. C.</td>
<td>28</td>
<td>II</td>
<td>Jan. 22</td>
<td>Jan 22</td>
<td>Jan 26</td>
<td>Acute yellow atrophy</td>
<td>Patient a long time in labour; no progress; bag inserted; 2 hours later forceps applied; head unfixed; during extraction there was a slight crack, due to rupture of symphysis; head came through easily; apparently no contraction; P. O. E.; following day patient axamcted, and died on 4th day.</td>
</tr>
<tr>
<td>D. H.</td>
<td>21</td>
<td>II</td>
<td>Jan. 2</td>
<td>outside</td>
<td>Jan 22</td>
<td>Acute sepsis</td>
<td>Patient sent in with history of fits; delivered previous day; temperature 102°; pulse 120; soon afterwards there was a rigor; ulcer of vagina communicating with rectum; douche; culture streptococci; vac ines; 10 days later thickening to right of uterus; ligature of ovarian veins; patient died 9 days later.</td>
</tr>
<tr>
<td>S. H.</td>
<td>38</td>
<td>I</td>
<td>Nov. 21</td>
<td>Nov 21</td>
<td>Nov 22</td>
<td>Shock</td>
<td>Patient sent up from country with history of ruptured membranes; slight pains on admission; uterus not tight on child; forceps applied some hours later, when pains returned; fæces macerated, putrid; 12 hours later pulse feeble and abdomen distended; patient tried to get out of bed, and shortly afterwards collapsed and died.</td>
</tr>
<tr>
<td>E. O'C.</td>
<td>36</td>
<td>VI</td>
<td>Jan. 2</td>
<td>Jan 2</td>
<td>Feb 22</td>
<td>Intestinal perforation</td>
<td>Patient ran a high temperature from 3rd day; uterus well involuted; lochia normal; laparotomy performed Feb. 21; pus welled up when abdomen was opened; uterus and appendages normal; perforation of cæcum; patient died next day.</td>
</tr>
<tr>
<td>Name</td>
<td>Age</td>
<td>Para</td>
<td>Admitted</td>
<td>Delivered</td>
<td>Died</td>
<td>Cause of Death</td>
<td>Remarks</td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
<td>------</td>
<td>----------</td>
<td>-----------</td>
<td>------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>M. K.</td>
<td>23</td>
<td>II.</td>
<td>May 2</td>
<td>May 19</td>
<td>May 24</td>
<td>Eclampsia</td>
<td>Patient conscious on admission; considerable oedema; 4th fit shortly after admission; 5th fit 3 hours later; on May 18 labour began; forceps applied next day; foetus macerated 3rd day of puerperium; considerable ascites; good quantity of urine passed; next day comatose, with incontinence, &amp;c.; patient died on 5th day.</td>
</tr>
<tr>
<td>E. P.</td>
<td>32</td>
<td>III.</td>
<td>June 9</td>
<td>June 10</td>
<td>June 18</td>
<td>Miliary Tuberculosis</td>
<td>Thirteen fits prior to admission; 10 more in hospital; last fit on 10th; delivered herself 1 hour later; on 11th patient semi-conscious. Pulse and temperature up; pneumonia suspected; later, pulse and temperature still high; respiration 40; vaccine (pneumococi); died on 18th. Post-mortem.—Initiative T. B. in both lungs.</td>
</tr>
<tr>
<td>E. D.</td>
<td>36</td>
<td>IV.</td>
<td>Jan. 16</td>
<td>Jan. 16</td>
<td>Jan. 16</td>
<td>Ante partum haemorrhage and concealed haemorrhage</td>
<td>Patient in very feeble condition; pulse 120 on admission; no external haemorrhage; uterus normal; 7 hours later membranes ruptured; some blood escaped; head unfixed; bleeding ceased after this; Pituitrin 1 cc., morphia ½; tight binder; 5 hours later another gush; head on perinaëum; child expressed, uterus and vagina plugged; patient collapsed and died shortly after.</td>
</tr>
<tr>
<td>Name</td>
<td>Age</td>
<td>Para</td>
<td>Admitted</td>
<td>Delivered</td>
<td>Died</td>
<td>Cause of Death</td>
<td>Remarks</td>
</tr>
<tr>
<td>--------</td>
<td>-----</td>
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<td>-----------</td>
<td>---------</td>
<td>---------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>A. R.</td>
<td>34</td>
<td>I</td>
<td>Aug. 28</td>
<td>Aug. 30</td>
<td>Aug. 30</td>
<td>Fatty degeneration of heart</td>
<td>Os 3 fingers; head fixing; bag inserted; membrane ruptured before labour began; vertex IV; bag expelled in 4 hours. Forceps failed. Pubiotomy performed: patient died shortly afterwards. Post-mortem.—Fatty heart, tear in bladder wall</td>
</tr>
<tr>
<td>M. D.</td>
<td>28</td>
<td>I</td>
<td>Sept. 1</td>
<td>Sept. 1</td>
<td>Sept. 2</td>
<td>Uremia, chronic nephritis</td>
<td>Complained of pain in legs on admission; albumen present; labour normal; soon after patient became comatose; died Sept. 2nd, not having regained consciousness. Patient very wasted on admission; delivered herself at 12 a.m.; slight bleeding; some difficulty in expressing placenta; patient collapsed and died at 2.45. Normal delivery; sepsis showed on 6th evening; no improvement in spite of vaccines, douches, &amp;c.; pulse and temperature kept swinging; nothing to indicate operation; patient died on 39th day. 5th evening, temperature 100.8°; 8th morning, temperature 103°; uterus empty; vaccine given regularly; temperature normal 15th evening; 18th evening patient allowed out of bed, while sitting at fire she fell down and was picked up dead. Post-mortem.—Clot at bifurcation of pulmonary artery.</td>
</tr>
<tr>
<td>M. M'C.</td>
<td>40</td>
<td>VII</td>
<td>Sept. 16</td>
<td>Sept. 16</td>
<td>Sept. 16</td>
<td>Shock</td>
<td></td>
</tr>
<tr>
<td>L. B.</td>
<td>34</td>
<td>II</td>
<td>Feb. 2</td>
<td>Feb. 3</td>
<td>March 12</td>
<td>Acute sepsis</td>
<td></td>
</tr>
<tr>
<td>M. C.</td>
<td>30</td>
<td>VIII</td>
<td>March 24</td>
<td>March 24</td>
<td>April 11</td>
<td>Pulmonary embolus</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Age</td>
<td>Para</td>
<td>Admitted</td>
<td>Delivered</td>
<td>Died</td>
<td>Cause of Death</td>
<td>Remarks</td>
</tr>
<tr>
<td>------</td>
<td>-----</td>
<td>------</td>
<td>----------</td>
<td>-----------</td>
<td>------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>B. C.</td>
<td>36</td>
<td>IX.</td>
<td>Sept. 27</td>
<td>Sept. 27</td>
<td>Sept. 28</td>
<td>Concealed accidental hemorrhage</td>
<td>Collapsed on admission: pulse 150, temperature 97.4°; uterus large, tense and painful; abdomen opened; pan-hysterectomy performed; patient died 11 30 a.m., 19 hours after operation.</td>
</tr>
<tr>
<td>M. D.</td>
<td>26</td>
<td>I.</td>
<td>Oct. 26</td>
<td>—</td>
<td>Oct. 27</td>
<td>Eclampsia</td>
<td>Two fits before admission; comatose, then 5 hrs after admission; died without regaining consciousness.</td>
</tr>
<tr>
<td>M. D.</td>
<td>31</td>
<td>I.</td>
<td>Oct. 27</td>
<td>Oct. 28</td>
<td>Oct. 29</td>
<td>Acute lobar pneumonia</td>
<td>Internal pelvicotomy; C.V. 15 cms.; forceps applied; patient's pulse very fast after delivery; complained of pain in right side and dyspnœa; died on 29th. Post-mortem.—Acute lobar pneumonia.</td>
</tr>
<tr>
<td>C. C.</td>
<td>33</td>
<td>XI.</td>
<td>Oct. 29</td>
<td>Oct. 31</td>
<td>Oct. 31</td>
<td>Post-partum hemorrhage</td>
<td>No foetid heart on admission; headache, vomiting, &amp;c.; on 29th tents and bougies inserted; 31st tents removed, foot brought down; patient delivered herself; manual removal of placenta; cervix tom and repaired; uterus and vagina plugged; pulse 120; blood oozed through; vagina plugged twice; bleeding stopped; patient died soon afterwards.</td>
</tr>
<tr>
<td>T. T.</td>
<td>38</td>
<td>I.</td>
<td>July 4</td>
<td>—</td>
<td>July 4</td>
<td>Cirrhosis, pericardial peritoneal effusions</td>
<td>Patient sent in from dispensary complaining of pain in right leg and diarrhœa; 5½ months' pregnancy; some oedema of legs; 2 hours later she became drowsy, breathing stertorous; urine contained albumen; respirations failed; patient died 8 p.m.</td>
</tr>
</tbody>
</table>
APPENDIX B.

STATISTICS OF THE GYNECOLOGICAL DEPARTMENT.

Table I.—Number of Admissions and of Operations.

<table>
<thead>
<tr>
<th>Number of Admissions</th>
<th>Number of Operations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>630</td>
<td>465</td>
<td>530</td>
</tr>
</tbody>
</table>

Table II.—Nature and Number of Operations.

<table>
<thead>
<tr>
<th>Abdominal Section</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vulva and Perineum—</td>
<td>202</td>
</tr>
<tr>
<td>Extirpation of vulva for carcinoma</td>
<td>5</td>
</tr>
<tr>
<td>Removal of Bartholin’s cyst</td>
<td>2</td>
</tr>
<tr>
<td>Perineorrhaphy— Complete</td>
<td>6</td>
</tr>
<tr>
<td>Incomplete</td>
<td>90</td>
</tr>
<tr>
<td>Urethra— Caruncle</td>
<td>2</td>
</tr>
<tr>
<td>Vagina— Anterior colporrhaphy</td>
<td>5</td>
</tr>
<tr>
<td>Vesico-vaginal fistula</td>
<td>7</td>
</tr>
<tr>
<td>Recto-vaginal fistula</td>
<td>1</td>
</tr>
<tr>
<td>Posterior colpotomy</td>
<td>3</td>
</tr>
<tr>
<td>Excision of vaginal cyst</td>
<td>1</td>
</tr>
<tr>
<td>Rectum— Excision of haemorrhoids</td>
<td>3</td>
</tr>
<tr>
<td>Cervix— Trachelorrhaphy</td>
<td>23</td>
</tr>
<tr>
<td>Amputation</td>
<td>106</td>
</tr>
<tr>
<td>Posterior division</td>
<td>1</td>
</tr>
<tr>
<td>Tubes and Ovaries—</td>
<td></td>
</tr>
<tr>
<td>Resection of tube with other operations</td>
<td>11</td>
</tr>
<tr>
<td>Salpingectomy— Single</td>
<td>22</td>
</tr>
<tr>
<td>Double</td>
<td>8</td>
</tr>
<tr>
<td>Salpingo-oophorectomy with other operations— Single</td>
<td>18</td>
</tr>
<tr>
<td>Double</td>
<td>9</td>
</tr>
<tr>
<td>Tubal pregnancy</td>
<td>2</td>
</tr>
<tr>
<td>Removal parovarian cyst</td>
<td>1</td>
</tr>
<tr>
<td>Ovariotomy</td>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Uterus—</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curettage— Alone</td>
<td>67</td>
</tr>
<tr>
<td>Combined with other operations</td>
<td>175</td>
</tr>
<tr>
<td>Polypus (benign)</td>
<td>6</td>
</tr>
<tr>
<td>Ventral suspension— Alone</td>
<td>6</td>
</tr>
<tr>
<td>Combined with other operations</td>
<td>54</td>
</tr>
<tr>
<td>Alexander-Adams</td>
<td>79</td>
</tr>
<tr>
<td>Vaginal shortening of utero-sacral ligaments</td>
<td>12</td>
</tr>
<tr>
<td>Interposition of uterus</td>
<td>7</td>
</tr>
<tr>
<td>Gilliam’s operation combined with ventral suspension</td>
<td>40</td>
</tr>
<tr>
<td>Myomectomy— Abdominal</td>
<td>20</td>
</tr>
<tr>
<td>Vaginal</td>
<td>5</td>
</tr>
<tr>
<td>Hysterectomy— Supra-vaginal</td>
<td>32</td>
</tr>
<tr>
<td>Complete</td>
<td>4</td>
</tr>
<tr>
<td>Wertheim</td>
<td>10</td>
</tr>
<tr>
<td>Vaginal</td>
<td>2</td>
</tr>
<tr>
<td>Cæsarean section</td>
<td>7</td>
</tr>
<tr>
<td>Miscellaneous— Appendicectomy associated with other operations</td>
<td>16</td>
</tr>
<tr>
<td>Appendical abscess</td>
<td>3</td>
</tr>
<tr>
<td>Excision pelvic tumour</td>
<td>1</td>
</tr>
<tr>
<td>Supra-pubic cystotomy</td>
<td>1</td>
</tr>
<tr>
<td>Plastic operation for pendulous abdomen</td>
<td>2</td>
</tr>
<tr>
<td>Amputation of feet (Raynaud’s disease)</td>
<td>1</td>
</tr>
<tr>
<td>Resection of intestine</td>
<td>2</td>
</tr>
<tr>
<td>Myoma of rectus muscle</td>
<td>1</td>
</tr>
<tr>
<td>Tubercular peritonitis</td>
<td>3</td>
</tr>
</tbody>
</table>
Dr. Hastings Tweedy congratulated the Assistant Masters on the manner in which they had fulfilled their arduous task without any help, for their Master, Dr. Jellett, was serving his country in France. This completed the thirty-third consecutive Report which had been published from the Rotunda, and throughout the United Kingdom there was no record which could compare with these statistics in regard to the amount of material dealt with.

He was glad to see morbidity rate had improved, for this index pointed to, and was the measure of, the real value of a maternity institution.

In respect to the treatment of eclampsia, he did not think treatment followed with precision the methods which had yielded such excellent results during his (Dr. Tweedy's) mastership. He noticed that chloroform, saline injections, and much smaller doses of morphine had been in use than formerly. Neither salt nor chloroform should be given to an eclamptic, and morphine unless pushed to its full doses did more harm than good.

Dr. Madill said there were one or two points referred to by Dr. Tweedy upon which he might be able to throw some light. He agreed with him when he emphasised the morbidity standard of successful practice. He was struck, for a couple of years past, by the number of morbid cases in which the morbidity was taken on the B. M. A. standard, in some of these cases it was hardly right to have treated them as morbid.

Referring to a case of inverted uterus, he said this case occurred in the Extern Department, and, as far as he recollected, the patient was alive when the assistant arrived. The uterus was plugged, but she died shortly afterwards.

In the eclampsia cases bicarbonate of sodium was not discontinued altogether. It was simply discontinued for sub-mammary infusions. He understood that the patients reacted more quickly to saline than to bicarbonate of sodium. The latter was always used for washing out the stomach.

He remembered one case of rupture of the symphysis in which the forceps was applied, and without any great pull there was a distinct crack and the symphysis ruptured. The
patient was treated in the same way as if pubiotomy had been done, and she recovered.

Both of the ovarian tumours were dermoids, one of them was diagnosticated before operation. It was really to save time that no examination was made to discover whether one of the ovaries could be left.

Dealing with the Report itself, there was only one case to which he wished to refer—viz., the first case under the heading "pubiotomy." In this case the record did not say whether the child was delivered immediately with forceps or not.

Dr. Solomons said he considered it a pity that any changes were made in the treatment as laid down by Dr. Tweeddy in cases of eclampsia. During the last two years of Dr. Tweeddy's Mastership, when he (Dr. Solomons) was his assistant at the Rotunda, thirty consecutive cases of eclampsia were treated during that time without a death. He suggested that attention to the minor points was the chief factor in bringing about this successful result. He inquired if scopolomine-morphine anaesthesia was still used at the Rotunda. He considered it was a method not to be set aside. Under the heading "contracted pelvis" he noticed that in several of the cases of Caesarean section the pelvis was not measured. He thought that pelvimetry should, if possible, be performed on these women. He would like to know if atropine was being used as a routine with morphine in eclampsia. Referring to prolapse of the cord, he asked if reposition was being carried out. Turning to the Gynaecological portion of the Report, he mentioned that the number of cases of operation for vesico-vaginal fistula appeared to be large. He was anxious to know the after results of these operations. He was surprised to see that where Gillam's operation was performed it was thought necessary to do ventral suspension as well. Either of these operations should suffice.

Sir William Smyly joined in congratulating the Assistant Masters on their admirable Report, in which the copious tables were especially instructive. He considered that morbidity was a truer test than mortality in estimating the
Clinical Report of the Rotunda Hospital.

value of the methods adopted in an institution. On looking over his own statistics he was struck by the change which took place about half way through his term as Master. In the first half the results were bad and in the second good. This he attributed to improvement in the nursing after Miss Hampson’s appointment, together with structural changes in the hospital, which had practically abolished sepsis; to the abandonment of accouche ment forcé in accidental haemorrhage, and of chloroform in the treatment of eclampsia. Referring to scopolomine-morphine, he considered that the combination was useful in cases where morphine had long been used, but in the second stage of labour it did not appear to him to be as good as chloroform.

Dr. Gibbon FitzGibbon considered the number of concealed accidental haemorrhage cases large (3) compared with what appeared in previous Reports. He thought it a pity that an estimate was not given of the amount of blood lost, and that in the third case there was no post-operative report giving some idea of the amount of free blood contained in the uterus. The case in which the symphysis was ruptured was reported as one of acute yellow atrophy, which he considered would account for the death. He agreed that it was inadvisable to go on with Cæsarean section in the case of double dermoid cyst.

The President said he would like to share in the congratulation expressed on the work of the Assistant Masters. Dr. Tweedy had properly pointed out that it was interesting and important to have the series of Reports unbroken. It had not been observed by those who had already spoken, what he thought as an Assistant was true and even still thought, that at certain times of the year, particularly in the early autumn and spring, there was a great difficulty in preventing the occurrence of sepsis. When he was an Assistant at the Rotunda they were always glad when March had passed without any very distinct outbreak of sepsis. In those days such occurrences were not altogether unknown. He was unable to offer any explanation of this. Referring to Sir William Smyly’s remarks about chloroform in the treatment of eclampsia he (Dr. Purefoy) had not a case for a long time, but
he could recall a good many cases in past years in which he administered chloroform, in some of them without morphine, with results which were quite satisfactory.

He had always felt that in severe cases of accidental haemorrhage the question of operation—either Cæsarean section or hysterectomy—was a very doubtful resource, and he considered that the Report before them did not give any reason for changing his opinion on that point.

Dr. Crichton said that in the case of concealed accidental haemorrhage there was a very large amount of blood, and Dr. Rowlette had a very good specimen. In the pubiotomy case the patient was delivered at once. He understood that Dr. Jellett did not approve of scopolomine. In the two Cæsarean section cases which were not measured, both patients arrived in hospital strong in labour. Dr. Jellett considered it a useless proceeding to replace the cord in the vast majority of cases. In the cases of vaginal fistula six of the seven patients left the hospital apparently cured.

Dr. Tottenham thanked Dr. Purefoy, Sir William Smyly, and Dr. Tweedy for the assistance given in compiling the Report.
ABSTRACTS.

SECTION OF OBSTETRICS.

Friday, October 30, 1914.

The President in the Chair.

Exhibits.

Malignant Adenoma Uteri.

Dr. Gibbon FitzGibbon showed a uterus with malignant adenoma removed from a patient aged sixty. The history of the case was:—M. B., unmarried, had been told when thirty-five years of age that she had a fibroid of the uterus and was advised not to have it removed. Menstruation was always normal, and the menopause occurred at forty-eight years of age normally. Since then there had been no bleeding or discharge until seven months before being first seen by Dr. FitzGibbon. Bleeding had then occurred and lasted fourteen days, and had been recurring irregularly ever since—it was sometimes profuse. It had been continuing heavy for a month when first seen, and the patient was very anaemic. On examination the uterus was found uniformly enlarged, about the size of a four months' pregnancy, somewhat soft, and the cervix was small and atrophic. The diagnosis of myoma was made—probably undergoing some degeneration. Laparotomy and panhysterectomy was performed, and the patient made an excellent recovery. The specimen showed a soft cauliflower growth filling up the cavity of the uterus and growing all over the walls, which were very thick, about 1 1/4 inches, and at one part showing a line of demarcation which might have been the capsule of an original fibroid. Sections of the growth showed typical adenoma with very marked malignant characters in some parts, and invading the wall of the uterus. The cervix was quite free from invasion. A second section was shown of a non-malignant adenoma.
removed from a girl of twenty-eight, which had been extruded from the uterus as a polypus, and showing great similarity in structure, but without any malignant characters.

Dr. Rowlette said the specimen appeared to him to be a carcinoma occurring in a uterus already the seat of a fibroid. Such an event was not uncommon where a fibroid gave rise to irritation of the endometrium. Dr. FitzGibbon's second specimen was of much interest for comparison. There was in it a great growth of glandular tissue without obvious evidence of malignancy, but nevertheless he would regard the case with suspicion.

Fibroid Uterus.

Dr. Solomons said that there was nothing remarkable about the size of the specimen shown. The girl from whom it was removed was unmarried, aged twenty-seven years, and came to Mercer's Hospital complaining of uterine haemorrhage. On examination fibroid uterus was diagnosticated though the uterus was not at all typical, being quite smooth and feeling like an ordinary myometritis. Palliative curettage and styptic treatment was carried out, and the patient was told to return if the symptoms did not abate. She was sent to a convalescent home, but as the haemorrhage recurred, she returned to the hospital. She was then very blanched in appearance. The abdomen was opened in the hope of performing myomectomy, but when the uterus was opened it was found to be studded with myomata, some submucous, others interstitial. Hysterectomy was done. The case showed how impossible it was to promise myomectomy. He considered that the devotees of x-ray treatment for myoma would possibly have looked on this case as favourable. It, however, appeared to him that owing to the patient's condition there was nothing to be done but to open the abdomen and remove the uterus.

The Heart and Kidneys in Pregnancy.

Dr. M'Allister gave a summary of the various conditions of the heart which might influence pregnancy, and the forms of renal lesions which might occur during pregnancy. See page 227, ante.
Dr. Solomons said the woman from whom he removed this uterus was aged forty-seven years, and had been married sixteen years. She had borne four children, and had one miscarriage, the last child eight years previously, the miscarriage six years previously.

She complained for a year of difficulty in walking, with pain and tenderness in the lower abdomen. Menstruation had been irregular for the last six months. On examination she had the appearance of a woman of sixty. On bimanual examination the uterus was found to be enlarged by a tumour on the anterior wall. The parametria were normal.

On opening the abdomen, extravasated blood was seen, which exuded from the region of the right cornu. On grasping the uterus blood escaped from this site. He considered that the case was one of sarcoma, and performed Wertheim's hysterectomy. The glands were not involved.

The patient made a good recovery.

He submitted the specimen to Dr. Wigham, who reported as follows:

Macroscopically, the uterus is enlarged by a tumour in the anterior wall and by a projecting mass at the right cornu. The adnexa appear normal. On opening the uterus the enlargement is found to be caused by a mass of friable and haemorrhagic tissue on the anterior wall which is seen to be continuous with the mass at the right cornu. To the naked eye the muscle tissue and mucous membrane are normal.

Microscopically, the main red part and the projecting piece by the right cornu show necrosis and haemorrhage. The structure of the necrotic tissue appears to have been a cellular one. The rest of the mass is fibrin and red cells. In the mucous membrane is a certain degree of cystic endometritis. The sarcoma tissue is found in small masses between the muscle bundles of the body of the uterus. It consists of large, irregular polygonal cells with very large
nuclei, many of which are undergoing mitosis. In many places the sarcoma tissue appears to be continuous with the muscular tissue, as if the muscle cells of the uterus were undergoing a sarcomatous change.

The sarcoma is of the large, mixed-celled variety, which has undergone almost complete necrosis with much hemorrhage into the necrotic tissue. Only outlying parts, where the tumour is infiltrating the muscle of the uterus, can its structure be made out.

**Tubal Abortion.**

Sir William Smyly, in showing this specimen, said it was chiefly a blood clot, and a little foetus, about three-quarters of an inch long, was to be seen in the middle of it. The capsule of the tumour was formed by the extremity of the Fallopian tube and some blood.

The patient from whom it was removed came into the Adelaide Hospital on October 28th. She was aged twenty-eight, married three years, and had one child aged two. She menstruated regularly up to June, missed that period and the two following ones. On the 10th of August red discharge set in, and after ten days she got pains in the back, and was supposed to have aborted about the 20th of August. From that time there was continuous red, bloody discharge from the vagina, and she was sent into hospital to be curetted. On examination the tumour was found on the right side of the uterus and attached to it by a pedicle. A diagnosis of ovarian tumour was made. When the abdomen was opened the ovaries were found healthy.

The peculiarity of the case was the small foetus, three-quarters of an inch long, which would appear to be about a six weeks' foetus, and supposing the pregnancy to date from May, which would have been five months, this would have been a long time for such a small foetus to have remained preserved.

The symptoms were those of ectopic pregnancy, but he considered it more likely that the supposed abortion was really an abortion, and that between that and October she conceived the ectopic pregnancy. He did not know which theory was right, but it would seem remarkable if this little foetus was not absorbed in five months.
Section of Obstetrics.

Etiology and Treatment of Toxaemic Pregnancy.

Dr. E. H. Tweedy read some short notes of a case of severe hyperemesis gravidarum. See page 245, ante.

Friday, January 15, 1915.

The President in the Chair.

Exhibits.

Two Broad Ligament Tumours.

The President said he removed this tumour from a patient aged forty-seven and unmarried. She came to him complaining of uterine hæmorrhage every third week. Otherwise she was in good health, and was able to do her work, which entailed much cycling. When examined, the abdomen was found fatty and distended, but flaccid and tympanitic all over. There was no difficulty in palpating a fibroid uterus bimanually. When the abdomen was opened he was surprised to find a large thin-walled flaccid cyst which was obviously subperitoneal between the layers of the right broad ligament. The intestines were adherent to it. The peritoneum was divided between some of the coils of adherent intestine and the cyst was shelled out. The fibroid uterus was then removed with the cyst en masse. The patient made a good recovery. The points of interest were the difficulty in diagnosticating the cyst and the peritonitis localised to the covering of the cyst.

The President said the second specimen was removed from a patient aged thirty-five, unmarried. She felt perfectly well, but had noticed the abdomen increase in size three months previously. The tumour was impacted in the pelvic cavity, which it filled completely, and above the pelvic brim it swelled out into an enormous growth. There was no history of bleeding or of pain, and there had been only occasional difficulty in emptying the bladder. On further examination the uterus was found above the pelvic brim and crowded over to the right side. It was atrophied, and there were two small
Abstracts.

subserous fibroids in the fundus. There was difficulty in removing the tumour, which was growing from the left side of the uterine body and under the broad ligament. The huge cavity which was left was drained through the vagina, covered over, and the uterus was left behind. The shape of the lower end of the tumour corresponded almost exactly to that of the pelvic cavity.

**Congenital Oral Defect.**

Dr. Spencer Sheill showed photographs of a child born with unusual frænum between the upper maxillary bone and the lip. It was not considered of great consequence at the time, and was left, but as the child grew older it grew rapidly, and at the time of the development of the teeth he had to cut the frænum. The frænum came level with the tips of the two central incisors. He suggested that an epithelial inclusion was pressed out through the two mesial nasal processes.

**Fixed Chronic Retroversion of the Uterus.**

Dr. Bethel Solomons read a paper on the above subject. See page 254, ante.

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Friday, February 12, 1915.

The President in the Chair.

Exhibits.

Myomatous Uterus removed during Parturition.

Sir William Smyly said this uterus was removed from a woman who had been in labour twenty hours. The labour was obstructed by a large fibro-myomatous tumour which occupied the pelvic cavity. It was an extra-peritoneal tumour, situated in the triangle bounded in front and below by the cervix and vaginal wall, behind by the rectum, and above by peritoneum; it was fixed in the pelvis. The walls of the uterus were enormously thickened, and the lower uterine segment was very much thinned out.
The patient was aged forty-five, and this was the sixth pregnancy. On the 5th of January, 1915, at 2 p.m., the membranes ruptured, the local midwife was called in, and she sent for Dr. Murray, who, after consultation with Dr. Wallace, determined to bring her to Dublin from Roscrea. She arrived at the Rotunda Hospital at 5 a.m. When examined there it was found that the head was freely movable above the brim, but no fœtal heart could be heard. On vaginal examination, the pelvis was found to be blocked by a large tumour, and the fœtal head could be reached only with difficulty. The child was dead. The patient had already been examined by three different people, and the case was therefore not certainly in an aseptic condition. There was not room to perforate, and extraction by version or by forceps was out of the question. It being impossible to push up the tumour, it was at first determined to wait to see what nature would do. Morphine and scopolamine were given. However, at 10 a.m. there was no alteration in the condition, and it became necessary to deliver. It was then decided to do Cæsarean section and to remove the uterus and tumour. Cervical Cæsarean section offered no advantage, so the classical operation was done, and the tumour and uterus were removed. The patient made a normal recovery.

Ruptured Horn of a Two-horned Uterus.

Sir William Smyly said this specimen was removed from a young married woman, who was four months pregnant. On the morning of the 20th of January, 1915, she was in perfect health, and had arranged with a friend who was a trained nurse to call for her to go to Mass at 8 o'clock; but just as the friend came in she felt what she described as if a knife had been thrust into her umbilicus, and then fainted. After a time she recovered, and fainted again, and spent the whole day going from one fainting fit to another until 4 p.m. Dr. Winder was then called in, and sent her to the Rotunda Hospital at about 6 30 p.m., so that she had been bleeding from 8 a.m. until 7 p.m., before operation. When admitted, she was blanched and pulseless, and there was no doubt about the diagnosis of ruptured ectopic pregnancy. When the abdomen was opened, a two-horned uterus
was found. The foetus had escaped into the abdominal cavity, and the placenta was extruding through the opening. The horn was removed, and the patient recovered.

Pathological Report of Broad Ligament Specimens.

The President said that the microscopical examination of the large tumour which he had shown at the last meeting of the Section had proved it to be a fibro-myoma. The tumour weighed seven thousand and twenty grams. The more central portions of it exhibited some myxomatous degenerative changes.

The second specimen shown at the same meeting was a case of fibroid uterus with a large cyst. Complete examination showed the cyst to be parovarian.


Dr. Spencer Sheill read a paper on above. See page 264, ante.

Friday, March 12, 1915.

The President in the Chair.

Exhibit.

An Unusual Degeneration of the Cervix.

Dr. Alfred Smith said that the patient, aged sixty, the mother of sixteen children, consulted him on account of a profuse slimy discharge. The menopause came on ten years ago. She enjoyed good health up to August last, when she noticed a slimy discharge coming from her vagina. There was neither hæmorrhage nor pain nor offensive odour. On making a bimanual examination, the vaginal portion seemed to have disappeared, the margins being flush with the vaginal vault, the os being so dilated that the index and middle finger could easily be passed in. The impression conveyed was that there was no internal os, that the cavity of the uterus was greatly dilated; the mucous membrane felt like velvet pile. This slight palpation caused hæmor-
rhage. On curettage, large quantities of brain-like matter came away, as in cancer. The pathologist reported non-malignant. A simple panhysterectomy was performed. The total length of the uterus was 12 c.m., fundus 3.5 c.m., cervix 8.5 c.m., greatest width 6.7 c.m. The fundus of the uterus is normal, but the cervical portion is greatly thickened. On section, this thickening is seen to be due to the transformation of the normal muscle wall into a spongy mass infiltrated with mucoid material; this mucoid material is directly continuous with a large amount of mucus in the cavity of the cervix. This change affects the whole contour of the cervix, though it is more marked in the anterior and left wall. The remains of the true cervical wall are represented by a thin layer of fibro-muscular tissue. No evidence of malignancy. The specimen is in the nature of a channelled mucous polypus, but is remarkable in that it engages more or less uniformly the whole of the cervical wall.

A Note on the "Dublin Method" of Conducting the Third Stage of Labour.

Dr. T. P. C. Kirkpatrick read a paper on above subject. See page 273, ante.

Alexander-Adams' Operation and its Results.

Dr. D. G. Madill reported the after-results of cases, and described the method of doing the operation with a single incision.

Friday, April 30, 1915.

Dr. R. D. Purefoy in the Chair.

Rotunda Report.

Drs. R. E. Tottenham and E. C. Crichton submitted the above. See page 287, ante.
SECTION OF PATHOLOGY.

CARCINOMA OF THE PROSTATE.

By L. G. GUNN, F.R.C.S.I.; Surgeon to the Adelaide Hospital, Dublin.

[Read in the Section of Pathology, December 4, 1914.]

There are three points in connection with carcinoma of the prostate to which I wish in particular to direct attention: First, its relative and increasing frequency; secondly, the relation of the hypertrophied prostate; thirdly, its diagnosis.

Sarcoma is so rare that I do not intend to touch on it at all.

It is difficult to find trustworthy statistics. The earliest that I can get are those of Tanchou. He collected the post-mortem records of the Paris hospitals from 1830 to 1840. He found in all 8,600 deaths from cancer. In 6,200 of these the primary cancer was stated. Of this number the cancer occurred in males in 1,904, and out of these cases only five showed carcinoma of the prostate—that is to say, one case occurred about every two years. In Dublin at the present time probably from five to ten cases of carcinoma of the prostate occur every year with a population less than a quarter the size of Paris in 1840.

Sir Henry Thompson in 1860 does not give the number of cases investigated by him, but these numbers must have been large, for he describes six cases of sarcoma. He has only been able to collect eighteen cases of malignant
Carcinoma of the Prostate.

disease of the prostate, of which six were sarcoma. Either the disease was much rarer in those days, or Sir Henry Thompson’s observation was at fault. The latter can hardly be the case, as his account of the diagnosis and symptoms of carcinoma of the prostate is to-day generally accepted.

Sir Henry Morris in 1895 looked upon the disease as an exceedingly rare one. He does not mention actual figures, but obviously has seen few cases in his very extensive practice.

Then comes the advent of prostatectomy. Statistics at once alter.

Albarran in 1906 found ten carcinomatous prostates among 100 given to him to examine as simple hypertrophy.

Lewissohn in 1909 found eighteen cases in 147 examined by him, or about 12 per cent. carcinomatous. Oliver Smith in 1910 found sixteen in 100. Young in 1912 found forty-two in 400, about 40 per cent.; this included three sarcomas. Mansell Moullin in 1913 puts the percentage as high as 25 per cent.

Of my own cases up to date seventeen prostates have proved to be carcinomatous out of 133. I have seen no cases of sarcoma. This gives about 12 per cent. I would call attention to two possible fallacies. First, what I might call the falacy of the specialist. It is certain that more bad cases go to the specialist in any type of disease than will go to the ordinary surgeon or physician. The specialist’s percentages of cancerous conditions are always likely to be on the high side. Secondly, the expectation of life is considerably longer to-day than it was forty or fifty years ago.

From the points that I have mentioned two facts seem to stand out: First, that at least 7 per cent. of all enlarged prostates giving rise to symptoms are carcinomatous.
Secondly, that cancer of the prostate is a more common disease to-day than it was thirty years ago. When we remember that, of men over sixty years of age, in one in four cases the prostate gland is enlarged, and that in one in twelve this enlarged gland gives rise to symptoms, we can hardly look on the disease as a rare one.

The Association of Carcinoma with the Hyper-trophied Prostate.

What is the hypertrophied prostate? Its pathology at the present time seems rather unsatisfactory. As an operator, I can recognise readily four clinical types of prostate gland that give rise to obstruction and call for surgical interference:—

First.—The small, firm, fibrous prostate; difficult to remove, not difficult to explain. It can be explained as the result of chronic inflammation, with the formation of fibrous tissue. It might almost be called a cirrhotic prostate.

Second.—The large, elastic prostate, smooth and even in its consistence; easy to remove by operation, but difficult to explain on removal, unless it be a true hypertrophy.

Third.—The lumpy, irregular prostate, which is commonly met, containing few or many uncapsuled tumours scattered through it. These are obviously all of the nature of non-malignant growths, adenomata or fibro-adenomata.

Fourth.—The carcinomatous prostate, hard, and fixed to the pelvis; very difficult to remove.

The amount of gland removed by operation differs in each of these four varieties. In the first the whole gland is affected, but the whole gland is probably never removed. The surgeon snips away as much as he believes necessary.
to relieve the obstruction. In the second the entire gland inside the fibrous capsule appears to come away at the time of the operation. In separating the gland from the true capsule and its fibrous sheath, at two points difficulty is met with—at the urethra and at the seminal vesicles. This makes me think that a real enucleation of the gland takes place. In the third adenomata and some prostatic tissue are removed, but the greater portion of the prostate gland, thinned and altered by pressure, is left behind. In the fourth, if a radical operation is done, both gland and capsule and the seminal vesicles are removed.

I wish to call attention next to simple hypertrophy of the prostate. What causes the enlargement? Is it a hypertrophy? Is it inflammatory? Is it a tumour formation?

This is still far from being a settled point. To show the difficulty of coming to a definite conclusion I will quote short extracts from opinions of pathologists for the past fifty years:

- Virchow (1863) describes hypertrophy of the prostate as of two classes—one, a myoma, the other a gland tumour.

- Bilroth (1869) believes hypertrophy is never an adenomatous growth, but is a dilatation of the acini, with some hyperplasia. He also thinks that myoma formation is common.

- Socin (1871) believes that hypertrophy of the prostate is never inflammatory nor a hypertrophy but a true tumour formation.

- Lounois (1885) believes hypertrophy of the prostate is never a tumour formation, but is part of an arteriosclerotic process, beginning in the kidneys and extending to the entire genito-urinary system.

- Hirschfeld (1887) believes that hypertrophied prostate
is a new growth; that it takes its origin in a buliding of the gland tubules.

Ciechanowski (1900) believes all hypertrophied prostates are inflammatory, the great majority the result of gonococcic infection.

Albarran (1900-1910) and the majority of the French investigators hold the hypertrophied prostate to be a true tumour formation. Some think it springs from the accessory periurethral glands—others from the prostate itself.

Wallace (1911) states that it is an adenomatous formation, usually springing from the periurethral accessory glands.

A. Thompson (1905) says that he has never seen an encapsulated adenoma or fibro-adenoma in the hypertrophied prostate. He doubts if they exist, and says the enlargement is due to a diffuse hyperplasia of the gland itself.

Adami and Nichols (1911) say that "prostatic hypertrophy may precede the development of definite neoplastic conditions within the organ, nevertheless it must be sharply distinguished from the same. We should regard it as the outcome of a long continued chronic inflammation, more particularly involving the urethral portion of the gland.

Aschoff (1913) states that the inflammatory theory is very doubtful, and that the enlargement is a true tumour formation.

All this goes to show that there is yet great doubt as to the character of the simple prostatic hypertrophy. It seems most probable from recent work that, in most cases, it is a tumour formation, occurring in the periurethral glands and possibly not really in the prostate itself.

Three types of carcinoma are described. A fibrous type, a soft fungating type, and, lastly, an adeno-carcinoma.
Carcinoma of the Prostate.

The last is by far the most common, the others being comparatively rare.

Hawley (1906), who has done a considerable amount of work in connection with carcinoma of the prostate, describes it as follows:—

"The adeno-carcinoma resembles very closely the non-malignant, adenomatous growth found in the so-called hypertrophy; the alveoli in both may be distended with desquamated epithelial elements. In carcinoma, however, there exists usually less space between the alveoli, the cell nuclei stain deeper, and lymph spaces often contain cancer cells. The fibrous sheath of the prostate is not involved until the last, often they escape being invaded, and very often escapes being penetrated by the disease for years."

The question arises: Does cancer of the prostate ever occur without hypertrophy being present first? Clinically, I would say yes, but the percentage of such cases is small.

It is well to remember that cancer of the prostate is not necessarily an enlarged prostate. Metastasis may first call the patient's attention to the fact that he has something wrong with him. Deposits in abdominal glands, in the mediastinum, in bones, in the brain, &c., may occur before the onset of any urinary symptoms. In five out of Young's forty cases of carcinoma the disease seems to have begun before hypertrophy was at all marked. This happened in two of my own cases. It seems nearly always to occur in prostates that we recognise as adenomatous. This raises the question: Is the adenomatous prostate an enlarged prostate?

The work of Gardiner and Simpson in 1913 shows quite clearly that adenomata occur much more commonly in the prostate, and at a much earlier period of life, than is usually supposed. They have examined a large number of prostates removed from patients dying of other diseases.
Of nineteen cases of prostate glands removed from men between the ages of forty and fifty, five glands showed definite adenomatous formation. Of twenty-one cases removed from men between the ages of fifty and sixty, seven showed the same condition. Of eighteen removed between the ages of sixty and seventy, five also were adenomatous. This would lead us to suppose that adenomata are as common in the prostate gland between forty and fifty as they are at a much later period of life, when they may give rise to clinical symptoms. It also makes it very uncertain that carcinoma, when it does develop, may not develop in a previously existing but unrecognised adenoma.

Is there any reason why a prostatic adenoma should become carcinomatous more readily than, let us say, mammary adenoma? On general lines, all tumours of the genito-urinary tract are rather malignant in type. We know that a tumour exposed to the urine certainly tends to become malignant. A villous tumour of the bladder is histologically not very different from a papilloma of the skin, or polypus of a mucous membrane. Yet it is rather a rare thing for either of the latter to become carcinomatous. It is, on the other hand, a certainty that if a patient with a villous tumour lives long enough the growth will certainly become carcinomatous.

It is important for this reason for us to be sure whether the hypertrophied prostate is an inflammatory or a true tumour formation.

If exposure to the urine is an exciting cause, is there, then, a danger in removing adenomata and leaving raw prostatic tissue exposed to the urine? In this connection I quote two cases of my own:—

Case I.—Canon H., aged seventy-one. A simple adenomatous prostate was removed. The pathological report was:
"An adenomatous growth." Eighteen months later a malignant mediastinal growth appeared, and a hard mass at the neck of the bladder, which eventually caused his death. No post-mortem examination was allowed, but there was, no doubt, cancer at the neck of the bladder, and a secondary deposit in the thorax.

Case II.—Mr. B., aged eighty. Adenomatous prostate removed. Pathological report: "Good—no malignancy found." In nine months carcinoma occurred at neck of bladder. Seven months later a suprapubic fistula had to be made, and death occurred three months later.

I believe both these cases were failures on the part of the pathologists to find a cancerous deposit in the gland. The number of such cases where cancer has followed the removal of apparently simple adenomata is very small, and in the present state of our knowledge of the pathology of the enlarged gland no definite conclusion can be drawn from such cases.

Perhaps a more important point is: Is enlargement of the prostate gland an indication for its removal, for fear of carcinoma occurring in it? Up to the present, the symptoms caused, and not the size of the prostate, have been the points considered. Even if a gland is enlarged, and is not causing trouble to the patient, few (if any) surgeons advise its removal. The change from simple to carcinomatous enlargement is sometimes sudden, and often not well marked. I quote a case in point: Mr. F., aged seventy-three, originally came to me for another trouble in connection with a rupture. Inquiring if he had any straining in passing water, he said "No," but on making a rectal examination, I found considerable enlargement of the prostate gland. This was giving rise to no symptoms of obstruction. I advised him to see me twice or three times a
year, in case any evidence of back pressure should show themselves. I last saw the case in May, 1914. I was then away from Dublin for a short time, and on my return found that things had not been going well with Mr. F. Pain and frequency had developed, and he had lost some weight. Examining the prostate gland, it showed all the evidence of a typical carcinoma in the left lobe. It had not been possible to diagnosticate six weeks previously. It was now quite obvious. Had his gland been removed a year earlier the operation required would have been far less dangerous, and the chances of recurrence infinitely less. Success in such cases, I am sure, depends far more on early operation than on the extent of the operation performed.

THE DIAGNOSIS.

Sir Henry Thompson's classical description of obstruction, a stony growth—a swelling fixed in the pelvis, pain radiating into the sacrum and out towards the hip—is typical of advanced carcinoma; but in nine cases out of ten, where such symptoms are present, the case is too far advanced for any hope of success by means of a radical operation. A palliative operation may, however, be performed in some of these cases. Many books tell us to be on the look-out for the presence of blood in the urine. This, in my opinion, is quite wrong. Haemorrhage is a rare occurrence, and, in any case, is always a very late symptom of the disease.

There are three points which may help in the early diagnosis of this condition:—

First.—The occurrence of pain without obvious retention of urine.

Second.—A disproportion between the symptoms com-
plained of and the condition found on rectal examination (Mansell Moullin).

Third.—The rapid onset of symptoms, progressing as far in six months as an average case would in two or three years (Watson).

Perhaps it would be well to emphasise here what has already been mentioned—that the carcinomatous prostate is not necessarily an enlarged prostate.

Of the seventeen cases that have come under my care, in three the disease was not recognised prior to operation. Two of these cases I have already mentioned; in the third I found a definite carcinomatous mass in one lobe of the prostate as I was removing it.

In three cases I have performed a radical operation. In one, the operation had to be abandoned before the entire gland was removed. One patient died from a cerebral haemorrhage fourteen months after the radical operation had been performed, and, although I am not certain, I think there was some recurrence of the cancer at the neck of the bladder. One patient treated in July, 1914, is alive and well—putting on weight—but it is obviously too soon to be certain that no recurrence will take place in this case.

Eleven of the cases were inoperable. These lived on an average of from two to fourteen months from the time the diagnosis was made. In four of these cases a suprapubic fistula had to be made. In three cases I have diagnosed carcinoma, and this diagnosis proved to be wrong. In one, after removal, the gland was found to be adenomatous. In a second—in a man of sixty-four—the symptoms coming on very acutely, a radical operation was performed, but the gland proved to be tuberculous. And lastly, in a gentleman of eighty-two, who presented all the symptoms of an advanced carcinoma of the prostate, now eleven months have elapsed since I made the diagnosis,
and, as his general health has vastly improved during this time, I think the diagnosis must have been wrong.

In conclusion, I wish to lay stress on three points:—

First.—That carcinoma of the prostate is a comparatively common disease in elderly men. It is becoming increasingly frequent.

Second.—That it is most important that we should be certain if the hypertrophied prostate is a true tumour formation or not, and if all forms of prostatic hypertrophy are due to the same pathological process.

Third.—That the prospect of successful treatment depends far more on early diagnosis than on extensive operative procedures.

Note.—Many statements and facts in the above paper have been taken directly from papers. The names of the authors in many cases have been mentioned: where they have not, I trust that the omission may be forgiven.

The President said he was not aware that carcinoma of the prostate was relatively so common as mentioned in the paper. He inquired as to the characteristics of the pain.

Dr. T. T. O'Farrell inquired as to the condition of the urine.

Dr. Crawford said he would like to thank Mr. Gunn for the hints given as to how an early diagnosis of cancer of the prostate might be made, as he was often at a loss to know what were the reliable diagnostic signs in these cases. He referred to the work on the subject at present being done in Trinity College, and expressed the hope that a paper would be forthcoming giving the result.

Mr. D. Kennedy was interested in the early signs of cancer of the prostate. He considered the three symptoms mentioned aided in diagnosis, but he did not look upon them as absolute. He was aware that frequently the amount of enlargement felt by digital examination might not be very
much, and yet the symptoms might be very great. None of his cases were reported by the pathologist to be malignant. He recalled the case of a patient aged seventy-two, whose prostate he removed, and it had been reported to be non-malignant. Some years afterwards the patient died of cancer.

It would be most important if some reliable signs could be discovered that would lead one to be certain that a given case was benign or of a malignant nature.

Dr. W. D. O'Kelly said he did not know that cancer of the prostate supervened very often. He did not remember a case. All the cases he observed were instances of true adenoma. Referring to the cases mentioned in which there was recurrence after adenomatous growths, he suggested the possibility that they were becoming malignant, and that some of the formation might have been left behind. He compared the condition to adenoma of the breast which frequently became malignant. He thought that cancer of the prostate occurred at an earlier age than hypertrophy or adenoma. He agreed with the remark that the symptoms were often out of proportion to the signs.

Mr. Gunn, replying to the remarks, said that in all his cases the urine was acid and apparently normal prior to operation; but he had never done prostatectomy that the urine did not become alkaline, evidently some decomposition takes place, but this usually passed off. He fully realised how impossible it was to make an early diagnosis, and although he did not look on the points he mentioned as pathognomonic, he thought they would be helpful.

The pain described by Sir Henry Thompson was a deep one felt in the perineum, and often radiating outwards to one hip. If a patient complained of a good deal of pain and no retention of urine, he would consider it a point that would lead to a suspicion of carcinoma of the prostate gland. He was glad to hear that all the cases observed by Dr. O'Kelly were true adenomata. His (Mr. Gunn's) impression was that there was more than one form, and if they could be sure all were adenomatous it would be of the greatest assistance. The majority of his cases were in men well over the age of sixty. The condition does occur at an earlier age, and then it was extremely fatal.
A NOTE ON THE ACTION OF RADIUM ON TISSUES.

By W. G. HARVEY, M.D., F.R.C.P.I.;
Assistant Physician to the Adelaide Hospital, Dublin.

[Read in the Section of Pathology, March 19, 1915.]

In treating of the effect produced by radium on living tissues we must keep clearly in mind two facts:—(1) That radium is capable of exerting an influence on living cells through three separate agents—the alpha, beta and gamma rays; and (2) that the effect on any given tissue almost certainly varies, not only in degree, but in kind according to the quantity of irradiation, varying from a stimulatory effect to a destructive action.

The alpha rays are composed of material particles. Their penetrating power is so low that a sheet of paper, or mica, is sufficient to stop them. The beta rays are a "stream" of electrons, whose small size and high velocity give them a penetrating power which requires one centimetre of lead to stop, though 1 mm. of lead would stop most of them. The gamma rays are pulsation of the ether, similar to the x-rays, but far more penetrative. With this preliminary, I pass on to some of the facts observed.

Histological.—Dominici and Barcat exposed the skin of an adult healthy guinea-pig to radium. A month later the irradiated areas were hairless, smooth, colourless, and supple; the hair bulbs, sebaceous and sweat glands were atrophied; but in addition to the destructive action selecting special elements of the epidermis they found a very
remarkable series of changes in the corium, which I shall briefly relate.

The connective tissue bundles and elastic fibres almost entirely disappeared, and were replaced by innumerable connective tissue cells ramified and spindle-shaped, and anastomosing in a network of narrow, oblong mesh. These are the fixed cells of the connective tissue which multiplied after undergoing a kind of embryonic degeneration. In this network lay numerous dilated embryonic capillaries. The vascular connective tissue came to have a structure at once angiomatous and embryonic, and non-inflammatory. There was no diapedesis, phagocytosis, or deposition of fibrin. Myxomatous tissue prevailed over angiomatous in the evolution of the histological process. The capillaries shrank until they became practically non-existent. Gradually the myxomatous tissue was transformed into a sort of flat connective tissue, the final cicatrix having neither the structure of normal corium nor of post-inflammatory connective tissue. Its texture was comparable to that of a fibroma, but did not exceed in surface or depth the limits of the ordinary connective tissue; moreover, it was by degrees transformed into fibrous tissue rich in elastin.

The same authors go on to describe the changes found in certain morbid tissues under the action of radium. Thus, in a case of early cutaneous tubercle the peri-tubercular inflammation disappeared, and was replaced by an angio-myxomatous tissue, which gradually extended to the tubercles themselves, and ultimately the whole mass was found to have the structure of a pure fibroma. Similarly they observed a sarcoma to be transformed first into a myxoma, and then into a fibromatous form of tissue. On the other hand, in cancroids of the skin the atrophy of
morbid tissue corresponded not to the metamorphosis, but to the destruction of the epithelial elements.

In short, these authors show that the effect of radium on the integument, normal or diseased, is twofold:—(1) Absorption of glands (hair, sebaceous sweat) or of epitheliomatous tissue, the Malpighian epithelium persisting; (2) the evolution of connective tissue, normal, inflamed, or sarcomatous, through an embryonic stage, into a fibrous form.

Finzi, in discussing the action of radium, shows that the filtered radiations are a depressant of the activity of the cells of almost all malignant growths, and argues that there is probably a point, before the full dose has been given, when the action, if stopped, would be a stimulant to cell activity, as in the case of most other cell depressants. In some cases one-twentieth of the full dose is sufficient to cause regression, but other growths are only affected by half the full dose. It is in these latter that the danger of insufficient dosage is to be feared.

The histological changes with very penetrating rays, Finzi notes, are invasion of the growth by leucocytes, and disappearance of cells with maintenance of the fibrous stroma. When only 0.5 mm. silver is used as a screen, degeneration of the cells is observed, and proliferation of the vascular endothelium.

Finzi notes that improvement is sometimes seen after forty-eight hours, but more usually there is not much alteration in size for two or three weeks, and this goes on for six or more weeks altogether.

Clinically.—Warden, discussing the effect of radium in inoperable cancer, summarises his conclusions as follow:

(1) Radium immediately relieved pain.
(2) It arrested the growth temporarily.
(3) It temporarily destroyed the cancer cells.
(4) It had no effect on metastases.
(5) It probably prolonged life.

Lawrence gives a list of morbid conditions in which radium is of value, including rodent ulcer, epithelioma, lupus, nævus, leukoplakia, lichen planus, keloid, pruritus ani, papilloma, &c.

Experimentally.—Wedd and Russ, experimenting on mouse cancer with radium and \(x\)-rays, showed that the effect of irradiating the excised tumours was to cause these tumours to fail to grow, when subsequently inoculated into fresh mice.

It has been shown by Russ and Chambers, that when mouse tumours were exposed to a dose which retarded without destroying the growth, the characteristic of slow growth assumed by the tumour was transmitted to successive generations.

Lazarus Barlow and others have shown that ova irradiated by radium are retarded in their development, and give rise to many monstrosities.

The same author has shown the marked difference in susceptibility of different cells outside the body to radium emanation. Sarcoma cells are much affected, leucocytic relatively little, cells in active mitosis are peculiarly vulnerable. The notion that radium may be in some way connected with the occurrence of cancer has been supported by two observations:—(1) While the great majority of gall-stones possess no radio-activity, Lazarus Barlow found in gall-stones from carcinomatous cases radio-activity varying from 15 to 225 times what is regarded as the limit of experimental error. (2) Bicton and Russ showed that alpha rays cause Altmann's granules to disappear from normal cells which contained them. These
granules are absent in malignant growths, contrasting with their presence in the corresponding species of normal cells.

Clifford Morrison, in a recent paper, characterises the changes produced by radium as (1) rapid degeneration of the malignant cells in the immediate vicinity of the radium; (2) apparent vacuolation and enlargement of those cells beyond the degenerate zone; (3) loss of the reproductive function of the cancer cells. He refers to the fact that in mouse carcinoma, sublethal doses of radium irradiation produce an immunity against the same strain of tumour; on the other hand, if a lethal dose be administered, this immunity is abolished. He shows that in the human there is no evidence of diminution of metastases after removal of the primary growth by radium. The complications following treatment by radium may be:—Hyper-pyrexia, persistent pain, bone necrosis, fibrous stricture and thrombosis. Round cell sarcoma, rodent ulcers, endotheliomata and testicular new growths are those which are most sensitive to radium.

The problems which these observations appear to present are:—(1) What is the nature of the action of radium upon the living cell? Knox suggests a two-fold action:—

(a) Immediate—the suppression of the normal function of the irradiated cell, possibly by ionization of the nucleus;
(b) where this effect is incomplete the production of a substance in the nature of an antibody, which tends to stimulate growth against the irritating presence of the radiation.

(2) Is the gamma ray responsible directly, or through the medium of secondary radiation?

(3) Is the effect produced by radium different in kind, or only in degree, to that of the x-rays?

Taking a broad, general view, the morbid tissues bene-
fitted by radium will be found to be identical with those deriving benefit from Röntgen irradiation. Individual cases differ. Is this due to employment of too hard or too soft a ray? And will the Coolidge tube, with increasing experience, give us a ray suitable for every case?

(4) Is there any hope that technique may ever so be altered that in the human patient, as in the mouse, we may be able to establish an immunity against any of the forms of malignant disease?

Mr. Maunsell said he took the liberty of bringing forward a few specimens taken from patients before and after treatment by radium. The cases were of three different kinds. The first was an open ulcerating epithelioma in the mouth. In this case the first therapeutic change noticed in the growth was that within forty-eight hours of the application of the needles the whole growth seemed to have softened. The next change noted was that the floor of the ulcer began to clear up and take on the appearance of more healthy granulation tissue, and finally the floor of the cancerous ulcer began to be covered over with epithelium. At no time was there any sloughing apparent. As far as can be seen the patient is still well. Microscopical sections made from the tumour prior to treatment were shown. It appeared to be a very actively growing cancer with a large number of mitoses. A second section was brought forward which was taken after treatment, which exhibited much lateral atrophy with practically a complete removal of the cancer.

The second case was one of deep cancer in the neck—a primary epithelioma springing from the branchial cleft. This was proved to be an actively growing epithelioma. The place from where this specimen had been removed subsequently became patent, and after the application of radium the cancer sloughed out. The growth was now quite a small thing, and he hoped that in a few weeks it would clear up altogether.

The third was a case met with about two months ago in
which an old man came for treatment with a large tumour in Scarpa's triangle. A section was made which showed it to be an actively growing round-celled sarcoma. From the attachment of the growth operative removal was considered inadvisable, and the patient was therefore treated with radium. Three different applications were given, and a very marked change took place in a few days. The tumour diminished about one-third in size. Operation for the removal of the remaining part of the tumour was performed that morning, and it was cut down upon and shelled out. The specimen was brought forward for exhibition.

Mr. Maunsell mentioned that one pathological aspect of these cases was that if the needles were left in longer than twenty-four hours the skin presented the appearance of having been burned. This did not take place if the needles were left in for a less time than twenty-four hours.

Of the cases mentioned the only one that showed any reaction was the patient with cancer in the neck. He had a high temperature and very severe headache some hours after the needles were inserted.

With regard to the risk of thrombosis, the cancer of the neck was somewhat curious, as most of the needles must have nearly pierced the jugular vein, yet no harm resulted. The smallest dose given in these cases was 12 millicuries.

Dr. Wigham, referring to the sections shown by Mr. Maunsell, said that anyone who looked at them would see that the growth was a rapidly growing cancer. He pointed out that toward the edge of the section cut off from near the centre of the previously diseased portion one or two islands were found which were thought to be composed of epithelial tissue somewhat like the cells of the old cancer. It seemed to him that these islands were changed in appearance owing to the action of the giant cells. The epithelium on the part which was occupied by the open ulcer was practically the same as that of the normal tissue alongside, the only difference being that it was thicker than usual. It looked as if the cells had been regenerated. He believed that Mr. Maunsell considered an operation performed after the radium treatment was much simpler than it would have been had
the radium not been used. He mentioned that the first section taken out showed a mass of live cells, and the second section, which was taken from the middle part of the growth, showed a large amount of necrosis.

Dr. Walter Smith said he understood that it was the wish of the Council that the discussion should follow on the lines of the mode of action rather than the clinical results. He considered that there was no medical man in Dublin at present competent to discuss the subject, as it required a profound knowledge of the physics of radium. They were fortunate in having in their midst a man who was pre-eminent in his knowledge of the physics of radium—viz., Professor Joly. Two or three fundamental points, however, occurred to him which would be a guidance on this question. When x-rays were first discovered they got their name because they were an unknown quantity; but an extremely important generalisation had been made of late—i.e., that x-rays, gamma rays, ordinary spectral rays of sunlight, and the more recent Finsen light were all the same, and differed only in their wave length. The fundamental points for guidance were—(1) The identity of light with x-rays; (2) the fact that these rays emit electrons; (3) the application of these electrons are the determining factor in the effect of the rays.

Dr. W. C. Stevenson said it seemed of interest to note that there was no change in cells radiated outside the body, but that if they were implanted into a mouse there was an effect. The effect of radiation on cells in some cases seemed particularly rapid. He produced a paper from the Middlesex Hospital which showed that after twenty-four hours' radiation, the part near the tube showed complete disappearance of the malignant cells, and there appeared to be a well-defined line of demarcation between the cells which had disappeared and those remaining. He mentioned a case of tumour in the floor of the mouth and involving the tongue. The case was radiated for six hours with six needles, and after twenty-four hours it was again radiated. In the first instance about 24 millieuries and subsequently about 16 were applied. The tumour before radiation was fungating, very
malignant-looking, and if touched bled freely. After four
days the tumour had almost disappeared. Before radiation
the patient could scarcely touch his teeth with his tongue,
but after radiation he could put it well beyond the margin.
In about three weeks afterwards the base of the tongue
and floor of the mouth were quite smooth. He suggested
that radium causes a good deal of fibrous tissue formation.
In one case at the Middlesex Hospital, in which a patient
was considered too bad for Wertheim's operation for re-
moving the uterus, she was radiated with 24 millicuries,
and the tumour became so much smaller that it was
decided to remove it. It was removed in a fortnight after-
wards, and the surgeon declared that he never had such a
difficult operation. The whole tumour had turned into a
fibrous mass, and was found very difficult to remove.

Another point of importance was that the patient appeared
to suffer very much from shock. He had been warned that
if a patient was radiated with a large amount of radium one
should be careful about operating on account of the liability
of the patient to suffer from shock. He thought that throm-
bosis was very likely to occur when a large amount of radium
was used, but he did not consider that there was much risk
when small quantities were used. He had treated several
cases, putting a number of needles quite close to the sub-
clavian vein and never had any trouble from thrombosis.
He referred to a paper by Dr. Lazarus Barlow, showing the
effect of radium on various cells, in which it was stated that
columnar cells were found more favourable for treatment
than squamous cells.

Dr. O'Kelly said that much was not known of the action
of radium on the tissues. The specimens shown by Mr.
Maunsell were interesting. He had never seen the giant
cells occurring as shown in the specimen. He considered
that probably the only mechanism against cancer was the
round-celled infiltration, and in the section after treatment
this was not apparent. He had come to the conclusion that
the giant cells appeared after the radium had killed the
cancer.

Dr. M. J. R. Hayes said that by pathological examination
before, during, and after treatment by radium it was hoped
A Note on the Action of Radium on Tissues.

that in time they would be not only able to give a satisfactory prognosis, but that the state of knowledge on the subject would be vastly improved. There was a great diversity of opinion as to the methods by which radium acts. The amount of work done would seem to prove that radium per se had a destructive effect on abnormal tissues, and he believed before long that the theory of production of antibodies would be considerably altered. He recalled a case of cancer of the neck very much like that referred to by Mr. Maunsell, in which there was very little general reaction, but a smart local reaction. He had found that if the needles were left in for more than twenty-four hours in a position in which gravity could affect them they would drop out. This he attributed to thrombosis. He considered that an important point was raised as regards treatment, as undoubtedly it was easier to produce x-rays than to procure radium emanation or radium, and as knowledge of the subject extended x-ray burns might be prevented, so that massive doses might be possible by using proper filters, and thus an effect might be produced by x-rays as good as those of radium.

Professor Mettam asked if it was not likely that if a new growth was destroyed by these emanations a toxaemia might be set up. He would like to know if the tissues broken down did not discharge would they give rise to toxaemia. He suggested that many of these branchiomata are sarcomatous, and he would like to be clear in his mind that the branchioma mentioned by Mr. Maunsell was not a sarcoma.

Dr. W. G. Harvey, replying to the remarks, said he was glad that Mr. Maunsell had brought down these exhibits. The results published by various observers were different on the question of thrombosis; some said none was observed, and others gave accounts of its occurrence. He suggested that the explanation of this might be the quantity of the dose. With regard to the rapidity of the action of radium on the tissues, he was struck in his experiments by the extraordinary rapidity of the effect on the spleen. He agreed that there were a great many difficulties about the theory of the production of antibodies.
ADENO-CARCINOMA (MESOTHELIOMA) OF THE KIDNEY.

By THOMAS T. O'FARRELL, F.R.C.S.I., D.P.H.; Pathologist to St. Vincent's Hospital, Dublin.

[Read in the Section of Pathology, May 7, 1915.

The kidney exhibited was removed at an operation by Dr. Staunton, to whom I am indebted for permission to exhibit the specimen. The following is the history of the case:—

The patient was a little girl aged six.

Since she was two years old she suffered from vague abdominal uneasiness. For the past two years the abdomen has been visibly distended, but except for occasional attacks of pain there have been no other signs or symptoms.

There has been no wasting or haematuria and apparently no diminution in the amount of urine passed.

Physical examination led to the diagnosis of tumour of the left kidney, and it was removed.

Since the operation the general condition of the child has much improved; there are no signs of secondary deposits, and the patient is running about apparently in the best of health.

Naked eye appearances of tumour:—Length 15 cm., breadth 9 cm., thickness 7 cm.

The kidney is uniformly enlarged with some slight projections on the surface. The tumour, on the whole, seems continuous with the organ; but in parts, more particularly towards the pelvis, it is quite separate, the kidney sub-
stance being flattened out into a kind of shell about the tumour.

On section:—The tumour is soft, somewhat pinkish in colour, and is divided up into distinct lobules, which vary in size from 8 cm. down to 0.5 cm. in diameter. There is a certain amount of haemorrhagic extravasation and softening towards the centre of the larger lobules.

The large bulk of the tumour is towards one pole, but the kidney substance is almost everywhere infiltrated by the growth.

Histological appearance.—Sections taken from different parts all show the tumour to be composed of rather closely packed columnar cells arranged in the form of acini. The majority of the acini are regular, but in many places they show a tendency to become broken, the cells becoming irregular in their arrangement and spreading in every direction.

It has the typical appearance of adeno-carcinoma. No evidence of other neoplastic cells, such as sarcoma, could be found after careful examination.

The interest in the specimen lies in the fact that simple carcinoma is comparatively rare. I proceed to recapitulate briefly the general types of tumour to be met in the kidney, with special reference to Adami's classification, which is based on embryological considerations. For the sake of lucidity I have drawn up the main headings in the form of a table, my object being to tentatively place this particular tumour in its proper position in the list.

Classification of Tumours (Adami).
(Modified with special reference to kidney tumours.)

I Teratoma. Derived from totipotential cells.
(i.) Twin Teratoma: Foetal inclusion.
(ii.) Filial Teratoma: Separation of embryonic totipotential cell with subsequent growth.
Kidney dermoid very rare.
II. TERATOBLASTOMA. Derived from pluripotential cells.
(i.) Diphylic : Containing derivatives of two germinal layers; rare kidney tumours.
(ii.) Monoplyhic : Containing derivatives of one germinal layer; most mixed kidney tumours.

III. BLASTOMA. Derived from unipotential cells.
(i.) Heteroehthonous : Cells derived from another individual.
(ii.) Autoehthonous : Cells derived from own individual unipotential cell (ordinary tumours).

AUTOCHTHONOUS BLASTOMAS (Ordinary Tumours).

A. LEPIDIC, or Rind Tumours (cells grouped together, groups not penetrated by blood-vessels, and no definite intercellular substance).
(i.) First Order (derived in direct (1) Epiblastic origin, descent from epi- or hypoblast).
(ii.) Second Order (derived in indirect descent through a mesoblastic stage, hence— Transitional).
(3) Mesothelial (a) typical adenoma of kidney ; (b) atypical carcinoma of kidney and hypernephroma.
(4) Endothelial.

B. HYLIC, or Pulp Tumours (cells separated by intracellular substance in which blood-vessels may be found).
(i.) Epiblastic.
(ii.) Hypoblastic (chondroma).
(iii.) Mesenchymal :
(1) Mesenchymal : (a) typical : fibroma, lipoma, &c.; (b) atypical : sarcoma.
(2) Mesothelia : rhabdomyoma.

For the purposes of the present paper I intend to deal only with two types of tumours, viz.—(1) The Teratoblastoma; (2) the Mesothelial blastoma : as these are primarily concerned with the diagnosis of the present specimen.

I.—THE TERATOBLASTOMA.

This is a growth of infancy or early childhood, and usually contains at least two types of cell, for example, both carcinoma and sarcoma in the same specimen. This dual reproduction is explained by the fact that the primitive kidney (Wolffian body) gives rise to the
myotome, consisting of pluri-potential cells, which in turn gives rise to two elements, the Nephrotome or matrix of the future kidney, and the Sclerotome from which spring the muscle vertebrae, &c., of that part of the body. Hence a tumour arising from this myotome will reproduce both the epithelial type of kidney cell as well as the connective tissue type of cell of the overlying connective tissues.

It is interesting to note that the majority of this type of kidney tumour consists of the products of only one germinal layer of the embryo, hence it is monophylic; but Muns, of Marburg, described a specimen from a child aged 18 months, in which were found, in addition to the above structures, some epidermal inclusions showing that some of the epiblastic germinal layer over the site of the future kidney were included, and hence the tumour was said to be diphilic.

Now the blastoma or ordinary simple tumour is one growing from unipotential cells, that is to say, a cell which will only reproduce one type of cell, namely, its own type; for example, a squamous epithelium cell will reproduce a papilloma or epithelioma. And a fibrous tissue cell will reproduce a fibroma or a sarcoma.

These examples are easy to understand, but the matter is not quite so simple when we find a tumour, histologically epithelial, like a carcinoma, arising in a portion of the kidney which is mainly mesoblastic or connective tissue in origin.

Adami explains this by the statement that the epithelial cells of these tumours have a decided embryonic appearance, and that this epithelial appearance is only assumed. Hence he states that the usual description of "carcinoma" of tumours in this region is misleading from the embryological point of view, in that their real origin is
<table>
<thead>
<tr>
<th>Incidence</th>
<th>Fairly common, found at birth, in infancy or early childhood, rare in adults.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>More common in the left kidney; may be situated in the body or pelvis.</td>
</tr>
<tr>
<td>Size</td>
<td>May reach a great size (36 lbs. recorded).</td>
</tr>
<tr>
<td>Shape</td>
<td>Shape of kidney not much altered, but surface generally nodular. Kidney substance proper forms a more or less complete shell about the tumour.</td>
</tr>
<tr>
<td>On section</td>
<td>Soft and sarcoma-like, homogeneous, greyish pink in colour.</td>
</tr>
<tr>
<td>Changes</td>
<td>Great tendency to internal haemorrhage and necrosis.</td>
</tr>
<tr>
<td>Metastasis</td>
<td>Extension usually takes place by the veins, lungs frequently show secondary deposits.</td>
</tr>
<tr>
<td>Pain and haematuria</td>
<td>Apparentely very malignant (Swan).</td>
</tr>
<tr>
<td>Malignancy</td>
<td>Spindle-cell sarcoma-like matrix with epithelial elements like gland tubules, but different from typical renal tubules. Also may be found, fat, cartilage cells, plain and striped muscle fibres, elastic tissue with all these elements in no apparent order. The most prominent features are a mixture of adenoma or carcinoma with spindle-cell sarcoma. Hence it is commonly called adenosarcoma, carcinoma sarcomatodes, or, again rhabdomyoma, spindle-cell sarcoma, adenoma, or carcinoma, according to the preponderating element present.</td>
</tr>
</tbody>
</table>

Rare; more common in adults and in men than women (forms 2 per cent. of all kidney tumours, "Swan.")
More common in the right kidney; may be situated in the body or pelvis. Frequently large, but not so large as sarcoma.
Nodular or diffuse, scirrhous or encephaloid type, diffuse type forms general enlargement without deformity.
Nodules well defined and apparently encapsulated.
Degenerative changes not infrequent, haemorrhagic extravasations, cyst formation and calcification.
Glandular enlargement, both local and distal.

Both constant.

One case reported well two years after operation (Swan). It is distinctly an adeno-carcinoma. It is occasionally difficult to diagnose from simple adenoma, but Pillet, Sotas, Albarran have found local infiltration and metastasis in apparently simple adenomatous cases, thus revealing its truly malignant character.
mesoblastic, and hence they should be more properly called mesothelioma. His contention is that these cells when of slow growth imitate acini, but if of rapid growth imitate sarcoma, and therefore they have a transitional character, hence the name transitional lepidomas. Now, departing from the purely embryological aspect, it may be of interest to compare these two types of kidney tumour from a general standpoint.

It will be observed from the above comparison that the specimen described has to a certain extent the characters of both types of tumour.

The naked-eye characters and the fact that it occurred in a child are strongly in favour of its being a teratoblastoma, which histologically should be a mixed tumour.

Nevertheless, keeping in mind that even in a teratoblastoma one element—for example, the carcinomatous one—may preponderate, there is no microscopic evidence, so far as I could find, in many sections made from different parts, of any other element than that of adeno-carcinoma, hence it must be regarded as a true blastoma or simple tumour arising from unipotential cell or cells of mesothelial type, and therefore a true mesothelioma.

Before concluding, I should like to make reference to some recently published cases of kidney tumours.

Stewart, writing in the *Journal of Pathology and Bacteriology* (page 120, Vol. XVIII.), describes a tumour obtained *post mortem* in a child, 11 months old, containing both sarcoma and carcinoma; this is, therefore, properly a teratoblastoma; but he, I think erroneously, describes it as a mesothelioma, which, in Adami's classification, would come under blastomas or simple tumours arising from unipotential cells.

Dr. Shaw Dunn, at the Glasgow Medico-chirurgical
By Mr. T. T. O'Farrell.

Society, showed a specimen in a boy aged $9\frac{1}{2}$. Right kidney, an embryonic adeno-sarcoma, almost though not purely adenomatous in structure, therefore a teratoblastoma. (Lancet, page 1133, Vol. I., 1912.)

Dr. Swan, of the Brompton Cancer Hospital (already referred to) mentions a case of carcinoma with no recurrence two years after operation, but he gives no details as to the history. It appears from a diagram to have been in the lower pole of the right kidney. (Lancet, p. 374, Vol. I., 1915.)

Mr. Ball and Prof. O'Sullivan (Trans of R.A.M.I., 1914) described a small tumour in a man aged 45. It was in the cortex, and histologically a papillary cystoma of intracanalicular type.

The subsequent history was not stated, but it would be interesting to obtain details as to whether it may have been the blastoma of adenomatous type, which some observers have regarded as liable to undergo malignant change.

The Chairman said that the nomenclature of kidney tumours was at present in a very complex state. The difficulty in classifying these tumours arose from the fact that whereas the term carcinoma was generally reserved for tumours of epi- or hypo-blastic origin, kidney tumours often resemble carcinoma very closely, but are nevertheless of mesoblastic origin. He said that the use of the term mesothelioma would get rid of the difficulty. After examining Dr. O'Farrell's microscopic specimens, he had no doubt that, apart from embryological considerations, the tumour should be called an adenocarcinoma. According to his experiences most kidney tumours that occur in young children presented an admixture of imperfectly formed tubules with sarcomatous ground substance. The term adeno-sarcoma, on the whole, applied fairly well to
them, but, as there was a developmental error underlying them, the proper name would no doubt be teratoblastoma.

Professor Mettam said he did not see why a new growth in the kidney should not be of a compound papillomatous nature, such as is met with in the ovary. He referred to a specimen of enlarged kidney shown at the last meeting of the Section in which he found very marked proliferation of the tubules. The epithelial lining of the tubules were undoubtedly sprouting to the lumen of the tubules. The epithelium had proliferated in certain of the tubes and split them so that two of them lay parallel to one another. He suggested that had the animal, from which the specimen was obtained, lived the condition might have invaded the kidney in very much the same way as the new growth had done in the present case. The cells which gave rise to the main portion of the cortex were mesothelial in origin, and he could not satisfactorily understand why these particular enlargements of the kidney should contain so-called muscle fibre. He mentioned that they came across a type of tumour which they called lymphosarcoma, but whether they were justified in calling it so he did not know.

Dr. O'Farrell, in replying, said he was pleased to have had his diagnosis confirmed as to the adeno-carcinomatous appearance of the specimen. He considered that, though histologically the specimen had an epithelial aspect, the term mesothelioma was more suitable from the developmental standpoint. He considered that in view of the absence of any other neoplastic elements the specimen was a blastoma rather than a teratoblastoma. He agreed that though the classification was useful in explaining the developmental position of tumours it was rather cumbersome for every-day use. He said that the presence of muscle fibres is a not uncommon finding in kidney tumours, and is probably due to inclusions from the sclerotome.
PATHOLOGICAL REPORT OF THE ROTUNDA HOSPITAL FOR ONE YEAR, NOVEMBER 1st, 1913, TO OCTOBER 31st, 1914.

By R. J. ROWLETTE, M.D. (Univ. Dubl.); F.R.C.P.I.; Pathologist to the Hospital.

[Read in the Section of Obstetrics, May 7, 1915.]

The work of the Laboratory shows an increase over that recorded in previous years. Three hundred and seventy specimens were examined, as against 330 in 1913, exclusive of 404 specimens of urine sent for special examination. The actual work has increased, however, more than the number of reports shows, since there is each year a wider use of vaccines. All septic cases on the maternity side, and nearly all on the gynaecological side, are now treated by vaccines.

In all, 27 autopsies were performed—17 on subjects from the maternity side, 10 from the gynaecological side.

The causes of death were as follows:—Hæmorrhage, 4; eclampsia, 2; acute pneumonia, 2; cirrhosis of liver with pregnancy, 1; chronic nephritis, 1; shock, 6; acute sepsis, 2; pulmonary embolus, 2; miliary tuberculosis, 1; acute yellow atrophy, 1; acute peritonitis, 3; general tuberculosis, 1; fatty heart, 1.

The following are the notes on the case of acute yellow atrophy:

(Maternity).—M. C., aged twenty-eight, died Jan. 26, 1914, four days after prolonged labour, ending in delivery by forceps, during which the symphysis was ruptured; well
developed and well nourished; marked jaundice of surface and of internal organs; jaundiced fluid in pericardium and peritoneum.

*Lungs* healthy.

*Heart* small, soft, pale.

*Peritoneal* surfaces normal.

*Spleen.*—Dark red, small and firm.

*Kidneys* pale, with bile-stained urine.

*Stomach* normal.

*Pancreas* firm, normal.

*Liver.*—Pale, weight 3½ lbs.; length of right lobe, 7 inches, of left, 3 inches; depth, 7 inches; thickness, 3 inches.

*Uterus and Ovaries* normal.

*Symphysis Pubis* completely separated; all ligaments torn.

Bile and leucine and tyrosine were present in the urine before death.

Curettings and other fragments of tissue removed for purposes of diagnosis were examined on 128 occasions. On two occasions tuberculosis of the endometrium was encountered, in both cases being associated with tuberculous salpingitis.

The varieties of malignant disease of the uterus bear an unusual relation to each other. There were only 2 cases of epithelioma of the cervix, an equal number of adeno-carcinoma of the cervix, 6 cases of adeno-carcinoma of the body, and 2 cases of sarcoma. The figures for the previous eight years had been—epithelioma, 51, or 64 per cent.; adeno-carcinoma 21, or 26 per cent.; sarcoma, 8, or 10 per cent.; chorion-epithelioma, 2; endothelioma, 1. In 2 of the 6 cases of adeno-carcinoma there were co-existing myomata.

Forty-four cases of myoma were examined. In 20 of them degenerative changes, other than fibrosis, had occurred. The changes were classified as—grey necrosis,
4; red necrosis, 7; fatty, 2; oedema, 1; calcification, 2; inflammation, 3—in one of which was a large abscess. In addition, in one case one myoma was infiltrated by co-existing sarcoma. The number of cases of fibrosed uterus—"chronic metritis"—encountered was much larger than heretofore. This is probably due to greater frequency of operation for the condition than to any increased frequency of the condition itself.

Of the cases of salpingitis, 31 in number, 13 were due to tuberculosis. This is identical with the proportion in the preceding nine years.

Among the 29 cystic conditions of the ovary, an unusual number of dermoids were met—six. In one of these the dermoid co-existed with an ordinary multilocular cyst. In another the dermoid was definitely malignant, typical squamous-celled epithelioma having developed. Thirteen smooth multilocular cysts were examined, and four papillary. Of the latter two were definitely malignant, the growth in one case having invaded all the neighbouring organs. One case of primary carcinoma of the ovary occurred, and one case of fibroma.

Fibroma of the rectus muscle is, I think, a rare condition. The case recorded here is the first I have met, though, curiously enough, in the same week as this occurred I was sent for examination an exactly similar tumour from a private patient. This tumour occurred in a patient from whom a myoma had been removed three years previously.

The number of reports on lochia is, I am glad to say, much reduced this year, the morbidity of the hospital having been less than for some years past. Moreover, in a good many of the cases classed as "morbid" the infection was so slight that it was not deemed necessary
to examine the lochia. As usual, the prevailing organism among the specimens examined was the streptococcus. It is rare to find a severe puerperal infection, caused by any other organism. The gonococcus was seen only once in a specimen of lochia this year.

APPENDIX.

Table I.—Examinations of Curettings and other Fragments for Purposes of Diagnosis.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endometritis</td>
<td>75</td>
</tr>
<tr>
<td>Endocervicitis</td>
<td>4</td>
</tr>
<tr>
<td>Erosion of cervix</td>
<td>9</td>
</tr>
<tr>
<td>Epithelioma of cervix</td>
<td>2</td>
</tr>
<tr>
<td>Adeno-carcinoma of cervix</td>
<td>3</td>
</tr>
<tr>
<td>Adeno-carcinoma of uterus</td>
<td>2</td>
</tr>
<tr>
<td>Hydatidiform mole</td>
<td>2</td>
</tr>
<tr>
<td>Chorionic villi, decidua, &amp;c.</td>
<td>9</td>
</tr>
<tr>
<td>Epithelioma of vulva</td>
<td>3</td>
</tr>
<tr>
<td>Various</td>
<td>6</td>
</tr>
<tr>
<td>Normal tissue, débris, &amp;c.</td>
<td>13</td>
</tr>
</tbody>
</table>

Table II.—Varieties of Endometritis.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glandular (including cystic)</td>
<td>53</td>
</tr>
<tr>
<td>Interstitial</td>
<td>4</td>
</tr>
<tr>
<td>Septic</td>
<td>15</td>
</tr>
<tr>
<td>Tuberculous</td>
<td>2</td>
</tr>
</tbody>
</table>

Table III.—Operation Specimens.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epithelioma of vulva</td>
<td>3</td>
</tr>
<tr>
<td>Cyst of vagina</td>
<td>1</td>
</tr>
<tr>
<td>Mucous polypus of uterus</td>
<td>7</td>
</tr>
<tr>
<td>Nabvoid polypus of uterus</td>
<td>1</td>
</tr>
<tr>
<td>Epithelioma of cervix</td>
<td>2</td>
</tr>
<tr>
<td>Adeno-carcinoma of cervix</td>
<td>2</td>
</tr>
<tr>
<td>Adeno-carcinoma of uterus</td>
<td>6</td>
</tr>
<tr>
<td>Sarcoma of uterus</td>
<td>2</td>
</tr>
<tr>
<td>Myoma of uterus</td>
<td>44</td>
</tr>
<tr>
<td>Fibroid uterus</td>
<td>6</td>
</tr>
<tr>
<td>Inflamed uterus</td>
<td>1</td>
</tr>
<tr>
<td>Uterus with cystic endometritis</td>
<td>1</td>
</tr>
<tr>
<td>Salpingitis or pyosalpinx (non-tuberculous)</td>
<td>18</td>
</tr>
<tr>
<td>Salpingitis or pyosalpinx (tuberculous)</td>
<td>13</td>
</tr>
<tr>
<td>Tubal pregnancy</td>
<td>4</td>
</tr>
<tr>
<td>Cyst of ovary</td>
<td>29</td>
</tr>
<tr>
<td>Carcinoma of ovary</td>
<td>1</td>
</tr>
<tr>
<td>Fibroma of ovary</td>
<td>1</td>
</tr>
<tr>
<td>Atrophic ovary</td>
<td>1</td>
</tr>
<tr>
<td>Parovarian cyst</td>
<td>2</td>
</tr>
<tr>
<td>Thrombosed ovarian vein</td>
<td>1</td>
</tr>
<tr>
<td>Appendix</td>
<td>16</td>
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<tr>
<td>Fibroma of rectus muscle</td>
<td>1</td>
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<tr>
<td>Retro-peritoneal sarcoma</td>
<td>1</td>
</tr>
<tr>
<td>Rectal polypus</td>
<td>1</td>
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<tr>
<td>Polypus of finger</td>
<td>1</td>
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<tr>
<td>Glands</td>
<td>5</td>
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By Dr. R. J. Rowlette.

Table IV.—Organisms Observed in and Isolated from the Lochia in Twenty-five Morbid Cases.

<table>
<thead>
<tr>
<th>Organism</th>
<th>Count</th>
<th>Organism</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptococci</td>
<td>17</td>
<td>B. coli</td>
<td>2</td>
</tr>
<tr>
<td>Staphylococci</td>
<td>6</td>
<td>Saprophytes</td>
<td>15</td>
</tr>
<tr>
<td>Gonococci</td>
<td>1</td>
<td>Negative</td>
<td>2</td>
</tr>
<tr>
<td>Unrecognised cocci</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Chairman said with regard to vaccines, that in his experience they were now called for much more frequently than at any previous time, and were used very often with excellent results, even in cases where the organism was always certainly not the same as that with which the patient was infected. He was well aware that this view was heterodox, but he had had some experiences which led him to hold it. He did not lose sight of the fact that one could not always be sure that good results in vaccine treatment were due to that treatment. It was difficult to exclude the post hoc and propter hoc fallacy.

In connection with the case of acute yellow atrophy of the liver, he agreed that the naked eye appearances were not always very striking. Fuller details as to the state of the urine in that case would have been desirable, more especially as to the presence of urea and the microscopic appearance of the sediments of leucin and tyrosin. Referring to the frequency of cancer of the uterus, it was interesting to note that the recently published returns of the Registrar-General for England showed that cancer in this situation was not increasing, whereas the disease was undoubtedly on the increase in other positions, such as the breast and lower half of the intestinal tract in females. He inquired whether this failure of uterine cancer to increase, as it did in previous years, may not be due to earlier diagnosis and timely operation. With reference to the minute structure of sarcomatous polypi of the uterus, he asked whether Dr. Rowlette had ever encountered multi-nucleated giant cells in such polypi. In a case of the kind that occurred in the practice of Dr. M. J. T. 2 A
Gibson he found numerous large giant cells scattered through the sarcomatous tissue. They were multi-nuclear and not unlike the syncytium of chorion epithelioma. The case of malignant dermoid tumour raised the same interesting question regarding nomenclature as occurred in Dr. O'Farrell's paper. This would indeed be a case of a blastoma implanted upon a teratoblastoma. With regard to the micro-organismal causation of puerperal sepsis, he agreed with Dr. Rowlette that it was rare to find any other organism save the streptococcus.

Sir William Smyly said he was afraid ideas with regard to endometritis were in a very chaotic condition. He was interested in the case of myoma with sarcoma as he recollected a somewhat similar case. The case was one in which a large myoma was present in the interior of the uterus. The myoma was removed and the uterus explored, but the sarcoma was not found. The patient continued to have very profuse hemorrhages, and curettage was done and the sarcoma discovered. Referring to vaccines, he considered that there was a great difficulty as to the post hoc and propter hoc, but from what he had seen he was prepared to admit that the treatment was of much assistance, and he looked upon it as a valuable addition to the means of treating sepsis. He felt confident that if cancer was seen at an early stage it was curable by operation, more especially cancer of the body of the uterus. He suggested that pathological conditions of the uterus about the menopause are specially common, and that any practitioner who met with a patient suffering from hemorrhages at this period and did not carefully investigate the question of malignancy was guilty of a serious error.

Dr. Neill asked if it was all autogenous vaccines that were used. His experience of vaccines in septic cases was very favourable. He recalled the case of a patient suffering from an apparently pre-puerperal infection in which a vaccine had helped to save her life.

Dr. O'Farrell inquired if the guinea-pig test had been applied in the cases of salpingitis which were definitely described as non-tuberculous.

Referring to endometritis he asked whether any particular type as prone to malignant change though at the time not
cancerous, and whether a specimen showing a tendency to intracanalicular projections were more likely to become malignant than the simple acinous type.

In connection with the bacteriological examination of puerperal cases he asked whether Dr. Rowlette had noticed any difference in the rate of growth on agar of staphylococci obtained, as compared with ordinary Staphylococcus pyogenes, as he had met a staphylococcus which grew so slowly as to resemble a culture of streptococcus in forty-eight hours. He also asked whether Dr. Rowlette could give the results of any personal experience to the value of blood count in cases of cancer of the uterus.

Dr. R. J. Rowlette, replying, said he was quite alive to the danger of arriving at wrong conclusions with regard to the effect of vaccines. He recalled a case which was an example of how a wrong conclusion might be arrived at. The custom at the Rotunda was, as soon as a patient was discovered to be suffering from sepsis, a dose of vaccine made from some previous case was immediately given, and at the same time cultures were started to produce an autogenous vaccine. It was found in the majority of cases the stock vaccine apparently produced good results. It was always the practice to have the autogenous vaccine ready for the second dose if possible.

In the case of yellow atrophy the leucin and tyrosin were only found after considerable difficulty. In another case of the kind which he had met with and which was more acute the centrifuged urine showed the leucin and tyrosin without any preliminary treatment. The urine was not examined particularly for urea. He would not like to form any opinion on the figures for one year as to the diminution of cancer of the uterus. The incidence seemed to be about the same as the average for the last eight years.

With regard to the giant cells in sarcoma, he had never seen the typical giant cells such as were to be met with in sarcoma of the jaw. He would not go so far as to say that no severe cases of puerperal infection occurred other than those due to streptococci, as he had come across a severe staphylococcal case. The guinea pig test was not tried in the case of salpingitis. He considered that it was not difficult to find cells suggestive of
tuberculosis. He did not think there was any relationship between endometritis and malignancy. He had not seen a patient return with malignant tumour whose endometrium had been previously reported as non-malignant histologically. He had not found any difference in the cultures from puerperal sepsis and those found in ordinary pus. He expressed the hope that the demand for vaccine treatment would not lead to diminution of other forms of treatment that might be indicated.

He had no experience of blood count in cases of cancer of the uterus.
ABSTRACTS.

SECTION OF PATHOLOGY.

Friday, November 6, 1914.

The President (J. B. Coleman, M.D., F.R.C.P.) in the Chair.

The President gave his introductory address on "Cerebro-Spinal Syphilis."

Exhibits.

Heart from a Case of Sudden Death.

Professor A. C. O'Sullivan, in exhibiting the specimen, said that during a number of years he had come across four cases which, from the clinical point of view, presented no symptoms. Anatomically there was a very close resemblance in each case. The patient from which the specimen was removed appeared to be in perfect health when he suddenly dropped dead, so that the only means of ascertaining the cause was by post-mortem examination.

The first case of the kind which came under notice was that of a soldier with a very powerful heart who dropped dead on the march. The second was a man who dropped dead in the street. The third was found dead. The fourth, being the one from whom the specimen exhibited was obtained, was brought into hospital dead.

In all the cases the heart presented very similar appearances, and in none of them was there any very marked valvular disease. In each of them there was a very straight marked line of thickening from above the aorta downwards. This thickening was of a somewhat different character from the ordinary case of atheroma. In two of the cases it was
marked by vertical striae. In every one of them the thickening surrounded the orifices of the coronary artery on one side or the other, and narrowed the lumen to a great degree. In the present specimen the lumen was of a fair size, but in the others it was almost obliterated. He attributed the sudden death in these cases to the narrowing of the coronary artery, as there was no marked lesion nor was there any occlusion of the wall.

In the present specimen the changes could be seen to be in excess of those in ordinary cases of atheroma. The adventitious tissue was abnormally thick; the vessels in this tissue were quite large and had undergone in many cases complete obliteration. The media had also undergone a marked change, and in places small infiltrations were apparent. Although examination was not yet complete, he felt that it was likely that this form of endarteritis was syphilitic.

Dr. O'Sullivan then showed two definitely syphilitic hearts for comparison with the specimen, and pointed out that in the syphilitic heart the usual structures seen on the wall of the vessel were scattered all over the wall of the ventricle, and were matted together by a dense growth of connective tissue, and in the heart shown the same condition appeared to be present although in a somewhat less advanced stage.

He referred to the amount of recent work on endarteritis, and pointed out that opinion seemed to be generally rather inclined to the idea that in ordinary atheroma the primary lesion was really in the middle coat, not in the inner coat. It, however, appeared to him that in ordinary atheroma the changes in the inner and middle coats were not found over the same area. He was not certain whether the two changes could be called, one primary and the other secondary.

Dr. R. Travers Smith said he was glad to hear further examination was being made to ascertain if the origin was syphilitic. The more he had seen of cases of aortic degeneration and aortic regurgitation the more was he inclined to consider them of syphilitic origin. He referred to a paper published in the "American Year Book" in which statistics were given proving that in about 70 per cent. of such cases the origin was syphilitic. It was pointed out that sometimes
Abstracts.

no degeneration was shown in the coronary arteries, but that the little band of arteries supplying the band of His was blocked. He recalled a case of his, where a patient complained of a little substernal pain, but in which nothing could be found the matter with the heart on the most careful examination, yet the patient died suddenly a few minutes after the examination. He attributed these cases of sudden heart failure to syphilis or great strain.

(1) Primary Cancer of Gall-bladder resulting from Gall-stones; (2) Primary Sarcoma of Suprarenal, with lantern slides.

(1) Dr. W. D. O’Kelly showed a case of cancer of the gall-bladder following gall-stones. The cancer was situated at the fundus, and several cholesterin stones were embedded in it, many others being free in the cavity. The cancer cells were very embryonic. The epithelial columns showed some false laminae due to necrosis, but did not form acini. The cells were short spindles.

(2) He also showed a case of primary sarcoma of the right suprarenal gland. The left suprarenal was unaffected. The tumour was six inches in diameter. It infiltrated the kidney, and secondary deposits were present in the portal glands, liver, and diaphragm. Microscopically the tumour was a round-celled sarcoma.

Stenosis of the Pulmonary Valve.

The President said this specimen was from a rare case of pulmonary stenosis. The patient from which the specimen was taken was shown last Session to the Medical Section of the Academy. The clinical signs were:—Very loud, rough, systolic murmur over the pulmonary area and a very loud thrill over the same area. There were no signs of congenital heart disease, although in all probability the lesion was congenital. The stenosed pulmonary valves were seen to be adherent in the specimen. The patient was aged about twenty-four, and had been under observation for about ten years.
Carcinoma of the Prostate.

Mr. L. G. Gunn read a paper on above subject. See page 335, ante.

Specimens from an Unusual Case of Intestinal Obstruction.

Mr. W. S. Haughton said that the interest in the specimen was the unusual nature of the material which led to the death of the patient and to the apparently long continuance of this foreign body in the bowel before she sought relief. The patient, a girl aged twenty, a cork cutter, was admitted to Steevens' hospital about the middle of June, 1914, complaining of constipation and obscure abdominal pains. Her colour was peculiar, being of an orange yellow tint. Her abdomen was somewhat boggy, it was not elastic, nor were the muscles rigid, and she had little tenderness. Enemata were given which brought away some faecal matter mixed with small pieces of cork. Some few days after admission, the enemata giving little relief, it was decided to do an exploratory laparotomy. The pelvic colon was found to be in a very much higher position than normal. It was very smooth, and there was no sign of peritonitis. The consistency of the bowel was tough. The small intestine was matted together with sub-acute peritonitis of old standing. Feeling that it was full of some foreign body, the pelvic colon was opened and was found to be packed densely with pieces of cork. Cork was also found on opening the transverse colon near the hepatic flexure. The cork was matted together so firmly that it could not be removed by the finger, and it was necessary to excavate it with a spoon. The matter removed was shown. Some lotion was then got to pass from the pelvic colon down to the anus, showing that section to be somewhat clear. Failure to mobilise the colon led to the opinion that there was no use in further operative interference. The girl died thirty-six hours afterwards.

The specimen included the cæcum, ileo-cæcal valve, and
Ascending colon. The patient was in the habit of putting pieces of cork in her mouth in the course of her employment. Apparently she swallowed them unconsciously, for she seemed to be unable to explain how the cork got into the bowel.

Teratoma of the Testis.

Dr. W. D. O'Kelly said the reason for bringing forward this specimen was its rarity. It was the only tumour of the testis he had met with in the course of seven years. Ordinary tumours of the testis appeared to be common, but this was one of teratoma. The patient was aged thirty-five, and up to three months before the removal of the tumour he had not noticed any difference in the size of the testes. He then remarked that suddenly one got larger than the other, and it grew rapidly. The testis was separated from the tumour.

Microscopic sections were thrown on the screen showing syrystic spaces lined by squamous epithelium. Cartilage was also to be seen. This led to the view that it is one of two things—viz., either a diphyllic teratoma or a true teratoma.

Of two cases that he had seen of tumour of the testis one was teratoma and the other a sarcoma.

An Abnormal Cecum.

Mr. D. Kennedy, when showing the specimen, which consisted of the large and small bowel, said the patient from whom it was removed four years ago complained of vague abdominal pains, and at that time he opened an abscess in the costal arch and provided drainage, after which the patient appeared to do as well as could be expected, and left hospital with a small sinus. Recently she returned with faecal fistula. The case was thought to be tubercular. The abdomen was opened, and when a portion of the bowel was got free from the abdominal wall a suture was put round the fistula. On examination of the bowel it was found very unhealthy, and it was decided to remove a section of intestine in order to get healthy anastomosis. Accordingly, the ileum was joined to the transverse colon well beyond the hepatic flexure. No evidence of tubercle could be found during the operation. The patient made an uneventful recovery.
On receipt of the specimen Dr. O'Farrell said he had carefully dissected away a large amount of fat and found the resected piece of bowel to consist of about five inches of ileum somewhat hypertrophied and dilated, but otherwise normal. The ileo-caecal valve was badly formed, having more the appearance of a pylorus. The caecum was represented by a small fusiform sac, one and a half inches long, lined by epithelium, the wall being composed of two definite layers of unstriped muscle. Two muscular bands covered by epithelium were found arising at the ileo-caecal valve, crossing the bowel lumen obliquely and becoming re-incorporated with the caecal wall.

No appendix was found, but a slight fossa was present at the usual developmental site of the appendix.

There was a very narrow opening between the caecum and the ascending colon, the latter being very short, about one and a half inches in length, and containing stercoral ulcers with the opening of the fistula previously mentioned.

Friday, January 22, 1915.

The President in the Chair.

Exhibits.

Two Cases of Lymphangioma of the Conjunctiva.

Dr. Euphan Maxwell said that in the first case the patient could not be shown as she had developed scarlatina. The patient was a girl aged three and a half years, whose parents noticed that she had a cold in the right eye since birth. The lower half of the conjunctiva was raised, and when touched with a probe had a boggy feeling. A piece of the growth was removed for examination, and the whole tissue then became diffused with blood and remained bright red for some days. The child was taken from hospital by the parents. The section showed several spaces lined with endothelial, epithelial, and a few round cells. The child was brought back to hospital with a purulent discharge from the conjunctiva. The growth had increased, and now involved not only the lower
half of the conjunctiva but the inner half as well. A bogginess also appeared above the right eyebrow, but there seemed to be no communication between it and the conjunctival growth. Treatment by electrolysis was commenced, but it was interrupted by the development of broncho-pneumonia, and now the child had scarlatina.

Dr. Maxwell said the patient in the second case (who was brought forward) was also a girl aged three and a half years. The appearance was somewhat similar to that described in the previous case, but the growth seemed to involve the orbit. The history was that the parents had noticed that the left eye protruded since the child was ten months old. The fundus was examined and found to be normal, and the vision was the same in both eyes. The eye was displaced downwards and outwards and the motion was slightly limited. The orbit was explored under an anaesthetic, but nothing could be seen or felt from the outer side. The conjunctival growth appeared to go backwards indefinitely. The treatment adopted in this case also was electrolysis. The proptosis had lessened by one m.m., the original amount of proptosis being 3 m.m., and the conjunctiva had shown considerable improvement.

Dr. Maxwell said that according to the literature on the subject it seemed that the predisposition to these lymphangioma is present at birth, but that the early stages of their growth was gradual. The first case certainly bore out the statement as to their early appearance, and probably in the second case the growth had been in the orbit some time before it had caused sufficient protrusion of the eye-ball to be noticeable. Lymphangiomata of the conjunctiva do not seem to be so very uncommon, but they are extremely so in the orbit (according to Parsons only five such cases are recorded). All authors are agreed as to electrolysis being likely to produce the best results.

**Enlarged Thymus.**

Dr. A. R. Parsons said that in Sir Patrick Dun's Hospital he had met with five cases in young children, aged from two to five years, in which death occurred suddenly, and on examining them he was struck by the size of the solitary
follicles of the intestine and of the mesenteric glands. Dr. Walter Smith had exhibited these cases before the British Medical Association in 1891, and no one was able to throw any light on the pathology. The exhibit now shown was taken from a child aged nine, who was admitted to hospital at two o'clock on Christmas Day. The history was that the child was well until 5 p.m. on the previous day, when it became delirious. It was found impossible to make a satisfactory examination on admission on account of the restlessness of the child. He was extremely emaciated, and the pulse was uncountable. The first impression was that it was meningitis. It was impossible to obtain a specimen of the urine. The child died at 7 o'clock, or five hours after admission. At the autopsy some of the urine was obtained, and, except for a slight trace of albumen, was normal. Enlargement of the thymus gland was the only thing found. In this case there was no enlargement of the mesenteric gland or of the solitary follicles of the intestine.

*Acidosis in a Case of Typhoid Fever.*

Dr. A. R. Parsons said that this was a case of a boy, aged eleven years, who was rickety almost from his birth, and he was admitted to hospital as probably a case of Friedreich's ataxia. He had difficulty in walking, and swayed from side to side. For the first two or three days he had no idea of what was wrong. There was no nystagmus, and the knee-jerks were only slightly exaggerated. On the third morning after admission a marked change was noticeable. He was stupid, cold, and his hands were bluish; he also vomited. It was thought that he was suffering from acidosis, and on examination of the urine an amount of aceto-acetic acid and acetone was discovered. Next evening his respirations were laboured. He was cold, barely conscious, and the clinical picture was like that of a boy in diabetic coma. The fundus was examined and found to be perfectly normal. On the following morning some members of the class noticed a sweet odour from the breath. On free administration of alkali by the mouth the lad gradually recovered, and after some days the aceto-acetic acid and acetone disappeared from the urine. An
attempt was made to get him to walk, but he was very weak on the limbs. After three or four weeks in hospital the temperature, which was previously normal, rapidly rose, and he then died. In the same ward there had been three cases which developed typhoid fever, and when the post-mortem examination was made, evidence of typhoid was found. There was marked enlargement of the solitary gland, and the typhoid bacillus was isolated from the spleen. There were two points of interest in the case—i.e., for a boy of eleven, who had never taken vigorous exercise, the heart was very large, and his liver also was enlarged. No explanation of the acidosis in the first instance was forthcoming. In the second instance it might have been a febrile acidosis.

Malignant Disease of the Stomach.

Dr. A. R. Parsons said this specimen was removed from a man, aged forty-five, who was admitted last September complaining of abdominal pain and weakness. He was extremely emaciated, and weighed only 5 st. 12 lbs. Notwithstanding his condition, he always said he was getting on well. During his time in hospital he took a fair amount of food, but had no desire for meat. He was practically free from vomiting. Physical examination revealed nothing beyond some slight crepitus in the lungs. The upper part of the abdomen was a little resistant, but it was impossible to find any tumour. He was given a test meal, and a very small quantity of fluid was obtained and a small clot of blood. The fluid was acid in reaction, but contained no free hydrochloric acid. It was suspected that the man was probably suffering from cancer of the pancreas or growth on the anterior wall of the stomach, which could not be got at. He was under observation three months, and died a fortnight ago. On post-mortem examination the liver was found absolutely normal. In the stomach was found a mass all matted together. The omentum was all infiltrated with malignant disease, and along the greater curvature of the stomach there were enlarged glands. On opening the stomach a malignant growth was found where the oesophagus entered the stomach. On examining the thorax a hard mass was found in the lungs which at first sight looked like a secondary deposit, but was found
to be tubercular. The heart was very small in size, and he looked upon it as the best specimen of brown atrophy of the heart that he had seen.

Brain from a Case of Hemiplegia.

Dr. W. Boxwell showed a brain removed from a woman, aged fifty, who was suffering for years from mitral disease and a certain amount of stenosis as well as mitral regurgitation. She was well on the mend when one day, while sitting up in bed taking her dinner, she fell back, and it was noticed that she was paralysed. There was a complete paralysis of the left arm, leg and face. She survived that attack, never lost consciousness, and after a day or two could speak. The heart, however, gave way afterwards and she died. The brain was taken out, as it was expected that a specimen of hemiplegia due to embolism would be obtained, and that a lesion would have been encapsuled. When the specimen was cut the only lesion to be seen was a small hemorrhage on the frontal lobe and here and there small spots. The patient had had only one attack with cerebral symptoms, and in that she had complete hemiplegia. It was not quite clear why she had complete hemiplegia with a lesion in the situation in which the one shown was found.

Pituitary Tumour.

Dr. W. G. Harvey said the patient from whom the specimen was removed was a woman, aged about sixty, who was admitted to the Adelaide Hospital complaining of a severe headache which had been troubling her for about a fortnight. She also complained of giddiness, but never vomited. Shortly after admission she became suddenly unconscious. An attempt was made to get her discs examined, but she died before this could be done. There were no signs of acromegaly.

The autopsy revealed a tumour of the pituitary body about the size of a walnut. This tumour consisted of masses of cells, epithelial in type, with clear protoplasm and large nuclei. The cells were arranged in a papillo-adeno-matous manner, and lay in a matrix of lightly staining connective tissue. The epithelium in places formed solid cell masses
in which were numerous glandular and cystic spaces. Round these spaces, the epithelium, elsewhere irregularly cubical, had a columnar arrangement—the cells lying more closely packed together and their nuclei staining more deeply than those of other parts. The spaces were sometimes empty, and in some places their walls surrounded tissue which was obviously identical with the above-mentioned connective tissue matrix. This quite clearly represented part of the matrix enveloped by the papillomatous growths of the epithelium. In other parts were to be seen apparently cysts containing a homogeneous light pink staining colloid material devoid of visible cells or nuclei.

Intermediate conditions, however, appeared to be frequent, for in one part of the space, fairly well formed connective tissue was seen, its nuclei staining well, while at another was a pink homogeneous vacuolated material. Here and there lying loose in these spaces were large swollen oedematous cells with well-marked nuclei, and containing a finely granular pink protoplasm. In places, large, oval, yellowish-coloured cells with the nucleus at one end were seen; elsewhere were similar looking globular yellowish masses, the nucleus having apparently disappeared. Here and there, also, were plasmodial masses apparently derived from the epithelium, and in these were several nuclei—sometimes arranged as in the giant cells, sometimes seen in tuberculous masses. Throughout the tumour were large blood spaces.

Friday, February 19, 1915.

DR. BRONTÉ in the Chair.

Blood Films from a Case of Trypanosomiasis from West Africa.

Dr. J. T. Wigham showed blood films from a case of Trypanosomiasis. The history was that about November last Dr. Jellett, of Waterford, brought him a patient to Trinity College, saying that the man had been having malaria, and
Section of Pathology.

did not seem to be able to get rid of it, attacks of fever having recurred from time to time. Specimens of the blood were examined, but no malaria parasites could be found. At the time he was not in a febrile condition, and it was decided to make another examination when the fever came on. This was done, but the result was also negative for malaria. On inquiry he found that the patient had been in Nigeria. A search was made of the blood, and the trypanosoma was discovered.

The only symptoms of trypanosomiasis was that the man had some enlargement of the glands in the posterior triangle of the neck. He had some attacks of fever, but thought he was getting better. He was, however, losing strength. This seemed typical of trypanosomiasis.

It was remarked that it was a practice in the Tropics to call all fevers malaria.

(a) Infective Sarcoma (dog).

Professor A. E. Mettam showed a specimen taken from a dog suffering from this condition. The condition was said to be found most frequently in bulldogs in this country, and on the Continent in St. Bernards. The specimen exhibited was obtained from a fox terrier. The growth sometimes reproduced vegetatively. In great Danes and St. Bernards it reproduced metastatically in the lungs. It was easily transplanted and the structure was a sarcoma.

(b) Cystic Kidney (dog).

Professor A. E. Mettam said this specimen was obtained from the same animal as the previous one, in which the kidneys were found to be cystic. It had been previously shown that in dogs suffering from lesions of sarcoma the kidneys had also interstitial nephritis. He was not sure whether the condition was of congenital origin or that the specimen shown was in the nature of a new growth.

(c) Endocarditis (pig).

Professor A. E. Mettam exhibited the heart of a pig showing endocarditis. On examination of the heart he found unexpectedly that the lesion was due to a streptococcus. So far as he was aware, there was no fibrous tissue.
(d) Endocarditis (ox).

Professor A. E. Mettam showed a specimen of this condition taken from an ox. He pointed out that the only aperture which persisted for the passage of blood would scarcely admit a small spatula. Air cysts were numerous in the lungs.

(e) Dissecting Aneurysm of the Pulmonary Artery (sheep).

Professor A. E. Mettam, in showing the specimen, said he found the pulmonary artery enclosed apparently in a huge blood clot. The haemorrhage was into the wall of the pulmonary artery, and on following the course of the pulmonary artery the haemorrhage could be seen. It was easily demonstrated that the haemorrhage was in the wall and not external.

(f) Tuberculosis of the Udder (cow).

Professor A. E. Mettam, in showing this specimen, said the animal from which it was removed gave milk recently in the city. The whole of the specimen was one huge tuberculous mass. He understood that the milk given by the animal was actually swarming with tubercle bacilli. The animal showed generalised tuberculosis, and there were miliary tubercles in the lungs. He presumed that the animal was free from tuberculosis twelve months before.

(g) Tuberculosis of the Udder (sow).

Professor A. E. Mettam said that the tubercles found in this specimen were more of the classical type. There was acute inflammation present.

(h) Tuberculosis of Udder (sow).

Professor A. E. Mettam showed two small pieces of the udder of a sow which contained a growth about the size of the finger. It was thought to be a case of actinomycosis, but on examination the tumour was found to be tubercular. He had not seen the carcase of the pig, but on inquiry found that it was suffering from generalised tuberculosis. It showed tuberculosis of the spinal column.
(i) Tumour of Kidney (ox).

Professor A. E. Mettam showed portion of the right kidney of an ox, which was apparently in a great tumour-like mass. The entire mass would weigh about 50 lbs. On splitting the organ he found cysts, the tumour spreading into the pelvic substance, and involving the vena cava. The posterior vena cava was enormously dilated. The carcass was thin and emaciated. The diaphragm, lungs, and pleurae contained metastatic deposits. The tumour appeared to be a sarcoma, but of what kind he was yet unable to say. The section of the secondary growth was true to type.

An Unusual Case of Sarcoma.

Dr. T. T. O'Farrell, in showing the specimen, said it was one of ordinary spindle-celled sarcoma, but that the position was unusual.

The history was—Four years ago the patient, who was a labourer aged fifty-four, got a fall on his back, and afterwards passed blood mixed with the urine. He stated that he was drinking heavily at the time. Three months ago he complained of pain, which he referred to the region between the last rib and the erector spinae muscle. The pain at night prevented him sleeping. He also referred to the bad attacks of pain at the right external abdominal ring, and these very bad attacks lasted from one to two hours, and at times he felt very thirsty after them. After the attacks the urine was said to be red or brown. He never suffered from incontinence, but had become very emaciated and weak latterly. Albumen was never found in the urine.

The abdomen was opened, and the kidney on that side was found apparently normal. The patient afterwards died. Partial post-mortem was done. The specimen consisted of liver and kidney. The other kidney was normal, as was the suprarenal. There was a tumour between the liver and kidney. Sections of it were made from different parts, and showed it to be a spindle-celled sarcoma. The interest in the case was that the growth was perfectly outside the capsule of the kidney, and distinct from the liver.
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and suprarenal. Some part of it was external to the peritoneum, but the large bulk of the tumour had pushed the peritoneum in front of it. He thought there could be no doubt that it originated outside the peritoneum.

Friday, March 19, 1915.

The President in the Chair.

A Note on the Effect of Radium on Living Tissues.

Dr. W. G. Harvey read a paper on above. See page 347, ante.

Exhibits.

Echinococcus Cyst.

Dr. W. G. Harvey, in the absence of Dr. H. T. Bewley, showed this specimen. The cyst turned up unexpectedly in a patient on whom an exploratory laparotomy was done for ptosis of the organs. The liver was pressed down very much. When first seen it was thought to be hydatid cyst from the jelly-like appearance. There was also some sebaceous-looking material. Scrapings were taken from the inside to examine for the hooklets, and these were shown under the microscope.

Compensatory Hypertrophy of the Kidney.

Dr. W. G. Harvey said the specimen was removed from a man who came to the Adelaide Hospital suffering from chronic interstitial nephritis. He had extremely high tension in his arteries. There was a history of a stroke, although there was no paralysis or any alteration in the knee jerks. The patient was always somewhat of unsound mind. It was expected to find the kidneys small and sclerotic, but when taken out one was large and the other was a little atrophied kidney. There was nothing to suggest why one should have atrophied rather than the other. It was certainly a cystic sclerosed kidney. There was a small cyst, and there was very little kidney substance present.
Friday, May 7, 1915.

Professor E. J. McWeeney in the Chair.

Adeno-Carcinoma (Mesothelioma) of the Kidney.

Dr. T. T. O'Farrell read a paper on a specimen of adeno-carcinoma of the kidney. See page 357, ante.

Pathological Report of the Rotunda Hospital.

Dr. Rowlette read the Pathological Report of the Rotunda Hospital for the year ending October 31, 1914. See page 365, ante.

Congenital Cystic Kidneys.

Professor McWeeney exhibited the kidneys of a male, aged forty-seven, who died at the Mater Misericordiae Hospital in a uraemic seizure. Patient was alcoholic, but had enjoyed good health until three weeks prior to admission, when he began to suffer from "fits." He complained of headache, tenderness over the left hypogastrium, violent pains in the calves of his legs and diarrhoea. The seizures consisted of clonic spasms lasting about fifteen minutes, giving place to coma, with stertorous breathing, which lasted about three hours. Pupils unequal, knee-jerks absent. After a seizure patient was quite collected and intelligent. On palpation a large tumour could be felt in the left hypochondrium. Patient lived only two and a half days after admission. Shortly before his death, a white frost-like efflorescence was noticed on the skin of the face. The urine had a specific gravity of 1.010, and contained a small amount of albumen. Samples were difficult to obtain, and it was not fully examined. At the autopsy the left kidney measured 20 x 10 x 10 cm. and weighed 1,250 grams. The left measured 17 x 10 x 8 cm. and weighed 850 grams. The pelves and ureters were remarkably small. The kidney substance was reduced to small patches of parenchyma wedged in between innumerable cysts, and there was no distinction between cortex and medulla.
The cysts were of all sizes up to that of a walnut, and the contents of some were thinly liquid, whilst others contained solid translucent brownish material like inspissated glue. Some of the cysts contained minute yellow spherical concretions with laminated and radical structure, and consisting of an albuminous matrix with lime salts—chiefly carbonate. The largest seen measured .3 mm. in diameter. Microscopically, very few glomeruli were visible, and of these the majority were hyaline, with a laminated Bowman's capsule. The cysts were lined with a single line of cubical epithelium, tending to disappear in the larger ones. The connective tissue was much increased and contained patches of lymphoid cells and unstriped muscle. There were patches of cells of epithelial aspect lying free in the connective tissue and suggestive of carcinoma, but presenting no evidence of mitotic activity.
SECTION OF STATE MEDICINE.

THE FAILURE OF THE VACCINATION ACTS

By T. PERCY C. KIRKPATRICK, M.D. DUBL.; M.R.I.A.;
Fellow and Registrar, Royal College of Physicians of Ireland;
Physician to Steevens' Hospital, Dublin;
President of the Section of State Medicine in the Royal Academy of
Medicine in Ireland.

[Read in the Section of State Medicine, January 8, 1915.]

In bringing the subject of Vaccination under the notice of this Section of the Academy I wish at the outset to define clearly my position. I am firmly convinced that vaccination confers on the vaccinated individual a protection against small-pox—a protection which, however, is adequate and efficient for a limited period only after vaccination. If this protection is to continue through the life of the individual it must be renewed by repeated revaccination. The length of time that the protection conferred by vaccination lasts is probably variable, but protection cannot be counted on with any certainty for much more than five years. Published statistics appear to make this position quite sure. Small-pox has over and over again occurred in persons who have been successfully vaccinated and revaccinated, and though the disease when it occurs in such persons is, as a rule, profoundly modified and much less virulent than it is in unvaccinated persons, yet many persons who have been both vaccinated and revaccinated have died of the disease. My contention is that while vaccination and repeated
revaccination affords to the individual an almost complete protection against small-pox, no such protection is afforded by primary infantile vaccination alone. The mortality from small-pox is undoubtedly less among those who have been once vaccinated than it is among those who have never been vaccinated, but it is equally undoubted that many vaccinated persons have died of small-pox. Furthermore, it is important to remember that even the mildest attack of modified small-pox is capable of infecting unprotected persons with the most virulent form of the disease.

From this position, then, I propose to examine shortly the present administration of the vaccination laws in this country. I propose to make this examination from the point of view of the public health, or the health of the community, not from that of the individual. The two points of view are not identical, for though what is good for the community is good for the majority of those who form the community, yet the individual good may be directly opposed to the good of the community.

Let me first give you a short synopsis of the history of vaccination in the United Kingdom of Great Britain and Ireland. In the year 1798 Edward Jenner published his book entitled "An Enquiry into the Causes and Effects of the Variolæ Vaccinæ, a Disease discovered in some of the Western Counties of England, particularly Gloucestershire, and known by the Name of Cow-Pox." Subsequent to the publication of this book the practice of vaccination spread to a considerable extent, and vaccine institutions were established in various towns in the kingdom. In 1802 and in 1806 Parliament made money grants to Jenner in recognition of his discovery, and from time to time made grants to the National Vaccine
Establishment. It was not, however, till 1840 that the first Vaccination Act was passed by the British Parliament. This, "An Act to extend the practice of Vaccination" (3 & 4 Vic., Cap. 29), applied to England and Wales, and by a special section was extended to Ireland. By this Act the Guardians and Overseers of every parish were empowered to contract with their medical officers for the vaccination of such persons as might apply to them for that purpose. The payments made to such officers were to depend on the number of persons successfully vaccinated for the first time. By the Act the practice of the inoculation of small-pox was made illegal. In the following year, June 1841, an Act was passed to provide that the expenses of carrying out the Act of 1840 should be charged on the poor-rate, but that persons vaccinated under the provisions of the Act should not be considered to be in receipt of parochial relief or deprived of any privilege in consequence. In August, 1853, there was passed "An Act to extend and make compulsory the practice of Vaccination," but this Act applied only to England and Wales. By this Act it was declared that all children were to be vaccinated within three months of birth under a penalty of twenty shillings on their parents or guardians if the vaccination was not carried out. The Act regulated also the payment of public vaccinators. In 1861 a further Act was passed to empower guardians to appoint persons to prosecute offenders under the former Act and to make parents perpetually liable during the period of default. The Public Health Act of 1858 was one of considerable importance, as it vested in the Privy Council certain powers for the protection of the public health. The Privy Council was then given powers to issue regulations as to the quali-
fications of public vaccinators, and generally to control the practice. These powers the Privy Council continued to exercise till they were transferred to the Local Government Board by the "Local Government Board Act, 1871." In 1867 a consolidating statute was passed (30 & 31 Vic., Cap. 184) which also introduced some new provisions. The payments to public vaccinators were increased, and the Privy Council was empowered to pay to them additional sums as a reward for successful work. Payment for revaccination was also enforced, and parents were compelled to bring their children to the vaccinator a week after the operation, and to permit him to take lymph from them if he wished to do so. This Act was further amended by Acts passed in 1871 and 1874, but the changes then introduced were chiefly of an administrative nature.

In 1889 a Royal Commission on Vaccination was appointed, which sat for several years and heard a mass of evidence both for and against vaccination. In 1896 this Commission issued its final report recommending that the compulsory clauses of the previous Acts should be modified by the recognition of the "conscientious objector." In 1898 an Act was passed which permitted such objectors, on application to the Court, to be granted exemption from the compulsory clauses of the Vaccination Acts. This Act did not apply to Ireland. In 1907 the Vaccination Acts were further modified by an Act which enabled parents to obtain exemption from vaccination for their children by making a statutory declaration that they had a conscientious objection to having them vaccinated. Appearance in Court was no longer enforced. Thus in England compulsory vaccination, except in name, has been practically abandoned.
In Ireland the legislation has been somewhat different from what it was in England. The Acts of 1840 and 1841 applied to Ireland as well as to England, but the compulsory Act of 1853 did not apply to Ireland. In 1863 an Act was passed making vaccination compulsory in Ireland (26 & 27 Vic., Cap. 52). According to this Act the children were to be vaccinated within six calendar months of birth, and a fee of one shilling was to be paid to the medical officer for such vaccination. In 1868 a short Act (31 & 32 Vic., Cap. 87) was passed making inoculation with variolous matter a penal offence and providing that persons vaccinated by a public vaccinator should not be considered as in receipt of poor-law relief. In 1878 a section dealing with vaccination was introduced into the Public Health (Ireland) Act similar to Section 31 of the English Act of 1867. In 1879 the last Act dealing with vaccination in Ireland was passed. This Act reduced the time within which a child might be vaccinated from six to three months. It raised the fee for the operation from one to two shillings, and permitted the vaccinator, if he wished, to take lymph from the vaccinated child.

The Vaccination Acts at present in force in Ireland are:—21 & 22 Vic., Cap. 64; 26 & 27 Vic., Cap. 52; 31 & 32 Vic., Cap. 87; 42 & 43 Vic., Cap. 70. But Sections 1, 2, 3, and 13 of 26 & 27 Vic., Cap. 52, were repealed by Section 13 of the Act 42 & 43 Vic., Cap. 70.

In Scotland the vaccination law is practically comprised in one Statute that was passed in 1863 (26 & 27 Vic., Cap. 108). That Act made vaccination compulsory in Scotland. In that country the majority of the people are vaccinated by private practitioners, and the public vaccinators deal only with paupers and the chil-
The Failure of the Vaccination Acts.

dren of paupers. In the case of defaulters, however, they must either be vaccinated by the public vaccinator or submit to the penalties of the law. Vaccination in Scotland, too, differs from that in other parts of the British Isles in that the public vaccinator vaccinates chiefly at the person's own house and not at a public dispensary.

The present position of the law in Ireland is that all children must be vaccinated before they reach three months of age, unless they are exempted by a certificate of a medical man stating that the child is unfit for the operation. In England children may be exempted either by such a certificate or by their parents or guardians making a statutory declaration that they have a conscientious objection to allowing the child to be vaccinated. Revaccination is not compulsory in either case.

In England, in consequence of the objections to vaccination which resulted in the Acts of 1898 and 1907, and further, in consequence of these Acts themselves, there is a considerable proportion of the population quite unprotected by vaccination. In Ireland the proportion of unvaccinated persons to the total population is growing greater year by year. In this country there is a decided disinclination on the part of those entrusted with the enforcement of the vaccination laws to put into effect their compulsory clauses or to prosecute those who disobey them. There are, probably, many reasons for this condition of affairs into the consideration of which we need not enter, but we must recognise that everything points to the likelihood that in the near future the proportion of those protected by vaccination will diminish. Furthermore, future legislation with a view of rendering the existing compulsion more stringent, or
of introducing compulsory revaccination, is quite outside
the bounds of practical politics.

By some persons this will be considered an advantage; by others a great disadvantage; but all, we believe, will admit it to be a fact. In the future our provisions for the prevention of small-pox must be made with regard to things as they are, and not as we might wish them to be.

As medical men we must face the situation before us, and give to our legislators the best advice we can to enable them to deal with the matter. If compulsory vaccination and revaccination are impracticable, it is not sufficient for us to counsel their adoption, or to say that they afford the surest protection against small-pox. Our advice to be of use must be capable of being acted upon. To recommend a course of action, no matter how perfect, if it cannot be acted upon, is to fail in our duty.

At the present moment there is growing up in the community a considerable number of persons quite unprotected by vaccination from attacks of small-pox, and this number, as we have seen, is likely to increase rapidly in the future. Side by side with these persons is a further number inefficiently protected by primary infantile vaccination—persons who are liable to the disease, in a modified form it is true, but who are capable of spreading the disease in a virulent form to those who are unprotected. The former group of persons will, we believe, increase largely in size, while there is no prospect of compelling those of the latter group to accept the protection offered to them by repeated revaccination.

Twenty years ago were the medical profession faced with such a problem they would have prophesied, we have no doubt, that a rude awakening was in store for the people; that sooner or later small-pox would return
and decimate the country as it did in the seventeenth and eighteenth centuries. That the lesson then learned in bitterness and sorrow would remove all the difficulties in the way of compulsory legislation. Just as the present war is teaching us the necessity for an efficient navy and army, so small-pox would teach us the necessity for compulsory vaccination. The analogy is pleasing, and at first sight appears exact, but it is strictly true? An efficient navy and army is the only means we know of to ward off the attacks of a foreign enemy. Is compulsory vaccination the only means we know of to ward off small-pox? Twenty years ago the answer of the majority would have been unhesitatingly in the affirmative, but now the wise will hesitate before they make such an assertion.

Let me recall to your notice the facts regarding one or two communities. About the year 1886 the authorities of the town of Leicester finally abandoned any attempt to enforce the compulsory clauses of the Vaccination Acts. In the twenty-seven years that have elapsed since that time till the end of the year 1913 the number of children recorded as born in Leicester has been more than ten times greater than the total number of persons recorded as vaccinated there. In the face of these facts Leicester must be looked on as a thoroughly badly vaccinated town. It is probable that from forty to fifty per cent. of its population is totally unprotected from small-pox, either by vaccination or by previous attacks of the disease.

Here, then, is a fine field for a small-pox disaster should that disease break out. In the epidemic of 1871-1872 Leicester, with a population of 100,000 persons, had 358 deaths from small-pox, the number of persons attacked
by the disease being estimated at 3,300. Since that time small-pox has been introduced into Leicester on several occasions, but only on three has it assumed epidemic proportions. In 1892–1893, when the population had reached 183,000, there was an epidemic of small-pox in which 355 persons were attacked and 21 died, or a case mortality of 6 per cent. In 1902–1903 there was an epidemic that lasted ten months, during which 394 persons were attacked and 21 died, or a case mortality of 5.3 per cent. In 1903–1904 the third epidemic occurred, beginning shortly after the previous one had terminated, and lasting for eight months. During this third epidemic 321 persons were attacked, of whom 4 died, or a case mortality of 1.3 per cent. At this time the population of the town had reached 224,000 persons.

Thus in the period under review Leicester, with a rapidly increasing population and a decreasing protection from vaccination, has shown its capacity to deal with three considerable outbreaks of small-pox in an increasingly efficient manner. Various explanations have been given of the success that Leicester has achieved. It is stated that Leicester, being surrounded by a well-vaccinated community, has been afforded the protection which the people themselves had refused. On each occasion, however, the small-pox was introduced into Leicester from that well-vaccinated surrounding community. It is stated that the type of the epidemic was mild, and so the death-rate was low; but this gives no explanation of the fewness of the cases in an unprotected community. Besides, several of the patients were attacked by the disease in a very severe form.

What, then, are the weapons that Leicester has made use of to attain this desirable end? Compulsory infan-
tile vaccination was evidently not one of them, for Leicester has practically abandoned this altogether. Those who have studied the conditions at first hand claim that the end was achieved by good sanitation, using that term in its widest sense. The government of Leicester as regards sanitary matters is admitted by all to be better than the average. Healthy houses, good water supply, absence of overcrowding, and strict cleanliness make for a healthy town. To these conditions Leicester has added particular provision for dealing with small-pox. A properly constructed and well isolated hospital for the treatment of small-pox patients, with sufficient accommodation to meet the needs of even a wide-spread epidemic of the disease; effective notification of small-pox patients, followed by the removal of those patients to the isolation hospital, has prevented the spread of the disease, while segregation and vaccination of contacts, though a difficult and expensive undertaking, has well repaid the money and trouble expended on it.

But it will be asked would not all this, admirable as it is, be greatly assisted by compulsory infantile vaccination? Would not this be true even though it be admitted that such vaccination is not in itself capable of protecting a community from small-pox? Various answers may be given to such questions. Vaccination cannot be looked on as a good thing in itself. It is so much preferable to small-pox that some people appear to have come to look on it as a thing to be desired in itself. A moment's consideration, however, will show that it is not a good thing; it is an evil and objectionable thing, and were it not for its protective power against small-pox no one would willingly submit to it. Hence the onus of
By Dr. T. P. C. Kirkpatrick.

proof lies with the vaccinators; the necessity for vaccination should be demonstrated before its use is insisted on. Furthermore, it is expensive, and that expense should not be incurred if the money could be better employed in some other way. Leicester's experiment would appear to cast doubt on the necessity and to give good grounds for thinking that the money spent on infantile vaccination might be more usefully employed in other forms of sanitation.

But the question has not been left to the decision of merely negative considerations; the attack has been carried right into the vaccination camp. It is generally admitted that in the preventive treatment of small-pox, early recognition and notification of the disease, followed by strict isolation of the infected persons, are matters of the first importance. If these fail, all our experience goes to show that small-pox is apt to run riot in a community. Unmodified small-pox usually sets in suddenly with well-marked symptoms and characteristics, and in a manner sufficiently severe to ensure that the person attacked will seek medical aid early in his illness. Thus the unmodified disease usually ensures not only that the patient will be seen early, but that the nature of his illness will be easily recognised. Thus notification and isolation can be effectively carried out before the really infectious period of the disease has developed. Modified small-pox, on the other hand, occurring in those persons in whom the protective influence of vaccination is wearing out, follows a very different course. The disease is often so mild that the patient may continue at his work during the greater part of his illness without seeking medical advice. Even when the patient is seen by a medical man the recognition of the disease is difficult, in spite of
the greatest care and skill. This has occurred over and over again in the past, and will occur over and over again in the future. Patients with unrecognised modified small-pox may thus distribute the disease in a most virulent form wide-spread through a community before any effective steps can be taken to deal with them. This is what has actually occurred at Leicester. Thus the public health authority blames infantile vaccination for making his work more difficult and less effective. Primary infantile vaccination modifies small-pox, but does not prevent it. Modified small-pox easily escapes detection, yet may be the source of the most virulent and fatal infection. Whatever one may think from the point of view of the individual, it must be admitted that from the point of view of the sanitary authority that there is much against infantile vaccination. Such authority feels a further grievance that large sums of money should be spent annually on a preventive measure that is admittedly ineffective and possibly harmful to the community, while so much that has been proved to be wholly beneficial has to be left undone for want of funds.

Have we any suggestions to offer for the improvement of the present state of affairs? A few are submitted for consideration without any pretension of covering in detail the whole field of inquiry.

A thoroughly efficient administration of the laws dealing with matters of sanitation is of the first importance. Efficient sanitary administration not only will have the advantage of lessening the ravages of small-pox, but will also help to banish all other forms of infectious disease. A lowered death-rate appears inevitably to follow improvement in sanitation. Good sanitary administration involves much more than the provision of
lean towns, healthy homes, sufficient air-space for the people, and pure food. It involves also direct provision or dealing with outbreaks of infectious disease. Among such provisions compulsory notification is of great importance, and this procedure should be made universal and enforced by severe penalties. The sanitary authority should have power to insist on the removal of all persons to hospital who are suffering from certain scheduled infectious diseases, of which small-pox should be one. The using of this power should not be left to the option of the sanitary authority. In the case of small-pox the compulsory segregation of contacts should be insisted on for a period of time at least equal in length to the incubation period of the disease. Such contacts during the period that they are segregated should be paid a fair proportion of their normal wages, and such payment might well be made to depend on their permitting themselves to be vaccinated. Suitable and sufficient hospital accommodation should be provided for the isolation and treatment of all small-pox patients, and every sanitary authority should be compelled to provide such accommodation. The administration of the sanitary laws should be in the hands of a Medical Officer of Health, who should devote his whole time to the duties of his office, and not be allowed to undertake private medical practice. Every town of a certain size should be compelled to appoint such an officer, and rural districts, either alone or in combination, should also have such officers. Arrangements should be made so as to ensure that every part of the country was under the supervision of some one of these officers. Such public health officers might well form a kind of State Medical Service, and the tenure of their office should not depend on whether they pleased or displeased the in-
individual members of the local boards of municipal and rural government.

There is nothing new in these suggestions, and nearly all of them will be found to be contemplated in the various Public Health Acts already in force. The chief novelty, perhaps, is the suggestion that efficient sanitary administration should be compulsory and not merely permissive. The failure of permissive sanitary administration has already been made very clear to us in this country. The adoption of such suggestions would almost certainly result in a marked improvement in the public health, and while affording protection against epidemic smallpox, would at the same time afford protection from all forms of infectious disease.

With the provision of an efficient sanitary administration, compulsory vaccination might well be abandoned. It would probably be unnecessary and possibly actually harmful to the public health. Without efficient sanitary administration the experiment might well lead to disaster.

At the present time there is a wide-spread objection to the enforcement of the vaccination laws, an objection that is growing in activity from day to day. There is a rapidly increasing population inefficiently protected from small-pox, and nothing is being done to prepare us to meet the danger. Let us face this danger boldly, and offer to the people the alternative of an efficient sanitary administration or compulsory vaccination. I believe we are justified in urging that the former alternative offers the best protection, unless vaccination is to be accompanied by repeated revaccination. There is little doubt which alternative would be chosen, and I believe the choice would be wise. Were it made, it would have the
advantage of carrying with it the goodwill of the people in place of their active opposition, a matter of no small importance in sanitary reform.

I am indebted to Dr. Millard’s book, “The Vaccination Question,” for much of the information contained in this paper.

Dr. Ninian Falkner said that he believed that vaccination was one of the necessities at the present time for the protection of the population. Referring to the last Act mentioned in the paper—the Act of 1907—the year 1905 might be taken as the maximum of protection by vaccination in England, Wales, Scotland, and Ireland. At that time the percentage of the population vaccinated in the different countries was:—England and Wales, 76 per cent.; Scotland, 85 per cent.; Ireland, 82 per cent. The figures for the year 1911 (four years after the passing of the Act) were:—England and Wales, 52 per cent.; Scotland, 58 per cent.; Ireland, 73 per cent.; and when the figures for 1913 were available it was expected that a further decline would be shown in the number of those vaccinated. It was also pointed out that the percentage of conscientious objectors in England and Wales had increased from 8.4 per cent. to 28.4 per cent., and in Scotland from 5.6 per cent. to 24 per cent.

Sir John Moore referred to the Notification Act and its perfunctory enforcement in this country. He looked upon it as a farce. He was quite sure that sanitation would not afford any protection against small-pox in Ireland, so long as there were no medical superintendent officers of health except in Dublin, Belfast, Cork and Londonderry. He quoted Dr. Millard, whom he looked upon as sitting on the fence—“I am prepared to admit that a universal system of vaccination and re-vaccination, if effectively carried out, would abolish small-pox.” What was wanted was a Minister of Public Health. The Local Government Board in Ireland were complaining that the Vaccination Acts were not being enforced, and instead of getting a mandamus against the
guardians whose duty it was to enforce these Acts. What they did was to approach the Corporation of Dublin and point out the necessity of providing extra hospital accommodation for cases of small-pox which were expected to arise. He suggested that the most practical and effective protection against small-pox was to be found in aseptic primary vaccination, aseptic secondary vaccination, and, of course, sanitation in the fullest sense of the term.

Dr. Rowlette said it was the duty of the medical profession to put forward practical methods. Sir John Moore had told them the best methods for preventing small-pox, and he (Dr. Rowlette) was in thorough agreement with him; but the immediate problem was how much of that programme was practical. He considered that the whole programme was not practical. He did not think, nor had Sir John Moore suggested, that re-vaccination could at present be made compulsory. As to the question of sanitation, he looked upon Ireland as without sanitation. There was only one whole-time medical officer in Ireland. No attempt was made by any section of the community to make sanitation more efficient in Ireland. He pointed out that the community paid certain medical men from £5 to £15 per annum to look after the health of a large district, which showed that the work was not taken seriously; on the other hand, vaccination had been taken seriously, and was fairly well done. Sanitation at the present time was impossible in Ireland, as no one seemed to think it was required, and whatever chance there was of carrying out primary vaccination, there was no chance of sanitation.

Dr. Kirkpatrick, in replying to the remarks, said it was difficult to advocate a complete change in what had been the belief of the majority of the medical profession for well over a century, and it was now over a century since they came to the conclusion that vaccination was the best preventive measure against small-pox. One must, however, consider the evidence. In any other matter it would come as a striking phenomenon to learn that a community which had abandoned a preventive measure had greater immunity than a community that had adopted that measure to the fullest extent. What had to be considered was what was
going to be done in this country, since primary infantile vaccination cannot be relied upon, and compulsory re-vaccination cannot be got. As long as compulsory vaccination was relied upon, the greatest lever which could be got for sanitary reform was lost. He had no brief for anti-vaccinators, and he did not agree with them in what they say about the failure of vaccination to prevent small-pox.
REMARKS ON THE RECENT OUTBREAK OF CEREBRO-SPINAL MENINGITIS IN THE DUBLIN MILITARY DISTRICT.

By GEORGE E. NESBITT, M.D. Univ. Dubl., F.R.C.P.I.; Assistant Physician to the House of Industry Hospitals, Dublin.

[Read in the Section of State Medicine, April 16, 1915.]

Following a period of comparative freedom from the disease, the reappearance of epidemic cerebro-spinal meningitis in the British Isles has created considerable interest, mainly due to the frequent association of the infection with troops, and the consequent importance at the present crisis.

From current medical literature it is evident that the cases in England have been numerous, and though I have not an estimate of the total to date, I have reason to believe that during the past few months the weekly incidence amongst the troops alone has amounted to from fifty to one hundred cases.

My remarks are based chiefly on those cases which have come under my notice while acting as sanitary officer for the troops in the Dublin district, which embraces, roughly, the middle third of Ireland. For uniformity, however, I have obtained, through the courtesy of the Secretary, Local Government Board, the figures for the entire country since 28th January of this year. The number of cases thus notified amounts to 89. Unfortunately, the mortality figures for the country are not yet available, as, with the
exception of certain towns, these returns are made quarterly to the Registrar-General.

In the Dublin District the cases amongst the troops have been 15, practically all of which I had an opportunity of investigating, in addition to three or four of the civilian patients in the Hardwicke Hospital.

While this number is, of course, much too small to form a basis for any general deductions, it may, perhaps, serve to support or to modify certain current theories regarding this curious disease.

Eight of the fifteen military cases terminated fatally (=53 per cent.), while the rate for the few civil cases I have been able to trace was about 60 per cent.

In this brief résumé I do not propose to discuss the clinical features of the disease, which, in the fully-developed stage as presented by the average case on admission to hospital, are sufficiently characteristic to render the diagnosis fairly obvious—at least during an epidemic. While many excellent descriptions are available, I have found none more instructive than an account (published in 1903) by Dr. Travers Smith of a personal experience of forty cases.

It is, however, at times when the disease is not prevalent that one must be particularly on the alert to detect its occurrence, and I would submit the following particular symptoms as highly suggestive, though they may not all be found in every case of this protean affection:—Rapid onset, intense headache or backache, vomiting, rapid progress of stupor, stiffness of the neck. The last sign I have found extraordinarily characteristic—it has been described as the "soldered" neck, and the term is most appropriate.

This combination is, to my mind, quite sufficient to jus-
identify lumbar puncture forthwith, which, in the majority of cases, will settle the question. I am aware that many clinicians have a curious aversion to early lumbar puncture in these cases where no signs of increased pressure appear to warrant it. The objections can take only two forms—either that the procedure is harmful or that it is not likely to prove helpful. With regard to the first, I admit that injury could be done as in many similar methods of investigation, but I have not heard of any such occurrence, while the opportunity for early diagnosis and treatment would seem to be, as far as our present knowledge goes, a very important matter for the patient and for the community.

In most cases the cerebro-spinal fluid presents obvious diagnostic features—turbidity, moderate increase of pressure, increased content of albumen, absence of sugar, poly-nuclear leucocytosis, and, finally, the presence of the Gram-negative diplococcus both free and intracellular.

In one case, however, which presented signs that could be ascribed only to this disease, I obtained a perfectly clear fluid under considerable pressure. Recovery had already begun, and was very rapid.

In some cases difficulty is experienced in finding the organism in the fluid—it is advisable in most cases to culture, though often such cultures are unexpectedly negative. The organism is delicate, and a medium containing animal protein, such as serum-agar, blood serum or egg, is required. Several cc.s of fluid should be used to inoculate the media.

Before passing from the clinical aspects of the disease I would like to refer to a series of papers at present appearing in the British Medical Journal by three military workers at Aldershot. Many interesting topics are dealt with, but I have been most struck by their division of the affection
into three stages—catarrhal, septicæmic, and meningeal. They believe that many cases never go beyond the first or second stage. I shall refer to the catarrhal stage later. The septicæmic they state to be "undiagnosable," but to present raised temperature, "amazingly exaggerative reflexes," and—very important—diplococci in the urine.

The question of treatment is also somewhat beyond my intended scope. The cases have been scattered under the care of various practitioners, and I have not been able to draw many useful inferences from the results.

At the Curragh Military Hospital, the impression was gained that Flexner's serum was better than others tried, but in England much better results are being obtained since a serum made from organisms isolated from some of the early cases has been substituted for the stock article. Soamin was tried in one case by Dr. Dillon-Kelly, of Mullingar, after serum, and the man recovered. Vaccines are recommended for the chronic type. I have had no experience of their use.

My present inclination is to employ Flexner's serum in 20 to 30 cc. doses for two or three days in succession if required. Later treatment must be symptomatic, and in using serum with any considerable interval between doses the possibility of anaphylactic phenomena should be remembered.

My observations, however, are chiefly concerned with the remarkable epidemiological features of the disease. Much recent as well as older work has been done in this connection without any very satisfactory solution of its mysterious behaviour. This aspect is well summed up in a recent work by Herman and Feldstein, from which I quote:—"It is usually impossible to trace the progress of the contagion . . . there is no regular extension.
... It moves by leaps and bounds. ... Cases are scattered and grouped around several small foci instead of a single focus. ... Attendants rarely contract the disease. ... A multiplicity of cases in a family or dwelling is unusual. ... Compared with other epidemics, a small proportion of the population contracts the disease."

Every one of these features is borne out by the cases under consideration, and in discussing them and their bearing on preventive measures it will be convenient to adopt certain grouping.

(1) Etiological Factors.—The influence of season is borne out by this epidemic, which appears to have reached its maximum in the early spring, and is now, we hope, on the wane. In this connection the frequency of catarrhal affections at this time of the year is very suggestive. During the past few months these complaints have been almost universal. and in one station where cerebro-spinal meningitis appeared, the "morning sick" had previously averaged 300 from a total strength of 2,000, most of the cases being influenza.

Past experience shows that the disease has a marked preference for young people. Of the fifteen cases in this district, it is, therefore, not unusual to find that twelve were between the ages of eighteen and twenty-two. The civilian cases, so far as I know, were all young. Hygienic conditions play an important part, and possibly on this account the disease has been of frequent occurrence in barracks. Fortunately, it is not a war disease. In our cases sanitary conditions were surprisingly good, and no overcrowding existed according to the present army standard of 400 cubic feet per man.

(2) The Source of Infection and Mode of Spread of the Disease.—This has presented the usual puzzle. The first
Case was detected in Kildare by Dr. Coady, on the 30th of November, 1914, in a man who had passed through Woolwich two weeks previously. I understand that Woolwich is a favourite locality for the disease, and it is likely that this man brought the organism with him. The second case, however, did not appear till two months later (24th of January, 1915), this time in Mullingar. Almost the same day another appeared at the Curragh. At intervals, four other cases occurred at Mullingar and two at the Curragh. Dublin was attacked on the 1st and 18th of March by two cases at the same barracks, and a third appeared recently at quite another barracks. Longford had two, with a month between, and one has very recently occurred at Galway.

To sum up briefly, no connection whatever could be traced between any of these cases, no two of which happened in the same room, or even in the same block of buildings. The disease seemed to exhibit a curious perversity in emphasising this point. Arkwright (British Medical Journal, March 20th, 1915) had a similar experience with 40 cases in England, no two of which occupied the same hut. It is noteworthy, however, that 12 of our cases had been in England at various periods up to four or five weeks previous to the onset.

Two interesting cases of possible infection in civilians came to my knowledge. In one, an officer returned home on a week's furlough from France, and left with symptoms of a bad "cold in the head." His sister developed cerebrospinal meningitis almost immediately after his departure. No other source of infection being available, it seems more than likely that the brother was a carrier.

The facts of the other were sent me by Dr. Casey, of Clifden, who writes:—"The patient is a boy, aged
eighteen, an inmate of a small orphanage, seven miles from Clifden. Two soldiers of the Canadian contingent visited the place one month previously, and one slept in this boy's bed." There had been no outbreak of the disease at Clifden since 1904.

(3) Carriers.—The question of carriers presents one of the most interesting and difficult problems of the disease. By the demonstration of their existence in 1901, Albrecht and Ghon threw much light on the puzzling mode of transmission. These workers showed that persons in close contact with cases harboured the meningococcus in the naso-pharynx. The number of carriers so found in proportion to patients has varied greatly in different investigations. Thus, Flügge states that 70 per cent. of individuals in close proximity to a patient become carriers. V. Lingelshein found only 9.5 per cent., Bruns and Hohn 36.9 per cent., Black 28 per cent. In Silesia (1904) 327 carriers were found for each case, while in the early part of the present epidemic in England 3.7 per cent. of 887 contacts were found to be carriers.

These discrepancies can be easily assigned to various causes—the difficulty of recognition and separation of the organism from the naso-pharynx, the rapidity with which cultures are incubated, the hygienic surroundings of the patient, and the intensity of the epidemic. The important fact remains, however, that a certain number of carriers may be expected in connection with every case.

An important question at once suggests itself—Is the organism found in the naso-pharynx of individuals not exposed to infection? Many features of the disease bear a close resemblance to pneumonia, and it would be an attractive hypothesis to assume that the majority of people harbour the meningococcus, and for some ill-defined
reason, as in pneumonia, only a certain number develop the disease. The answer of most workers is in the negative—the only positive evidence being from Munich, where 1.73 per cent. of the garrison were found to be carriers. The result in this case is attributed to the usual annual appearance of a few cases in this station.

Though in civil practice, in this country at least, comparatively little attention has been given to the examination of contacts or the search for carriers, the subject is a matter of the greatest importance in the army. Explicit orders have been issued for the bacteriological examination of contacts in all cases of the disease. Hence the importance of early diagnosis. The bulk of this work in connection with the Dublin cases has been undertaken by Captain Gibbon and Lieutenant Lyons, bacteriologists at King George V. Hospital, and I am much indebted to them for frequent demonstrations of correct technique and for valuable assistance in endeavouring to limit the spread of the epidemic amongst the troops.

The procedure consists in obtaining a swab from the naso-pharynx, using West's swab (shown), the advantage of which is the absence of risk of contamination from the fauces or mouth. Culture media (e.g., serum agar, or a medium containing animal protein) are inoculated and should be incubated as soon as possible. This is an important point, as the organism dies quickly in the cold. If local laboratory facilities are not available—a difficulty experienced in some out-stations—the tubes or plates may be conveyed in a bag with a hot water bottle or some similar device. The ordinary serum-media, being soft, are liable to break up during transit. This difficulty we got over by using 4 per cent. agar.

In most cases an abundant growth of mixed organisms
results, and in a considerable proportion no difficulty is experienced in finding a Gram-negative diplococcus. Unfortunately, several different organisms present the same appearance, and are found in the naso-pharynx. The best known of these, in addition to meningococcus, are pseudo-meningococcus, M. pharyngis sicccus, chromogenic cocci, and M. catarrhalis. The gonococcus is sometimes included in the list, but for practical purposes may be excluded. The differentiation of the true organism, particularly from the M. catarrhalis, is a matter of very considerable difficulty, fermentation and agglutination tests being required.

All contacts, for safety, and particularly those in whom a suspicious organism has been demonstrated, are segregated, provided with antiseptic sprays, and kept under careful observation. The cocci are generally found to disappear from the throat in three weeks, but the time is variable, and carriers have been classed as temporary, periodic (i.e., alternately appearing and disappearing), and persistent (i.e., for months). Three weeks is adopted as the period of quarantine. General measures to limit extension of the disease are carefully adopted. Particular care is taken to avoid overcrowding and debilitating influences—such as excessive exertion or exposure—are abated.

Prophylactic vaccination deserves consideration, but sufficient statistics are not available to form an opinion as to its merits.

As summer approaches, we may hope that the disease will pursue its usual course and tend to disappear. If so, we shall have been comparatively fortunate in the small incidence of the disease in this country.
Prof. E. J. McWeeney suggested that the cases of cerebro-spinal meningitis that occur only constitute a small minority of the cases of this epidemic affection; the whole mystery of the disease would then disappear, leaving a widespread catarrhal affection all over the country, with here and there a meningitic complication. How the diplococcus got from the pharynx into the cranial cavity had been under investigation for a long time, and light had recently been thrown on this by the discovery of the meningococcus in the blood. He recommended that in a case of suspected meningitis 10 c.c.s of blood should be removed from the arm for examination. He also impressed upon clinicians the necessity for doing lumbar puncture early, and said it would be found to be a matter of extreme simplicity if the proper needle was used. He pointed out that one of the leading features of this bacillus was its extraordinary tendency to die off, and he considered that this might be due to the fulminating character of the micro-organism, and it was just possible that the fulminating cases were the ones in which there was difficulty experienced in getting the organisms.
THE EXPLOITATION OF THE MEDICAL PRO-
FESSION IN RESPECT TO MEDICAL CERT-
TIFICATES.

By SIR JOHN MOORE, M.A., M.D.;
Physician to the Meath Hospital and County Dublin Infirmary;
Professor of Practice of Medicine in the Schools of Surgery,
Royal College of Surgeons in Ireland.

[Read in the Section of State Medicine, April 16, 1915.]

Among the meanings of the verb "to exploit" set down in one of our standard modern word-books (Webster's International Dictionary) is this—"to get the value or usefulness out of,‘‘ and—in a bad sense—"to draw an illegitimate profit from.'’ In the same way the substantive "exploitation" comes to signify a selfish, or unfair, utilisation of something. It is exactly in this sense that I employ the word in the title of this paper.

My object is to draw attention to what I regard as a serious professional grievance—namely, the demand made upon the time, patience, and responsibility of registered medical practitioners in respect of medical certification for State or personal purposes at a nominal fee, or, as in the case of the Medical Certificate of the Cause of Death, for no fee at all.

The grievance may have existed for an indefinite period, but it crystallised when death certification became compulsory by law. In England the Acts of Parliament in which the law is written are the Registration Act, 1836 (6 & 7 Will. IV., cap. 86), and the amending Act, the Births and Deaths Registration Act, 1874 (37 & 38
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In Ireland, the law is embodied in the Registration of Births and Deaths (Ireland) Act, 1863 (26 Vict., cap. 11), and the amending Act, the Births and Deaths Registration Act (Ireland), 1880 (43 & 44 Vict., cap. 13). In Scotland, the Registration Acts (which must be read together) at present in operation are:—

1. The original Registration Act of 1854 (17 & 18 Vict., cap. 80);
2. the first amending Act, 1855 (18 Vict., cap. 29);

Dr. John Glaister, from whose excellent work on "Medical Jurisprudence and Toxicology" I have culled the foregoing list of Statutes, writes:—”Certification of death is one of those duties which the Legislature has imposed upon the medical profession and which must be performed without fee or reward. Failure to comply is followed by a penalty”—namely, a fine not exceeding 40s. Furthermore, the giving of a false certificate makes a medical practitioner liable, on summary conviction, to a fine of £10, or, on indictment, to seven years’ imprisonment.

By Section 20 of the Births and Deaths Registration Act (Ireland), 1880 (43 & 44 Vict., cap. 13), it is enacted that—

1. In case of the death of any person who has been attended during his last illness by a registered medical practitioner, that practitioner shall sign and give to some person required by this Act to give information concerning the death, a certificate stating to the best of his knowledge and belief the cause of death, and such person shall deliver or cause to be delivered that certificate to the Registrar; and the cause of death as stated in that certificate shall be entered in the Register.
Now come the questions:—For whom is this gratuitous medical certificate intended, and with what end in view? The answers will be found on the form of certificate itself—they are:—"N.B.—This certificate is intended solely for the use of the Registrar," and—

"In order that the Causes of Death as certified by Registered Medical Practitioners may be satisfactorily classified in the Statistical Department of the General Register Office, for publication in his Weekly, Quarterly, and Annual Reports, the Registrar-General requests:—

"(1) That Registered Medical Practitioners in filling up their certificates will adopt as far as possible the suggestions prefixed to each Book of Certificate forms; and

"(2) That the Names of Diseases in the Certificates be written as legibly as possible in order that Registrars may be enabled to copy them accurately into the Death Register."

So, then, this Medical Certificate, for which no fee is paid, is for State purposes, and is demanded under the threat of a penalty. Who, after this, will not say that the registered medical practitioner at all events serves his country, and that, too, without fee or reward?

If I remember aright, an attempt was made to insert in the amending Bills when passing through Parliament a clause providing for payment of a fee to a medical practitioner certifying to the cause of death. The only concession to the profession, however, was permission to insert in the form of certificate the words "as I am informed," should the medical attendant on the deceased not feel justified in taking upon himself the responsibility of certifying the fact of Death. This amendment was adopted at the instance of Sir Dominic Corrigan, Bart., then Member of Parliament for the City of Dublin.
The necessity for this amendment is illustrated by the following quotation from Dr. Glaister's account of the law as to death certification:

"In the evidence given before the Select Committee of the House of Commons on Death Certification, Dr. Grimshaw, Registrar-General for Ireland, told the Committee the following facts:—Dr. Lyons—who was at one time a Member of Parliament—when in practice in Dublin, was attending a man who was very ill from paroxysmal asthma, complicating bronchitis. He saw the man one day in a very bad attack. Next morning, friends of the patient called at the house of Dr. Lyons, stated that the patient was dead, and asked that a certificate of the cause of death be sent to them. It happened, however, that Dr. Lyons had gone out on his round of visits, and calling upon this patient early because of his serious condition, found the man not only alive, but sitting up in bed. It was clear that the informants wanted the certificate from Dr. Lyons so that they could register the death and obtain the insurance money."

The efforts made to obtain redress for the medical profession in the matter of certification fees, although for the time abortive, seem to have borne fruit, such as it was, at a later date. For in the Infectious Disease (Notification) Act, 1889 (52 & 53 Vict., c. 72), Section 4, Sub-section (2), runs thus:—"The local authority shall gratuitously supply forms of certificate to any medical practitioner residing or practising in their district who applies for the same; and shall pay to every medical practitioner for each certificate duly sent by him in accordance with this Act a fee of two shillings and sixpence if the case occurs in his private practice, and of one shilling if the case occurs in

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*Loc cit.* Chapter VI. Page 169.
his practice as medical officer of any public body or institution."

The supplemental Infectious Disease (Prevention) Act, 1890 (53 & 54 Vict., cap. 34), and the Public Health (Ireland) Act, 1878 (41 & 42 Vict., cap. 52), as also the Public Health Acts Amendment Act, 1907 (7 Edw. VII., cap. 53), are almost silent on the subject of fees for medical certificates under the Act in question. In the first-named, Sec. 20 allows a local authority to pay "the reasonable remuneration of any veterinary inspector or surgeon employed under Section four" for the inspection of dairies. Part of the duty of such "veterinary inspector or veterinary surgeon" shall be to report to the Medical Officer of Health of the District. But the "inspector" or "surgeon" is not in this case a medical practitioner.

Section 57 of the Public Health Acts Amendment Act, 1907, which deals with the case of a child "who is or has been suffering from infectious disease or has been exposed to infection," enacts that the parent or guardian shall not "permit" such child to attend school without having procured from the medical officer [that is, the M. O. H. of the district] a certificate (which shall be granted free of charge on application) that in his opinion such child may attend without undue risk of communicating such disease to others."

The last Act of Parliament bearing on the subject of this paper to which I will draw attention is the Tuberculosis Prevention (Ireland) Act, 1908 (8 Edw. VII., cap. 56).

Section 1 deals with notification and disinfection. It is divided into eight sub-sections. Of these I quote the fourth and fifth word for word. Please note the order—penalty, first; reward, second.

"(4) If any medical practitioner required by this section
to send a certificate fails to send the certificate within the period specified in this section, he shall be liable on summary conviction to a penalty not exceeding forty shillings.'

"(5) The sanitary authority shall pay to every medical practitioner for the certificate duly sent by him in relation to a patient in their district a fee of one shilling if the case occurs in an infirmary, public hospital, or workhouse, and a fee of two shillings and sixpence if the case occurs elsewhere, but only one notification fee shall be paid by the sanitary authority in respect of the same patient.

"Where the medical practitioner required by this section to send a certificate is himself the medical officer of health of the district he shall be entitled to the fee to which he would be entitled if he were not such medical officer."

This last sentence, I admit, shows some signs of grace.

With regard to medical certification under the National Insurance Health Scheme, it has been as unsatisfactory as it is possible to imagine. This may be gathered from the Report of the Departmental Committee on Sickness Benefit Claims under the National Insurance Act, dated 24th July, 1914, and presented to both Houses of Parliament by Command of His Majesty. Suffice it to say here that the Committee expressed the "opinion that, in view of the difficulties with regard to certification, it is necessary that there should be established as soon as possible a system of medical referees." (Report, paragraph 67, page 75).

The Committee were further "of opinion that it would be equitable that practitioners should also contribute towards the cost of medical referees, in so far as the medical referee may remove from the panel practitioner the necessity of discharging certain of those duties which.
by his agreement with the Insurance Committee, he has undertaken to perform "—that is, no doubt, an allusion to a clause in the contract entered into by the medical practitioner on the panel with the Insurance Committee, under which he agrees in effect to give, without charge, the initial certificates, the continuation certificates and the declaring-off certificates required by the rules of the society of which the insured person is a member.

Is it not perfectly obvious that the Chancellor of the Exchequer in his Bill for National Insurance should have provided for proper remuneration out of State funds for the Medical Profession who would be called upon to certify under the Bill? He made provision for the approved Societies and for the insured—only the Medical Profession was left out in the cold.

Now, I think I may claim so far to have proved that the State through the Legislature places but a small, an insignificant, financial value on medical certificates—that, in fact, it "exploits" the medical profession in the matter of certification. I proceed to show from recent personal experiences how this attitude of the State has influenced the public into believing that medical certificates are to be had for the asking, and actually should be so obtainable as a matter of course, if not of right.

On January 19th of the present year, I received from the Advisory Committee (of which, by the way, I am myself a member) a very complimentary letter asking if I would be willing to act as Honorary Medical Officer for the Irish Branch of Queen Victoria's Jubilee Institute for Nurses. With the letter, this form was enclosed:
"QUEEN VICTORIA'S JUBILEE INSTITUTE FOR NURSES.

"MEDICAL CERTIFICATE.

1. Name.
2. General Health?
3. Hearing and Sight?
4. Teeth?
5. If any tendency to Varicose Veins?
6. If any tendency to Flat Feet?
7. If any illness of importance?
   What?
   When?
8. If any tendency to Pulmonary or Scrofulous Disease?
9. If any tendency to Rheumatism?
10. If any Heart Disease?
11. If subject to Anaemia?
12. If physically fit to cycle?
13. If vaccinated?
14. If re-vaccinated? Date?

"I have this day, , 191 , examined and hereby certify that she is in good health, that she is not laboured under any defect or deformity, and that she is in my opinion both physically and mentally competent to undertake the duties of a District Nurse.

"Signed
"Address ."

My reply was to the effect that my professional services were freely and without fee at the disposal of any Queen's Nurse who was ill, but that I could not undertake to fill up a medical certificate as suggested unless a fee of one guinea was paid for every such certificate.

A professional brother, to whom a similar request was made, adopted a similar course—so I understand.

At the next meeting of the Advisory Committee, it was agreed to leave the necessary medical certificate as heretofore in the hands of the individual nurses, to have it filled
The Exploitation of the Medical Profession.

by their usual medical attendants, with the addition of a new question—namely, "If physically fit to cycle?"

To take another instance—For some thirty years I have been Honorary Physician to a large girls' school in Dublin. It seems that the school is now under the scheme whereby grants are made by the Department of Agriculture and Technical Instruction for Ireland to Technical Schools and Science and Art Classes. In February of this year three of the pupils in the school were invalided and unable to present themselves at the inspection of their work by a Representative of the Department. I was asked to give the necessary medical certificate, but declined unless a fee of a guinea was paid. This request on my part was based on the fact that the object of the certificate was not personal, but to secure for the school a grant from a Public Body. My request was at once acceded to, and a few days later I received a cheque with a very courteous letter from the secretary on behalf of the school committee.

This case shows that perhaps the public need only to be placed in possession of the facts to act justly and more generously in regard to medical certificates. There is considerable misunderstanding on the subject, and people are too apt to look to the interests of one of the two parties to a transaction, forgetful of the fact that the other party also has interests at stake and rights. Some time ago, at a meeting in support of a nursing institution which does splendid work among the Dublin sick poor, a clergyman, in bearing testimony to that work, naively mentioned that an Approved Society under the National Insurance Act very kindly saved its poor clients expense by accepting the nurse's report as to the progress of a patient in lieu of a medical certificate. At the close of the meeting, I asked the speaker whether he realised that the action of the Society deprived some medical practitioners of the small
fees to which they were entitled under the Act for granting medical certificates. I also told him that, while I knew the district nurses were innocent, the action of the Society was calculated to imperil district nursing in Dublin, for its success depended on a complete understanding between doctors and nurses, and loyalty to the medical profession on the part of the nursing-calling.

My statements opened the speaker's eyes, and I am bound to say that he made every effort to prevent the mischief which his speech was certainly calculated to cause.

In conclusion, I venture to state that the Medical Profession is itself not altogether free from blame in this exploitation. Its proverbial generosity, and—"horresco referens"—its lack of worldly wisdom, have contributed to establish a false estimate in the mind of the public as to the value of a medical certificate, and what it costs to give an accurate one.

Dr. Rowlette feared the practice of giving certificates of death free could not be reversed, but the profession should try to prevent any further impositions. This was a serious question where the profession was asked not to protect the interests of the poor, but to protect the interest of trading bodies such as insurance societies. The Legislature had provided money to pay, and that money was being perverted from the persons who were properly able to do this work, and his was done on the plea that doctors were not honest. The arguments, he considered, should be put before the public, and it should be made quite clear that the profession was tired of this exploitation, and some steps ought to be taken to prevent its continuance. He suggested that the General Medical Council should consider whether it is within their power to look into the regulations made by the Government, and whether they interfere with the interests of the medical profession.
ABSTRACTS.

SECTION OF STATE MEDICINE.

Friday, January 8, 1915.

The President (T. P. C. Kirkpatrick, M.D., F.R.C.P.I.) in the Chair.

The Failure of the Vaccination Acts.
Dr. T. P. C. Kirkpatrick read a paper on this subject. See page 391, ante.

Friday, April 16, 1915.

The President in the Chair.

Remarks on the recent Outbreak of Cerebro-spinal Meningitis in the Dublin Military District.
Dr. G. E. Nesbitt gave an account of the recent outbreak of cerebro-spinal meningitis in Ireland. See page 408, ante.

The Exploitation of the Medical Profession in respect to Medical Certificates.
Sir John Moore read a paper entitled as above. See page 418, ante.
SECTION OF ANATOMY AND PHYSIOLOGY.

EXPERIMENTS ON CARDIAC REFLEXES.

By D. T. Barry, M.D.;
Professor of Physiology, University College, Cork.

[Read in the Section of Anatomy and Physiology, Jan. 8, 1915.]

SECTION I.—Introduction.

The subject of heart reflexes, already grown somewhat trite, remains, however, of much interest and importance. Our knowledge of the subject is by no means complete.

Some little time ago I began a series of experiments on the hearts of frogs and toads which had mainly a pharmacological bearing, but in the course of them certain reactions on the part of the heart seemed to touch closely on the question of nervous control and reflexes, about which so much recent controversy has taken place.

Taking the nervous mechanism of the heart as a whole we find, by artificial stimulation, three factors—augmentor, accelerator, and inhibitor—the degree of interdependence or mutual adjustment between which, it must be frankly said, is not properly understood. As to the relative importance of these factors much difference of opinion prevails, and they seem to vary in importance in different animals and in different states of the same animal.

We may group the augmentor and accelerator under one head, and call it the exciting factor, which, with the inhibitor, forms a complex comparable to that existing in
other regions. As instances of this latter we may cite the nerve mechanism presiding over skeletal muscles where a true reciprocity has been shown to exist between excitor and inhibitor by Sherrington, and the vasomotor complex in which Bayliss has given definite proof of reciprocal action between dilator and constrictor parts.

A few short references to the recent work on this aspect of the cardiac mechanism may be cited.

Franck says the important factor is the vagus normally, but in certain states, especially under experimental conditions, this is altered, as the vagus under artificial influences is the more affected. Franck has no convincing evidence of this.

Roy and Adami contend that acceleration cannot occur independently of vagus action because accelerator stimulation after section of vagi gives augmentor effect without increase of rate. But such stimulation, reflex or direct, may give a pure augmentor effect with intact vagi. (Fig. 1.)

McWilliam says reflex acceleration is not dependent on excitation of augmentor nerves; if the heart is slowed by vagus stimulation, stimulation of sensory nerves causes no acceleration. This is, I think, a somewhat fallacious argument: reflex stimulation of accelerator ganglia is weak as compared with direct stimulation of vagus.

Bayliss got acceleration by stimulating the depressor after section of the vagi.

Hering says acceleration in exercise is due to stimulation of accelerator, but is accompanied by depression of inhibitor tone.

Tigerstedt says the reflex may occur through both paths. According to Bainbridge reflex acceleration can be brought about through sympathetic paths; for instance,
by stimulating the sciatic with the vagi cut in cases where the rate is not maximal. He thinks that three factors enter into the causation of reflex acceleration—viz., excitation of accelerators, depression of vagus tone, and increased secretion of adrenalin.

![Fig. 1](image)

Blood-pressure (upper tracing), heart-beats (second tracing), and respiration (lower tracing) of dog. The central end of the sciatic was stimulated at the signal mark. Time in seconds.

To avoid confusion let us consider the possibilities. A peripheral accelerator stimulus such as sciatic excitation may affect a pressor centre alone, a depressor centre alone, or both together. In the latter case it would enhance pressor impulses from one centre, and antagonise
depressor impulses from the other. A true reciprocity connotes this combined action unless we admit the possibility of a local influence on inhibitor ganglia of sympathetic impulses—a sort of drainage action.

Section II.—Perfusion.

Before discussing the question of reflexes pure and simple and how they are influenced by such conditions as may arise from anaesthetics, poisons, etc., it will be well to consider the nervous control of the heart from a broader standpoint; that is, by brief reference to the old controversy waged round the neurogenic and myogenic hypotheses of Englemann and Gaskell respectively. Of the many arguments bearing on this controversy very little importance seems to have been attached to bringing the beat to a standstill and again setting it going by nerve stimulation. Schelske and Von Cyon caused the frog's heart, brought to a standstill by heat, to resume its beat by stimulation of the vagus; and Hering restarted the mammalian heart by stimulation of the accelerators. I have found the degree of heat necessary to stop the heart completely so deleterious as to prove of little value in such investigation. I have never seen reference to such method of restarting the heart when brought to a standstill by drugs. If a drug stops the beat it may do so by acting either on muscle or nerve, and the resumption of the beat as a result of nerve stimulation is not, of course, conclusive proof that the beat depended on the nerve, but is strong presumptive evidence in favour of the importance of such nerve as a factor in the rhythm.

By perfusion with nicotine the heart is readily brought to a standstill, both chambers ceasing together or one
before the other, the auricle being the more likely to stop
first in the fresh heart, and the ventricle in the hypo-
dynamic heart. Where the perfusion pressure is compara-
tively high a weak solution of nicotine often stops the
auricle, while the ventricle goes on beating, the pressure
masking in the ventricle the action of the weak poison.
in such cases stimulation of the stellate ganglion often
causes a renewal of the beat, especially after a certain
interval following the perfusion. Stimulation of the vago-
sympathetic is less effective in renewing it, and stimula-
tion of the sciatic still less so. But stimulation of the
sciatic is equally effective whether the vagus centre be
 crushed or not. This shows, at any rate in the frog, a
direct influence of peripheral stimulation on accelerator
nerves.

Perfusion with alcohol readily brings about a stand-
still, varying in duration with the strength of the alcohol,
and slowly recovered from by perfusion with Ringer's
fluid. There are three stages in the recovery so far as
the muscle condition goes—firstly, it is absolutely in-
excitable by artificial direct stimulation; secondly, it
responds by a single contraction to each stimulus; and
lastly, a single stimulus sets up a regular rhythm. In the
first stage sympathetic stimulation has no effect; in the
second an occasional muscle response is given to a series
of accelerator stimuli; and in the third phase a rhythm is
set up in the same way as by direct muscle stimulation.
In the third phase a sciatic stimulus is also generally effec-
tive in renewing the regular rhythm.

Perfusing a toad's heart once with the juice of an
nion-2cc. in Ringer's solution 100cc., I was much sur-
prised to see it come to a standstill after a few seconds.
On cutting off the fluid it remained quiescent for more

T.
than a minute and then resumed beating at the previous rate. Each time that the fluid was turned on arrest of the beat quickly supervened. The heart in this condition was instantly set going by stimulation of the vagus, of the sympathetic or of the sciatic. (Fig. 2.) Atropin was only tried as an antidote when the heart had been long exposed and was in a hypodynamic condition. In this

**Fig. 2.**

Perfusion of toad's heart with an extract of onion. Upper tracing auricular, lower ventricle. The second stop is spontaneous.

condition the extract caused marked irregularity after atropine, but did not bring about the same abrupt termination of the beat. The result seemed very like a simple vagus stimulation, but I think the muscle substance was also affected. The same extract was tried on the heart of a tortoise, and produced much irregularity and grouping of beats, but did not cause arrest for any long period. The last mentioned experiments were done in
By Dr. D. T. Barry.

winter, and subsequent attempts at producing a similar effect ended in comparative failure. Whether the results described are to be attributed to some very susceptible condition of the particular toad's heart in question or to a toxin developed possibly by decomposition in the onion I do not know.

All these experiments point, I think, to the importance of the accelerator nerves as driving factors in the cardiac mechanism not only to the heart as a whole but to each chamber separately, and would seem to indicate that this side of the complex is of necessity concerned in reflex-modifying influences. We can get acceleration of the frog's heart by stimulation of the sciatic after crushing or pithing of the medulla, but it is not easy.

Section III.—Mammal.

Let us turn to the question in the mammal. Here we are met by many apparent anomalies. The difficulties of technique, etc., in the investigation are not insurmountable; the chief difficulty lies in the interpretation of results. My experiments in this field have been somewhat on the lines of those performed by Bainbridge and MacWilliam. Dogs were used for the experiments.

An important consideration here is the anaesthetic used and the degree to which it is pushed. MacWilliam employed cats for the investigation of chloroform action on the heart reflexes. Speaking generally, he says chloroform causes in the first stages of its action acceleration, and subsequently slowing to normal or above normal; but the rate may increase with increased chloroform and a falling blood pressure. Peripheral stimuli, he says, may cause acceleration or slowing, the latter being more usual when visceral nerves are excited, and accelera-
tion when somatic nerves are stimulated, especially with weak or moderate stimuli. Strong stimulation of somatic nerves he thinks more likely to affect depressor fibres.

Bainbridge worked with dogs, using chloroform and ether after an injection of morphia. His chief results go to show that peripheral stimuli may cause acceleration of the heart in three different ways—viz., by the lowering of vagus tone, the increase of accelerator tone, and the increased secretion of adrenalin. Of these three mechanisms he considers the vagus the most important under ordinary circumstances, and he seems to regard, with Gasser and Meek, whom he quotes, the accelerator side as of secondary importance and only called on in exceptional conditions.

The anaesthetic which I used was chloralose. It was generally given to the animal in a little food—1 grm. per kilo of the body weight about an hour before starting an experiment. It has the great advantage of being uniform. In some cases a smaller dose was given, and this was supplemented by ether.

While Bainbridge regards the reflexes of rise in blood pressure, acceleration of the heart and increased breathing to form a group which respond almost invariably to the same stimulus of the sciatic, I have come to the conclusion that the group is very easily dissociated, that any of its three factors may not only give no response but that it may take the contrary form to that mentioned. Bainbridge admits that the blood pressure change may occasionally be a fall, and due to variations of anaesthesia depth. I have found the blood pressure response to sciatic stimulation to be very frequently a fall both in deep anaesthesia and light anaesthesia, and with moderate and strong stimulation.
By Dr. D. T. Barry.

The most favourable conditions for getting a reflex rise of blood pressure on sciatic stimulation with not more than a couple of seconds latent period are a fresh condition of the animal and a comparatively weak stimulus. The degree of anaesthesia does not seem to matter. The accelerator response is much less likely to occur as the experiment goes on and the response of rise in blood pressure is also more rare. So much so is this the case that I am inclined to attribute in part the immediate rise of blood pressure to the acceleration and the continued rise to adrenalin production. A fall, however, of pressure may, as Bainbridge stated, accompany acceleration.

The best way of getting the response described by Bainbridge is by simple massage of the sciatic nerve, and even surrounding muscles in the early stages. (Fig. 3.) If the vagi are cut before dissection in the thigh is begun it is easy to get the accelerator and pressor response; it is not so easy if, prior to section of vagi, the sciatic has been for some time exposed, and especially if it has been stimulated with strong currents. The accelerator fibres in the
Experiments on Cardiac Reflexes.

Sciatic, influencing normally accelerating ganglia, and easily stimulated by local changes in normal circumstances, rapidly deteriorate under artificial conditions and thus lead to fallacious reasoning as to their importance in normal circumstances. In other words, the sciatic afferent fibres to the vasomotor centre are in great part depressor in function and are easily affected by ordinary electrical stimuli. That pressor fibres exist is shown by an occasional immediate small rise of pressure without acceleration, lasting not more than a second or two and giving way to a fall. With massage of nerve initial rise is always marked. The increased pulmonary ventilation, too, aids the rise of blood pressure, but even where breathing is

![Figure 4](image-url)

Fig. 4.

Record showing fall in blood pressure with respiration greatly increased.
markedly stimulated we may have a marked fall of blood pressure accompanying it with practically no preliminary rise and with a varying latent period. (Fig. 4.) A preliminary rise of blood pressure is determined in great measure by the presence of increased CO₂ in the blood.

In Fig. 5 the breathing is inhibited for ten or twelve seconds by pinching the trachea, and the response to sciatic stimulation, which a few minutes previously was an immediate fall, now shows a momentary but distinct rise preceding the fall. The latent period of the pressor response, which, as Bayliss has shown, is really a response
of both parts of the centre, seems shorter than that of the depressor, also a reciprocal action.

A stimulus which has a marked depressor effect when applied to the sciatic may have very slight effect when applied to the central end of the vagus (Fig. 6), but the effect is depressor, showing that there is not much difference in the susceptibility of those fibres in visceral and somatic nerves for this particular stimulus.

![Fig. 6.](image)

First signal mark shows sciatic effect, and second shows effect of stimulating central end of vagus.

The latent period for adrenalin secretion is shorter than is generally believed; at any rate in case of a first application of a stimulus. After a period of rest not more than five or six seconds intervene before the adrenalin rise is marked. A second stimulation, following within half to one minute of the first, finds the glands somewhat exhausted, and a considerable interval elapses before secretions occurs. (Fig. 4. Second stimulus.)
A weak stimulus to the sciatic which gives slight or no rise of blood pressure has a cumulative effect on the suprarenal for a succeeding stimulus of the same strength if the latter falls within about half a minute from the first. If the interval is much greater than this the second stimulus is no more effective than the first.

![Graph demonstrating blood pressure (BP), sphygmomanometer (Sphyg), and respiratory (Resp) responses](image)

**Fig. 7.**

Prolonged anaesthesia preventing respiratory increase on sciatic stimulation.

Considering the question of duration of the stimulus we find the breathing factor most affected by prolonged stimulation. The effect is usually continued long after stimulation ceases. The breathing factor is affected most in the other direction by depth of anaesthesia, especially where ether has been pushed as a supplement to chloro-
lose, and the vagi have been cut and massaged. A rise of blood pressure with a long latent period follows stimulation in these cases, and may be preceded or not by a fall. Fig. 7 shows an initial fall and Fig. 8 a slow rise of blood pressure under these conditions.

Fig. 8.

Prolonged anaesthesia preventing the augmentor effect on respiration of sciatic stimulation. The respirations are actually diminished in extent.

It occurred to me that a little knowledge of the relative importance of the vagus in the nerve complex might be gained by noting the action of a well-known heart poison—nicotine—with vagi cut and intact. The records of these two experiments are somewhat interesting, but the information which they give of the nervous mechanism may
or may not be considered significant. The dose used was 1 m per kilo of weight in Ringer's fluid, and injected into the external jugular vein. In Fig. 9, where the vagi are intact, the first effect of nicotine, of very rapid onset, is a rise of blood pressure, soon followed by a marked fall and again a rise of some 25 mm. above the previous mean. During the greater part of this rise there is considerable acceleration, and death abruptly ensues about 45 seconds after injection. The breathing ceases early in the poisoning, and convulsions, not shown by the respiratory tambour, were of somewhat mild degree.

In the case with cut vagi the initial rise of blood pres-
sure is somewhat less; the fall and secondary rise resemble in point of time those of the first case, but the rise is much greater, acceleration is better marked, death is more gradual and comes on only after more than three minutes have elapsed. Convulsions were well marked in this case, and affected the respiratory tambour. (Fig. 10.)

Nicotine is said to stimulate powerfully both central and peripheral vagus. In this case it would seem that the central stimulation is a powerful factor in the rapid onset of death, while without the vagus control the heart action was maintained for a considerable time. Nicotine quickly paralyses nerve cells, though it has recently been thought by many observers that it has an initial stimulating action. In the case of intact vagi it looked as if the latter neutra-
ised the efforts of the accelerator to keep the heart going in adverse circumstances.

In summarising the results I would say that cardiac reflex acceleration is not such a constant phenomenon as a result of sciatic stimulation as is generally thought. The action of the vagus nerve in the reflex has not been properly determined. The reflex can take place with cut vagi. It is most readily seen in the early stages of anaesthesia and well brought out by simple stimulation, such as mere handling of the sciatic and muscles of the thigh.

Alterations of blood pressure accompanying sciatic stimulation may take the form either of a rise or fall. One factor in the cause of an immediate rise (one to two seconds latent interval) is, I think, acceleration of the heart, but there is also momentary pressor stimulation of the centre. The continued or later rise is due to adrenaline and disappears, or is much delayed, in repeated stimulation. A fall of blood pressure with or without a preliminary momentary rise is quite common in different depths of anaesthesia and with different stimuli.

Increased CO₂ in the blood quickly determined a pressor effect.

Inhibitor tone is probably depressed as an associated part of the accelerator reflex, but does not constitute the main part of that reflex.

The paralysis of the peripheral vagus by nicotine cannot account for the acceleration produced; the nicotine effect was greater after previous section of these nerves. It has been said that the convulsions were more pronounced in the case of cut vagi. These convulsions excited numerous somatic nerves which re-acted on the accelerator ganglia unbalanced by vagus action. In the case with intact
vagus the convulsions were less in degree, which may account in part for the acceleration being less, but I think the vagus acted the principal part.

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THE ACTION OF RENNIN ON MILK.

By T. H. MILROY, M.D., F.R.S.E.;
Professor of Physiology, Queen's University, Belfast.

[Read in the Section of Anatomy and Physiology, May 28, 1915.]

The two main factors which govern the action of the coagulating ferment of the gastric juice, rennin, are the reaction and the calcium content of the milk. Thus, for a given calcium content of milk, the rate of coagulation is more or less proportional to the true acidity, or hydrogenion concentration of the milk; while, with the latter at a fixed standard, the rate is proportional to the calcium content.

Many agents which lower or prevent coagulation of milk affect both factors. For example, as is well known, the addition of an alkaline oxalate to milk prevents the coagulant action of the ferment. This effect is usually regarded as being due to the precipitation of the soluble calcium of the milk, but it is also in part caused by the fall in hydrogenion concentration which this salt produces. In studying the parts played by these two factors it is necessary to be able to alter one without affecting the other.

In order to lower the calcium content of milk, I adopted the method of heating the milk to a little below boiling point, and keeping it at this temperature for one hour, while preventing evaporation. Such milk shows very great reduction in coagulability, and also a fall of about 12 per cent. in the calcium content. When the hydrogenion concentration of heated milk is estimated, it is found to be above that of an unheated specimen of the
same milk. The rise in acidity ought, of itself, to make the milk more coagulable, but this diminution in coagulability is due to the lowering in the calcium content. In order to render heated milk coagulable with rennin, either the calcium content must be raised again to the normal, or the hydrogenion concentration must be increased beyond the normal.

A series of estimations was made to determine the hydrogenion concentrations of milk specimens of different calcium contents which gave the same coagulation time with rennin.

The numbers given in the table refer to milk diluted 1 in 4.

<table>
<thead>
<tr>
<th>Ca O per cent.</th>
<th>( [\text{H}] \times 10^{-6} ) Normal</th>
</tr>
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<tbody>
<tr>
<td>.035</td>
<td>1.778</td>
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<tr>
<td>.036</td>
<td>1.660</td>
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<tr>
<td>.038</td>
<td>.871</td>
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<td>.042</td>
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<td>.122</td>
<td>.125</td>
</tr>
<tr>
<td>.135</td>
<td>.107</td>
</tr>
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All these specimens of milk coagulated in the same time—namely, five minutes, when acted upon by the same quantity of rennin.

In nearly all cases where milk from special cows shows lowered coagulability with rennin, the fault lies in the lowered calcium content of the milk, and, on the addition of a small quantity of calcium chloride solution, the rennin again becomes active.

\( [\text{H}] \) = Hydrogenion concentration.
In all experiments of ferment action it is essential to determine accurately the reaction of the medium, and, in cases where the calcium content plays a part, to estimate the percentage of that element. Thus, for example, in the study of the so-called anti-ferment actions produced by the addition of blood serum to fluids containing a particular enzyme, it is necessary to differentiate between a true anti-ferment action and one due to the accompanying alterations in the reaction or calcium content of the medium.
HEART BLOCK PRODUCED BY YOHIMBINE AND QUEBRACHINE.

By J. M. GIBSON, B.A., M.B.;
Demonstrator of Physiology, Queen's University, Belfast.

[Read in the Section of Anatomy and Physiology, May 28, 1915.]

These drugs are peculiar in that they both produce heart block when perfused, but do so in different ways. They are probably representatives of two distinct groups of cardiac depressants. One group produces heart block by acting chiefly on the conducting bundles which normally convey the excitatory impulse from one chamber of the heart to another. The other does so by depressing the irritability of the general mass of the cardiac muscle so that it fails to respond to an excitatory stimulus normally conducted thither. (*)

When either drug is slowly perfused one notices that the A. V. interval gradually lengthens, that the rate of the heart decreases, and that after a time the ventricle beats once for every two auricular contractions. With further perfusion the blocking becomes deeper and deeper so that the ventricular beat follows three, four, five, &c., auricular beats, and then the stage of complete A. V. blocking supervenes, when the auricular contractions alone are seen. It can be shown that the blocking in each case is due to the direct action of the drug concerned on the musculature, and is not produced through any nervous

* A series of tracings were shown illustrating the actions of yohimbine and quebrachine on the frog's heart.
agency, for the blocking persists (1) when the heart is completely separated from the body, (2) when the ganglionic nerve endings have been paralysed by nicotine, (3) when the final nerve endings in muscle have been paralysed by atropine. Both drugs depress the irritability of the general mass of the cardiac muscle.

Points of distinction may be demonstrated: (1) In the early stage of blocking by yohimbine an increase in the irritability of the ventricle makes no change on the block. In the case of quebrachine the same procedure throws off the block. (2) When saline is perfused subsequent to perfusion with yohimbine the block may disappear while the irritability of the ventricle remains as much, or even more, depressed than when blocking was showing; whereas with quebrachine disappearance of the block coincides with increased ventricular irritability. (3) Perfusion with yohimbine may produce complete dissociation of the auricular and ventricular beats. Such an effort is never seen with quebrachine. From these and other experiments one may argue that yohimbine produces blocking chiefly by acting on the conducting bundles, whereas quebrachine does so by lessening the irritability of the general musculature of the heart and to a very small extent, if at all, by diminishing conduction in the conducting bundles. (*)

The alterations produced in the various waves of the electro-cardiogram may be used as an aid to the interpretation of electro-cardiograms generally. Thus it can be shown that when quebrachine—a well-marked muscular depressant—is perfused, the so-called T-wave becomes smaller and smaller and finally is reversed. From this it

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(*) A series of electro-cardiograms of the frog's heart were shown which also demonstrated the depressing effects of the drugs.
can be inferred that the height of the T-wave on the human electro-cardiogram is an important clinical guide and that it is an indicator of the degree of tonicity of the ventricular myocardium.

It may be pointed out that by comparing the form change of the frog's heart with the electro-cardiogram one could tell whether the block is due to an interference with the conduction of the excitatory impulse over the junctional system, or due to inability on the part of the general mass of the muscle of the ventricle to respond, as it should, to a stimulus normally conducted thither. In the same way one may suggest that by comparing the electro-cardiogram with the jugular pulse tracing it would be possible to recognise in the human heart either type of heart block if present.
ABSTRACTS.

SECTION OF ANATOMY AND PHYSIOLOGY.

Friday, January 8, 1915.

Professor J. M. Purser in the Chair.

Some Experiments on Cardiac Reflexes.

Professor D. J. Barry read a paper, illustrated by lantern slides, on the above subject. See page 429, ante.

Friday, March 26, 1915.

Professor Thompson in the Chair.

Demonstrations.

A Test for Nitrites in Organic Solutions.

Dr. W. G. Smith demonstrated some tests for the detection of nitrites in organic mixtures.

(a) The oldest and simplest test is the liberation of iodine from an acidified solution of potassium iodide.

This answers excellently for many purposes, but is not so useful for such complex mixtures as urine or saliva, because some free iodine is "bound" by the organic matter present.

(b) Meta-phenylene-diamine (meta-diamido-benzol) test (Griess). An acidified solution of the reagent develops with nitrites a brown colour (Bismarck brown). Very delicate, but the solution must be freshly prepared.

(c) Griess's double test—

(i.) Sulphanilic acid, dissolved in acetic acid (1 grm. in 200 cc.).
(ii.) \( \alpha \)-Naphthylamine, dissolved in acetic acid (0.2 grm. in 300 cc.).

Add a little of the mixed solutions to the suspected liquid. Fine red colour. Extremely sensitive. Limit = 1 in 500 millions.

The test reacted with filtered saliva and with freshly expressed groundsel juice.

Professor Thompson stated that he was under the impression that there was a small amount of nitrites in urine, but did not know that this was due to bacteria, as suggested by Dr. Smith.

*The Influence of Temperature on the Secretion of Sweat.*

Dr. O'Connor reported on experiments on the influence of temperature on the secretion of sweat, which show that active sweating appears in the anaesthetised cat when the body temperature reaches about normal or the subcutaneous temperature of a portion of the body rises to about 43° C.

*A Suggested Reconstruction of the Mandible of Piltdown man.*

Professor A. Francis Dixon exhibited a proposed reconstruction of the lower jaw of the Piltdown man. He believed that it was not necessary to assume a complete absence of the mental eminence, or an enormous development of the incisor teeth. Further, he did not think that the fragment indicated that the molar-præmolar series of teeth was more nearly parallel to the mesial plane than is often the case in recent specimens. He had obtained the mandible believed to belong to a native of one of the Melanesian Islands, which exhibited many resemblances to the fragment discovered at Piltdown. From this specimen a portion corresponding to the Piltdown fragment was carefully cut away and a cast of the Piltdown fragment was fitted to the remaining part. The manner in which the cast and actual bone so united form a nearly symmetrical "mandible" is very striking. The
alveolar part with the sockets for the teeth formed a symmetrical curve, and there was space enough for the recently discovered canine tooth, should it prove to belong to the Piltdown skull. The actual model of this tooth will not fit into the existing socket, but there is room enough to enlarge the socket sufficiently to hold the tooth without encroaching unduly on the neighbouring teeth. In the compound "mandible" formed in the manner described, as was to be expected, a considerable want of symmetry exists in the region behind the lower part of the symphysis. Yet the difference on the two sides is not very striking. On both sides the lower edge of the bone widens out very much as we approach the symphysis, but the horizontal backward shelf-like projection on the side formed by the cast is distinctly more marked.

As the fragment of the mandible is the only part of the Piltdown skull which exhibits very striking peculiarities, when the specimen is compared with the skulls of existing peoples, and as upon it alone the facial part of the Piltdown skull can be reconstructed, it becomes of supreme importance not to exaggerate its anthropoid characters. The reconstruction exhibited by Professor Dixon showed that these characters are not necessarily as marked as has been supposed.

In reply to a query by Professor Thompson, Professor Dixon said that the suggested reconstruction did not fit in with either Dr. Keith's or Dr. Smith-Woodward's.

Papers.

After Effects of the Activity of Organs.

Professor Barcroft read a communication on the above subject. He confined his remarks to the subject of skeletal muscle, stimulated so as to produce short tetani, and showed that the blood flow was increased for some hours after the exercise, and that the amount of oxygen consumed by the muscle also increased, but this increase did not last so long as the vascular change, though the maximum of each occurred at the same time.
A Method of Determining the Content of Replaceable Hydrogen Ions in the Urine and the Bearing of this Content on Metabolism.

Professor Collingwood read a paper on the above subject, and, in reply to questions, stated that the amount of CO$_2$ in the urine was negligible. He used phenolphthalein as an indicator.

Friday, May 28, 1915.

Mr. P. T. Crymble demonstrated the new x-ray apparatus and showed many beautiful plates; a series of demonstrations on students who had had a bismuth meal at varying periods within the previous twenty-four hours attracted much interest, and incidentally showed that the rate of progress of the bismuth through the alimentary canal varied with the nature of the food with which it was mixed.

Professor Symington showed a series of casts of the endocranium arachnoid and brain to illustrate the degree to which the convolutions and sulci impress the inner surface of the skull.

Additional Observations on the Estimation of the Degree of Brain Development from Endocranial Casts.

Dr. Symington read a paper on the above subject. He also showed and described a new method of illustrating cranio-cerebral topography. The method adopted was to make an accurate cast of a coronal section through the head, and then to photograph the section absolutely to scale and place the print on the plaster cast.

The Action of Rennin.

Professor T. H. Milroy read a paper on the above subject. See page 447, ante.
Abstracts.

Electro-Cardiographic Method of Estimating the Condition of the Heart Muscle.

Dr. J. E. M'Ilwaine read a paper on the above subject, embodying the result of two years' experience.

Heart Block produced by Yohimbine and Quebrachine.

Dr. J. M. Gibson read a paper on the above subject. See page 450, ante.

The Effects of Racemic Arginin on the Excretion of Creatine and Creatinine. (Preliminary Communication.)

Professor W. H. Thompson read a paper on the above subject, and said arginin was used prepared from herring milt and racemised according to the procedure followed in Kossel's laboratory. Four experiments were performed—three with rabbits and one with a dog. In the latter the addition of 2 grms. per day to the food (two days) gave an increase of 2.6 per cent. subcutaneous injection of the same amount, an increase of 195 per cent. to the total output of creatine-creatinine in the urine. The preformed creatinine was not increased, or only to an extent (2 per cent.) which lay within the errors of observation. In the rabbits the increase of urinary creatine was less marked, varying from .04 to .1 mgms. per hour during a period of six hours following injection via the jugular vein. There was, however, in two of these (in which the creatine of muscle was determined) an increase of .0341 and .0178 grms. per cent. respectively in the fresh muscle. In the latter the increase amounted to .0870 grms. per cent. of the dried solids. A control experiment on a rabbit with the same anaesthetic (urethane), but without arginine, gave a decrease in the preformed urinary creatinine of 1 mgm. per hour, a decrease in the total urinary creatinine of 0.6 mgm. per hour, and a relative increase in the latter of 0.5 mgms. per hour. The creatine of the muscle was also increased—namely, to the extent .0067 grms. per cent. for the fresh muscle and .0710 grms. per cent. as calculated for the
dried solids—that is to say, almost as large as the increase observed after the injection of the racemic arginine. The results, so far as they go, point to the formation of creatine from laev-arginine in the dog, and do not support the theory of a "wash-out" or expulsion of preformed creatine from muscle. Further experiments, which are in progress, are however required before a final decision on this point can be reached.

Some Further Observations on a Urinary Acid Index.

Professor B. J. Collingwood read a paper on the above subject.

Chemical Temperature: Regulation in Anaesthetised Animals.

Dr. J. M. O’Connor read a paper on the above subject, and said in anaesthetised cats and rabbits shivering occurs if the body temperature and the subcutaneous temperature are below a point which is fixed for that particular animal. The oxygen consumed by the animal when not shivering is approximately a simple function of the body temperature. When shivering, more oxygen is consumed than at the same body temperature in the absence of shivering. This excess is directly proportional to the extent to which the subcutaneous temperature has fallen below the fixed point referred to.

Some Applications of Electrolytic Reduction.

Dr. J. A. Millroy read a paper on the above subject. He said a cathode consisting of purified sheet lead was used for the following experiments. Lead was selected because it is a metal on the surface of which the hydrogen is developed at a relatively high tension, and therefore exerts a correspondingly intense reducing action. In this respect zinc and mercury are superior to lead, but are less convenient to use.

The reduction was carried out in an electrolytic cell consisting of an inner porous porcelain pot, containing the
solution of the substance to be reduced, enclosed by an outer vessel containing dilute sulphuric acid. The cathode was immersed in the solution in the inner vessel and the anode in the dilute acid in the outer vessel. The current was derived from 4-8 accumulators placed in series.

The following are some of the results obtained:—(1) Oxalic acid is reduced successively to glyoxylic acid and glyoxal. (2) In the hope that this reaction might be applicable to other dibasic acids, the reduction of saccharic acid was tried. Only a small amount of a substance which reduces Fehling was formed, and so far I have not obtained the glycuronic acid which might have been anticipated as the earliest reduction product. (3) Hæmatin dissolved in 70 per cent. alcohol containing sulphuric acid is transformed first into a pigment resembling hæmatoporphyrin; later on the solution becomes yellow and has the spectroscopic characters of a solution of urobilin. Still later the solution becomes practically colourless, but on standing exposed to the air it becomes yellow. This acidation is more rapid in ammoniacal solution, and the resulting pigment has similar characters to those of urobilin, having a similar spectrum and giving a marked green fluorescence on the addition of ammoniacal zinc hydrate. It may, therefore, be concluded that the final product of reduction is a chromogen of a pigment resembling urobilin.
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