[130] Prus, J., *Wiener klinische Wochenschrift*, 1898, 11, 857.
[131] Jung, R., and Hassler, R., in *Handbook of Physiology. Section I, Neurophysiology, Vol. 2.* ed. by J. Field, H. W. Magoun, and V. E. Hall. Washington, American Physiological Society, 1960.
[132] Denny-Brown, D., *The Basal Ganglia and their Relation to Disorders of Movement*. Liverpool, University Press, 1962.
[133] Connor, J. D., *Science*, 1968, 160, 899.
[134] Feltz, P., *Journal of Physiology*, 1969, 205, 8P.
[135] McLennan, H., *Experientia*, 1965, 21, 725.
[136] Portig, P. J., and Vogt, M., *Journal of Physiology*, 1969, 204, 687.
[137] McLennan, H., *Journal of Physiology*. London, 1964, 174, 152.
[138] McLennan, H., and York, D. H., *Journal of Physiology*, 1966, 187, 163.
[139] Phillips, C. G., *Archives of Neurology*, 1967, 17, 188.
[140] Liddell, E. G. T., and Phillips, C. G., *Brain*, 1950, 73, 125.
[141] Calne, D. B., *Parkinsonism: Physiology, Pharmacology and Treatment*. p. 136. London, Arnold, 1970.
[142] Rushworth, G., *International Journal of Neurology*, 1961, 2, 34.
[143] Stern, J., and Ward, A., *Archives of Neurology*, 1962, 6, 404.
[144] Steg, G., *Acta Physiologica Scandinavica*, 1964, 61, Suppl. 225, 1.
[145] Dietrichson, P., *The Role of the Fusimotor System in Spasticity and Parkinsonian Rigidity*, p. 101. Oslo, Universitetsforlaget, 1971.
[146] Vedel, J. P., *Competes Rendus des Séances de la Société de Biologie et ses Filiales*, 1965, 159, 441.
[147] Van Buren, J. M., *Journal of Neurophysiology*, 1966, 24, Suppl. Part II, 416.
[148] Hassler, R., in *Behaviour, Ageing in the Nervous System*. ed. A. T. Welford, and J. E. Biran. Illinois, Thomas, 1965.
[149] Blaschko, H., *Experientia*, 1957, 13, 9.
[150] Carlsson, A. *Pharmacological Review*, 1959, 11, 490.
[151] Carlsson, A., Lindqvist, M., and Magnusson, T., *Nature*, 1957, 180, 1200.
[152] Everett, G. M., and Toman, J. E. P., in *Biological Psychiatry*, ed. J. Massermann, p. 338. New York, Grune and Stratton, 1959.
[153] Carlsson, A., Falck, B., and Hillarp, N. A., *Acta Physiologica Scandinavica*, 1962, 56, Suppl. 196, 1.
[154] Andén, N. E., Dahlström, A., Fuxe, K., and Larsson, K., *American Journal of Anatomy*, 1965, 116, 329.
[155] Hökfelt, T., *Zeitschrift für Zellforschung und Mikroskopische Anatomie*, 1968, 91, 1.
[156] Ehringer, H., and Hornykiewicz, O., *Klinische Wochenschrift*, 1960, 38, 1236.
[157] Birkmayer, W., and Hornykiewicz, O., *Wiener klinische Wochenschrift*, 1961, 73, 787.
[158] Barbeau, A., *7th International Congress of Neurology, Rome*. Abstracts of papers presented, p.152, 1961.
[159] Cotzias, G. C., van Woert, M. H., and Schiffer, L. M., *New England Journal of Medicine*, 1967, 276, 374.
[160] Ordenstein, L., M.D. thesis, *Sur la Paralysie Agitante et la Sclérose en Plaques Généralisée*. Paris, Martinet, 1867.
[161] Hughes, R. C., Polgar, J. G., Weightman, D., and Walton, J. N., *British Medical Journal*, 1971, 2, 487.
[162] Bartholini, G., Burkard, W. P., Pletscher, A., and Bates, H. M., *Nature*, 1967, 215, 852.
[163] Cotzias, G. C., Papavasiliou, P. S., and Gellene, R., *New England Journal of Medicine*, 1969, 280, 337.
[164] Barbeau, A., *Canadian Medical Association Journal*, 1969, 101, 791.
[165] Bartholini, G., Tissot, R., Pletscher, A., in *Third Symposium on Parkinson's Disease*. ed. F. J. Gillingham and I. M. L. Donaldson, p. 192. Edinburgh, Livingstone, 1969.
[166] Siegfried, W. H., Ziegler, F., Regli, F., Fischer, C., Kaufmann, W., and Perrett, E., *Pharmacologica Clinica*. 1969, 2, 23.
[167] Tissot, R., in *L-Dopa and Parkinsonism*, ed. A. Barbeau and F. H. McDowell, p. 80. Philadelphia, Davies, 1970.
[168] Barbeau, A., Gillo-Joffroy, L., and Mars, H., *Clinical Pharmacology and Therapeutics*, 1971, 12, 353.
[169] Duvoisin, R. C., Yahr, M. D., and Cote, L. D., *Transactions of the American Neurological Association*, 1970, 94, 81.
[170] Yahr, M. D., and Duvoisin, R. C., *Journal of the American Medical Association*, 1971, 216, 2141.
[171] Cotzias, G. C., and Papavasiliou, P., *Journal of the American Medical Association*, 1971, 215, 1504.
[172] Parks, L. C., Watanabe, A. M., and Kopin, I. J., *Lancet*, 1970, 2, 1014.
[173] Schwab, R. S., England, A. C., Poskanzer, D. C., and Young, R. R., *Journal of the American Medical Association*, 1969, 208, 1168.
[174] Parkes, J. D., Zilkha, K. J., Marsden, P., Baxter, R. H. C., and Knill-Jones, R. P., *Lancet*, 1970, 1, 1130.
[175] Hunter, K. R., Stern, G. M., Laurence, D. R., and Armitage, P., *Lancet*, 1970, 1, 1127.
[176] Svensson, T. H., and Strömberg, U., *Journal of Pharmacy and Pharmacology*, 1970, 22, 639.

Medical History

The Norfolk and Norwich Hospital

A. BATTY SHAW

British Medical Journal, 1971, 3, 697–699

The foundation of the Norfolk and Norwich Hospital in 1771, to be commemorated in a series of events from 22 to 25 September 1971, is a reflection of that great spate of hospital building that took place in England during the eighteenth century. Between 1721 and 1745 five new voluntary general hospitals were founded in London, and by 1789 30 similar hospitals had been founded in the main cities and towns of England; of these the Norfolk and Norwich Hospital was the seventeenth.[1 2]

After the dissolution of its monasteries and their infirmaries in the first half of the sixteenth century, Norfolk, like other English counties, was virtually without hospitals for the sick over the next two centuries. Sir Thomas Browne, who in 1636 settled in practice in Norwich—then probably still the second largest city of the realm after London, as it had been since he Middle Ages—practised without the resources of a local hospital until his death in 1682. Thirty-one years later a public mental hospital was opened in Norwich, the first in England since the foundation in 1247 of the Priory of St. Mary of Bethlehem, which later became the Bethlehem Royal Hospital. This was the Bethel Hospital, Norwich, founded in 1713 by Mrs. Mary Chapman, the daughter of one of Browne's circle of friends, and still in use as a psychiatric hospital. Between 1731 and 1754 a cottage hospital, claimed to be the first in England, was built at the village of Shotesham, near Norwich, by its philanthropic squire, William Fellowes.

There was thus a local interest in erecting hospitals early in

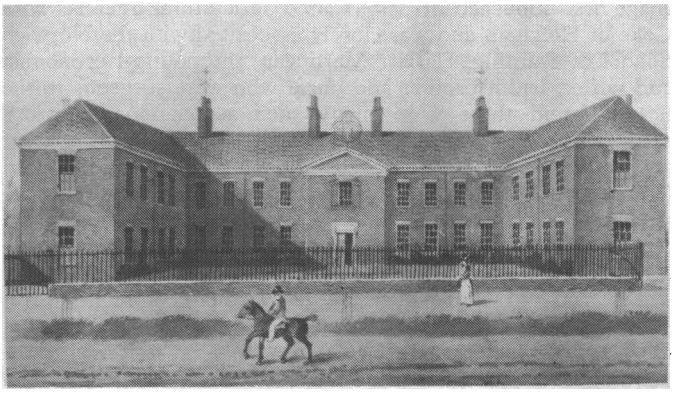

FIG. 1—The Norfolk and Norwich Hospital 1771-2. The original building contained 110 beds and cost £13,000 to erect.

Norfolk and Norwich Hospital, Norwich, Norfolk
A. BATTY SHAW, D.M., F.R.C.P., Consultant Physician

FIG. 2—The Norfolk and Norwich Hospital 1970. One wing of the original building and the hospital building of 1879-83 are in the foreground of the hospital area. The top left of the area is now occupied by the completed diagnostic and treatment centre. To its right is the maternity department completed in 1968; below and to the right of this a main new ward block is currently under construction. Photograph by Aerofilms.

the eighteenth century. By the 1740s the correspondence columns of Norwich newspapers were publishing letters suggesting that a public general hospital for the county should be built. In 1758 this public demand found a leader in Thomas Hayter, Bishop of Norwich. He asked Benjamin Gooch, the leading Norfolk medical man of his day and one of the outstanding English provincial surgeons of the eighteenth century, to study the design and administration of the London hospitals with a view to establishing a hospital in Norwich. Plans for such a hospital were drawn up, but in 1761 Hayter was translated to London. He died at Fulham Palace the following year and the plans fell into abeyance. They were revived in 1770 by William Fellowes, supported by Benjamin Gooch, his neighbour at Shotesham, and a committee of four charitable earls and other members of the Norfolk gentry. Fellowes and his committee raised enough money to enable the hospital to be built, and he laid its foundation stone in 1771 (Fig. 1).

The history of the Norfolk and Norwich Hospital, like others founded in the eighteenth century, embodies many chapters of England's social, economic, and medical history, and it is possible in a brief retrospect to refer to only a few lines of them. Fuller accounts have been given by two of its physicians, Sir Peter Eade[3] and A. J. Cleveland,[4] and in the catalogue to a public exhibition of the hospital's history staged as part of its bicentenary events.[5]

During the hospital's early years Norwich was somewhat of an intellectual centre, with a coterie of painters, writers, scholars, and philanthropists residing within its walls, and to this circle many members of the hospital staff belonged. Edward Rigby, renowned for his work on antepartum haemorrhage first published in 1776, shared agricultural interests with Coke of Holkham and was closely associated with the Norwich School of Painting. Harriet Martineau, the political economist and writer, had a brother and uncle who were surgeons to the hospital, and there were many such associations. Harriet's uncle was Philip Meadows Martineau, one of a long line of able lithotomists that included William Donne, John Green Crosse, and William Cadge. The hospital's contribution to the study and treatment of bladder stone earned for it a European reputation, and early in its history engendered a strong sense of corporate pride. William Cadge, the last of the lithotomists and surgeon to University College Hospital before ill health enforced his return to his native county, is also to be recalled for his personal gift of £20,000 towards the first major rebuilding of the hospital in 1879-83; a second major contribution of £30,000 was made by the then hospital president, the second Earl of Leicester.

Changes in Hospital Practice

The second half of the nineteenth century saw the great changes introduced to hospital practice by aseptic and antiseptic surgery and the introduction of anaesthesia. There were problems of hospital infection to deal with and the hazards of hospital finance, especially at times of economic depressions in agriculture. In 1873 one of the hospital surgeons, Thomas William Crosse, was elected the first medical officer of health for Norwich (then a part-time post). The lack of division between the different branches of medical practice in the past is also recalled by the fact that all members of the hospital's consultant staff were concurrently in general practice until 1898. In that year Sir Hamilton Ballance, brother of Sir Charles Ballance of St. Thomas's Hospital, was appointed surgeon and was the first to engage in consultant practice only. In 1891 one of the physicians, Sir Frederic Bateman was awarded the Alvarenga prize of the Paris Academy of Medicine for his contribution to the study of aphasia, and there have been other highlights in the hospital's story in the nineteenth and twentieth centuries, precluded from mention by limitations of space. Space, however, has to be found to recall the great contribution of H. A. ("Tommy") Brittain to orthopaedic surgery and the local school of orthopaedics that he may be said to have founded.

As in the case of many other county or district hospitals the Norfolk and Norwich Hospital has a long tradition of teaching. In 1845 it opened a pathology museum, claimed to be the first at a provincial non-university hospital, to aid the instruction of its pupils; these have included Sir Astley Cooper and Bransby Cooper, Sir George Humphrey, Joseph Thomas Clover, Sidney Ringer, and many members of its own consultant staff of the nineteenth century. The hospital's recent educational activities have benefited from its proximity to the University of East Anglia, founded in 1963, and an appeal for funds to aid the prosecution of education and research at the hospital is one of the objects of the hospital's bicentenary programme. Other items include an open day for the public and a day of historical and scientific papers that will be concluded with a bicentenary oration by the Earl of Cranbrook, first chairman of the East Anglian Regional Hospital Board. There will also be a thanksgiving service at Norwich Cathedral attended by H.R.H. the Duchess of Kent, who earlier on the same day will have opened the hospital's new diagnostic and treatment centre; the building comprises part of the hospital's current rebuilding programme of £8 million that is depicted at the stage it had reached by 1970 in Fig. 2. This major rebuilding programme is an auspicious omen for

the hospital as it enters its third century of service to the people of Norwich and Norfolk, for which purpose it was founded by William Fellowes.

References

1 Poynter, F. N. L. (editor), *The Evolution of Hospitals in Britain.* London, Pitman, 1964.

2 Abel-Smith, B., *The Hospitals 1800-1948.* London, Heinemann, 1964.

3 Eade, Sir P., *The Norfolk and Norwich Hospital 1770-1900.* London, Jarrold, 1900.

4 Cleveland, A. J., *A History of the Norfolk and Norwich Hospital from 1900 to the End of 1946.* Norwich, Jarrold, 1948.

5 "Norfolk and Norwich Hospital 1771-1971. Catalogue of an Exhibition to Depict the History of the Hospital over Two Hundred Years." Norwich, the Hospital, 1971.

Any Questions?

We publish below a selection of questions and answers of general interest

Strenuous Exercise by Children

Is there any evidence that taking part in strenuous physical sports such as water-ski racing can be damaging to the health of children?

No evidence has been found that taking part in strenuous physical sports is damaging to the health of children. Though the energy expenditure involved in water-ski racing does not appear to have been measured, it is unlikely to exceed that of ski-ing on snow. As Durnin and Passmore point out,[1] this is a sport which can be enjoyed at any age, and even though falls are inevitable "children enjoy these and are much less likely (than adults) to injure themselves seriously."

However, competition in races of long duration which could involve exhaustion and collapse might be a risk to children. Distances and times involved should, in our present state of ignorance, be restricted and racing should be between equals, at least in age.

1 Durnin, J. V. G. A., and Passmore, R., *Energy, Work and Leisure.* London, Heinemann, 1967.

Hare Lip

What is the incidence of hare lip in the children of (1) affected and (2) unaffected parents. Are there any dietetic factors which might result in a "phenocopy?"

The incidence of cleft lip in the children of parents of whom one has cleft lip is of the order of 4%. But the incidence of cleft lip in the children of unaffected parents of European stock is of the order of 0·1%.[1] No dietary factors are known to cause cleft lip.

1 Carter, C. O., *British Medical Bulletin*, 1969, **25**, 52.

Routine Urine Tests

What are the reasons for doing routine urine tests for sugar and albumin in adolescent children as part of a general medical examination?

The real doubt in the questioner's mind appears to be whether urine testing is worthwhile as part of the examination of the symptomless adolescent. This age-group has less disease than any other in the community, but if a clinical examination is necessary or worth doing, the testing of the urine should also be done. Glycosuria of any significance is rare in the adolescent; many false positives turn out to be due to contamination of the container or the contamination of test paper by the fingers.

Harkness[1] screened a population of 5,000 people and in the group aged 10-19 years found four cases of unimportant glycosuria and no new cases of diabetes. In this survey Clinitest papers were used and the urine was tested one hour after a main meal. The incidence of diabetes in adolescence is between 0·1 and 0·2%,[2] but diabetes at this age is rarely asymptomatic and has an acute onset. The adolescent girl with a family history of diabetes who develops glycosuria while taking an oral contraceptive may be a latent diabetic.[3]

Proteinuria in adolescence is usually orthostatic and originates from otherwise normal kidneys. It cannot be stressed too strongly that the absence of proteinuria does not exclude pyelonephritis. In the adolescent girl, in particular, the most useful screening test on the urine is a properly performed bacterial colony count, or an equivalent method adapted for screening, which will pick out asymptomatic or unsuspected pyelonephritis or bacteriuria.

1 Harkness, J., *British Medical Journal*, 1962, **1**, 1503.

2 Malins, J., *Clinical Diabetes Mellitus*, London, Eyre and Spottiswoode, 1968.

3 Wynn, V., and Doar, J. W. H., *Lancet*, 1969, **2**, 761.

Immunization after Diphtheria

A patient living overseas contracted pharyngeal diphtheria. The swab was positive but there were no facilities for virulence tests. He received antidiphtheria serum IV (after sensitivity tests) and erythromycin. There was an anaphylactic reaction after the serum was given, and 10 days later serum sickness developed. The patient recovered. Should he now be immunized against diphtheria? The only available toxoids are the diphtheria tetanus double vaccine and triple vaccine.

The pharyngeal diphtheria probably rendered the patient immune to further infection, but if he is still living under conditions whereby he may be exposed to diphtheria and is either Schick-positive or has a diphtheria antitoxin titre of less than 0·1 I.U. per ml, he should be vaccinated.

Childhood dosages of the two available vaccines, particularly of the triple vaccine, are liable to produce severe local reactions in adults. Each 0·5 ml dose of the diphtheria-tetanus adsorbed vaccine contains 25 Lf of diphtheria toxoid but two subcutaneous injections of as little as 1 Lf, separated by an interval of over 3 weeks, will immunize about 80% of Schick-positive adults without giving rise to undue local reactions. A third 1 Lf dose a year later will increase the immunity rate to 99%.[1] This patient can therefore be immunized with little risk of local reactions if he is given two 0·1 ml deep subcutaneous injections of diphtheria-tetanus adsorbed vaccine, separated by an interval of 4 weeks. A third reinforcing injection of 0·1 ml should be given a year later.

1 Edsall, G., Altman, J. S., and Gaspar, A. J., *American Journal of Public Health* 1954, **44**, 1537.