PROF. J. L. W. THUDICHUM (1829–1901)

JOHN LEWIS WILLIAM THUDICHUM is regarded to-day as the father of neurochemistry. During 1865–82 he carried out a series of brilliant pioneer investigations on the analysis and characterization of brain tissue. This began the process of defining the nervous system in chemical terms—a scientific endeavour which has continued and is still gaining momentum to-day. Although Thudichum carried out virtually all his scientific work in London he was born in Büdingen, a small 'medieval' town in the old Grand Duchy of Hesse. It was here that after a recent colloquium in Mosbach, Baden, representatives of the Gesellschaft für Physiologische Chemie gathered to unveil a plaque on his birth-place (Fig. 1).

Fig. 1

Thudichum's family, distinguished in scholarly attainments, originated in the town of Marbach, the birthplace of the poet Schiller, and in this atmosphere he derived a great love for the classics. This latter expressed itself not only in his naming of the substances which he discovered but also in his non-scientific writing. Thudichum studied medicine at Heidelberg and later at Giessen where he was encouraged by his teacher, the great chemist Justus von Liebig, to develop a deep interest in the chemistry of natural substances.

Soon after graduation, Thudichum came to London where he married and settled for the rest of his life. Until his death he actively pursued the clinical practice of medicine, being a skilled otologist and rhinologist. He devised many surgical instruments and published a treatise on nasal polyps (which ran to several editions) and one on gall stones.

However, his interest in the application of chemistry to medicine steadily grew, he lectured in pathological chemistry at the old Grosvenor Place School of Medicine and then in 1865 he was appointed as lecturer in pathological chemistry in St. Thomas's Hospital, London. He also devoted himself to his chemical researches; urochrome, the principal colouring matter of the urine, was isolated in 1864, and he also made many important contributions to our knowledge of the carotenoids or 'luteins' as he called them.

These investigations, however, were probably not of such sustained importance as his work on the chemistry of the brain. These were carried out in his private laboratory and were supported by the Privy Council, the medical officer of which, Sir John Simon, quickly appreciated the value and brilliance of Thudichum's work. Sir John believed that eventually all diseases of the brain would be explained in chemical terminology and to do this it was first necessary to understand the chemistry of the normal brain. This in those days was remarkably far-sighted and is a line of reasoning not unfamiliar to many present-day neurochemists filling out applications for grants to support their work.

Thudichum continued his work on the brain during 1865–82, carrying out systematic analyses which resulted in the isolation of many new and important compounds, for example, sphingomyelin, cephalin, phrenasin, kerasin, sphingosine and cerebronic acid. Although in these days of chromatography we have become quite familiar with the rapid and easy separation of lipids, in the context of the times this was indeed a remarkable achievement. His work was published in a series of reports to the Privy Council and in 1884 his classic work on the *Chemical Constitution of the Brain* appeared in English, followed by a revised edition in German.

On his retirement from active chemical work, Thudichum wrote two most unusual works: the *Spirit of Cookery* appeared in 1895 and a *Treatise on Wines* in 1896. This illustrates the great diversity and originality characteristic of the man. His ever active mind and spirit appeared tireless to his contemporaries; he invented, wrote poetry, painted, sang with a fine voice and, like so many scientists, had a deep love of music. This combined brilliance often proved too much for lesser mortals and evoked unjust criticisms of his work. Nevertheless, his contribution has stood the test of time and his pioneering work still continues to act as a lead and inspiration to present-day neurochemists.

H. DEBUCH
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SCIENCE IN PARLIAMENT

Metric System

IN a written answer in the House of Commons on May 24, Mr. D. Jay, the President of the Board of Trade, stated that the Government was impressed with the case which had been put to it by the representatives of industry for the wider use in British industry of the metric system of weights and measures. Countries using that system now took more than half Britain's exports and the total proportion of world trade conducted in terms of the metric unit would probably increase. Against that background the Government considered it desirable that British industries on a broadening front should adopt metric units, sector by sector, until that system became in time the primary system of weights and measures for Britain as a whole. The Government had therefore asked the British Standards Institution—and the Institution had agreed—to pay special attention

to the provision of metric standards, wherever possible internationally recognized, and to press on with this as speedily as possible. The Government would take this new commitment into account in determining the amount of future grants-in-aid to the Institution. It was also considering how best to encourage the educational work to familiarize future school generations and students in technological establishments with working in terms of metric units. The Government would also encourage a change to the metric system as and when this became practical for particular industries, by seeking to arrange that tenders for procurement by the Government and other Public Authorities should be in terms of metric specifications. The Government hoped that within ten years the greater part of Britain's industries would have effected the change and to this end it proposed to establish a small standing joint committee of representatives of Government departments and industry to facilitate the removal of obstacles and keep under constant review the progress which was being achieved.

In the House of Commons, on June 15, the Minister of Technology stated that his Department would give every possible assistance to the British Standards Institution through its research stations and advisory staff in preparing the new series of British Metric Standards foreshadowed by the President of the Board of Trade. The Ministry of Technology, through its research stations and the grant-aided research associations, was represented on more than a thousand committees of the British Standards Institution. The measures under discussion included production of a comprehensive manual of international metric units used in industry. In collaboration with the Central Office of Information, assistance had been given to the Publishers' Association to revise engineering text-books for the domestic and export markets.

Machine Tool Industry

In a statement in the House of Commons on June 14, Mr. F. Cousins, the Minister of Technology, said that his Department was engaged in a full study of the machine tool industry. He welcomed the undertakings given by manufacturers' representatives to press for action on increased capacity, on building up research and development and qualified staff, on increased specialization and elimination of wasteful duplication, and on development of British machines to replace some types that are imported. Similar important undertakings had been given about the improvement of deliveries, and the manufacturers had also agreed to initiate a review of the factoring of improved machine tools by British manufacturers. Mr. Cousins said that the Government would also play its part and, to assist the industry to develop and produce more of the most advanced and efficient types of machine tool, research and development contracts would be considerably increased. The National Research Development Corporation was already examining a number of projects and the new Act would enable it to make a greater contribution on terms which should find wider acceptance in industry. The Government was prepared to order pre-production models for approved new types, and the National Engineering Laboratory at East Kilbride would be built up to give further support in the research field: its expanded activities should yield ideas for development projects. The Laboratory would mount a major effort, supported by appropriate machine tool control engineering and user firms, on applying numerical controls to manufacturing process and using computers to assist design. His Department was negotiating for a suitable British-made powerful computer for this purpose.

Mr. Cousins emphasized that the machine tool industry was too fragmented and must be concentrated into stronger units which could better meet the needs of industry. The Machine Tool Trades Association had agreed that the industry itself must take the lead in concentration and rationalization. One of his industrial advisers would direct particular attention to methods of promoting concentration and placing development contracts and pre-production orders to this end. His Department had also studied the serious difficulties created by the cyclical pattern of ordering machine tools, and a working party was studying the question of Government participation in financing building to stop its flat periods. The Government had also accepted the recommendation of the Machine Tool Economic Development Committee that machine tool holdings of Government establishments should be considered with the view of replacing older types with more modern machines when economically advantageous. It also accepted the recommendation that Government contracts should encourage advanced methods by stipulating the use of particular manufacturing techniques. Mr. Cousins referred to the important part that universities had to play in advancing machine tool technology: the Government had directed the attention of the University Grants Committee to the recommendation of the Economic Development Committee in this connexion. Mr. Cousins stated that he was setting up at his headquarters an expert machine tool unit the functions of which would include acting as a focal point for co-ordinating research and development in Government establishments with that in research associations, the National Research Development Council, universities and industry. This new unit would be developed to provide a technical advisory service to Government and public users of machine tools and, if desired, for private purchasers.

Greenland Fishing of Atlantic Salmon

In reply to a question from Lord Balfour of Inchrye in the House of Lords on July 5, regarding the Greenland fishing of Atlantic salmon, Lord Hughes, the Joint Parliamentary Under-Secretary of State for Scotland, said that the increase in exports of Atlantic salmon from Greenland from 2 metric tons in 1957 to 1,400 metric tons in 1964, mentioned by Lord Balfour, was quite correct. To that figure, however, had to be added the amount retained for consumption in Greenland itself, probably some hundreds of tons, but the total left out grilse, which were not reflected in the Greenland figures. As there was only one salmon river in West Greenland, it seemed that salmon caught off the coast must have bred elsewhere: and salmon tagged mostly as smolts in Britain and in other countries on either side of the Atlantic had been caught in this fishery.

Lord Hughes stated that of 64 salmon caught in Greenland up to May this year, just more than half had been tagged in the United Kingdom, but the information was still very scarce in some respects and insufficient for a final and reliable judgment. Partial information was to some extent reassuring. All the salmon caught in Greenland that had been tagged in Scottish waters came from half a dozen batches of smolts, totalling 38,000, and had been tagged between 1961 and 1963. Up to May 1965, 45 had been recaptured, but nearly all on their return to Scottish waters and only 13 off Greenland. It was not known, however, whether tagged salmon were easily recognized as such in the Greenland fishery and almost 90 per cent of the tagged Scottish smolts came from one river.

Lord Hughes referred to the difficulty and the importance of persuading Greenland fishermen that control was in their own interests and not just in the interests of people in other countries: international action was not within the control of Britain or even of Britain and Denmark. So far as the Danes were concerned, it had been confirmed that they were prepared to be helpful. For the joint tagging programme in Greenland waters, planned in co-operation with Danish scientists, and designed to show where the salmon in those waters went

if they were not caught there, Britain was receiving considerable help from the Danish authorities, who were contributing substantially to the cost of the equipment required and providing many of the facilities needed. They had also been co-operative in supplying the information about the Greenland fishery. For the same reason, at the recent meeting in Canada of the International Commission for the North-west Atlantic Fisheries, Britain joined with other nations in urging that all countries concerned should step up their investigation on salmon fisheries. After full discussion the Commission had drawn up a schedule of further information required for a proper assessment of the effect of the Greenland fishery on stocks of the Atlantic salmon and commended it to all countries concerned. There had not yet been time to find out the full extent to which the Danish authorities could co-operate, and if remedial measures proved to be necessary they could only be taken by international action. There was a similar commission for the North-east Atlantic which relied for scientific advice on the International Council for the Exploration of the Sea, which was concerned, among other things, with salmon stocks native to European countries. Lord Hughes emphasized that Britain would keep in touch with developments, but he did not think that Britain could do more on the international side than she was doing at present.

THE INSTITUTION OF GAS ENGINEERS

THE 102nd annual general meeting of the Institution of Gas Engineers was held at Solihull, near Birmingham, Warwickshire, during May 24–28, when several communications on diverse subjects of interest to members were read and discussed.

Among the papers presented* was one by Dr. N. J. Sander and Dr. W. E. Humphrey (Exploration Department, American International Oil Company, New York) entitled "Why Look for Oil and Gas in the North Sea ?") (now issued as Publication No. 677), one of the most informative, both geologically and technically, descriptions of the off-shore drilling areas in this basin yet to appear; the reasons for the venture are clearly stated, chances of success cautiously assessed, and inclusion of many maps and diagrams of simplified geological sections enables the reader to grasp without difficulty the fundamentals of North Sea geology and to assess for himself the ultimate possibilities of oil and gas recovery here.

J. W. Kerr (president, Canadian Gas Association) contributed a paper (678) on "Natural Gas in Canada", which described the phenomenal growth rate of the industry during the past seven years; while it is admitted that this rate cannot be repeated or maintained, the future growth prospects of the industry are viewed with justifiable optimism. A paper (679) on "The Application of Work Study and Associated Techniques to Plant Maintenance" was presented by H. R. Hart (Scottish Gas Board), and confirms that, on the basis of results so far achieved, work study within the field of plant maintenance and having due regard to forward developments has more than proved its worth.

C. E. Mills discussed "Some Special Features of the Recent Developments in the East Midlands Gas Board" (680), which emphasized the enormous importance to the gas industry of the grid-main system in Great Britain, with special reference to the Killingholme Grid extension. A communication (682) by F. Bell, R. O. Emmony and P. E. Gallaher (West Midlands Gas Board), entitled "Keeping up the Pressure", concerns much that is administrative in the industry, especially since the advent of gas grids, the implication being " . . . pressure on staff, contractors, and suppliers of material and equipment". P. J. Savage (North Thames Gas Board) discussed (683) "The Production of Gas from Hydrocarbons, using the O.N.I.A. Continuous Autocaloric Process". "Part and Parcel" (684) is the title of a paper by W. V. Olsson and J. K. Mitchell (West Midlands Gas Board), which dealt with appliance spare-part service.

Finally, a paper on "Progress in Management Techniques" (685), by R. J. Maher (Australian Gas Light Company, Sydney), describes his company's " . . . effort to develop the conditions under which each sub-system and its objectives are compatible with and adaptive to the total Company objectives". The tremendous potentialities of the electronic computer for efficiently handling large and involved logical systems in management in the industry are particularly stressed.

* The Institution of Gas Engineers. Publication No. 677: *Why Look for Oil and Gas in the North Sea?* By Dr. N. J. Sander and Dr. William E. Humphrey. Pp. 17. No. 678: *Natural Gas in Canada.* By James W. Kerr. Pp. 11. No. 679: *The Application of Work Study and Associated Techniques to Plant Maintenance.* By H. R. Hart. Pp. 16. No. 680. *Some Special Features of the Recent Developments in the East Midlands Gas Board.* By C. E. Mills. Pp. 21. No. 682: *Keeping up the Pressure.* By Fred Bell, R. O. Emmony and P. E. Gallaher. Pp. 17. No. 683: *The Production of Gas from Hydrocarbons, Using the O.N.I.A. Continuous Autocaloric Process.* By P. J. Savage. Pp. 17. No. 684: *Part and Parcel (An Appliance Spare-Part Service).* By W. V. Olsson and J. K. Mitchell. Pp. 16. No. 685; *Progress in Management Techniques.* By R. J. Maher. Pp. 15. (London: The Institution of Gas Engineers (1965).

INDUCTION OF ADRENAL DAMAGE AND CANCER WITH METABOLITES OF 7,12-DIMETHYLBENZ(*a*)ANTHRACENE

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A CARCINOGENIC hydrocarbon, 7,12-dimethylbenz-(*a*)anthracene (DMBA), differs from other members of this group of carcinogens in a number of ways that include:

(1) Being non-planar in the crystalline state, whereas most carcinogenic hydrocarbons are planar[1]. But the deviation from planarity of DMBA is not sufficiently great to prevent formation of donor–acceptor complexes with nitroaromatics.

(2) The ability to produce cancer in mice and rats in shorter periods of time than do other aromatic hydrocarbons.

(3) The ability to combine with DNA *in vivo* to a greater extent than do other hydrocarbons[2].

(4) The property of "invariably, selectively and totally destroying two zones of adrenal cortex of the adult rat and the induction of adrenal apoplexy"[3]. Rats can be protected against this effect and from the lethal action of