flavour of national pride. Alternative entertainment was normally provided, also showing the culture of the country. The high-lights of the week were probably the performance of Dvorak's "Rusalka" in the National Theatre and the traditional Symposium dinner in the Wallenstein Palace.

In retrospect one can sum up the Symposium as being one of the most successful yet held and certainly the best organized. The standard which was set is one which will be found difficult to equal, but it is hoped that something approaching this technical perfection will be reached in other countries, both west and east of the Iron Curtain, in future international symposia.

THE LIBRARY ASSOCIATION

ANNUAL CONFERENCE

IN his presidential address to the Library Association on September 17 on the theme of "Knowledge and Education", Dr. J. Bronowski said that a civilized society must preserve what its best minds discover, but preservation alone does not make it an educated or even a cultured society. Moreover, an educated society could exist only when knowledge is not merely stored but is also shared, and it was the invention of printing that made the book an instrument of education. Dr. Bronowski drew on his own experience to illustrate the role that libraries can take in education and above all in self-education, but in science the public libraries have scarcely played that part at all: if they are to do so, they must have the books to enable them to make the language of science familiar to those who are not professional scientists. Besides the classics of literature, we need many more new classics of science—books like those of Sherrington, Eddington and Schrödinger, which looked at new discoveries in a personal way and spoke to the non-scientist through their personal tone and philosophy. He urged the publication of the old and new classics of science in a single series, which he believed would be widely bought and read and would make the language of science familiar to a new generation, showing them the concepts of science for what they are, classical creations which rank among the permanent monuments to the human imagination. He did not think that the printed book was the last instrument of education we would discover, but he was sure that the printed book and the public library would remain the most powerful means for self-education.

Dr. Bronowski's address found echoes in several of the addresses which followed. Mr. A. Shaw Wright's review of the thirty years work of the County Libraries Section of the Library Association, in referring to the work of the regional bureaux, to the "Readers' Guides", to the international exchanges of assistants and the help of the Carnegie United Kingdom Trust, indicated also the way in which the county libraries contributed to this work of self-education. It was implicit also in the discussion of the problems of the school library which Mr. E. Blishen introduced under the title "The Reluctant Reader", and it was sounded explicitly by Mr. J. C. Harrison in his "Retrospect and Forecast of Education for Librarianship and Professional Status". Admittedly controversial on some points, Mr. Harrison made a strong plea for well-educated and trained librarians if the public library is to be an effective instrument of education, and he claimed that at present it offered neither the status nor the remuneration which could attract or hold a sufficient number of those possessing the ability and knowledge required.

Dr. T. A. Margerison took up more specifically Dr. Bronowski's point in discussing the interpretation of science in an address to the reference and special libraries section on September 19. Dr. Margerison asserted that the average layman's ignorance of science was a danger to democracy, and stressed the need for more effective science teaching in the schools, for more writing for the layman by scientists of repute, and for more effective advice to librarians on the choice of scientific books. Mr. B. S. Page in reviewing university library development was concerned with a particular aspect, but his paper is of special interest to the scientist as such. Recalling the assertion of the University Grants Committee in its report of 1921 that an adequate library is not only the basis of all teaching and study but also an essential condition of research, Mr. Page discussed the implications for the university library of the post-war expansion of the universities. The two-fold function of the university library, of supporting both the teaching of the undergraduates and the creative work in scholarship or science of the postgraduate students and the university staff, was not at all easy to balance. Mr. Page emphasized the importance of the library representing to all, and not least to undergraduates, the unity and not the fragmentation of knowledge. The whole question of training the student in the use of the library required more study, and Mr. Page referred to the investigation into the adequacy of present library techniques to the needs of scholarship initiated by the Ford Foundation, and to the pilot survey which the Nuffield Foundation was conducting at Leeds in the use of books in a university library. Stressing the importance of the initiative of the library in connexion with general education, Mr. Page suggested that the university library should include a centre of disinterested reading, looking and listening, and that the right kind of help and the right atmosphere were what the student needed. On the expenditure side, Mr. Page said little. He pointed out that according to the University Grants Committee's returns for 1955–56, fifteen universities and university colleges spent on books and bindings a total of £214,586, or about the amount spent by Harvard University alone, the total for England, including Oxford and Cambridge, being £487,786, but he did not attempt to analyse expenditure or holdings in relation to expansion.

Of the remaining papers, Dr. C. W. J. Higson's review of the libraries of the university institutes of education should be mentioned.

STRIVING FOR RIGOUR IN GREEK SCIENCE

IN an address delivered at Dublin to Section A (Mathematics) of the British Association, entitled "The Striving for Rigour in Greek Science", Prof. C. Lanczos compared the standards of mathematical rigour set by the Greeks with the standards of to-day, and examined their claims to be regarded as complete in terms of the general Greek philosophical back-

ground. In particular, it is to be remembered that to the Greeks geometry was not a professional or technical craft, but "a divine service, pursued by the select minds who could face the shadowy world of abstract ideas".

The pattern of Greek geometry has a three-fold basis: definitions, axioms, postulates. Definitions are intended to tell us what we are talking about; axioms give the fundamental and general basis of philosophical language; postulates, which ask for certain propositions to be granted, are assumptions special to geometry. The distinction between axioms and postulates was clear to the Greeks, who properly based the theory of parallels on a postulate rather than on an axiom, but later workers confused the issue: Prof. Lanczos considers that Kant's philosophy is partly defective because he placed axioms and postulates on the same footing. The present view of mathematics as a language and of deduction as a game with symbols again implies a three-fold basis of undefined elements, definitions and rules. The difference, according to Lanczos, is chiefly one of emphasis; to the Greeks, mathematics was an abstract language describing real things, to us mathematics is a language which need not have a physical meaning. Only if a correspondence can be set up between mathematical words and physical objects does a physical meaning emerge.

In dealing with limits, Prof. Lanczos notes that in the theory of irrationals due to the great Eudoxus, the method of exhaustion uses sequences of inequalities and avoids infinitesimals and equations involving infinitesimals. The dangers of the concepts of Newton and Leibniz, so caustically exposed by Berkeley, do not arise. The Greek method, when allowance is made for the difference between their geometrical language and our algebraic language, is precisely that recovered in the early nineteenth century by Cauchy and Gauss, and developed during that century by Dedekind, Weierstrass and many others. The subtlety of the Greek genius is particularly well shown by the observation, attributed to Archimedes, that a hitherto undetected postulate is required in the method of exhaustion, namely, that if ε is any positive number, an integer n can be found such that $n\varepsilon > 1$. It is, of course, now a commonplace that geometries can be constructed in which the Euclidean postulates hold, but in which the Archimedean postulate is not fulfilled.

Prof. Lanczos's conclusion is that contemporary mathematics adds nothing essentially new to the high standards of Greek rigour.

FOOD INVESTIGATION, 1956

THE research with which the Food Investigation Board is concerned lies between primary production on one hand and nutrition on the other; it includes, therefore, studies on the biological structure of raw foodstuffs and the changes that occur during storage, preservation, processing and cooking. The Board recognizes two types of objectives in its investigations, the first being knowledge of the physical and chemical properties of various types of foodstuffs, while the second is of short range and is concerned with the solution of specific practical problems. This dual approach is well illustrated in "Food Investigation 1956"*, which contains the reports of the Food Investigation Board and of the director of the Food Investigation Organization.

In the former the importance of close collaboration between research stations and the industries concerned with implementing the results of the research is emphasized. With this end in view, the setting up of a meat research laboratory in close association with an abattoir is strongly recommended. The Board is satisfied that a proper balance is maintained within the Organization between fundamental and applied work for the attainment of ultimate practical objectives.

The Director's report gives details of work performed during the year in the various stations of the Organization; on fish and fish products at the Torry Research Station and Humber laboratory, on fruit, vegetables and plant products at the Ditton and Covent Garden laboratories, and at the Low Temperature Research Station in Cambridge on meat and meat products, eggs and poultry, as well as biochemistry and biophysics.

Work at Torry has continued on the effects of preservative ice containing chlortetracycline (aureomycin) on the keeping quality of fish. Full-scale trials were conducted on the Station's research vessel *Sir William Hardy*, and it was concluded that the presence of 5 p.p.m. of the antibiotic in the ice extended the storage life of fish in ice by seven to ten days. Food regulations in Britain at present do not permit such additions to ice, and considerable work is needed before this practice can indeed be shown to be harmless. Work has also been concerned with the cleanliness of fish boxes, which has been shown to affect the keeping quality of fish. Since cleaning and sterilizing of wooden boxes are difficult problems, trials with a non-returnable fish box of moulded resin-impregnated paper pulp have been continued. Basic investigations include studies on the proteins, lipids and extractives of fish flesh, and on the chemicals responsible for the development of brown discolorations during the dehydration of fish. The well-known sugar–amino-acid reaction is not, apparently, the only factor concerned. Other basic work has been on some of the physical factors that affect the deposition of smoke during smoke curing. The bacteriology section has continued its investigations on marine bacteria, and a type culture collection is maintained that is used by workers throughout the world.

In the Meat and Meat Products Division at the Low Temperature Research Station and the Smithfield laboratory, work has proceeded on the improvement of the quality of frozen beef and on the problem of carcass wastage, that is, the loss of weight of animals that takes place prior to slaughter. Basic work included a detailed study of normal *rigor* in animals and of the distribution of dipeptides within the muscles of various species.

A feature of the work of the General Biochemistry and Biophysics Division has been a study of the preservation of foods with ionizing radiations. This work, begun on a small scale in 1949, was resumed in 1955 and is now particularly directed to the treatment of meat. One of the main problems is that a dose of radiation sufficient to sterilize a foodstuff

* Department of Scientific and Industrial Research. Food Investigation 1956. Report of the Food Investigation Board with the Report of the Director of the Food Investigation Organization. Pp. 68. (London: H.M. Stationery Office, 1957.) 3*s*. 6*d*. net.