The oximes investigated do not diminish the final values of oxygen consumed or of nitrite produced from pyruvic-oxime by washed suspensions of *Achromobacter*. They only retard the rates at which these values are attained. They appear to act as competitive inhibitors.

Summary

Three species of organisms have been isolated from a soil, perfused with neutral pyruvic-oxime solution, that attack this oxime with formation of nitrite. Two of the species fall into the genus *Achromobacter*; the third is identified as a *Corynebacterium*. The enzyme oxidizing the oxime is termed pyruvic-oxime oxidase. This may be an adaptive enzyme as it is developed in certain members of *Achromobacter* by continued subculture on pyruvic-oxime media. The ratio of moles of oxygen consumed to moles of nitrite formed by resting cells of the isolated *Achromobacter* at 37° C. at *p*H 7·4 in presence of pyruvic-oxime is 1·78. Pyruvic-oxime oxidase is inhibited, probably competitively, by phenylpyruvic-oxime, D-arabinose-oxime, and α-ketoglutaric-oxime, which are not themselves oxidized by the enzyme.

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AUTOMATIC COMPUTING

A SUMMER school in programme design for an automatic digital computing machine was held at Cambridge in the University Mathematical Laboratory during September 12–21. The arrangements were made with the co-operation of the Board of Extra-Mural Studies, and the lectures and demonstrations were given by members of the staff of the Laboratory and others closely associated with it. The course was concerned mainly with the methods which have been developed for use with the EDSAC (electronic delay storage automatic calculator) which has been constructed in the Laboratory. The same principles are, however, applicable with small modification to other machines of similar type, and lectures were given by Dr. T. Kilburn, of the University of Manchester, and Mr. J. H. Wilkinson, of the National Physical Laboratory, on the preparation of programmes for the machines with which they are associated. About forty students from universities, industrial research laboratories, and government departments, including several from France, Holland and Germany, attended the course. Practical work in numerical analysis and in programme design was included, and there were opportunities for gaining experience in the use of the EDSAC. Several members of the course were able successfully to run small problems of their own on the machine.

An automatic computing machine can perform a very limited variety of numerical operations—in the case of the EDSAC, addition, subtraction and multiplication only. Each operation is called for by an 'order', and to perform even the simplest mathematical calculation an extended sequence of orders is required. The sequence of orders is known as the programme. The EDSAC uses punched teleprinter tape for input of orders and numbers.

In order to simplify the preparation of programmes, it is very desirable that a library of sub-routines, that is, standard sequences of orders for carrying out common arithmetical operations, should be established. Sub-routines should be so designed that their incorporation in a programme is as simple as possible. At present the library associated with the EDSAC contains about seventy-five sub-routines which fall into various classes. There are basic sub-routines for performing the operation of division (the EDSAC has no built-in divider) and for the input and output of numbers. These latter sub-routines convert numbers from the scale of ten to the scale of two which is used within the machine, and vice versa, and some of the output sub-routines, in addition, control the layout of the printed page. There are sub-routines for taking square roots and cube roots, for evaluating sines and cosines and other elementary transcendental functions, for the summation of power series with real or complex coefficients, and for direct and inverse interpolation. On a higher level of complexity are sub-routines for performing numerical quadrature and for integrating ordinary differential equations. In another class there are sub-routines which facilitate the handling of complex numbers, 'floating decimal' sub-routines for use in problems in which the magnitudes of the numbers concerned vary over a wide range, and sub-routines for assisting the programmer to prepare programmes in which complicated counting operations are involved. Sub-routines are stored in the form of lengths of punched teleprinter tape and can be copied mechanically on to a programme tape.

When faced with a new problem, the programmer must first decide which parts of the calculation can be performed by sub-routines from the library, and which parts will have to be programmed *ab initio*. The orders for performing the latter may be contained in a master routine (alternatively called a main programme), which will also contain orders for calling in the sub-routines as required. It is sometimes convenient to construct one or more sub-routines specially for the problem in hand; these can be called in by the master routine in the same way as library sub-routines. The advantage of this procedure is that it enables the master routine itself to be simplified. The various routines and any sequences of numbers which are required for the problem are punched separately on short lengths of tape—the library sub-routines are already in this form—and copied mechanically on to a single input tape for the EDSAC. This tape contains everything required to enable the machine to perform the calculations, and, beyond putting it in the tape-reader, no setting-up of the machine is necessary.

When drawing up a programme it is very easy to make some blunder which may be trivial in itself, but which will cause the machine either to stop or to print wrong or meaningless symbols. Experience has shown that one cannot be sure of detecting all these blunders by inspection. One method of detecting them is to make the machine proceed order by order under the control of a push-button and to inspect the contents of the store each time. This is, however, very wasteful of machine time, and it is better to use methods in which the information required is printed automatically. For example, it is a good practice when first designing a programme to arrange that a code letter is printed every time a sub-routine is

called in. If then the machine stops on account of an error, the sequence of code letters printed will help the programmer to localize the error. Later, when the programme has been proved to work satisfactorily, the printing of code letters can be cut out. In a similar way, it is a good idea to begin by including orders in the programme which will print out extra numerical information that can be used for checking purposes. These orders can also be removed when the programme has been shown to work correctly. For more detailed checking there are a number of sub-routines in the library which, when attached to a programme, cause the machine to print (in addition to, or instead of, the numbers specified in the programme) some detailed information which can be analysed afterwards. Thus, the machine may print a letter specifying the type of each order (for example, *A* for add, *S* for subtract, etc.) as it is executed; alternatively, the number in the accumulator register may be printed each time it is cleared.

It frequently saves time in the long run if those sub-routines which have been constructed specially for the problem are tested on the machine before being incorporated in the full programme. The sub-routines from the library, of course, are known to be free from error, and this fact alone would make the use of a library highly desirable, quite apart from other advantages.

Members of the summer school were shown various examples of programmes prepared for the EDSAC, including one for obtaining solutions of Emden's differential equation which occurs in astrophysics. The EDSAC has also been applied to problems arising in geophysics, wave mechanics, statistics, electron optics and electrical engineering.

M. V. WILKES

SPECIAL LIBRARIES AND INFORMATION SERVICES

THE twenty-fifth annual conference of Aslib, held at the University of Bristol during September 22–25, marked the beginning of the second quarter-century of service of the Association of Special Libraries and Information Bureaux, and was attended by two hundred and thirty delegates representing a wide variety of interests and studies, scientific and humane. The conference was welcomed by the vice-chancellor of the University, Sir Philip Morris, at a dinner and reception on the night of September 22.

At the opening session on the morning of September 23 the president of the Association, Dr. Percy Dunsheath, made a short speech in which he described Aslib as an "invisible investment" paying to the nation dividends both tangible and generous, since it is a society of special libraries—"places where the progress of science and specialized knowledge are fostered and furthered at every step". The usual presidential address was replaced by one by the director, Mr. Leslie Wilson, who paid a warm tribute both to the voluntary effort which has built up the Association in the past and to the generous support received for some years through the Department of Scientific and Industrial Research and now greatly increased. While welcoming the present trend in national life towards a partnership between voluntary effort and State support, he emphasized the obligation on recipients of such support to think in terms of the national and not merely the professional need. The primary duty of Aslib at the present time is to those, particularly in industry, who are called upon to be the leaders in national recovery. The main sinew of their effort is industrial research; it is Aslib's concern that more special libraries and information bureaux should be set up in industry to supply vital scientific and technical information to research departments. The Association hopes to establish more local branches and a number of groups representing the interests of particular professions or trades, expanding by these means not only its membership but also one of its most valuable services—the provision of facilities for the cross-fertilization of ideas. Aslib is well represented on the Nicholson Committee, the successor of the King Panel on Technical Information Services, and is responsible for representing Great Britain (the director hoped with increasing energy) in the field of international documentation. There is still an enormous field for research in special library methods, and Mr. Wilson said that he hopes before long to set up a research committee to carry on this work and publish its results. He could not envisage a single organisation serving effectively both the technical and the professional interests of librarianship—it might be that the latter should rest more particularly on the Library Association—but he felt sure that the fundamental activity of Aslib must in the long run consist of research into the techniques of special librarianship and information work.

On the afternoon of September 23, Mr. F. L. Kent, librarian of the University of Bristol, presented a paper on the library resources of Bristol and the south-west of England. It is hoped that similar surveys of other regions will enable a general view to be arrived at of the resources of Great Britain as a whole, particularly in special and technical libraries which might be willing to co-operate in the national inter-library lending service. The paper was followed by a comprehensive programme of visits to libraries, including the University Library (general and medical libraries, engineering division, and botany and zoology departments), the City Library and the South-Western Regional Library Bureau, and the libraries of the Bristol Aeroplane Co. and the National Smelting Co.—most delegates being able to visit at least two of these. In addition, arrangements were made for individual delegates to see the libraries of the University of Bristol Institute of Education, Southmead Hospital and Messrs. W. D. and H. O. Wills, Ltd.

The third session, on the morning of September 24, consisted of papers by Miss M. Exley and Mr. W. Ashworth on the re-planning and re-organisation of special libraries, the former being concerned mainly with buildings, equipment and administration, and the latter with re-cataloguing and re-classification. At the afternoon meeting, Miss E. Ditmas, former director of Aslib, presented a paper on the literature of special librarianship, containing a select bibliography of three hundred items, copies of which were exhibited in an adjoining room. This paper gave rise to useful discussion on the future publishing programme of Aslib and the possibility of collaboration with the Library Association in this field. The conference concluded with a paper on the Earl of Leicester's Library at Holkham Hall by Dr. W. O. Hassall, who, to at least one member of his audience, conveyed once again that sense of the unity underlying all the diversities of librarianship, research and learning which was present throughout the conference.

F. L. KENT