wood manufacture, electric lamp capping cements, metal foundry core binders, etc.

Moulding powders are used to produce large television and radio cabinets in one piece, clock cases, rotary pump impellors, stud-welding pistol grips, car facia boards, Topham spinning boxes and spools for the rayon industry, vacuum cleaner bodies, shop counter drawers, ventilator fan cases and rotors and radio and electrical accessories. In addition, a large range of fancy goods such as cigarette caskets, desk calendars, etc., are produced. The present trend is for larger and larger mouldings to be made.

In its laminated form, using paper or fabric as the interlayer, phenolic plastic is used for plywood facing for furniture, wall panelling for ships and railway carriages, silent gear wheels to transmit both low and high powers, plating barrels, fish plates for railways, stern tubes for the propellor shafts of ships, roller bearings in steel rolling mills, aircraft propellors and structures (for example, the 'Mosquito'), moulded dinghy hulls, etc.

Amino-Plastics—Urea and Melamine, developed in 1920 *and onward.* These are thermosetting. Mouldings with a high degree of beauty can be made, and thus they are used for fancy goods to a large extent. Urea resins are used for plywood adhesives, foundry sand-core binders, surface coatings, treatment of textiles to render them resistant to creasing, increasing the wet strength of papers, permanently stiffened finishes for textiles in admixture with starches or dextrins, controlling shrinkage of fabrics.

Urea and melamine resin mouldings are non-tracking, and thus are widely used for certain electrical insulators where resistance to electrical surface leakage is essential.

Amino materials capable of being made in light colours and delicate pastel shades are used extensively for surface layers of laminated sheet for wall panelling and light-coloured materials for furniture finishing, for example, table and bar counter tops, etc.

Polyvinyl Plastics, developed during 1920–30. These are thermoplastics made as polyvinyl chloride or acetate or copolymers of chloride and acetate. They are also produced as the acetals, butyrals, etc. They are easily worked into sheets and are now extensively used for shower curtains, window furnishings, flooring tiles and raincoats (either as sheet or as coated fabric). They can be made with a high degree of decoration, either clear or opaque and with printed patterns. They are also used for upholstery (leather-cloth), shoe uppers, ladies' handbags, transparent packaging, etc. In the chemical industry, polyvinyl chloride sheet (known as p.v.c.) is used for tank linings, protective clothing, filter cloths. Other applications are: safety glass for motor-car windscreens, yarns for weaving hosiery, fishing nets, etc., 'cocoon' casing for armaments in storage or being shipped to the East. Very large quantities are used for covering electrical cable instead of rubber, and for the manufacture of highly successful primers and other surface coatings.

Polyethylene Plastics, developed 1937–43. They are thermoplastic and possess a very high degree of both chemical and electrical resistance. They are wax-like to the feel and in appearance. They can be used for many items of chemical plant and utensils, such as pipes for conveying many chemicals, and for lining the interior of chemical tanks and vats, containers and utensils for hydrofluoric acid.

The evolution and use of polyethylene contributed substantially to the development of radar during the Second World War, on account of its very low power factor.

It is extensively used as the interior core of undersea cables to reduce electrical losses. It is also used in transparent film form as a packaging material for foodstuffs, drugs (like 'Mepacrin' tablets), flexible bottles by the Plax extrusion blow technique, pharmaceutical tubes, cosmetic containers, etc. Balloons for high-altitude meteorological and other observations can be made of polyethylene. Tubing for cold-water plumbing is also made of polyethylene.

Nylon, developed during 1928–38. This is a polyamide plastic and is a thermoplastic. It is best known for its use in hosiery and specialized garments. Industrial applications include tow ropes for gliders and gear wheels for impellor pumps. As a filler for phenolic moulding materials, it imparts great strength and resistance to alkalis and acids in mouldings. It is used extensively for surgical dressings where 'breathing' outwards only is required.

Methyl Methacrylate, developed in 1938. This is an ethenoid type of plastic and is thermoplastic. Some of its applications are for use in aircraft as radomes from transparent sheet, transparent models or housings for working parts for use in exhibitions, for example, motor-car engines, gear-box casings, etc. It is also used for artificial teeth and dentures, some types of transparent mouldings, camera lenses, spectacle lenses, sculpture or highly ornamental carvings, and rods for transmitting artificial light round bends. It is a material of considerable beauty and consequently is used for a wide range of fancy goods for machining.

Polyethylene Glycol Terephthalate ('*Terylene*'), *developed in* 1939 *and onwards.* This is a true synthetic fibre, either silk-like or wool-like in properties. It can be made unshrinkable. It can be easily printed and is probably the most successful synthetic fibre for the textile industry to date. Its tenacity when wet is the same as when dry. It has good drape and handle, and has been used so far for lightweight suits. It is also used for filter cloth and laundry bags, ropes, cord, thread, corset cloth, brassière cloth, industrial overalls and sailcloth. It is expected to follow the pattern laid down by nylon.

The above is a brief outline of the state of the industry up to date; but new products are emerging rapidly and what is new to-day may be old to-morrow.

H. V. Potter

LIBRARY SERVICE IN GREAT BRITAIN

ANNUAL CONFERENCE OF THE LIBRARY ASSOCIATION

As one of the means by which scientific and technical knowledge is made more readily available to industry and to the community generally, the public library service must always be of some general interest to the man of science. While his own needs will be met in general by the libraries maintained by his professional institutions, or of the universities, research institutes or industrial organizations or firms with which he is associated, as well as by such national libraries as those of the Patent Office or the Science Museum, they are already to some extent served by the larger public libraries

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which offer a type of regional service. If the regional libraries or services envisaged by the Panel on Technical Information Services of the Committee on Industrial Productivity ever mature, the public libraries are likely to play an important part in the development.

Little hint of such developments was given at the annual conference held in Edinburgh during June 5–8 by the Library Association ; but papers presented at the Conference possess rather more than usual interest for the scientific worker. The presidential address of Mr. James Wilkie, for example, dealt largely with the challenge which the impact of science and technology on everyday life as well as on industry make to the librarian, not only to meet the needs of science and technology but also to assist the citizen to adapt himself to changing conditions. These opportunities of service to all sections of the community were indicated with the vision and sure touch to be expected from the secretary of the Carnegie United Kingdom Trust. The same qualities characterize the general report of the Public Library Inquiry conducted in the United States by the Social Science Research Council, with assistance from the Carnegie Corporation, at a request made by the American Library Association in 1948. The findings of this report were summarized for the Library Association Conference by Mr. W. A. Munford, Cambridge city librarian, and it is clear from his summary that, apart from its bearing on public library service in Great Britain, the report deserves attention in regard to adult education and the extra-mural work of the universities, at least as indicating some of the questions that should be answered before determining university policy in that field.

Mr. Munford's paper was presented at a session at which the Association looked to its future problems, and another paper contributed to that session, by Miss Gwenda Jones, dealt with the practical issue of the place of reference and technical libraries in the county library system. This is an aspect of the regional problem which has scarcely yet been faced, largely for reasons of space, staff and of money ; but it is one which the distribution or dispersal of industry would render ever more important. Decentralization of industry itself explodes the idea that the county library system is a purely rural service completely divorced from industry and science. Miss Jones herself recognizes that the pattern of a county library technical service may be decentralization to the towns where the main industries operate, and that this would necessitate strengthening the branch staffs with technical librarians, possibly joint appointments with that of reference librarian. It is interesting to note also in this paper the suggestion that the county library system should provide employment for more persons with scientific qualifications of the calibre who at present find a place only in the big municipal libraries or the industrial libraries. Doubtless it will not be easy to implement any such suggestion without considerable improvement in the status and salaries which the county library system can offer at present, but the freer movement of men and women both from the public library system into industrial libraries and in the reverse direction is desirable. It could be an important factor in encouraging that mutual understanding of problems and conditions which is a prerequisite in developing the co-operation between libraries to which a whole session of the Conference was devoted.

The paper on reference libraries presented by Mr. Hargreaves, reference librarian of Leeds, at that session, and the papers at the symposium on library service to industry are possibly those of most interest to the scientific worker. Mr. Hargreaves's paper presented a sane and balanced view of the whole problem of inter-library co-operation in which the point of view of the industrial librarian is very fairly reflected. Mr. Hargreaves sees clearly enough the advantages of building up a co-ordinated system, as well as the practical difficulties in doing so, and no one could have indicated more clearly the way in which any such system can be prejudiced or even wrecked by thoughtlessness in the way it is put to use. Some of his suggestions should be at least as useful to the librarian in industry as to the public reference librarian, and his paper gives also a hint of the extent to which inquiry is still required before any attempt is made to set up a system of regional reference libraries in Great Britain.

The Earl of Elgin and Kincardine, vice-president of the Scottish Council for Development in Industry, who opened the symposium on library service to industry, was concerned to provide a national background for the discussion, and, like Mr. Wilkie, stressed the dominant part of science in industrial production and expansion and the need for efficient library service to enable the scientific worker—and indeed the administrator—to do the best work of which they are capable. He gave, moreover, just a hint of the contribution which library service can make to the task of adult education and the bearing of this not merely upon industrial productivity but also upon the social satisfactions which, as Dr. Elton Mayo emphasized, go so far to determine productivity. That point was also stressed by Mr. L. R. McColvin in his final reference to the importance of preventing the devaluation of man.

Mr. McColvin was referring to the part which the public library can play in providing the real incentive to use our technical powers to improve productivity by helping to make life interesting, to promote understanding and tolerance, to provide relaxation and enjoyment and disclose opportunities. Whatever the public library system can contribute to the dissemination of technical information or the improvement of industrial efficiency is, and should be, secondary to its function as a means of adult education and the provision of social satisfaction. It would be untoward if its resources and energies were diverted from that primary task, and the papers presented at the Edinburgh Conference give grounds for believing that in any re-examination of the place of the public library in adult education or the direct contribution it can make to the dissemination of technical and scientific information, its social function will be kept firmly in mind, and particularly by the men and women responsible for carrying out that service.

That reassurance is supported by the presence in the Civil Estimates of an entry of £2,000,000 for the acquisition of a site for the National Library. Only £50,000 of this sum is earmarked for 1951–52, and the project is thus a fairly distant scheme, like that for the Science Centre, which is also to accommodate the Patent Office and its Library, extended and modernized to constitute a first-rate central reference library on science and technology. Mr. F. C. Francis, in his paper dealing with the place of the libraries of Government departments, learned societies and research institutes in providing a full library service

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for industry, indicated that a sub-committee has already completed its report on the scope and plan of the proposed new Central Scientific Reference Library, although the report has not yet been made public. Mr. Francis emphasized, however, that no one library could provide all the service now required, and that the elaboration of scientific library services in Great Britain demands the greatest possible spreading of responsibility. The function of the National Library is to cover the greater part of the field itself and to co-ordinate the activities of the other libraries, seeking to ensure that all fields of information are properly covered.

Beyond the announcement that the proposed Science Centre is to be on a site on the south bank of the Thames, there has been no official pronouncement since Sir Robert Robinson's reference to the scheme in his anniversary address to the Royal Society on November 30, 1950. The site for the National Library has also been chosen, and the Ministry of Works has requested the London County Council to designate for this purpose in its first development plan the area lying opposite the British Museum on the south side of Great Russell Street. It is proposed that eventually the library of the British Museum shall be separated from the museum departments and accommodated in its own building on this site, much as, some seventy years ago, the natural history collections were transferred to South Kensington. Both projects will require many years for completion, and even the detailed planning is scarcely in sight. Nevertheless, Mr. Francis rightly directed the attention of the Library Association to both the short-term and the long-term problems which such projects pose, and to the challenge they offer to constructive thinking as well as to co-operation. That challenge should be taken up by the scientific worker and technologist as well as the librarian, and indeed by all who appreciate the large part which libraries can play in the dissemination and assimilation of our scientific and technical knowledge. As Mr. Francis indicated, prime importance is attached to the whole matter by the Government; but if the opportunities are to be utilized to the full and all obstacles to achievement overcome, the Government will require the sustained support over a period of years of informed opinion in scientific, technical and industrial circles.

RESEARCH ON BRICK-MAKING

NEW RESEARCH LABORATORIES OF THE LONDON BRICK CO., LTD.

OVER a large area of Great Britain the fletton brick has won its place as the cheapest common brick of the building industry, and an annual output of more than 2,000 million is nowadays achieved by the group of brickworks situated on the Oxford clay in the districts lying mainly around Bedford and Peterborough. In any manufacturing industry operating on this scale it is to be expected that there would be many problems calling for research, and a notable advance has recently been made by the largest fletton manufacturer, the London Brick Co., Ltd., which has recently opened new research laboratories at its Stewartby works near Bedford. The building, which was designed by Mr. C. C. Handisyde, provides efficient accommodation for the strong research team that has been built up since the War and, in addition, includes a display hall, library, and directors' conference and dining rooms. It is perhaps significant of the changes which are coming about in even the more traditional of our industries that accommodation for the Company's directors should be provided in close association with the research laboratories.

The laboratories are, naturally, built of brick. They are on an ample site and are designed in three wings on one floor on a flexible plan which will facilitate any future extensions that may be needed. Offices and small laboratories open off central corridors, and the lessons of modern school design have been utilized in that the larger laboratories obtain cross-ventilation and additional lighting over the corridors.

Other interesting features are the use of ceiling heating-panels in the laboratories to avoid the loss of valuable wall and floor space which other forms of heating would have required, and the imaginative use of bright, pleasant colours throughout the building in the decorations. Even the service pipes, which, owing to the nature of the site, could not be accommodated in under-floor ducts, are picked out in various colours in accordance with recommendations issued by the British Standards Institution.

Much of the research work is aimed at improving both the understanding and the operation of the manufacturing processes used in the Company's works, and studies are in hand on the conditioning and grinding of the clay, on the methods of pressing it into green bricks, and on the drying and firing processes involved. It is something of a surprise to find a well-equipped fuel technology laboratory devoted mainly to a study of the fuel content of the natural Oxford clay. Theoretically, the organic content of most of the clay used in the works is sufficient to produce all the heat needed for burning the clay. In fact, on account of the unavoidable inefficiencies of the burning process, some additional fuel has to be provided; but this is only a quarter of that needed for burning most other types of bricks. This is a matter of great economic importance in the fletton industry.

As an essential part of the research on plant and methods, a close statistical watch is kept on the qualities of the bricks emerging from the various works. By this means the effects of changes both in the manufacturing processes and in the nature of the raw clay can be accurately followed. Research of this kind is badly needed in a group of industries which are normally regarded as falling outside the field of chemical engineering, and it may well be that this pioneering work by the London Brick Co. will lead other industries to make similar efforts.

Work of a much more fundamental character is also being done. In association with a detailed geological survey of the Oxford clay deposits, a study has been commenced of the constitution of the clay. Differential thermal analysis is being used for the identification of clay minerals, and provision has been made for the utilization of X-ray techniques at a later stage. These are essentially long-term investigations and represent an imaginative and long-sighted view by the Company of its research activities.

In addition to the work concerned directly with brick manufacture, there is also some research in hand on processes designed to produce a light-weight aggregate for concrete by the bloating of clay, and other clay products of cellular structure. Attention is also given to the utilization of by-products.

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