

tion, tried unsuccessfully to buy up Courtaulds in 1962. As well as comparatively routine expansions in nylon and other textile fibres, Courtaulds has also declared its interest in the bulk manufacture of carbon fibres. According to Sir Frank Kearton's declaration to the annual meeting a week ago, carbon fibre production should amount to 25 tons a year by the middle of 1970 and probably to 100 tons a year by early 1971. This is not merely a decision destined to win friends in Parliament and in the British Government—the Select Committee on Science and Technology has been calling for such a plant—but also another smack in the eye for ICI, possibly the most natural producer of carbon fibres.

#### PHARMACEUTICALS

### New Ventures for Beecham

THE Beecham Group, widely known as the manufacturer of what is described as the "world's leading haircream", seems to be preparing to spread its wings in pharmaceuticals outside the comparatively narrow field in which it has so far been engaged. This, at least, is the implication of a passage in the speech by Sir Ronald Edwards, the new chairman, who said at the annual shareholders' meeting last week that the group is "steadily increasing research in a number of other fields including nutritional, dental and viral disease, immunology and parasitology". For the past few years, the company's pharmaceutical division has been reaping the rewards of the semi-synthetic penicillins developed in the fifties. According to the annual report, £70 million worth of variants of the penicillin marketed as 'Penbritin' were produced throughout the world last year. The British plant manufacturing the semi-synthetic penicillins is said to have produced £11 million in exports alone in the same period. But, with all the examples of failure in pharmaceuticals which abound, the group is plainly on the look-out for the succession of new products on which continued survival must depend.

Where will be the next move? No doubt the company will be anxious not to move too quickly into the development and manufacture of vaccines—Glaxo and Burroughs Wellcome are well established and the British market is worth only £5 million a year, in any case. There may be more to be said for trying to make something of the way in which the antibiotic rifampicin seems to be effective against some viral and rickettsial infections, and certainly the time should eventually come when molecular biology has some therapeutic consequences. Another possibility is the production of immunosuppressive sera such as ALS, for transplants have come to stay. The Beecham Group will no doubt also wish to look hard at such openings as there may be in the manufacture of special components of diet, if only because it has the marketing organization for selling such things. The company itself is plainly anxious to keep its plans to itself for as long as possible, but it seems likely that the new ventures will be substantial. The cost of research in the new financial year is estimated to amount to £5 million. The group employs 300 qualified people on research and is extending its laboratory at Brockham Park in Surrey, and Sir Ronald Edwards says that it has bought a new laboratory at Harlow in Essex so as to increase the pace of growth.

#### EDUCATIONAL TECHNOLOGY

### Learning by Computer

THE investment of £2 million over the next five years in computer based learning is recommended by the National Council for Educational Technology in a report published this week. This "Programme for Action" is the outcome of eighteen months' work by the council, and is based mainly on a study by a team of seven appointed in September last year. Its main suggestions, intended to bring a measure of coordination to trends that are likely to occur in the near future, cover three general areas—specific applications of teaching by computer to selected topics that are particularly suitable for this technique; studies of the feasibility of using computers in fields of high priority, such as the education of slow learners; and the development of means of communication between the student and the computer.

Using computers is seen as a natural extension of current techniques of programmed learning and audio-visual aids. Many institutions in the United States are already making progress in this direction, and members of the study team have investigated their results at first hand—a report on what they found of direct relevance has been published separately. Such advances seem to be essential, constituting one way to avoid a clash between a continuing expansion of education at all levels and impending economic obstacles to a proportionate increase in the number of teachers. The report speaks rather vaguely of the finance coming "from diverse sources in the public and private sectors", but points out that sums of the order of £2 million will probably be spent anyway, so that the immediate task is one of central control.

The best sectors of education for the first phase of development are those in which there is a high degree of structural coherence in the subject matter. Further criteria of selection, somewhat more expedient, include a shortage of teaching staff and a substantial contribution to national economic needs. On this basis, the report's suggestions are technological and mathematical topics, parts of the medical curriculum such as diagnostic procedures, and the training of electronics technicians and computer staff. Quite what is to be done here is left as a matter for future evaluation. Feasibility studies refer euphemistically to "the needs of those children who are described as being at the lower level of ability", and also to the exploration of potential uses in refresher courses for teachers, as well as in management training. Whether any of these lines will actually be pursued presumably depends on the report's reception among ministers.

Computer technology is already adequate for most of these needs, with one exception: the link between the computer and the student who is learning from it. The council recommends that £500,000 be allocated to improving communications here. Computer-controlled teletypewriters have usually joined the machine to the external world, but this system will be far too cumbersome for routine use by students. Nobody yet knows what new developments will provide and, although there are optimistic references to future possibilities of written or even spoken input, it is clear that the problems of the "student terminal" are the main hindrance to immediate computerization.

Long-term plans will depend directly on the outcome