

rejected an offer of £15 to £50 a year according to grade—a rise of roughly 3.5 per cent which is just inside the Prices and Incomes Policy ceiling.

The union seems in no mood to continue negotiations with the universities. It argues that since 1966 its members have received only 4.4 per cent more pay and an offer of a further 3.5 per cent to last until April 1970. During that period the union says the average wage index has risen by 15.5 per cent, and people doing comparable work outside the universities have received rises of up to 14 per cent. In addition, the joint universities and union working party, which has been trying to hammer out new pay scales for all grades of technicians and minimum qualifications for the various grades, has made little headway after a year.

To further its claim, the union is to lobby MPs on April 21 and, after the national one-day strike, will hold a series of longer strikes at selected universities. As a start it has announced that 450 technicians at Imperial College, London, will strike on May 6–8, immediately before the college's open day. The college coyly says that the open day is not part of its recently launched appeal for £2 million, but just to keep the college in the public eye—which is a wise thing to do when trying to collect £2 million. Imperial College says it regrets the timing of the strike but has no intention of postponing the open day. Staff and graduate students in each department will have to do the best they can without their technicians.

That may be more than members of the Association of University Teachers feel able to do. The AUT, already bitter after its pay award and the lecture from the Prices and Incomes Board on the false criterion of wage comparability, cannot have been made happier by seeing the doctors, the Ford car workers and BOAC pilots all use the principle of comparability in successful pay claims. The association has sent a letter to its members advising them to do nothing that could be construed as breaking the technicians' strike. Whether the urge to teach or research will prove stronger than union solidarity remains to be seen, but it is significant that the technicians' union is one of the three unions with which the AUT has been holding exploratory talks to see if there is any benefit to be gained from cooperation or even merger. If AUT members appear as strike breakers, they will not make themselves popular with Mr Clive Jenkins's empire.

#### SRC REPORT

## Enzyme Chemistry

Now that enzymes have established themselves in the washtub—to the surprise of many enzyme chemists—it is clearly time to look more deeply into the commercial possibilities of these natural catalysts. This is just what is done in a new Science Research Council report, *Enzyme Chemistry and Technology*, compiled by a distinguished panel of specialists within the enzyme field.

The report is a model of its kind. It conveys in a vivid way the conviction that both our understanding of enzymes and our ability to make use of them in industry and medicine are due for a phase of dramatic growth. The near future may even see development beyond this, for in the words of the report: "The

study of the structure of enzymes and of the mechanism of enzyme action is also leading to a greater understanding of the basis of catalysis itself. In some ways enzymes provide ideal model systems for the study of the molecular details of catalytic reactions, and the rational design of specific catalysts is not nearly as remote as it appeared only a decade ago. A new era in pure and applied chemistry will be at hand when man can control specific catalysis."

Despite this promise, Britain is beginning to lag behind the USA, Japan and Sweden in enzyme technology, and to some extent in academic enzyme research also. The report recommends that SRC support for the field should grow from its present level of £200,000 per annum to between £400,000 and £500,000 per annum. The SRC has announced its acceptance of the proposal. It is willing to award up to £300,000 in research grants in 1969–70, if applications of sufficient promise are received. A new committee—the Enzyme Chemistry and Technology Committee—will assess grant applications and allocate research studentships. Professors Sir Ewart Jones, G. W. Kenner, H. L. Kornberg and D. C. Phillips have already agreed to serve on this committee.

More specific recommendations are that a 220 MHz nuclear magnetic resonance machine should be available somewhere in Britain chiefly for enzyme work, that facilities for isolation of enzymes on the gram scale should be extended and that the industrial potential of enzymes as catalysts should be explored vigorously. The report is not happy with the idea of a central enzyme research institute, and with good reason. The essence of growth in a field of this sort is flexibility, which is more likely to be achieved in changing patterns of collaboration between groups which already exist than in a new hierarchic institute. The committee expects the number of staff concerned with enzymes to double in the next two or three years, but this presents no problem of supply. Most of the personnel will probably be seconded from other less expanding fields.

The report does not neglect the medical promise of enzymes. They are already the mainstay of the clinical biochemistry laboratory, both as analytical reagents and as parameters in diagnosis. But their main potential is a future rational chemotherapy. It is hoped that detailed knowledge of the active site chemistry of enzymes will make possible the design of enzyme-specific inhibitors, tailor-made for any desired medical purpose.

#### SRC REPORT

## More Money for Polymers

POLYMER science is soon to get a much needed boost. The Science Research Council Polymer Panel, in its report published last week, recommends increased grants for research and training and the formation of the new Polymer Committee. For more than a year now the SRC University Science and Technology Board has been selecting important areas of science and technology which it considers deserve special support. The polymer report is the third to be published; the first was on organometallics (*Nature*, 221, 616; 1969) and the second on enzymes (see this page).

It is ironic that the practical importance of polymer

science may have caused its neglect by the academics. Only four British universities run substantial research programmes in polymer science, and although there are also about twelve minor schools these are insufficient to cover the subject fully. Polymer science is a growth industry, and considerable expansion in university polymer research is required if universities are to play their part in providing fundamental knowledge and trained manpower. The Polymer Panel estimates that about 100 polymer scientists are needed each year by the industry, and the present output from universities is not more than seventy a year. The SRC board has accepted that more money should be spent on training. The panel recommends an immediate doubling of financial support to about £0.5 m—the SRC has provisionally accepted that “the total funds granted may reach £300,000 by 1970 provided sufficient applications of sufficient standard are received”.

On the basis of an enquiry into the research programmes of the larger research teams in British universities, the panel has recommended various areas in which research should be initiated or more support given. These include the synthesis of new polymers (for example, three dimensional polymers, thermally stable polymers from cheap starting materials and studies of thermally labile linkages and inorganic polymers); the physical and mechanical properties of polymers and composites including the application of the concepts of metallurgy to polymers; and the engineering aspects of polymers including their design, applications and processing. The British plastics industry, which is lagging a little in the world stakes, as well as the universities should benefit from this shot in the arm.

## FALLOUT

### Strontium-90 Contamination Down

THE average concentration of strontium-90 in human bone in Britain fell once again last year, according to the latest report of the Medical Research Council's Committee on the Monitoring of Radioactivity from Fallout (HMSO, 3s). The committee says that the most important feature of the 1967 results is that lower values were recorded for all age groups (see Table); this decrease reflects the fall in the levels of contamination of food over the past few years. Adult bone was less contaminated than expected, but it is too early to say whether this is a real effect rather than a sampling error. Only 342 bone samples were analysed at the Atomic Energy Authority's Capenhurst laboratory, of which 23 were from people who died in the second half of 1966, and the samples analysed at Glasgow were from 188 children who had died there in 1967. Although

MEAN STRONTIUM-90 CONCENTRATIONS IN HUMAN BONE, 1966 AND 1967

| Age                   | Capenhurst sample |      | Glasgow sample |      |
|-----------------------|-------------------|------|----------------|------|
|                       | 1966              | 1967 | 1966           | 1967 |
| Newborn and stillborn | 2.2               | 1.5  | 2.7            | 1.95 |
| 6 months-2 years      | 6.2               | 4.2  | 8.3            | 5.8  |
| 2 weeks-4 years       | 5.1               | 3.6  | 6.5            | 4.1  |
| 5-19 years            | 2.6               | 2.1  | 4.8            | 4.8  |
| 20 years and over     | 2.2               | 1.6  | ...            | ...  |

such small samples may not be representative of the whole population, the committee notes that a similar unexpectedly large decrease in the concentration of strontium-90 in adult bone has been reported recently in the United States.

There were no adults in the sample analysed at Glasgow. In the table, the concentration of strontium-90 is expressed as picocuries per gram of bone.

## SPORTING REPRODUCTION

### Cloning and the Jockey Club

THE recent *in vitro* fertilization of human oocytes brings the whole question of animal cloning a little nearer in spirit if not in fact. Clones would be exact copies of an adult produced by a process of vegetative reproduction, with no act of sexual fusion intervening between adult and offspring. This has already been accomplished to some degree in amphibians, by injecting the nucleus from a tissue cell of a chosen adult into an egg cell from which the nucleus has been removed. The resulting embryos are prone to deformity, but sometimes they develop into viable adults.

Speculation about cloning people is not new. Discussions usually emphasize two questions. First, what would a nation do if a mercantile or military rival equipped itself with dozens of Einsteins or Machiavellis or whatever? Second, there is the nature-nurture question which Haldane posed by asking what would have emerged from the cloning of Rimbaud—a first-rate poet or a third-rate empire-builder?

There may be fewer difficulties with highly bred animals. Cloning, indeed, might seem ideal for a breeder of show dogs. When at long last a dog turned up perfect in the myriad parameters of concern to judges of canine quality, there would be a strong temptation to replicate the beast and, eventually, its descendants.

The Kennel Club is admirably phlegmatic about this. It predicts that the machinery already established for dealing with artificial insemination would also handle the ambiguities of cloning. Dogs sired by artificial insemination are only accepted for pedigree registration if a veterinary certificate attests the donor. The Kennel Club was unsure what would happen if a line of clones from some utterly splendid dog began regularly to usurp all the awards for a particular breed. Perhaps there would have to be special consolation prizes for uncloned animals, or perhaps clone could be pitted against clone, making the contest one of rearing rather than breeding.

Horses present a rather different situation. Horses attract attention when they run very fast, not when they approximate to some static conception of the ideal. There is also the feeling among horse fanciers that the game is the thing—that it is the uncertainties of racing which give it spice. The Jockey Club was therefore understandably cool when asked to comment on the possibility of a dozen cloned Arkles thundering neck and neck round the course at Epsom. Where horse breeding is concerned, even artificial insemination is forbidden. But apparently Japanese breeders are less fastidious—they have no objection to artificially inseminated racehorses. So it may yet be possible to see how long the Jockey Club will hold out if clones from some meteoric Japanese horse begin to sweep the board at race meetings round the world.