

other than that with which Beckwith has been concerned. There is, however, no assurance that manipulations like these presage the manipulation of the inheritance of *E. coli* in any deliberate way, and it is of course a far cry from even that to the deliberate manipulation of genetic inheritance in more complicated organisms than bacteria.

So why are people anxious to read sinister messages in this new development? The question is perplexing because it reflects an implicit change in the public mood. A century ago, for sure, few people would have been tempted to look for such sinister outcomes. For all the opposition of the Victorians to what they called Darwinism, few people feared (as they might have done) that the discovery of the importance of natural selection would make it possible for eugenicists to transform the character of living things. Indeed, the tendency to seek sombre consequences for scientific discoveries is a comparatively recent event, a thing of the sixties and not simply of the nuclear world. Two dangers lie concealed in this. First, the progress of science itself may be interrupted or even halted by excessive fears of the consequences. Second, as in the tale of the shepherd boy who cried wolf too often, exaggeration may blunt the sensibilities of society to real dangers. It is for scientists to help to distinguish between a responsible concern for the social consequences of what they do and an exaggerated fear of them.

## 100 Years Ago



A WEEKLY ILLUSTRATED JOURNAL OF SCIENCE.

"To the solid ground  
Of Nature trusts the mind which builds for aye."—WORDSWORTH.

The deep-sea dredgings in this cruise yielded no end of novelties and interesting results in every department of the Invertebrata. They were enough to take one's breath away. Among the Mollusca were valves of an imperforate Brachiopod with a septum in the lower valve, which I propose to name *Cryptopora gnomon*. Some shells were of a tolerable size; and the fry of *Isocardia cor* (*Kelliella abyssicola* of Sars) were not uncommon. Many Crustacea (Amphipoda) were scarlet, and others bright red with feathered processes of a golden colour at the tail. A magnificent Annelid was pinkish, with purplish-brown spots on the line of segmentation. A *Holothuria*, from 1,443 fathoms, was 5 inches long and  $2\frac{1}{2}$  in circumference. None of the animals, especially the Mollusca, were living when they were brought on board and examined; this was perhaps owing to the great change of temperature (sometimes as much as 20°) between that of the sea-bed and that of the atmosphere.

From J. Gwyn Jeffreys's account of the deep sea dredging expedition in HMS Porcupine. (*Nature*, 1, 136, December 2, 1869.)

## COMMITTEES

### Swann dissects Antibiotics

IN recommending that antibiotics should be classed into feed antibiotics and therapeutic antibiotics, of which only the former may be given to animals without a vet's prescription, the committee chaired by Professor Michael Swann has deftly struck what seems to be the optimum balance between two evils. The problem the Swann committee found itself facing was that the more severely it restricted the agricultural uses of antibiotics, thereby raising the costs of producing food, the more lives of old people and children would eventually be saved from falling to resistant micro-organisms.

"Solutions to such problems come not from dwelling on the ethical dilemma but by scientific discussion of the basic problems", the committee declares in the first page of its report (*Report of the Joint Committee on the Use of Antibiotics in Animal Husbandry and Veterinary Medicine*; HMSO, 8s 6d). In the spirit of this credo the report sets forth in uncluttered language the agricultural value of antibiotics and the dangers implicit in the situation, notably the transfer of organisms from animals to man and the transfer of resistance between organisms.

The report's chief recommendation is that what are to be defined as "feed" antibiotics shall fulfil the three conditions that (a) they are of economic value in live-stock production, (b) they have little or no application as therapeutic agents in man or animals, and (c) they will not impair the efficacy of therapeutic drugs through the development of resistant strains of organisms. Therapeutic antibiotics should be available to treat animals only if prescribed by a vet. The committee's most taxing decision was whether to allow chloramphenicol, the chief antibiotic used in treatment of typhoid fever, to be available in this way. In the event, they decided that vets should be allowed to prescribe chloramphenicol in special circumstances.

The Swann committee notes that more than half the antibiotics used in Britain are prescribed for human use. Use of antibiotics by doctors fell outside the Swann committee's terms of reference, but it recommends that a committee should be set up with overall responsibility for the whole field of use of antibiotics whether in man, animals, food preservation or for other purposes.

The use of antibiotics for the treatment of "stress" in animals is frowned on as being unscientific, but the Swann committee recommends that feed antibiotics should be available for use in calves up to 3 months old as well as in pigs and poultry. Present legislation restricts the feeding of antibiotics to the latter two species.

Feed containing antibiotics may be advertised, provided it is labelled with the name and dose of the feed antibiotics it contains; therapeutic antibiotics, however, may not be advertised to laymen.

The Swann committee believes that too little is known about veterinary epidemiology, a subject which is a distinct discipline in its own right. It wishes that departments of veterinary epidemiology were established in universities and that the Agricultural Research Council and the Medical Research Council would consider how best they could promote such studies.

Mr Cledwyn Hughes, Minister of Agriculture, has

declared that the government accepts, in general, the Swann committee's proposals for the control of antibiotics but that "some of the committee's more detailed recommendations and longer term proposals on research and veterinary epidemiology will need further study". Manufacturers will be given a reasonable period of grace to run down feed stocks which contain the prohibited "therapeutic" antibiotics; these include penicillin, the tetracyclines, tylosin, the sulphonamides and certain nitrofurans.

#### OPEN UNIVERSITY

## How to Get a Degree

THE Open University will accept applications from prospective students in January 1970, and will begin in earnest a year later. It seems that the plans have been made for a comprehensive selection of courses, and the student will graduate by building up a number of credits, each of which is awarded for successful completion of a one-year part-time course. Six credits are needed to qualify for a BA degree, and eight for a BA degree with honours. Because no more than two courses may usually be taken in any one year, the minimum period for achieving a degree will be three years, but it is expected that many students will take courses one at a time over several years.

Tuition will consist of a system of correspondence courses, radio and television programmes, a summer school, and regionally organized counselling. Students will probably spend about ten hours a week on their studies, including an hour's television and radio courses. The first year will be spent on "foundation" courses, which will be repeated every year for new students, while successful students will carry on to second, third and fourth level courses. Two credits from foundation courses must be achieved before a student can qualify for a degree, and an honours qualification will include credits from third or fourth levels. Apart from these restrictions, a student will be free to choose his courses, and he will therefore be able to combine a variety of subjects, for example, science and humanities. This is one obvious advantage that the Open University can offer, compared with conventional universities.

The university later hopes to introduce postgraduate and post-experience courses, and also "updating" courses which will be intended for people wishing to keep pace with advances in their professions. In addition, already qualified teachers will be awarded one credit for every year that they have spent in a college of education, thus enabling them to qualify for a BA degree on successful completion of only three courses.

Students will be accepted for the 25,000 places that the Open University hopes to have available, on the basis of their occupation, age, preparedness, region, and the subjects which they hope to study, but Dr Walter Perry, Vice-Chancellor of the Open University, said that the weighting given to each of these criteria could not yet be determined. The cost of qualifying for a degree will vary according to whether a student takes one or two courses a year. There will be an initial registration fee of £10 and a single foundation course will cost £40. This fee will be payable in April, however, to allow students, who find that they do not want to carry on, to drop out before they have committed themselves financially. Second, third and fourth

level courses cost £20, and it is therefore possible for a student to acquire a degree in three years for £140, or a BA with honours for £180, inclusive of accommodation fees at the summer schools.

#### SEISMOLOGY

## Setting the Moon Ringing

from our Geophysics Correspondent

IT is, of course, too early to do more than say "whoopce" and jump on the speculative bandwagon after the remarkable results from the lunar seismometer last week. We have been lucky in getting a comprehensive press coverage so soon, with comments from Drs Latham, Ewing and Press, but newspaper descriptions can only titillate the imagination—all geophysicists and planetary physicists will be itching to see the records for themselves. The hard facts that we have so far are that when the ascent stage of Intrepid was rammed back to the Moon's surface, it produced a crater twenty feet across and two feet deep, some forty miles from the Apollo 12 seismometer. The impact generated seismic waves which continued for thirty to forty minutes.

On Earth, this would be unthinkable. An explosion of modest size on the Earth's surface—perhaps a few tens of tons—could simulate this event, but a recording station a mere forty miles away would record signals for perhaps a minute or two as the surface waves passed by. After that there would be silence—and not just because the instrument would be not sensitive enough but because the next arrival of energy would be an hour or more later, from surface waves that had gone round the Earth the other way, and these would be so heavily damped by imperfections in the elasticity of the Earth (which has a  $Q$  between 200 and 500) that for practical purposes the waves would be completely blotted out.

How is the Moon different? If we assume as a starting point that the elastic properties are comparable, surface waves should get round the antipodal path much more quickly because the radius is smaller. These could certainly contribute to the signal, provided the an-elastic properties are not as marked as on Earth. For example, the presence of a low seismic velocity layer on Earth, probably the result of partial melting between 100 and 300 km, is widely believed also to lead to a low  $Q$  layer. This region of high seismic wave absorption dominates the attenuation of surface waves. On the Moon, things may be different. If there is no partial melting near the surface—and there is no reason why there should be an analogy with the Earth—then it is possible that  $Q$  is high throughout the Moon—maybe as high as a thousand. The Moon is then nearly as resonant as a bell, and any small disturbance will set it ringing for a very long time.

It would be foolish, however, to state at this stage that the results unequivocally favour the "cold Moon" theory, as one or two enthusiasts have already claimed. Much of the Earth's crust has a  $Q$  in the region of a thousand and the low  $Q$  zone may be a coincidence of thermal conditions, pressure and petrology. It is impossible to say at this stage whether the apparent absence of lunar absorption has any bearing on internal lunar temperatures.

Without the seismograms themselves, we can only