

The prime exhibit was a new method of magnetic levitation devised by a team led by Dr B. V. Jayawant of Sussex. For the demonstrations on show, the term might more properly have been magnetic suspension. They were objects weighing up to several pounds hanging a few millimetres below a.c. electromagnets. So far, the weight limit is 10 pounds, but Professor J. C. West, the director of the institute, optimistically says "We can float anything anyone wants, from a pin up to fifty tons". And heavy hints were dropped about levitated trains. The essence of this method of magnetic levitation is to include the electromagnet as part of a resonant circuit, and this arrangement overcomes the oscillations of the suspended object which arise with d.c. electromagnets. The profile of attractive force versus distance from the magnet can be arranged so that the circuit departs from resonance if the suspended object comes too close, whereupon the attractive force decreases and the suspended object falls. But if it falls too far, the circuit approaches resonance and the attractive force increases. At Sussex this week there was talk of using the principle as a magnetic bearing, in an ICI fibre plant and in an anemometer for the US Bureau of Mines.

The Inter-University Institute of Engineering Control meets with the approval of the SRC, and the director of the council's University Science and Technology Division, Mr C. Jolliffe, was at the celebrations to say that control engineering—like radio-astronomy—has been picked out by the council for generous support. He was unsure precisely how much the council spends each year on control engineering, but it is somewhere between £500,000 and £1 million, and the institute receives between £50,000 and £100,000. But it is still not clear how the institute fits in with the council's avowed intention to concentrate its resources at the control engineering group of Cambridge, Imperial College (London) and the University of Manchester Institute of Science and Technology. At Sussex this week it was jovially denied that the institute is just another way of persuading the SRC to part with its money. Apart from what sounds like an excellent MSc course which involves students in eight weeks of lectures at each of the three universities before they settle down at the department of their choice, it is hard to detect any concrete examples of the benefits of cooperation. A glance at the annual report reveals no examples of multiple authorship of papers by members of the institute who come from different departments, and the SRC is said to be disappointed that there is no large project involving all three departments. Mr Jolliffe, nevertheless, commended the arrangement to other universities. The chief obstacle to effective cooperation must be the distances between Bangor, Brighton and Warwick, but there seems no reason why departments in, say, the closely-packed universities of Yorkshire and Lancashire should not pool their resources.

SAUSAGES

Chicken with Everything

THE US Department of Agriculture has decided that the all-American hot dog may contain as much as 15 per cent chicken without anyone being the wiser. But if the hot dog, or frankfurter, contains any greater amount,

its chicken content must be advertised in small print on the package. The National Broiler Council, which had been hoping for a 25 per cent limit on unlabelled chicken, believes that a label of "frankfurters with chicken" is unfairly discriminatory to the poultry industry. Presumably it feels the same way about "chickenfurters" and "chicken dogs", names which advertisers have designed to combine honesty with sales appeal.

There is also a category of sausage sold under the euphemism of "all meat", that does not mean that the sausage is all meat (it contains fat, water and cereal), but rather that the meat is all meat. (Meat that is not all meat is meat mixed with fat and skin.) Under the new American rules, to go into effect in November, chicken skin may not be used in all-meat sausages; in frankfurters, it may appear in proportions no greater than that which it appears in the chicken itself. There must be no poultry kidney or sex glands minced into cooked sausages (a definition which embraces a number of other delicacies such as bologna, Vienna sausage and knockwurst) and no more than one per cent of bone residue, but these last simply extend existing regulations.

The real battle, one which President Nixon has joined, concerns the fat content of the frankfurter. He is allied with the anti-cholesterol faction who want to see no more than 30 per cent of fat in hot dogs. The Agriculture Department is plumping for 33 per cent and the industry 35 to 37 per cent. The final decision should be announced soon. The water content will probably remain stationary at 10 per cent.

What goes in the favourite national sausage is never a dull subject. The battle over water content raged in Germany a few years ago and Britain's own rules are spelled out fairly meticulously in the Sausage and Other Meat Product Regulations of 1967. Simply to read it, however, may put one off processed meat for life. Anything described, for example, as "meat curry with rice" need have a meat content of only 15 per cent and even the "meat" is given the broadest possible definition: the flesh, including fat, skin, rind, gristle, sinew and permitted offal. In Britain as in America, there is a superior category known as "lean meat" which means the total weight of lean meat free of visible fat. The interest in the new American rules is not only that they classify chicken as a second-class sort of meat but that they govern what must be printed on the packet. Rules laid down by governments for the producer are one thing. Rules that insist that consumers (at least those willing to risk myopia in the supermarket) be allowed to know what exact proportions of fat, meat and water they are buying when they choose cheap, quickly cooked foods are something else again, and something better.

ANIMALS

Fewer Tortoises in Britain

A SIGN that the craze for exotic pets in Britain may be on the decline can be found in the latest figures for the issue of import licences in 1968 published by the Department of Education and Science (HMSO, 4s). Tortoises are the chief beneficiaries. In previous years, the Advisory Committee set up by the Animals (Restriction of Importation) Act, 1964, has complained about

the "large and increasing number of licences to import tortoises". In 1968, however, the number of applications to bring tortoises to Britain decreased to 350,000 from 600,000 in the previous year. Moreover, it seems that only two thirds of the licences granted in 1968 were followed by the import of a living tortoise. What seems to happen is that importers overstate their requirements, presumably so as to be able to meet fluctuations of demand.

The import of animals for serious purposes seems also to have eased during the year. Old world monkeys, which play a part in the development and testing of vaccines, are prominent in the list. The Advisory Committee says that the only significant increases in applications for licences have been for the importation of kangaroos, wallabies, giant tortoises and iguanas, and even here, it seems, only a proportion of the licences issued were eventually translated into living animals.

PURPOSES FOR WHICH ANIMALS WERE IMPORTED	IN 1968			
	Animals	Zoos and breeding	Scientific research	Resale
* Marsupials				
Macropodidae				
kangaroos and wallabies	17	6		3
Phalangeridae				
opossums, koalas	3	—		3
Primates				
* Lemuridae	2	—		—
* Pongidae				
anthropoid apes	23	1		—
Cebidae				
South American tree monkeys	22	442		1,075
Callithricidae				
marmosets, tamarins	8	60		358
Cercopithecidae				
old world monkeys	47	8,642		1,371
* Ungulates				
Rhinocerotidae	2	—		—
Reptiles				
Testudinidae				
tortoises	9	7		223,129
Iguanidae	10	—		462

*Animals considered to be rarer than the rest. Some of the Testudinidae come into this category.

PLANT ECOLOGY

British Flora in Extinction

from our Botany Correspondent

BOTH man and climate have influenced the distribution of British flora, although from the Neolithic period onwards it is generally difficult to distinguish between the effects of each. The shift from tundra to trees that occurred some 15,000 to 13,000 years ago was chiefly the result of climatic change, which must still be taken into account in predicting the future of British flora. This was the upshot of a conference held in London from September 19 to 21 by the Botanical Society of the British Isles to consider the flora of a changing Britain.

J. P. Savidge described studies of the influence of climate on the vegetation of Cader Idris, a hill in West Wales. He and his colleagues at the University College of Wales, Aberystwyth, are recording the abundance of the various species, together with details of the environment in which they grow—soil pH and concentrations of nutrients, for example—with the intention of establishing an "environmental spectrum" for each species.

This will help to detect changes in the distribution of a species that are the result of climatic changes alone.

Savidge pointed out that, as the climate alters, species that can adapt to new conditions will survive, while those that cannot, because their breeding system does not encourage variation, will tend to die out. This category includes for example apomictic species which reproduce by seed without the intervention of fertilization. Furthermore, if summers continue to become cooler, the British flora may lose the continental species which grow chiefly in the south, and which need a fairly high temperature for germination and a fairly hot summer for fruiting.

C. D. Pigott (University of Lancaster) is also investigating the response of plants to climatic change, and has found that the small thistle *Cirsium acaulon* grows more densely and has a greater reproductive capacity in the south of England than in Derbyshire, near the limit of its distribution. In the south there seems to be a potential of about three hundred good seeds per flowering rosette, but in Derbyshire the number is only thirty to fifty in a good year. The temperature sensitivity of fruiting in *C. acaulon* is a sure sign that climate is a cause of the different behaviour in the two parts of Britain.

The ecological significance of such a phenomenon, Pigott explained, has to do with the ability to exploit new habitats. A species such as *C. acaulon*, growing in conditions which limit its sexual reproductive capacity and make it dependent on vegetative propagation, will be less able to adapt to changes in the environment than species which can produce abundant seed, some of which should be genetically equipped to cope with changed conditions. In the face of climatic changes *C. acaulon* may therefore die out in Derbyshire, but it is less likely to do so in the south of England where all the variation consequent on abundant sexual reproduction would be available for adaptation.

The speakers who went on to assess the changes that man has wrought on the British flora made it clear that his influence has not been wholly bad, in spite of pollution and wholesale destruction of habitats. J. E. Lousley (past president of BSBI) related how the coming of the railways created vast stretches of new habitats for foreign plants. As is well known, Oxford ragwort (*Senecio squalidus*) spread throughout the railway system after seeds had been dispersed from the Botanic Garden to Oxford station. Canals have had a similar effect on the aquatic flora. For example, *Elodea canadensis*, Canadian pondweed, arrived in Britain in the 1850s and has since infiltrated the whole canal system. With increasing cleanliness and container transport, there will be much less scope for the spread of plants by rail and canal, but motorway verges could prove interesting as sites for the spread of new species.

A. J. Gray (Nature Conservancy, Merlewood), who has the task of assessing the botanical consequences of the Morecambe Bay barrage, predicts that new habitats will be created; it will be interesting to see what species move into them. Gray suggested that even species such as *Senecio palustris*, extinct since 1899, could return in such conditions. For botanists, barrages, like many of man's activities, could have welcome results in spite of the initial destruction involved. Nonetheless, climatic change cannot be made to bear all the blame for the twenty-one species of plant that have become extinct in Britain since 1800.