

the implications of results from rapid screening for regulatory policy. Previously (see *Nature* 278, 388; 1979), President Carter's advisers at the US Office of Science and Technology expressed the view that "it is necessary to start by distinguishing scientific from regulatory decisions" — "scientific data collection and analysis" was one matter, but "cost benefit analysis" definitely another.

This view did not seem to be shared by B. Commoner, who began his presentation of results, from Ames tests of human body fluids and foodstuffs, by stating his belief that this type of experimental work could, in certain cases, supersede epidemiological studies, and did have direct implications for regulatory policy.

On the lighter side, he included an entertaining account of his work showing that red onions contain mutagenic flavonoids, leaving white onions, in the absence of any known specific nutritive value of their congeners, as winners in the risk-benefit analysis.

Some asperity developed between Commoner and R. Morgan (University of Toronto), who expressed the anguish of at least some of his fellow epidemiologists, that "the Ames test has led to more hypotheses than could possibly be tested", but, perhaps in some compensation, has been of distinct benefit to the legal profession. In an elegant presentation, Morgan showed that, in agreement with epidemiological experience, increasing the sensitivity of a screening test (certainly a marked feature of the history of Ames' tests) necessarily decreases its specificity and hence its predictive value.

The 'book of the meeting' will be required reading for many administrators (or indeed any of the public seeking a comprehensive view of this important area of research) as well as cancer aetiologists and toxicologists in general. □

The fascination of echinoderms

from Norman Millott

ECHINODERMS do things differently, which is one good reason why they have attracted increasing numbers of biologists with widely differing specialisations. This appeared to advantage in a recent colloquium*. Communications were so many and varied that only a few of the many excellent ones can be mentioned here.

Palaeontologists — seemingly tireless in their devotion to the group — were in part concerned with rare fragments of Jurassic

echinoids from Western Australia indicating a wide and rapid spread of cassiduloids. Others challenged existing ideas concerning the primitiveness of the cidaroid lantern, or urged the need for a critical revision of classical changes in Adriatic echinoids to deepening of the sea, changes in climate and sediment and accumulation of calcium carbonate. D.G. Stephenson (Keele University) advanced yet one more idea concerning the seemingly eternal mystery of the five-rayed symmetry, showing that it could have conferred advantages in passive suspension feeding and could have been independently evolved in various groups of echinoderms.

Taxonomy, ever restless, was represented in the findings concerning holothurians of a 28-year survey of the Chinese coast, yielding incidentally, two new species and a proposed new genus. Other communications argued for regarding *Holothuria stellata* as a genuine species and for transferring the genus *Ophiocoma* to the Ophiacanthidae.

Ideas concerning the affinities and phylogeny of echinoderms invariably command attention. H. and G. Termier (Université P. et M. Curie, Paris) envisaged the evolution of coelomates as involving an early separation of echinoderms from lophophorates and chordates, with development of 'architectural' diversity and adaptive radiation in the Cambrian. R.P.S. Jefferies (British Museum (Natural History)) also painted a broad canvas, adding more detail to his picture of chordate evolution, deriving these animals from his palaeozoic Calcichordates, which show echinoderm affinities, yet possess what he interprets as tell-tale characters of chordates.

Echinoderms have nothing if not spectacular coelomic systems, achieving much by hydrostatic pressure, circulation of coelomic fluid and wandering cells. J. Binyon (Royal Holloway College, University of London) reported experiments determining the level to which fluid pressure could be raised in starfish before structural damage occurs, while C.W. Walker (University of New Hampshire) supported by direct observation, the importance of flagellated collar cells in producing coelomic circulation. Some functions of the ubiquitous wandering cells, including their bactericidal action, were elegantly demonstrated by L.I. Messer and A.C. Wardlaw (University of Glasgow) and a very different relationship with bacteria in *Leptosynapta* was reported by J-P. Feral (Museum National d'Histoire Naturelle, Paris) who described their constant association with cuticular structures. Others demonstrated the ultrastructure and symbiotic associations of amoebocytes, their relation to lesions in the body wall and their importance in transporting gut enzymes. The importance of the enigmatic 'haemal' system in moving

assimilated substances, accumulating lipids and eliminating effete phagocytes was also indicated.

The extraordinary plasticity of peritoneal cells which Farmanfarmanian and I showed in 1967, received striking confirmation from A. Van Der Plas and M. Jangoux (Rijksuniversiteit, Utrecht & Université Libre de Bruxelles) who described the migration of these cells into the epithelial lining of the pyloric caeca of *Asterias* to form lipid stores showing changes related to the reproductive cycle.

Concerning the nervous system, there were reports of an unusual mode of dual innervation in echinoid podial muscles, of the importance of the radial nerve and its own sector of the nerve ring in the arm regeneration of *Asterina* and (for a change!) an analysis of associative learning in *Marthasterias*.

Physiological flexibility was the keynote of communications concerning rock pool species and the remarkable tolerance of sudden and extensive salinity changes of *Ophiura albida* in Loch Etive.

Much was said about nutrition, including the partition of energy between respiration, excretion and growth in plutei, and in starfish, changes in diet and population structure which occur with depth were reported, as well as the existence of a 'waiting stage' between larval and growing phases when food is scarce. Differing feeding processes in echinoids were correlated with differing fine structure of their radiole spines, and it was indicated that the shallow water holothurians of Enewetok Atoll do not occupy the same habitat unless they have different feeding habits.

Population dynamics with undertones of pollution and economics were represented in separate accounts of the effects of sewage sludge dumping near the mouth of the Elbe, where brittle stars were involved in the ensuing instability of the benthos, and of the possibility of introducing threatened edible species into suitable sites. Impressive densities of echinoderms off the west coast of Ireland and their dominant role in benthic economy were emphasised by a group of workers from University College, Galway. These were the contributions of professional scientists, but D. Nichols (University of Exeter) rightly paid tribute to the important contributions to his survey of threatened *Echinus*, made by amateur and professional divers.

As befits a modern programme, biochemistry and cytochemistry were represented by reports concerning the importance of steroids and the occurrence of gut enzymes in various species as well as the different aspects of the action of 1-methyladenine on starfish oocytes in which a calcium-binding factor resembling calmodulin was reported. □

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*A European Colloquium on Echinoderms, dedicated to L. Cuénot, was held at the Université Libre de Bruxelles on 3-8 September. It was organised by Dr. M. Jangoux, Laboratoire de Zoologie.