

Escape from Lysosomes

from a Correspondent

THREE principal topics were discussed at the second international conference of the European group for the study of lysosomes which was held at Herceg Novi from September 26 to 29: lysosomes in protozoa, in plants and their role in immunological reactions. Evidence for heterogeneity of lysosomes in protozoa is accumulating. Dr M. Müller (New York) has found two main classes of lysosomes in *Tetrahymena*, which can be separated by isopycnic sucrose gradient centrifugation. Light lysosomes, with a density of about 1.14 g-cm^{-3} have high concentrations of proteinase, ribonuclease and phosphatase, which are the main enzymes added to ingested material to form digestive vacuoles. A heavier group of lysosomes, with a density of about 1.24 g-cm^{-3} , has high amylase, α - and β -glucosidase and β -N-acetylglucosaminidase activities, and relatively large amounts of these enzymes are secreted into the extracellular medium during normal growth and starvation.

Dr Y. Eeckhout (Louvain) reported that in the trypanosomid flagellate *Crithidia luciliae*, acid phosphatase and β -fructofuranosidase do not show latency and other properties expected of lysosomal hydrolases; they are in a compartment of the cell accessible to substrates but limited by a diffusion barrier. Cytochemically, acid phosphatase activity is confined to the anterior invagination of the plasma membrane termed the flagellar pocket or reservoir, which appears to play a role in endocytosis and digestion. This is an interesting stage in the evolution of the vacuolar system, and if the hydrolases of pathogenic trypanosomes escape through the flagellar reservoir into the external medium they may play a role in pathogenicity and antigenicity.

Digestion of reserve materials during the course of development of freshwater sponges (*Ephydatia mulleri* and *Spongilla lacustris*) from hibernation bodies was described by Dr W. Tessenow (Rostock). The reserve materials (ribonucleoprotein, protein, lipid and glycogen) are arranged in an orderly manner in lens-shaped vitelline platelets. Small granules containing hydrolases are added to the periphery of the platelets and initiate their breakdown individually in small vacuoles or aggregated in large vacuoles. Lysosomal digestion of vitelline reserve material in developing eggs also appears to be a common and analogous process.

A stimulating discussion of lysosomal enzymes of the exoplasmic compartment of plant cells was contributed by Drs P. Matile and A. Wiemken (Zurich).

Although there is strong evidence for the presence of hydrolytic enzymes in the exoplasmic compartment of plant cells, the function of secreted hydrolases has been defined in only a few cases. These include extracellular digestion by fungi of proteins, DNA, RNA and phosphoric acid esters. In germinating barley grains, secretion of hydrolases (α -amylase, RNAase, protease and β -glucanase) into starchy endosperm is involved in the degradation not only of dead tissue but also of the walls of the secreting aleurone cells. In yeast, β -glucanase in small vesicles derived from the endoplasmic reticulum is discharged into the wall to produce degradation followed by budding at the same site. The role of lysosome-like structures in extracellular digestion and plant development clearly deserves further study.

A contractile microfilament system in the peripheral cytoplasm may play an important role in endocytosis (phagocytosis of bacteria and pinocytosis of fluid) in macrophages, and in the discharge of granules containing histamine from mast cells. Dr A. C. Allison (MRC, Northwick Park) said that both processes can be inhibited by the fungal product cytochalasin, which disturbs microfilament function, but not by colchicine, which disperses cytoplasmic microtubules. Adjuvants, which increase immune responses especially to poorly immunogenic materials, seem to act primarily on macrophages, although thymus-dependent (T) lymphocytes are required for adjuvant effects. There is a correlation between the potency as adjuvants of many compounds and their capacity to interact with membranes. That particles (such as bacteria or silica) are adjuvants suggests that the effects are exerted on lysosomal rather than plasma membranes. Such an interaction may perhaps release material from macrophage lysosomes that can stimulate proliferation of T lymphocytes and so increase their participation in immune responses.

Dr A. Trouet (Louvain) reported that young rats injected with antibodies against soluble lysosomal constituents of rat liver do not grow, show a severe granulopenia in bone marrow as well as peripheral blood and a moderately severe lymphopenia. Death occurs after several days, possibly because of increased susceptibility to infection. Antibodies against other cellular organelles have only slight effects. Cultured rat cells exposed to anti-lysosomal globulin have increased numbers of lysosomes (possibly because digestion is impaired) and show a delayed death even in the

CRYSTALLOGRAPHY

Protein Data Bank

A repository system for protein crystallographic data will be operated jointly by the Crystallographic Data Centre, Cambridge, and the Brookhaven National Laboratory. The system will be responsible for storing atomic coordinates, structure factors and electron density maps and will make these data available on request. Distribution will be on magnetic tape in machine-readable form whenever possible. There will be no charge for the service other than handling costs. Files will be updated as new material is received. The total holding will be announced annually in the organic bibliographic volumes of the reference series "Molecular Structures and Dimensions" published for the Crystallographic Data Centre and the International Union of Crystallography by Oosthoek's, Utrecht.

The success of the proposed system will depend on the response of the protein crystallographers supplying data. These will be accepted either "raw" or refined, in machine-readable form or as manuscripts. Laboratories intending to join the scheme should communicate with Mrs Olga Kennard or Dr D. G. Watson at the University Chemical Laboratories, Lensfield Road, Cambridge, who are responsible for the organization of the system. Data can be submitted to Cambridge or to Dr W. C. Hamilton at the Brookhaven National Laboratory, Upton, New York 11973, where the data will be computer processed.

The two centres will maintain identical files and both will provide data services. The new data bank is intended to supplement existing publication media so that depositing material in this form is not a substitute for the publication of the results of structural investigations in a scientific journal.

absence of complement. The mechanism underlying these remarkable findings is not yet clear.

Among several interesting short communications was a paper by Dr N. Pipan (Ljubljana) on the presence of numerous autophagic vacuoles in the epithelium of the stomach in newborn mammals. Vacuoles containing partially digested mitochondria are discharged into the lumen. These changes may be related to remodelling of gut epithelium in newborns in preparation for extracellular digestion.