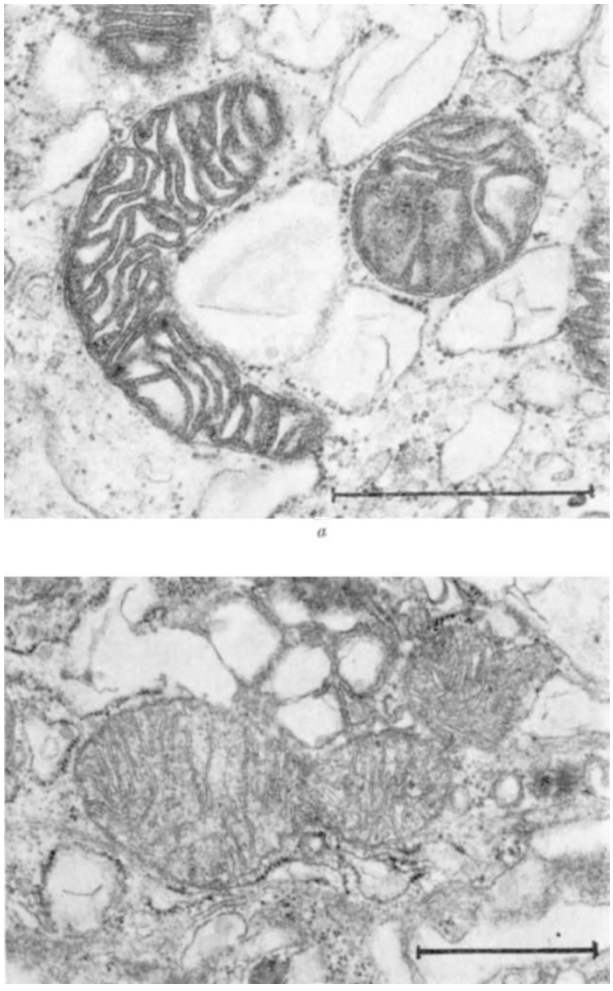
CELL BIOLOGY

Membranes and Metabolism

from our Special Correspondent

THE high point of the second day of the meeting of the Society for Experimental Biology at York on July 16 was provided by Professor A. Frey-Wyssling (University of Zurich), who gave a masterly review of the membranes of cell organelles, in which he introduced the idea of comparative organellography. This is based on the ability of the membranes of different organelles to fuse with each other. The different organelles then have what Professor Frey-Wyssling calls homologous membranes, and this can tell something about the origin of some organelles. For example, spherosomes, lysosomes, provacuoles and tonoplast all have membranes homologous with the endoplasmic reticulum, from which they are probably formed. Professor Frey-Wyssling concluded by suggesting that this subject is going to grow so fast that in a few years there will be a science known as membranology.

On a less theoretical plane Professor J. R. Bronk (University of York) described some visible changes in mitochondria which are associated with a high rate of respiration. He and his colleague D. K. Jasper used slices of mucosal tissue from the jejunum of rats. When the tissue was incubated in bicarbonate Ringer solution for five minutes or more, some of the mitochondria took on a condensed appearance, as though the matrix material was piled up on the membranes. At the same time a high rate of respiration was recorded polarographically—by measuring oxygen consumption. Many more mitochondria—more than 50 per cent—became condensed when 1 mg/ml. of a mixture of amino-acids was added to the medium.



Mitochondria of jejunal mucosa of rat, (*a*) condensed in a medium containing a mixture of amino-acids, and (*b*) uncondensed in a medium containing the amino-acids and glucose. The scale in each case represents 1 micron.

Professor Bronk does not think that the condensation is simply due to the presence of the amino-acids because mitochondria incubated with glucose as well as the amino-acids retained the orthodox uncondensed appearance. Because the structural change is associated with a high rate of respiration he had two possible explanations: condensation is a result either of a large drain on the cell's energy or of some uncoupling of oxidative phosphorylation. The second possibility has been eliminated by incubating mucosal slices in medium containing 2,4-dinitrophenol which uncouples oxidative phosphorylation. In this case less than a quarter of the mitochondria were condensed, indicating that condensation is associated with a high rate of coupled oxidative phosphorylation. This process had been upset by the 2,4-dinitrophenol, so that condensation was prevented.

Dr J. V. Possingham (CSIRO, Australia) struck a light note on the very practical topic of how to dry grapes. To produce sultanas as quickly as possible it is necessary to speed up cuticular transpiration—grape berries have no functional stomata, they lose water only through their waxy cuticle. Special treatments have long been used to speed up this process. In Greece and Turkey it used to be olive oil and ashes, now where grapes are dried it is a commercial dip of mixed fatty acids with emulsifier and potassium bicarbonate. Dr Possingham and several colleagues in Australia think that these mixtures work by making the tiny wax platelets of the cuticle, which are usually strongly hydrophobic, wettable, so that water more easily passes through. Electron micrographs show a clear difference in the cuticle before and after dipping, which leaves the previously crisp looking wax platelets in a collapsed condition.

DNA POLYMERASE

Kornberg Furibundus

from our Molecular Biology Correspondent

Now that the sequence of the principal events in the replication of DNA is broadly established, much attention is being directed at the nature of the DNA polymerase itself, notably in A. Kornberg's laboratory. The current issue of *J. Biol. Chem.* contains six remorselessly thorough papers by Kornberg's cohorts, which deal with the physical and enzymological properties of DNA, being parts 26–31 of a series called "enzymic synthesis of DNA".

DNA polymerase is an enzyme of moderately high molecular weight, which catalyses a range of related reactions—polymerization of triphosphates, with release of pyrophosphate, exonucleolytic breakdown of DNA chains from either the 3′ or the 5′ ends (in which