used to synthesise ATP. When oxygen, and not light, is available the oxygen is used instead of the light to pump protons and so create the necessary potential.

An experimental observation on the anaerobic cells which is not so readily explained is a repeatable fast rise in *p*H when the light is first turned on. The rise is followed by a larger, slower fall leading to the net drop in *p*H already described. Oesterhelt and Stoeckenius suggest an initial influx of protons already forming a gradient across the cell membrane before the light is turned on. Adding an uncoupler causes the *p*H to rise, and the light effect is said to be abolished.

These results, although interesting in themselves, may also stimulate work on the visual pigments the function of which, beyond absorbing light, is still uncertain.

INSECTICIDES

Toxic to Cuticle

from a Correspondent

CHEMICALS have long been used in the control of insects of agricultural, veterinary and public health importance, but as their use has increased so resistance to the compounds has built up to the extent where some chemical pesticides now no longer provide economic and safe control. The use of other pesticides, notably some organochlorine compounds, has been severely restricted on account of their propensity for accumulation in food chains and consequently the pollution of the environment. A new class of insecticidal agents has recently been encountered which, apart from exhibiting a novel mode of action, also promises to be relatively innocuous as far as damage to the environment is concerned.

The laboratory evaluation of two members of this class of compounds 1- (4-chlorophenyl) -3-(2,6-dichlorobenzoyl) urea (designated PH 60–38) and 1- (4-chlorophenyl) -3-(2,6-difluorobenzoyl) urea (designated PH 60–40) is presented by Mulder and Gijswijt in a recent issue of *Pesticide Science* (**4**, 737; 1973). The toxicity of the two compounds has been evaluated in mice, rats and rabbits, where oral, intraperitoneal and dermal administration produces no toxic symptoms, and lethal doses are extremely high.

Several orders of insects were represented in the studies; lepidopterous and dipterous species proved the most susceptible. Insecticidal activity is manifested in the failure of larvae to moult or pupate so that the insect ultimately dies. PH 60–38 and PH 60–40 have so far shown no action on either the fecundity or on the viability of the eggs or larvae of treated adults. Toxicity to larvae is evident only when taken orally. If the compounds are applied topically to the larvae, or applied to the nutrient solution of the food plant (some chemical insecticides are absorbed, transported and distributed throughout the plant, so that much of it becomes toxic to its insect predators), no toxic effects are elicited in the larvae.

Failure of the larvae to moult or pupate adequately is due to the disturbance in deposition of endocuticle caused by treatment. If the compounds are applied more than 24 h before a moult, no new endocuticle is laid down; and if treated shortly after a moult, strengthening of the endocuticle is prevented. Larvae treated before pupation either do not survive pupation, or emerge as abnormal adults. Treatment therefore results in the formation of a delicate cuticle which is unable to resist internal pressures, and larvae fail to extricate themselves completely from the exuviae at ecdysis. Death largely becomes apparent through loss of moisture, blackening, immobility, and strongly degenerated adipose tissue. So the compounds can be expected to be relatively benign and relatively specific in the right situation.

Development of biological means for controlling insects is providing more selective and non-persistent forms of control; but control of insects by biological means alone is unlikely to suffice in all instances. It is in integrated control programmes, where the blending of biological and chemical means of control ensures the use of the best features of each component, that the newly discovered action of this series of compounds could prove invaluable.

The compounds will be relatively selective in that they will act only on those insects actually eating the outer surfaces of plants. One drawback is that good coverage of plants with the pesticides must be achieved and is important for ensuring the effectiveness of compounds which act only after ingestion by pests. One other drawback is that treated larvae will continue to survive and destruct normally until the next moult, so that a certain amount of plant damage is inevitable. The efficiency of the insecticides will obviously depend on treatment of early instar stages.

ANIMAL PHYSIOLOGY

Bird Bodily Functions

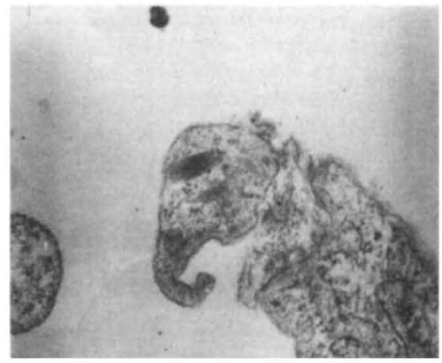
from a Correspondent

THE study of avian physiology as a subject in its own right has blossomed in recent years and many well known enigmas have been solved. Progress has been made because proper physiological studies are being carried out, as speakers at a Zoological Society of London symposium on "Advances in Avian Physiology" (November 22–23) made clear. Thus the bodily functions of birds are no longer simply the subject of brief excursions by mammalian physiologists in search of 'models', zoologists seeking comparative information or poultry scientists requiring physiological background to husbandry problems. As several speakers implied, however, some workers on non-mammalian vertebrates still do not attempt to attain the high standards set by mammalian physiologists. A point made by M. J. Purves (University of Bristol), who dealt with cardiovascular control, was that the most valuable information is usually the most difficult to obtain.

There have been no more spectacular advances made than in avian respiration; these were dealt with by K. Schmidt-Nielsen who, with colleagues at Duke University, North Carolina, and one ostrich, was largely responsible for discovering how the respiratory mechanism of birds, which is completely

VIRUSES

Pox on the Elephant



THIS extraordinary photograph has been taken by Drs S. S. Kalter, R. J. Helmke and R. L. Heberling of the Southwest Foundation for Research and Education, Texas.

They write: The list of poxviruses grows larger each year with the isolation of serologically distinct entities, all with the biological characteristics of the poxvirus group, from the multitude of animal species. Andrews and Pereira (*Viruses of Vertebrates*, third ed., Williams and Wilkins, Baltimore, 1973) as well as Wildy (*Classification and Nomenclature of Viruses*, Monographs in Virology, **5**, Karger, Basle, 1971) provide detailed information on the structure and other properties of the poxviruses. Electron micrographs depict the poxviruses as "brick-shape or ovoid complex particles" from such animal species as rhinoceros, buffalo, camel and so on. We have recently observed a configuration that makes us suspect that the elephant may also harbour a poxvirus.