over the course of the experiment. Intact embryos homogenized in Ringer solution show a considerably higher O_2 uptake than for similar embryos when homogenized in 0.25 M sucrose. When homogenates are fractionally centrifuged and supernatants (cytoplasm) and precipitates (nuclei) tested, the endogenous O_2 uptake of supernatants whether in sucrose or Ringer is similar. Nuclei suspended in Ringer have much higher O_2 consumption than those in sucrose. It seems reasonable from this to assume that low O_2 uptake for homogenates in sucrose must have been conditioned by the lowered O_2 uptake of the contained nuclei. As a matter of fact, nuclei when suspended in Ringer, appear quite distinct and show no visible signs of injury. On the other hand, nuclei in isotonic sucrose become sticky, clumped and practically impossible to handle with pipettes. They lose their shape, break up and appear as a sticky mass. It would thus seem that nuclei from grasshopper embryos are markedly affected when suspended in isotonic sucrose solution. That other parts of the cell are not so affected by the sucrose seems of interest and especially so when various substrates such as succinate are added to them.

Supernatants (cytoplasm) free of nuclei, and suspended in sucrose and Ringer show rather striking differences in O_2 uptake when sodium succinate is added to them. Results of typical experiments are graphically shown in Fig. 2. An inspection of this figure shows that supernatants suspended either in Ringer or sucrose respire at approximately the same rate. When sodium succinate (0.06 M) is added, however, supernatants in sucrose show increased O_2 uptake, markedly in excess of that shown by those suspended in Ringer. No apparent reasons for this marked difference in response to the succinate are evident. Since succinic dehydrogenase seems to be associated largely with mitochondria it seems reasonable to assume these differences may be due to some effect of the sucrose upon them, possibly a softening or splitting effect making the dehydrogenase more readily available than in the Ringer solution.

Summary. 1. Intact embryos of the grasshopper, *Melanoplus differentialis*, show similar rates of endogenous O_2 uptake when suspended in isotonic, Ringer or sucrose solution. 2. Homogenates of embryos suspended in Ringer solution show much higher O_2 uptake than those suspended in isotonic sucrose solution. 3. Isolated intact nuclei suspended in Ringer solution show much higher O_2 uptake than those suspended in isotonic sucrose solution. 4. Isotonic sugar solution affects the endogenous O_2 uptake of only nuclei and no other parts of the embryonic cell. 5. Supernatants (cytoplasm minus nuclei) suspended in isotonic sucrose show greater stimulation of O_2 uptake by addition of succinate than when suspended in Ringer solution.

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Excretory Function of the Skin in the Squid.* (19152)

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It is general knowledge that the cephalopoda have a special excretory organ, a kind of nephron for the elimination of waste products. The epidermis of this group of animals contains glands, which in some species eliminate a fluid rich in calcium salts, and in some mollusks produce certain coloring matter. The excretory function of the skin of squids is unknown, therefore the following observations are significant.

One to 4-day-old squids showing pronounced phototropism and aerotropism were

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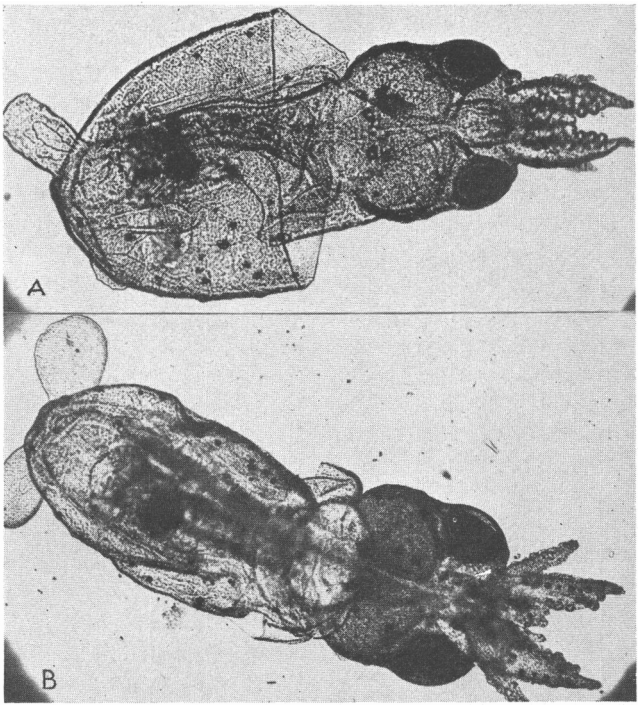

FIG. 1. Squids 2 days old. Slightly colored with neutral red. *Upper figure,* mantle relaxed. *Lower figure,* mantle contracted. Notice the smooth contour of the mantle, no sweat droplets visible. Enlargement 25 ×.

studied. They were made suitable for photographic purposes by adding very small amounts of neutral red to the sea water (0.001%).

Fig. 1A and B show such animals, one with the mantle contracted, one with the mantle relaxed. The surface of the skin appears as a smooth line, only on a few spots of the animal A, a very fine bulging of the surface of the skin, probably indicates places where chromatophores may be present. If the concentration of the neutral red is higher, (0.005% to 0.01%) the animals quickly become very deeply stained and are less satisfactory for photographic purposes. However, a few minutes after the addition of the stain to the sea water, small dark red stained droplets appear first in the apical aboral portion of the animal, but ultimately over the entire skin of the animals. The growth of these little droplets can be observed under the microscope. They become increasingly more distinct, become spherical in shape and finally at a movement of the mantle of the animals, which are swimming around, these droplets separate from the body and being heavier than sea water collect on the bottom of the container. Thus the skin of these animals functions as an excretion organ for neutral red. Apparently this neutral red was combined with mucus or protein, since these droplets do not dissolve in the sea water as neutral red does. Fig. 2A, B, C show the surface of the animals covered with such red droplets. They appear on the mantle skin, on the skin of the head, but not in the region of the eyes.

Summary. The skin of the squid functions as an organ of excretion. This is proven by feeding squids neutral red solution. The neutral red is eliminated by the skin in the form of dark red droplets, heavier than sea water and not soluble in it.

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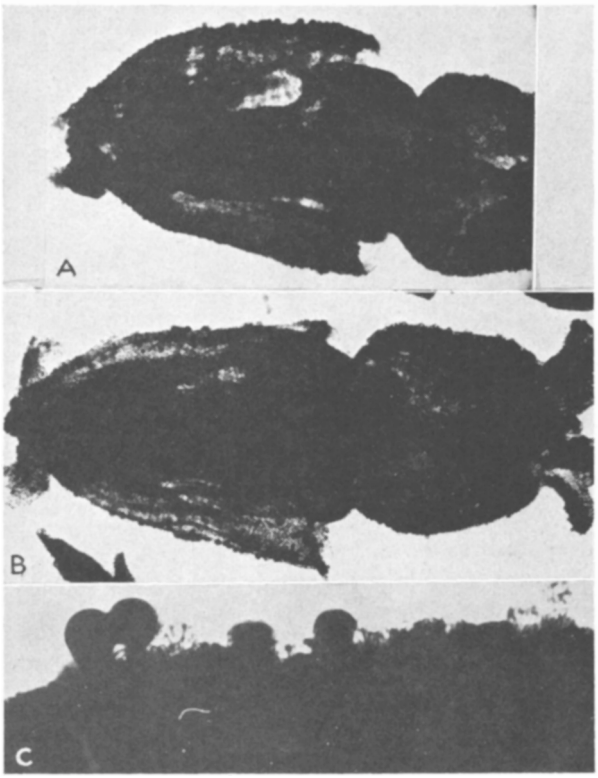

FIG. 2. Two different squids. Age 2 days. Kept for 20 minutes in sea water with a content of .005% neutral red. The surface of the skin is covered with smaller and larger droplets of dark red colored sweat. Enlargement 25 ×. *Lowest figure,* a part of the apical (aboral part of the body) of a squid eliminating droplets stained with neutral red from its skin. (Enlargement 250 ×). Four such droplets well recognizable, growing more and more to a bowl shape. If this stage is reached, slight movement of the animal may separate the droplets from the body.

A Phase Contrast Microscopy Study of X-Ray-Induced Pyknosis in the Living Cell. (19153)

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(Introduced by Douglas E. Smith.)

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This study was undertaken to determine the cytological effects of X radiation on the living cell. X-ray-induced pyknosis, as seen in fixed preparations, has been discussed in a previous communication(1); however, the effects of fixatives upon these cells were not determined. Therefore, with the aid of the phase contrast microscope, an attempt has been made to determine whether fixatives alter the cytological pattern of irradiated cells. Although the cytological pattern observed in living and fixed preparations appears to be similar, the physical state of the cell components varies in the living material.

Materials and methods. Melanoplus differentialis egg pods were collected daily from an indoor colony and stored on moist sand at a constant temperature of 25° ± 0.02°C for 30

1. Tahmisian, T. N., and Gasvoda, J., *Quart. Rep., Biol. and Med. Divisions, Argonne National Laboratory,* Aug., Sept., Oct., 1948, eds., A. M. Brues and H. Lisco. ANL-4227, p154-180.