by definite contraction of melanophores. The response was always general and unmistakable. During the time that the extract was effective there was complete loss of ability to adapt to backgrounds. The controls showed no response, behaving as do normal, non-experimental individuals.

The common dab, *Limanda ferruginea,* adapts to backgrounds, although not with the same readiness as do other flatfishes. It reacted to injection of eye-extract by local contraction of melanophores, both around the site of injection and at various parts of the body.

Amphibia: the tadpoles of *Rana clamitans* were described as responding to injection of *Palaemonetes* and *Callinectes* eye-stalk extracts by Perkins and Kropp (1932). In repeating these experiments with extracts from *Pagurus* and *Homarus* effects identical with those previously described were obtained, namely, maximum expansion of melanophores. Extract of two eyes of either of these crustaceans was sufficient to induce melanophore expansion in white-adapted tadpoles five minutes after injection.

SUMMARY

There is wide interspecificity in the action of the crustacean eye-hormone. Determination of its range of effectiveness has been extended to include sixteen species of crustaceans representing eight families of decapods and one schizopod. Contraction of chromatophores in crustaceans always follows injection of the eye extract.

The ability of the crustacean eye hormone to produce chromatophore changes is seen to extend into the vertebrates, as evidenced by the contraction of chromatophores in fishes and expansion in amphibia.

REFERENCES

Koller, G., 1928, *Zeitschr. vergl. Physiol.,* **8**, 601.
Koller, G. and E. Meyer, 1930, *Biol. Zentralbl.,* **50**, 759.
Meyer, E., 1931, *Zool. Jahrb.,* **49**, 231.
Perkins, E. B., 1928, *Jour. Exp. Zool.,* **50**, 71.
Perkins, E. B. and B. Kropp, 1932, *Biol. Bull.,* **63**, 108
Smith, D. C., 1930, *Biol. Bull.,* **58**, 193.

THE INTERNAL PRESSURE OF CUCUMARIA FRONDOSA

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In holothurians containing cuverian organs a rise in internal (body cavity) pressure may be associated with the discharge of those organs. In the case of *Holothuria nigra,* Mines (1912) found that the pressure needed to produce elongation of these organs was 20 to 30 c.m. of water. *Cucumaria frondosa* lacks cuverian organs and in this animal increased internal pressure is accompanied only by expulsion of water from the body cavity, contraction of body wall musculature and diminution in total volume of the animal. The maximum body cavity presure registered by *Cucumaria* ranged from 14.7 m.m. Hg by an animal 13 c.m. long, to 88.7 m.m. Hg by an animal 28 c.m. long when fully extended.

The pressure was measured as follows: To a mercury manometer was attached a Y tube. To one arm of the Y was attached a device connected with a rubber balloon and capable of being fastened to the body wall by a tight connection. The animal was anesthetized in magnesium sulfate solution, and the balloon inserted deflated through the body wall and fastened in place. The balloon was then slightly inflated through the other arm of the Y and its pressure measured. On transferring the animal to fresh running sea water recovery from the anesthetic was rapid. Mechanical stimulation by pricking or scratching the surface, handling, etc., brought on the usual contraction response. The rapid increase in internal pressure was registered by the manometer. The maximum increase in internal pressure found was approximately 16% above atmospheric pressure. This can be accounted for by the action of the body wall muscles alone.

STIMULATION BY ACIDS AND SALTS IN THE BARNACLE, *BALANUS*, AND THE KILLIFISH, *FUNDULUS*

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Continuing the study begun four years ago, the stimulating efficiencies of various acids and salts were determined on the rock barnacle, *Balanus balanoides*, and the killifish, *Fundulus heteroclitus*.

The acid solutions were prepared by making up to eighteen liters with sea water the required amount of acid. The mixture was thoroughly shaken and left standing until the hydrogen ion concentration as measured by the quinhydrone electrode became relatively constant. An interval of from thirty minutes to an hour elapsed before the solution was used. Such a standardized procedure was necessary because the addition of an acid to sea water which has a bicarbonate buffering system results in the liberation of carbonic acid. The change in pH of the sea water is an approximate measure of the amount of carbonic acid produced when all of the acid added to the sea water has reacted to liberate the weak acid. Under these conditions equivalent concentrations of strong and weak acids change the pH of sea water to about the same degree. For example, 0.001 N HCl, formic and acetic acid solutions prepared as described changed the pH of sea water from 8.3 to 6.32, 6.40 and 6.40 respectively. When the same concentration of these acids were made up in car-

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