other condition not encountered in 1932. Since this crustacean breeds normally from March to June the above conditions were unexpected. Together with this the number of *Strongylocentrotus* to be seen on the bottom was smaller, and relatively few were brought up by the dredge.

The unusually severe winter of 1933-34 may furnish a possible explanation of these conditions. According to winter residents of the region, during at least two months of the winter all of the coves were solidly frozen and in some places the ice extended 20 to 30 feet into Frenchman's Bay. Since *Crago boreas* is not normally a deep water form it would seem that enormous numbers must have been killed off in this way. If we regard the early breeding individuals as having been thus largely eliminated and the late spring and summer breeders as delayed, we have a possible explanation of the conditions found.

SOME PHYSIOLOGICAL EFFECTS OF THE CRUSTACEAN EYE STALK HORMONE*

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Heretofore, two physiological effects of the crustacean eye stalk hormone have been demonstrable—(1) the chromatophore effect on vertebrates and invertebrates and (2) its growth affecting action on growing coleoptiles and root tips. The study herewith reported of its effects on vertebrate heart muscle was part of a series designed to determine the range of its physiological action.

The heart of the sculpin *Myoxocephalus octodecimspinosus,* was exposed at 16°C, at which temperature in the well-aerated animal the heart will maintain its beat for at least 2 hours without violent fluctuations in rate. On injecting into the auricle of such a preparation 0.3 cc of a sea water extract of the eye stalks of *Crago* (concentration 1 eye stalk = 0.01 cc of extract) the immediate effect was cessation of the beat of the auricle for 2 minutes, after which the auricular beat gradually returned and was maintained at its original rate. The rate of beat of the sinus and ventricle was decreased by about one-half and their original rates were resumed gradually at the end of a 2 minute period. There was no lasting effect upon the rate of beat of any portion of the heart. Control experiments involving puncturing the auricle, the injection of sea water, etc., showed adequately that the observed effects were attributable to the hormone solution.

A preparation of the excised heart of *Myoxocephalus* was found to beat in sea water at 16°C with frequency and amplitude of beat unimpaired for about one-half hour. The beating of such a preparation was instantaneously extinguished by the injection of 0.3 cc of an eye stalk extract as dilute as 1 eye stalk = 0.2 cc of extract. The same quantity of a more dilute solution (i.e., 1 eye stalk = 0.3 cc, and 1 eye stalk = 0.4 cc) resulted in disorganization of the beat and

*This work was done during the summer of 1934.

decrease in frequency and amplitude from which there was no recovery. Since a dilution of 1 eye stalk = 0.2 cc. does not always evoke a pronounced response in *Crago* chromatophores the excised heart of *Myoxocephalus* would seem to offer a more sensitive test of the crustacean eye stalk hormone than does the former.

STRUCTURE AND GROWTH OF SCALES IN FUNDULUS HETEROCLITUS

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The purpose of the study was to learn something about the formation of the circuli or marginal lines of growth and the radiating grooves which are seen in surface views of many fish scales.

The scale in a longitudinal histological section resembles a lancet with barbs along the upper side. The barbs are really sections of ridges which give the effect of lines in the surface view. The upper portion of the scale consists of a thin homogeneous basic staining material and the lower somewhat thicker acid staining part shows longitudinally arranged lines. At the deeply imbedded end of the scale may be found varying numbers of cells, often giving the appearance of a knob or a papilla. Flat cells are also closely related to both upper and lower surfaces. Transections show that the radial grooves of the surface view consist only of the homogeneous basic staining material and that the calcareous deposits of the lower part of the scale are lacking.

In the growth of the scale, the lower cellular end penetrates the connective tissue fibers which adhere in bundles on the upper side and are incorporated into the homogeneous basic tip. Alternating with the extensions of the c.t. bundles into the newly formed scale are cells. As the scale grows, the bundles of fibers lose their attachment, and ridges (circuli in surface view) mark their place of extension into the scale. Connective tissue cells are closely related to the under surface yet are not incorporated as the calcareous material is gradually deposited.

THE SEPARATION OF THE HYPOPHYSIS CEREBRI OF CERTAIN SELACHIANS (SQUALUS ACANTHIAS AND RAJA STRABULIFORIS) INTO SIX DISTINCT LOBES

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Investigations lately undertaken on the hypophysis cerebri* (Lewis, Butcher, Halsey and Geiling) required a more careful sepa-

* Reported in this Bulletin.