

*Diffugia* sp.  
*Diplophrys archeri*  
*Hyalosphaenia papilo*  
*Nuclearia* sp.  
*Valkamfia limax*

## CILIOPHORA

*Acineta* sp.  
*Aspidisca lynceus*  
*Chilodon* sp.  
*Cinetochilum margaritaceum*  
*Coenomorphia medusula*  
*Coleps amphacanthus*  
*Coleps elongatus*  
*Colpidium striatum*  
*Condyllostoma vorticella*  
*Dileptus* sp.  
*Epistylis plicatilis*  
*Euplotes charon*  
*Halteria grandinella*  
*Holosticha* sp.  
*Holophrya* sp.  
*Lembadion* sp.  
*Lacrymaria olor*  
*Loxodes rostratum*

*Loxophyllum meleagris*  
*Loxophyllum* sp.  
*Nassula aurea*  
*Nassula* sp.  
*Metopus sigmoides*  
*Mesodinium* sp.  
*Oxytricha fallax*  
*Paramecium bursaria*  
*Paramecium caudatum*  
*Pleuronema* sp.  
*Prorodon* sp.  
*Spirostomum ambiguum*  
*Stentor coeruleus*  
*Stentor igneus*  
*Stentor polymorphus*  
*Stentor roselii*  
*Stentor viridis*  
*Stylonychia mytilus*  
*Trachelius ovum*  
*Tracholophyllum clavatum*  
*Urocentrum turbo*  
*Uroleptis pisces*  
*Vorticella* sp.  
*Zoothamnium nutans*

# SOME EXPERIMENTS ON THE EFFECTS OF HYPOPHYSECTOMY AND PITUITARY IMPLANTATIONS ON THE MALE *FUNDULUS*\*

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The endocrine relationships in the sexual activities of fish are very imperfectly known. The present experiments are a continuation of our studies on the sexual cycle of *Fundulus* (Burger '39, '40).

Adult male *Fundulus* hypophysectomized shortly after maximal spring spermatogenesis show an inhibition of spermatogenesis for stages beyond those of spermatogonial multiplication. While spermatogonial divisions occur they do not become numerous enough to cause a progressive increase in the number of these cells. The complete inhibition of the later stages of spermatogenesis is not immediately effected. A few cysts continue to form sperm for as long as one month after hypophysectomy. By two months after the ablation of the hypophysis spermatids no longer were formed. These results confirm those of Matthews ('39).

Both hypophysectomized adult male *Fundulus* and males which re-

\* Aided by a grant from the American Philosophical Society; this grant administered 1939-40 by T. H. Bissonnette.

ceived blank operations were maintained until sexual involution was well established. Implantations into the body cavity of each fish of twenty or fifteen fresh pituitaries from normal adult male *Fundulus* caused within two weeks a recrudescence of the testes in all fish treated. For example, ten hypophysectomized fish treated with twenty glands each had the average testicular volume quadrupled and the average weight doubled within two weeks when compared with non-implanted control hypophysectomized fish.

It is concluded that the pituitary of the male *Fundulus* contains gonadotropic material and the testes of the male, hypophysectomized or not is responsive to this material. The data secured together with that secured in a study of the normal sexual cycle gives a clear picture of the cycle of the pituitary, at least as far as its gonadotropic activity.

## REFERENCES

- Burger, J. W., 1939, Biol. Bull., 77: 96-103.  
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Matthews, S. A., 1939, Biol. Bull., 76: 241-250.

ON THE RELATION OF DAY-LENGTH TO THE PERIOD  
OF REFRACTORINESS TO PHOTOPERIODIC SEXUAL  
STIMULATION IN THE MALE STARLING\*

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Once an appropriate period of spermatogenesis has been completed in the male starling, the testes undergo an involution and remain naturally in a state of sexual quiescence until natural day-lengths begin to increase during the following winter. After the maximum of sperm formation (April-May), the day-lengths still naturally increase, and even during the summer they remain long enough to be stimulating to birds which are not refractory to photoperiodic stimulation, i.e., fall and winter birds (Burger '40). The failure of the starling to form sperm during the summer is obviously not due to insufficient daily illumination, but to the establishment of a refractoriness to the erstwhile stimulating effects of long days. The experiments to be described inquire into the problem of whether or not the duration of this refractory period can be modified by photoperiodic manipulations.

Two experiments of similar nature were performed. Beginning on February 18, twenty-four adult male starlings were given daily fifteen hours of solely artificial illumination. These birds were thus put through a precocious spermatogenesis. On April 19, when testicular regression was well established, eight of the males were further continued on a daily light ration of fifteen hours. Another eight starlings from the original lot had their daily light reduced to nine hours

\* Aided by a grant from the American Philosophical Society: this grant administered in 1939-40 by T. H. Bissonnette.