

ABSTRACTS OF MEMOIRS

RECORDING WORK DONE AT THE PLYMOUTH LABORATORY

THE EGG AND LARVAL STAGES OF *NYCTIPHANES SIMPLEX*, A EUPHAUSIID CRUSTACEAN FROM CALIFORNIA

By Brian P. Boden

Proc. Zool. Soc. Lond., Vol. 121, 1951, pp. 515-27

The female of *Nyctiphanes simplex* carries her eggs in an egg-sac. The eggs hatch in the nauplius stage and remain in the egg-sac throughout that stage. The larva emerges from the sac as a pseudo-metanauplius and moults immediately into the metanauplius stage. This is followed by three calyptopis stages and the furcilia stages. There are probably nineteen types of furcilia larvae. Since six of these are numerically dominant, it is probable that the larvae 'jump' stages in the furcilia series. The six dominant types are described as the six furcilia stages. A key to the furcilia stages is included. B.P.B.

MICRO-DETERMINATION OF NITROGEN IN ORGANIC MATTER WITHOUT DISTILLATION

By H. W. Harvey

The Analyst, Vol. 76, 1951, pp. 657-60

It was required to determine the quantity of organic nitrogen in small quantities of unicellular algae, which can be separated from suspension by centrifugation, and to complete six to eight analyses within 3 hr.

A method is described by which 5-30 μ g. quantities of nitrogen are estimated in test or centrifuge tubes without distillation. After digestion with sulphuric acid and hydrogen peroxide, in presence of a mercury catalyst, the resulting ammonium sulphate is treated with an excess of hypobromite. The residual hypobromite is determined by titrating the iodine, liberated on addition of potassium iodide and acetic acid, with standard sodium thio-sulphate solution.

In order to test the accuracy of the method, analyses of acetanilide were made and yielded the following results:

Nitrogen taken (μ g.)	Nitrogen found
10.32	10.1, 10.2
20.65	19.2, 20.6
41.3	40.7, 41.4
20.65	20.7 as mean of four analyses.

H.W.H.

THE SWIMBLADDER AND THE VERTICAL MOVEMENTS OF TELEOSTEAN
FISHES. I. PHYSICAL FACTORS

By F. R. Harden Jones

Journ. Exp. Biol., Vol. 28, 1951, pp. 553-66.

The vertical movements of a teleostean fish may be restricted by the presence of the swimbladder which will increase or decrease in volume when the fish moves up or down in the water. The restriction that the swimbladder imposes to vertical movements involving a reduction in pressure will depend on physical factors such as: (1) the resistance that the bladder and body-wall offer to the expansion of the bladder gas; (2) the percentage volume of the swimbladder and the density change of the fish when it is subjected to a reduction in pressure; (3) the pressure reduction that leads to the rupture of the bladder wall.

Various experiments were made on the perch, *Perca fluviatilis*, the wrasse, *Cremilabrus melops*, the rockling, *Onos mustela*, and the dragonet, *Callionymus lyra*. The results showed that there was a relation between the relative size of the swimbladder and the change in the density of a fish when it was subjected to a pressure reduction; that the bladder and body-wall of the perch offer little resistance to the expansion of the bladder gas; and that the danger of the bladder wall rupturing might restrict the extent of rapid movements made by the perch.

F.R.H.J.

A LARVAL HOPLOPHORID (CRUSTACEA) FROM BERMUDA

By Marie V. Lebour

Proc. Zool. Soc. Lond., Vol. 121, 1952, pp. 753-7

An interesting larva is described belonging, probably, to the genus *Notostomus*. No larva of this genus is so far known and it is probable that the usual habitat is in deep water. The suggestion is offered that the normal larva is small and thin-skinned and that the present large form which was found at a lesser depth may have been delayed in metamorphosing or not been able to metamorphose at all owing to the uncongenial surroundings.

M.V.L.

THE INDUCTION OF REGENERATION IN THE HYDROID
CORDYLOPHORA LACUSTRIS

By Janet Moore

Journ. Exp. Biol., Vol. 29, 1952, pp. 72-93

Reconstitution masses of the hydroid *Cordylophora lacustris*, made by chopping up unspecialized tissue and piling the fragments into heaps, may regenerate hydranths 'spontaneously'. An oral cone grafted into a mass

induces, at the point of grafting, the development from mass tissue of hydranth regions basal to the oral cone. The induced hydranth develops at an accelerated rate and spontaneous regeneration at other sites is inhibited. Beadle and Booth's report that oral cone grafts induce hydranth development in *Cordylophora* reconstitution masses is confirmed and extended.

The inducing properties of oral cone grafts are shared by grafts of other regions of the hydranth (tentacular ring, subtentacular region, hydranth neck, and even small fragments of tentacle) and by the rudiments of developing hydranths (tips of outgrowths from masses) but not by tissue lacking hydranth differentiation (stem coenosarc and stolon tips). Induction may be produced by differentiated tissue grafts when inverted or fragmentary, but not when macerated or killed, nor has induction occurred with thin agar or cigarette paper barriers inserted between the graft and host. There is no evidence that hydranth induction is mediated by a diffusing chemical; direct close contact with living differentiated tissue is necessary for induction to be produced in unspecialized tissue.

J.M.

AUTONOMIC NERVOUS SYSTEMS IN LOWER CHORDATES

By J. A. Colin Nicol

Biol. Rev., Vol. 27, 1952, pp. 1-48

This review presents a detailed survey of the visceral efferent systems of lower chordates from the protochordates to the Amphibia. The classical system of Langley's is used as a basis for discussion, a morphological description of the system in each of the major groups is presented, and this is followed by functional analyses, as far as the data permit. In these lower forms it is possible to trace an elaboration of complexity in the autonomic systems from the enteric nerve net of balanoglossids to the differentiated amphibian organization characteristic of tetrapods. The system is rudimentary in cyclostomes, but chromaffin tissue is present, and the vagus supplies the gut and heart. Sympathetic and parasympathetic systems show great diversity and specialization in fishes, from a rather primitive arrangement in elasmobranchs, to a high degree of differentiation in teleosts. The latter are characterized by a greater regularity in organization of the sympathetic trunks, and by augmentation of the fields of sympathetic innervation in the head and other peripheral effectors. In the Dipnoi the autonomic system appears to be on a lower level of morphological organization than in teleosts. In the Anura it is organized in the pattern found in mammals, and has cranial and sacral parasympathetic, and abdominal sympathetic components. A progressive elaboration of physiological complexity is traced along with morphological differentiation in the lower chordates, and the implications discussed. Analysis of evidence leads

to the conclusion that the autonomic nervous systems of vertebrates show two main independent lines of evolution from some simple level of organization such as that found in extant elasmobranchs. These two lines occur in actinopterygians leading to modern teleosts, and in choanichthyes leading to Dipnoi and tetrapods, and there has been a considerable degree of independent specialization and differentiation in these two groups. J.A.C.N.

UNTERSUCHUNGEN ÜBER DIE ALGENBEWOHNENDE MIKROFAUNA MARINER
HARTBÖDEN. I. ZUR OEOLOGIE UND SYSTEMATIK DER NEMATODENFAUNA
VON PLYMOUTH

(ON THE ECOLOGY AND TAXONOMY OF THE FREE-LIVING MARINE
NEMATODES OF PLYMOUTH)

By W. Wieser

Österr. Zool. Zeitschrift, Bd. 3, 1951, pp. 425-80

The free-living nematodes inhabiting the following seaweeds were studied: *Ceramium* sp., *Cladophora rupestris*, *Lomentaria articulata* between +3.25 and +0.8 m., *Gelidium corneum* between +2.75 and +1.10 m., *Fucus serratus* between +2.00 and +0.20 m., *Gigartina stellata* between +2.00 and +1.00 m., *Porphyra laciniata* between 1.95 + and +1.50 m. (above C.D.) and *Nitophyllum punctatum* between -0.70 and -3.00 m. (below C.D.). All samples were taken in the Tinside area of Plymouth Sound.

The population of the small and procumbent *Gelidium corneum* proved to be richer both in numbers and in species than that of the tuft-like *Ceramium* sp. The composition of the two faunas differs considerably, the former being dominated by relatively long and detritophilous species, the latter by small ones of the family Chromadoridae.

The composition of the nematode fauna of the two algae *Gigartina stellata* and *Fucus serratus* depends largely upon the extent to which epigrowth is developed on them. Apart from that, the fauna of *Gigartina stellata* proved to be much richer than that of *Fucus serratus*, which is due to the denser branching of the former weed. The habitats richest in species appear to be *Gigartina stellata* and *Nitophyllum punctatum*.

The distribution of length-classes in a given nematode population depends upon the shape of the seaweed inhabited. Two modes of distribution of length-classes were distinguished, viz. one with the smallest forms between 0.4 and 1 mm., amounting to more than 70 % of the total population, and a second one with these smallest forms comprising not more than 35 % of the population and being outnumbered by specimens over 1.5 mm. The vertical distribution of all species found is given. Typical species for the highest and

lowest zone, respectively, can be indicated with a high degree of probability. Altogether seventy species have been listed of which three genera, eleven species and one variety are new to science. These are described in detail.
W.W.

THE INFLUENCE OF THE NATURE OF THE SUBSTRATUM ON THE METAMORPHOSIS
OF THE LARVAE OF MARINE ANIMALS, ESPECIALLY THE LARVAE OF *OPHELIA*
BICORNIS SAVIGNY

By D. P. Wilson

Ann. Inst. Océan., T. 27, 1952, pp. 49-156

A survey of the literature concerning larval settlement shows that the larvae of a number of species are able to postpone metamorphosis for a period of time during which they are able to select the substratum in or on which to metamorphose. This ability is most strongly developed in species confined to a single type of bottom deposit. Such a species is *Ophelia bicornis* Savigny whose larvae are unusually suitable material for experimentation. In a large number of experiments they have been used in an endeavour to determine the factors by which the larvae distinguish one sand from another. It is concluded that certain sands are repellent by virtue of organic matter, or living micro-organisms, on the surface of the grains, and that provided the sand be not unsuitable in grade the larvae favour relatively clean sands, the cleanest sands normally found in nature apparently containing sufficient nourishment for the adults. Organic materials present on such grains may be also of a different nature from those on grains which are repellent.

The paper contains discussions of various matters relative to the main theme. It is shown that *Ophelia bicornis* is found only in a few restricted localities from the Bay of Biscay to the entrance to the English Channel, and that all localities are bays or estuaries where strong tidal scour may occur and the sand clean, coarse and loose. Certain physical features of sands, particularly the readiness with which their grains sink or float when sprinkled dry on to water, are investigated.
D.P.W.