

has been confirmed, *e.g.*, as to the injuriousness of house-sparrow, wood-pigeon, and carrion-crow, and as to the beneficial activity of hedge-sparrow, fieldfare, lapwing, and plovers. On the other hand, there are several cases in which the results up to the present do not altogether confirm previous opinions; thus the diet of the black-headed gull and the common gull shows a striking resemblance to that of the useful lapwing. It is much to be desired that this inquiry, and others like it elsewhere, should be continued for a term of years, and the co-operation of farmers and others interested is solicited.

#### 4. *Chordeuma obesum*, a New Parasitic Copepod Endoparasite in *Asteronyx loveni*. By Professor HECTOR F. E. JUNGENSEN.

This form is a common parasite in the interior of *Asteronyx loveni* (which itself is fixed to living Pennatulids and Gorgonians, in the Skagerrak always to *Funiculina quadrangularis*). With few exceptions I found it present in every specimen of *Asteronyx* examined. "The parasite is enclosed in a thin membranous capsule formed by the host, and these galls may be found practically in every part of the interior except inside the gonads and digestive cavity. "Sometimes they are so numerous that the whole interior of the host seems made up by the parasites; in such cases the gonads of the *Asteronyx* seem not to develop." Each gall contains either a male or a female Copepod. "If the latter is ripe the gall encloses also its eggs and brood, and very often a male (seldom two), and empty spermatophores. The eggs do not form ovisacs, but are loosely cemented together in one large mass, distending the one end of the gall, filling every space left at the posterior part of the mother. The male, if present, is completely imbedded in the egg-mass. Both embryonic development and most of the post-embryonic metamorphosis occur inside the gall. As larvæ of Cyclops shape the young leave the gall, subsequently either settling in the same host, thus augmenting the stock of parasites already present, or they leave by way of the bursal openings to infest other individuals of *Asteronyx*, making their way into these through the same portholes. In both cases the larva itself by its hooked maxillæ to some point of the tissues lining the bursæ, and causing them to produce the gall. The larval cuticle is now cast off, and the parasitic form ensues. No more moultings take place, but the Copepod and its gall continue for a while to grow considerably, the parasite at the same time undergoing slighter modifications in the shape of the body and its appendages, and developing its inner structures; finally the full size and sexual maturity are attained.

The *adult female* is 4.5.3 mm. in length, sausage-shaped; composed of a cephalon, four thoracic segments, and an unsegmented post-abdomen. The cephalon carries in front short, unsegmented *antennules*, with two blunt terminal processes and a small ventro-lateral spine. Immediately in front of the mouth is a pair of slender papilliform appendages, the *antennæ* (an antennal gland being present). Close behind the mouth are the *maxillæ*, the largest and the only segmented appendages found, consisting of three segments, the terminal one forming a hook. *Eyes, mandibles, and maxillulæ are wanting.*

Each of the thoracic segments carries a pair of short, conical, parapodia-like feet; in young specimens the terminal part—like that of the antennæ—is hairy. Each foot represents the *outer* branch of the biramous larval swimming foot. In young, immature specimens a rudiment of the inner branch may be preserved on the second, third, or fourth pair. Between the second and third thoracic segments is a deep constriction: here the membranous wall of the gall fits tightly in, thus forming two compartments, the posterior containing the hind part of the female, the egg-mass and eventually the male. The anterior part of the post-abdomen is as broad as the thorax, carrying on the ventral surface the genital openings; on each side it sends out a large rounded process. The remaining part of the post-abdomen forms a short, narrow appendix, sending out a blunt conical process, dorsally at the base and terminating in two short bifurcate spines. The whole post-abdomen represents three segments. There is *no anus*, and no trace of an intestine inside the post-abdomen. The digestive apparatus consists of a capacious stomach, ending blindly in the last thoracic segment, and

in front connected through a narrow œsophagus and pharynx with the mouth. In the stomach is always found a large, concentrically laminated ovoid body, probably of excretory nature. There are two rounded ovaries in the cephalon, each sending out a transverse narrow process reaching its fellow in the middle line; an oviduct passes laterally from each ovary to the genital opening, narrowing in the third thoracic segment and again widening, where it opens into the short vaginal duct. Close to the genital opening debouches a short duct from an unpaired receptaculum seminis, surrounded by a mass of unicellular glands.

The *adult male* is much smaller, at most ca. 2 mm. in length. It seems quite unlike the female, slender, sub-cylindrical, curved, and resembling an insect-maggot, but closer inspection reveals fundamentally the same structure, the same appendages, &c., as in the female; the antennules somewhat less clumsy, the maxillæ larger and stronger, the thoracic feet almost thread-like, in young individuals, with a proportionally large inner branch, rudiments of which are generally preserved in the adult on the second and fourth pair. The body tapers into the post-abdomen, the genital part of which bears lateral out-growths corresponding to those of the female but firmly chitinised and backwardly directed. The alimentary canal is like that of the female, the testes and their ducts corresponding in form and position. The distended terminal part of the sperm-duct contains the spermatophore, with a long thread-like neck reaching through the whole duct close to the testis.

The *Nauplius* has the typical three pairs of appendages and two simple caudal setæ; *eyes are wanting* as in all later stages. At the first moult a pair of *maxillulæ* are added, as small cylindrical warts, each with a long terminal seta. This *first Metanauplius* changes into a *second*, provided in addition with a pair of large *maxillæ* and two pairs of bifurcated *swimming-feet*, and rudiments of a third and fourth pair. The *fourth stage* is very interesting: the maxillulæ are completely lost; the outer branch of the *antennæ* forms an empty cuticular case without any setæ; both branches and almost the whole stem of the *mandible* are likewise empty, naked sheaths, only at the very base enclosing a minute papilla of tissue; the maxillæ are increased in size and directed forwards, the first and second pair of feet more fully developed, the third and fourth below, but still small; the four thoracic segments are distinct, and a post-abdomen indicated. The fifth stage is a '*Cyclops-stage*,' with a short, triply-segmented post-abdomen, four pairs of swimming-feet with short setæ on both branches; the mandibles are completely lost, the antennæ short, slender, and unbranched. This stage changes into the *Cyclops-larva* (sixth stage) found outside the maternal gall. This is elongated, laterally compressed; the slender three-segmented post-abdomen is short; it contains no trace of an intestine or anus; the terminal segment is provided with two pairs of plumose setæ (all the previous stages have only the two naupliar caudal setæ), but without furcal appendages. The antennules, hitherto of the simple three-segmented type of the nauplius, are now composed of seven segments, carrying several setæ, especially along the anterior border, and three large aesthetascs. The small, short antennæ show three slender joints, the last with two terminal setæ; the maxillæ are three-segmented with curved terminal claw. The four pairs of thoracic feet consist each of an unsegmented stem and a larger outer and a smaller inner plate-shaped ramus, the first with five, the latter with three stiff, non-plumose setæ. This larva—as already stated—moult and changes into the parasitic form (seventh stage), which by-and-by attains the size and shape of the adult.

The systematic position of the new genus I am unable to indicate at present. It seems not to be related to any parasitic copepod known to infest other echinoderms. The ectoparasitic *Asterocheridæ* seem to differ widely; and the endoparasitic *Pionodesmotes phormosomæ* (Bonnier), shortly mentioned and figured by Richard (1910) as living in galls inside the shell of *Phormosoma uranus* (W.Th.) as well as '*Philichthys amphiuroidæ*'—hitherto the only endoparasitic copepod found in any ophiuroid—provisionally described by Hérouard (1906), are both so incompletely known that no real judgment can be made concerning their structure or possible relation to our new genus (or any other parasitic copepod).