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Parasitology

CONTRIBUTION TO KNOWLEDGE OF BIOLOGY OF *CECROPS LATREILLII* LEACH, 1816 (*CALIGOIDA: CECROPIDAE*) THE PARASITE OF THE OCEAN SUNFISH *MOLA MOLA* (L.)

PRZYCZYNEK DO POZNANIA BIOLOGII *CECROPS LATREILLII* LEACH, 1816 (*CALIGOIDA: CECROPIDAE*) PASOŻYTA SAMOGŁOWA – *MOLA MOLA* (L.)

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The author describes external structure of a female *Cecrops latreilli* Leach, 1816 in chalimus final stage preceding the adult and matured form. This is the unique found so far larva stage of *Cecrops* genus. New morphological and biological details of parasite are presented.

INTRODUCTION

Cecrops latreillii Leach, 1816 is a cosmopolitan parasite owing to cosmopolitan distribution of its specific host *Mola mola* (L.). The parasite have been known and many times was noted by various authors (**Beneden,** 1855; **Brian,** 1912; **Hewitt,** 1968; **Markevič,** 1956; **Shiino,** 1959; **Threlfall,** 1957; **Wilson,** 1907, 1932; **Yamaguti,** 1936 and others) in Atlantic and Pacific Ocean, Mediterranean, Adriatic and North Sea etc., as presented on the enclosed map (Fig. 1). It was mainly noted as parasite of *Mola mola,* but some reports were also made on its appearance on Tuna fish gills – *Thunnus thynnus* (L.) and on Turbot – *Scophthalmus maximus* (L.) (**Brian,** 1912). The materials for this study originate from English Channel (Roscoff), N.W. Atlantic (Georges Bank). Easter Atlantic

(Mauretania Coast near of Ra's Timiris) and from some, not well determined, fishing grounds of N.W. African shelf. Except for the specimen of Roscoff which originated from unknown fish, the remaining specimen were found on the gills of *Mola mola.*

Fig. 1. Distribution of *Cecrops latreillii* Leach

Cecrops latreillii is a very common species, well recognized owing the detailed descriptions of Beneden (1855), Wilson (1907), Yamaguti (1936), Hewitt (1968) and others. These descriptions relate to the adult forms of male and female, but there is a complete lack of them in relation to larvae stages. Not much of information exist also on development stages of other species of *Cecropidae* family.

The author found in her materials one specimen of *Cecrops latreillii* in larva stage and considers it very useful to submit the detailed description and figures to cover partly the existing gap in the knowledge on this species and, thus, of the whole *Cecropidae* family.

MATERIAL AND METHOD

The material used for this study originated from sunfish caught in 1968 at N.W. African coast. Found on the gills of this fish were 9 adult females, 5 males and 1 larva of *chalimus* type.

The external morphology of this larva was subjected to examination. All appendages of body were outprepared and fixed in Berlése liquid. For comparison, analogical preparations were made out of the female and male appendages. The figures were made by drawing apparatus with exception of Fig. 8, 9, 10, which were made by hand.

No detailed description of adult forms is given as this was explicitely presented by **Wilson** (1907), **Yamaguti** (1936) and **Hewitt** (1963). Also, **Shiino** (1965) presented the detailed description of *Cecrops exiguus,* the species very similiar to *C. latreillii* differing by size only. Such descriptions are supplemented with some details relating to structure of carapace and with some observations relating to the biology of parasite.

DESCRIPTION

The grown-up specimen *C. latreillii* live attached to the gills by means of second antennae and of maxillipedes provided with strongly developed and chitinous hooks (Fig. 4). The female, however, not attached to the gills permanently, has probably limited possibilities of displacement and remains for longer time in one place. This supposition is supported by the appearance of the depression in gill laminae in attaching place in which the body of parasite is situated (Fig.2). The male is generally attached to female's body on its abdominal side on the genital segment with its head inserted under third swimming legs. With the hooks of second antennae is attaching to fourth swimming legs and with maxillipedes is embracing the female between the genital segment and abdomen (Fig.5). This is characteristic position for both sexes in copula, which was observed also by **Shiino** (1965) in *C. exiguus.*

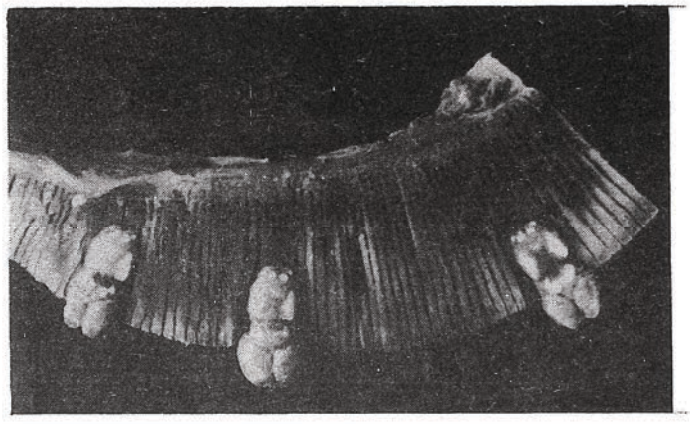

Fig. 2. Gills of *Mola mola* (L.) attacked by *Cecrops latreillii* Leach (Phot. mgr E. Ceronik)

Less frequently the males are found directly on the gills beyond the body of female.

Found larva is the typical *Caligoida chalimus* attached to the gills by means of filamentum on which is freely suspended (Fig.6, 7). The filamentum in form of twin strand is protruding from large frontal gland situated on abdominal side of cephalothorax between the second antennae (Fig. 9). The *chalimus* also uses for attachement the second antennae and maxillipedes similarily like the adult forms.

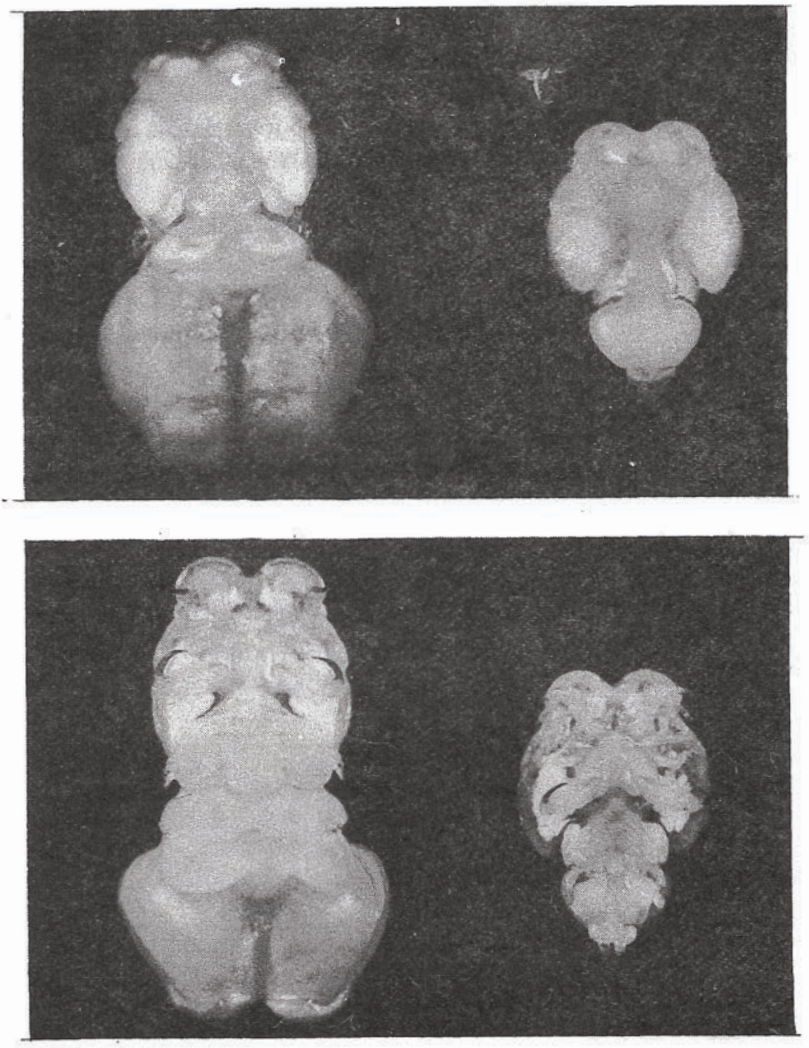

Fig. 3 and 4. Adult female and male of *Cecrops latreillii* Leach from dorsal and abdominal side

The carapace of *chalimus* is less chitinous than of adult forms and is more transparent; from its dorsal side, the appendages of body are clearly translucing (Fig. 6).

Total length of the larva is 14,5 mm. The cephalothorax is formed as of grown-up female, but slightly smaller. Its length equal to width amounts to 9,7 mm. It is also concave from dorsal side and convex from abdominal side. Side edges of carapace are folded in way of abdomen and provided at the edges with two raws of fine spines running nearly in parallel to the edges of carapace. Both raws of spines are starting below the basement of first antennae (Fig.12). More paracentral is running the raw of spines 0,022–0,030 mm in size which reaches the caudal lobes of carapace. Closer to side edges

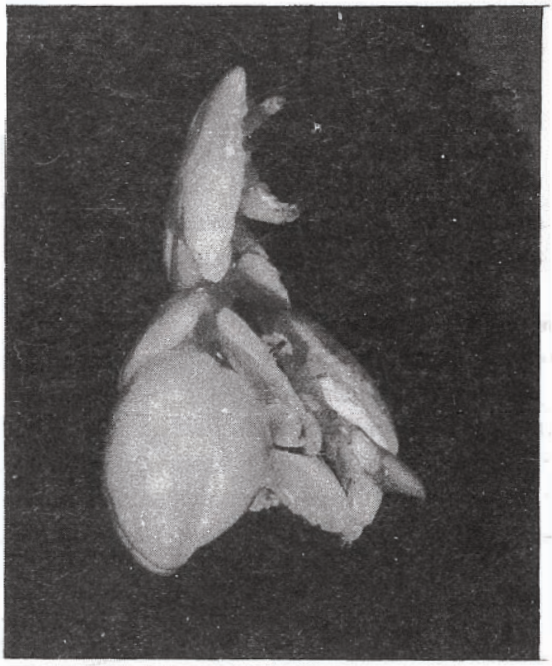

Fig. 5. Female and male of *Cecrops latreillii* Leach in copula

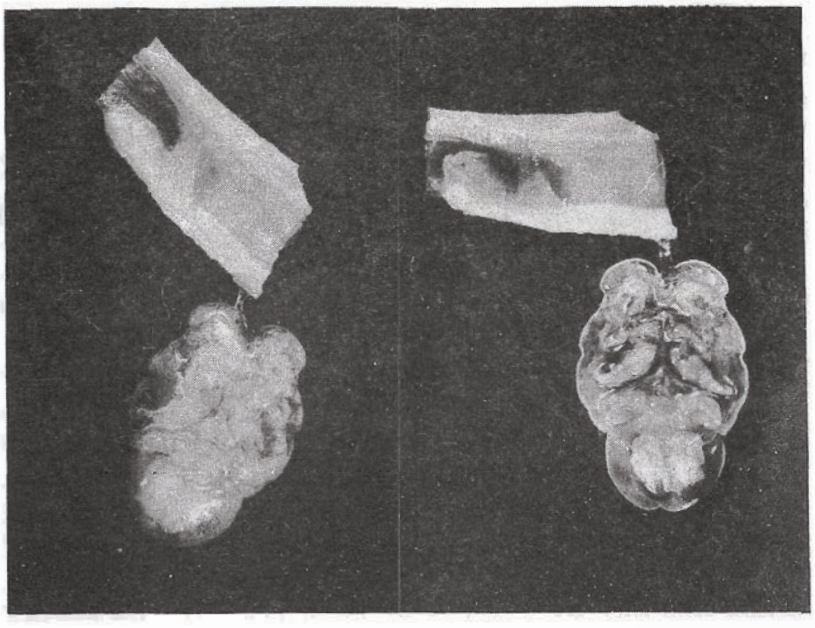

Fig. 6 and 7. *Chalimus Cecrops latreillii* Leach from dorsal and abdominal side

of carapace is the second raw of smaller spines (length ab. 0,01 mm), which is surrounding also the caudal lobes of carapace (Fig.11). Both raws of spines form additional strengthening of attaching surface formed by the convex side of cephalothorax. The same spines appear also in adult parasite. On similiar structures "toothlike" on the side edges of carapace in grown-up female mentions **Yamaguti** (1936).

Along the lateral edges of carapaces of *chalimus* and adults, are situated the sensorial papillae which are in form of the ducts piercing the chitinous carapace. In deeper layer of chitine, the ducts are widening into the cavities. A fine spine is creeping out of the papilla (Fig.10, 11).

Behind the cephalothorax of larvae are situated the *laminae laterales,* nearly totally covered by caudal lobes of carapace and the first *laminae dorsales* of thoracal segment of second swimming legs (Fig.8). This lamina of 2,5 mm in length and 3,4 mm in width, is overlapping the frontal edge of second *lamina dorsalis* situated on the segment of fourth swimming legs. The second *lamina dorsalis* is distinctly larger and wider from the preceding one and is 4,5 mm in length and 5,5 mm in width; it covers totally the genital segment and the abdomen of larva (Fig.8). Both *laminae* are identical as of adult female.

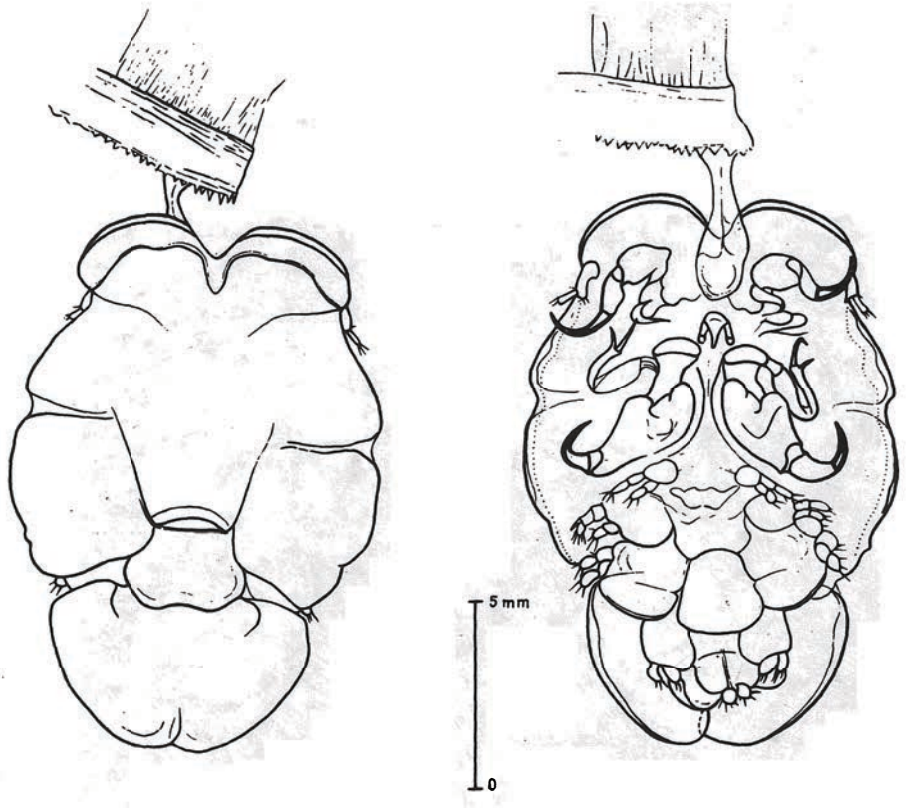

Fig. 8 and 9. *Chalimus Cecrops latreillii* Leach from dorsal and abdominal side

With the removed second dorsal lamina of larva appears the third dorsal lamina, which is developing on genital segment. It covers directly the genital segment and abdomen of larva and only the caudal laminae protrudes from its back edge. It is seen from abdominal side only (Fig.9, 14).

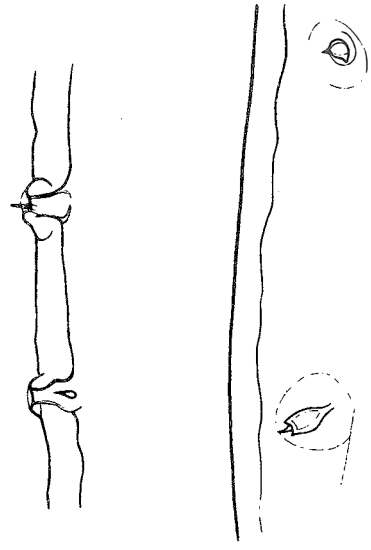

Fig. 10. Sensorial papillae at the edge of *chalimus* carapace

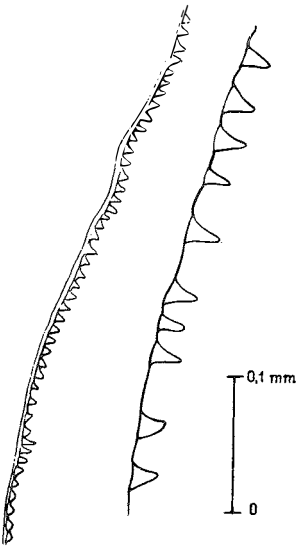

Fig. 11. Carapace edge of *chalimus* from abdominal side with spines and sensorial papillae

In contrary to *chalimus,* the third dorsal lamina of adult female is most strongly developed and highly concave with deep grooving in center line of body. Its front edge is overlapped by the second dorsal lamina. Its length is reaching the length of carapace and even exceeding it. Such strong development of the third dorsal lamina is connected with the development of genital segment due to the development of gonads and production of eggs. Matured eggs are deposited by female into the thin and very long egg-strings which in folded condition are filling the space between the genital segment, abdomen and third dorsal lamina. Thus, is being formed some sort of „Hatching chamber", named by **Wilson** (1907) as „external egg-case".

All the appendages of cephalothorax of described *chalimus* stage are of identical structure as of adult female, but less chitinized (Fig.12, 15, 16, 17, 18).

The first antennae, proboscis, mandibulae, maxillae I and II are nearly of the same size as of adult female, but distinct difference of size is noted in second antennae and maxillipedes, which function as attaching organs. The distal claws of these appendages of adult female are more bend, are longer (by 1/2 of length) and more solid than of *chalimus* stage.

Described larva possesses four pairs of swimming legs. First three pairs are biramose and the branches are of two segments; the fourth pair possesses exo-and endopodite with

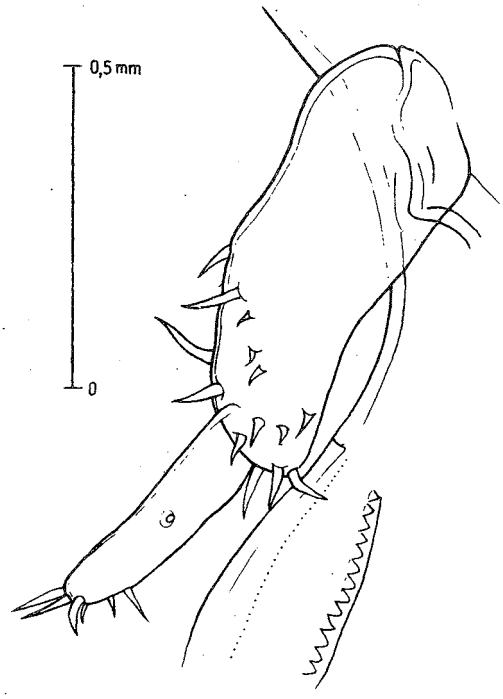

Fig. 12. First antenna

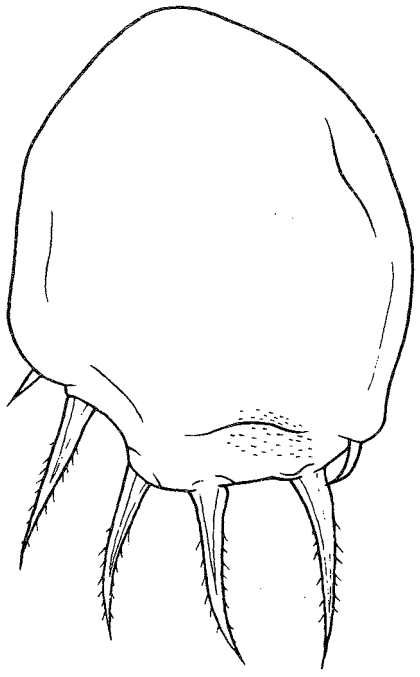

Fig. 13. Caudal lamina

one segment similarily like adult female. As presented in Tab. 1, the arrangement of setae and spines on swimming legs is not differing from the one typical for adult female. But the basipodit of fourths swimming legs of the *chalimus* is nearly twice smaller than of adult specimen.

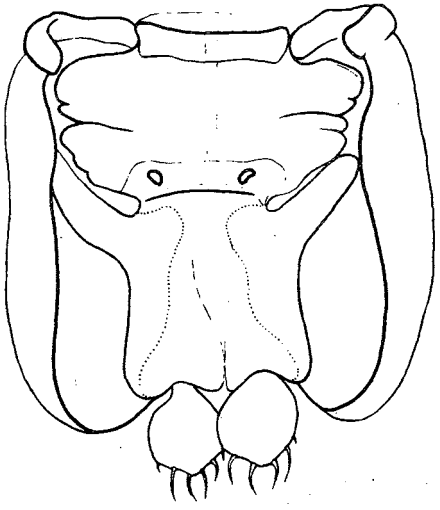

Fig. 14. Genital segment and abdomen of *chalimus*

Table 1

Arrangement of setae and spines on swimming limbs of the
I st to 4 th pair in *chalimus* and adult female of *Cecrops latreillii*

Swimming limbs	Chalimus ♀								Adult ♀							
	Exopodite				Endopodite				Exopodite				Endopodite			
	segm. 1		segm. 2		segm. 1		segm. 2		segm. 1		segm. 2		segm. 1		segm. 2	
	setae	spines	setae	spines	setae	spines	setae	spines	setae	spines	setae	spines	setae	spines	setae	spines
I pair	0	1	3	4	0	0	3	0	0	1	3	4	0	0	3	0
II pair	0	2	5	4	0	0	7	0	0	2	5	4	0	0	7	0
III pair	0	1	4	3	0	1	4	0	0	1	4	3	0	1	4	0
IV pair	3	4	–	–	3	1	–	–	3	4	–	–	3	1	–	–

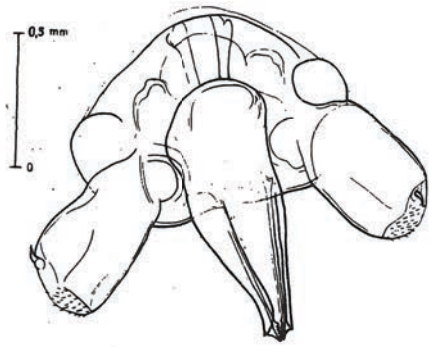

Fig. 15. Mouth tube and first maxilla of *chalimus*

Beyond the setae and spines described above, on the exoand endopodites are appearing the places with very fine spines (Fig.19–22).

Fig. 16. Second antenna Fig. 17. Second maxilla Fig. 18. Maxilliped

The one segment abdomen of *chalimus* possesses the lateral and frontal lobes folded towards dorsal side to form the letter „T" looking from abdominal side (Fig. 14). The abdomen of adult female prior to the appearance of egg strings looks identically, what was noted by Wilson (1907).

At the end of larvae abdomen are the anal laminae in form of wide laminas armed with four long plumose setae and two small spines also identical to adult female (Fig. 13).

Fig. 19–22 – Swimming legs of chalimus. 19 – First leg.
20 – Second leg. 21 – Third leg. 22 – Fourth leg.

The form described represents the final stage of female larva of *Cecrops latreillii*. This is demonstrated by the final development of all the appendages and segments of body. Only the genital segment and the abdomen have not yet attained the final size and shape. After moulting proœss from such stage developes an adult female which does not possess already the filament, but otherwise is not differing externally from the described chalimus stage, as it may be assumed according to description and figure supplemented by Wilson (1907).

In further development of parasite is growing out the genital segment and together with it the third dorsal lamina, which is protruding from under the second dorsal lamina and overgrowing it. The basipodites of fourth pair of swimming legs are also developing and form the wide folded lobes which nearly totally are covering the genital segment at abdominal side. The copula is now taking place during which the male is attaching the spermatophores to the openings of female's vagina. The thick-walled yellowish spermatophores of dimensions 0,834 mm in length and 0,550 mm in width on long peduncles are frequently observed on female genital segment.

DISCUSSION

Inspite of fact that wide literature exist already on *C. latreillii,* no informations whatsoever were published on development of this species. It is far more astonishing because this species have been known for a long time and is frequently noted on the gills of a sunfish. The above described stage is so far the unique exemple of larvae of *C. latreillii.* The stage is well advanced in the development from which a young female is liberating without the filament. One exemple of such young female of 12 mm in length was found and described by **Wilson** (1907). Its external appearance and the formation of dorsal laminae and of abdomen is identical with here-described *chalimus* exemple except for lack of filamentum.

Chalimus Cecrops latreillii is the second in turn larva found in *Cecropidae* family, which according to **Yamaguti** (1963) comprises 5 genus with 9 species. First larva of such type was described by **Wilson** (1907) as male *chalimus* belonging to the species of *Orthagoriscicola muricatus* (Krφyer). Since then, no later observations were noted by the author in any accessible literature.

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PRZYCZYNEK DO POZNANIA BIOLOGII *CECROPS LATREILLII LEACH*, 1816 *(CALIGOIDA: CECROPIDAE)* PASOŻYTA SAMOGŁOWA – *MOLA MOLA (L.)*.

Streszczenie

Cecrops latreillii Leach, 1816 jest specyficznym pasożytem samogłowa – *Mola mola (L.).* Jest to gatunek kosmopolityczny, występujący w Pacyfiku, Atlantyku i morzach przyległych. Jakkolwiek formy dorosłe pasożyta są dobrze poznane, to jednak brak jest informacji o jego rozwoju larwalnym. Autorka podaje opis jedynego dotychczas znalezionego okazu larwy *chalimus* w ostatnim stadium, poprzedzającym formę dorosłą dojrzałą płciowo. Stadium to charakteryzuje się wykształconym definitywnie głowotułowiem z przydatkami gębowymi, posiadaniem czterech par odnóży pływnych identycznych jak u samicy dorosłej oraz w pełni wykształconych pierwszej i drugiej płytki grzbietowej. Natomiast trzecia płytka grzbietowa oraz segment płciowy i odwłok nie osiągnęły jeszcze swej ostatecznej wielkości i są całkowicie ukryte pod drugą płytką grzbietową. Rozwój tych segmentów ciała następuje po ostatniej lince larwalnej w związku z dojrzewaniem gonad. Kopulacja ma miejsce na stadium całkowicie wyrośniętym. W czasie kopulacji samiec przytwierdza do otworów płciowych samicy duże grubościenne, żółtej barwy, spermatofory na długich szypułkach.

МАТЕРИАЛЫ К ВОПРОСУ ОБ ИЗУЧЕНИИ БИОЛОГИИ CECROPS LATREILLII LEACH 1816 CALIGOIDA: CECROPIDAE ПАРАЗИТА ЛУНА-РЫБЫ - MOLA MOLA (L.)

Р е з ю м е

Cecrops latreillii Leach 1816 является специфическим паразитом луна-рыбы - Mola mola (L.) Это вид-космополит, обитающий в Тихом океане, Атлантике и в прилегающих к ним морях. Несмотря на то, что взрослые формы паразита хорошо изучены, отсутствуют данные о его развитии в стадии личинки.

Автор приводит описание единственного найденного до сих пор экземпляра личинки chalimus в последней стадии, предваряющей взрослую половозрелую форму. Эта стадия характеризуется окончательно оформленной головогрудью с ротовыми придатками, наличием четырёх пар плавательных конечностей, таких же как у взрослой самки, и также наличием вполне оформленной первой и второй спинной пластинки. Третья же спинная пластинка, а также половой сегмент и брюшко не достигли ещё своей окончательной величины и полностью скрыты под второй спинной пластинкой. Развитие этих сегментов тела происходит после последней личиночной линьки в связи с созре-

ванием гонад. Копуляция имеет место в стадии полной зрелости. Во время копуляции самец прикрепляется к половым отверстиям самки крупными, толстостенными, жёлтого цвета сперматофорами на длинных отростках.

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