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Copepods Parasitic on Fish from the Vancouver Island Region

By C. McLEAN FRASER, Ph.D., F.R.S.C.

(Read May Meeting, 1919.)

In "Contributions to Canadian Biology, 1906-1910," a paper by Dr. C. B. Wilson was published, under the title, "Parasitic Copepods from Nanaimo, British Columbia, including eight species new to science." This report was based on a number of specimens sent from the Biological Station by the late Rev. G. W. Taylor. Since this publication appeared, although no systematic attempt has been made to collect copepods, quite a large number has accumulated. The additions to the collection include many specimens of species that appear to be new as well as those already described, and it is well that they should be reported, although it is fully recognized that even the list to date is far from being a complete list of the copepods that are to be found on the fish that inhabit the waters of the strait of Georgia in the vicinity of the station.

Wilson listed 13 species. To those 13 more are added, 11 of them new and 2 already described but not reported from this region. The 11 new species are:—*Bomolochus cuneatus*, *Ergasilus turgidus*, *Lepeophtheirus bifidus*, *L. breviventris*, *L. hospitalis*, *L. parvicruris*, *Chondracanthus deltoideus*, *C. gracilis*, *C. irregularis*, *C. rectangularis* and *Nectobranchia indivisa* (*Nectobranchia*, a new genus). The two not previously reported are:—*Caligus gurnardi* and *Echthrogaleus coleoptratus*. The male of *Lepeophtheirus nanaimoensis* has also been found. In some cases, copepods already reported, have been found on hosts other than those from which they were first reported.

The list here presented includes those in Wilson's list as well as those now reported from the vicinity for the first time.

Family ERGASILIDÆ

BOMOLOCHUS CUNEATUS new species

Pl. I, Figs. 1-11

Female.—General body form cuneate, tapering very regularly from the anterior to the posterior. Cephalothorax slightly narrower and more rounded anteriorly than posteriorly, length two-thirds width. The carapace does not cover the first antennæ but a small lobe projects between the bases. Second, third, fourth and fifth

segments decreasing regularly in width, each of them being nearly three-fourths of the one preceding; the fifth is about one-fourth the width of the carapace. The second segment is one-half the length of the cephalothorax, the third slightly longer, the fourth about half the length of this and the fifth about one-third the length of the fourth. Genital segment slightly wider than the fifth segment, nearly the same width throughout; the sixth pair of legs is represented by papillæ, each bearing three setæ. Abdomen not very distinctly separated from the genital segment, and not definitely divided into segments, tapering gradually, with a lateral seta on each side where it joins the laminae; the anal laminae are not distinctly separated from the abdomen, rather slender, well separated from each other; one short lateral and three terminal setæ, of which the inner is quite long, as long as the abdomen and anal lamina. Egg strings elliptical, nearly two-thirds of the total length of the body, with 5 or 6 vertical and 24–26 horizontal rows of eggs.

First antennæ showing the joints distinctly, the division of the two basal joints being indicated; heavy setæ appear around the margin of the first three joints, becoming more nearly parallel with the antennæ the farther from the base, the most distal one is longer and stouter than the others; there are two small setæ at the end of the fourth and fifth joints and four at the end of the terminal joint; from the second joint the tactile hairs project forward, the proximal one two and a half times, and the distal one twice the length of the setæ. Second antennæ with the terminal joint roughened; it is provided with three claws of unequal length, and a rough finger-like process. Labrum with length two-thirds width, a process projects at each side in front of the base of the mandible. Mandible small, smooth, projecting backward along the surface of the labrum. First maxilla with one longer seta extending diagonally to the median line and two shorter ones running backward side by side. Second maxilla with large base and broad terminal joint, reaching horizontally almost to the median line, blunt at the end and supplied with several setæ. Maxilliped with basal joint passing directly outward, second joint somewhat larger than the basal, passes outward in continuation of the first joint and then well forward so as to be well away from the remainder of the mouth parts, with a single large plumose seta at the distal end, curved like the joint and reaching backward past the proximal end of this joint; terminal claw S-shaped, passing backward to lie parallel to the second joint and to the seta of this joint, a little more than half of the length of the seta, provided with a long straight

seta at the base and a small blunt, claw-like projection about two-thirds the distance from the base to the point.

The first legs have a two-jointed exopod, the basal joint unarmed, the terminal one with six large setæ, the endopod is three-jointed; each of the two basal joints have a large seta on the inner margin and hairs on the outer, the terminal joint has five setæ. The arrangement of the spines, and setæ on the other legs are as follows:—Second exopod, I-0, I-1, II-1, II-4; endopod, O-0, O-2, O-3; third exopod, I-0, I-1, I-1, II-4; endopod, O-1, I-0, III-2; fourth exopod, I-0, I-1, I-1, II-3; endopod, O-1, O-1, O-3. The fifth leg is two-jointed, the first joint is rectangular, the second clavate, with a spine near the centre of its outer margin and three at the tip.

Total length 1.9 mm., cephalothorax, length 0.64 mm., width 0.96 mm., length of the four free thoracic segments 0.9 mm., width of genital segment 0.25 mm., length of anal setæ 0.3 mm., length of egg strings 1.2 mm.

(*Cuneatus*, from general shape of the body).

Only females were obtained, these from the gills of the Pacific herring, *Clupea pallasii*, and the gills of the shiner or small viviparous perch, *Cymatogaster aggregatus*.

ERGASILUS TURGIDUS new species

Pl. I, Figs. 12-14, Pl. II, Figs. 15-21

Female.—Body long and slender, over two and a half times as long as wide, narrowing gradually posteriorly. Head completely fused with the first thoracic segment without any indication of the junction. Carapace almost two-thirds of the body length, much arched, hence the body is one-third deeper than wide, it makes a slight, blunt projection anteriorly and posteriorly extending to entirely cover the second thoracic segment so that it cannot be seen in dorsal view; a line passes transversely across the carapace just at the base of the second antennæ and another about twice as far back of this as this is from the anterior margin; posterior margin almost straight but slightly rounded laterally. The third thoracic segment nearly as wide as the posterior portion of the carapace, the fourth narrower than this and the fifth still narrower. Genital segment about the same width as the fifth and a little longer than the fourth and fifth together. Abdomen three-jointed, the first one narrower than the genital segment and the other two slightly tapering from this. Anal laminae same length as the last segment, well separated, each provided with three setæ, the innermost one being more than twice as long as either of the other two.

Egg strings almost cylindrical, but tapering slightly from anterior to posterior, longer than the body and two-thirds the width, eggs in 4 to 6 longitudinal rows with about 20 eggs in each row.

First antennæ short, reaching about half way along the second segment of the second antennæ, six-jointed, well provided with setæ, two on first joint, four on second, two on third, two on fourth, two lateral and a terminal on the fifth and three terminal on the sixth. Second antenna with length equal to width of carapace, distinctly four-jointed; basal joint short, with a large globular swelling, whose diameter is twice as great as the diameter of the main portion of the joint; second joint longer than the first, smooth; third joint with a ridge going partly around the base, and a blunt spine or tubercle on the inner surface of the claw which is not very strongly curved. Mouth parts small. The mandibles are wide and are fringed with long hairs, the palp is slender and the hairs on it are short. The first maxilla is small and the two setæ are short. The second maxilla is enlarged at the end of the terminal joint to be somewhat clavate, this clavate portion is well provided with hairs.

In the four pairs of swimming legs, the endopod is larger than the exopod in each instance except in the case of the third where they are nearly equal in length; all the rami are three-jointed with the exception of the fourth exopod which is one-jointed. The fifth legs are small with a basal portion and a terminal claw or seta. The arrangement of the spines and setæ on the four pairs of legs are as follows: first exopod, I-0, 0-1, II-5; endopod, 0-1, 0-1, 1-3; second exopod, 0-0, 0-1, I-5; endopod, 0-1, 0-1, I-4; third exopod, 0-1, 0-2, 0-5; endopod, 0-1, 0-2, I-4; fourth exopod, I-4; endopod, 0-1, 0-2, I-4. Total length 0.78 mm., length of carapace 0.51, width 0.30, depth 0.39; length of egg strings 0.82, width 0.21.

(*turgidus*—referring to basal joint of antennæ).

Found on gill filaments of the small viviparous perch, *Cymatogaster aggregatus*. No males were obtained.

Family ARGULIDÆ

ARGULUS BOREALIS WILSON

Argulus borealis. WILSON, Contr. to Can. Biol., 1912, p. 84.

Specimens of this species have been found on *Lepidopsetta bilineata*, the host from which they were originally described, and also on *Hippoglossoides elassodon*.

ARGULUS PUGETTENSIS Dana

- Argulus pugettensis* DANA, U.S. Exploring Exped., 1838-1842, vol. XIII. The Crustacea. 1852, p. 1351.
 WILSON, Proc. U.S. Nat. Mus., vol. XXV, 1903, p. 711.
 WILSON, Proc. U.S. Nat. Mus., vol. XXXV, 1909, p. 432.
 WILSON, Contr. to Can. Biol., 1912, p. 87.

The rainbow trout, *Salmo irideus*, and the blue perch, *Taeniotoxa lateralis*, served as the hosts for this species in the specimens examined by Wilson. They have also been found on the steelhead trout, *Salmo gairdneri*, and the silver perch, *Phanerodon furcatus*.

Family CALIGIDÆ

CALIGUS GURNARDI Kröyer

- Caligus gurnardi* KRÖYER, Naturh. Tidsskrift, Ser. 3, vol. II, 1863, p. 150.
 WILSON, Proc. U.S. Nat. Mus., vol. XXXV, 1909, p. 439.
 SCOTT, T. and SCOTT, A., Br. Parasitic copepods, 1913, p. 52.

Many specimens have been found in different stages and on a great variety of hosts, one in a plankton haul, May 9, 1917, made in Northumberland channel, at the edge of the Dodds narrows tide-rip. The hosts were: the steelhead, *Salmo gairdneri*, the dog salmon, *Oncorhynchus keta*, the rock cod, *Sebastes* sp., and the Pacific herring, *Clupea pallasii*. The young stages were found on herring less than two inches long, when the scales were just beginning to appear.

Wilson has reported some from other points on the Pacific coast from the spring salmon, *Oncorhynchus tshawytscha*, and the rat fish, *Hydrolagus collei*.

LEPEOPHTHEIRUS BIFIDUS new species

PL. II, FIGS. 22-35

Female: Carapace nearly circular but flattened posteriorly; frontal plates well defined; posterior sinuses broad, widely separated, leaving a median lobe almost half the greatest width of the carapace; lateral lobes broad and well rounded. Free thoracic segment half the width of the genital segment, of medium length. Genital segment

nearly half the length of the carapace, considerably wider than long, well rounded anteriorly and posteriorly. Abdomen small, one-third the length of the genital segment, length and width nearly equal. Anal laminae large, curved outward, each one supplied with three long and one short setae and a short spine placed just dorsad to the inmost seta.

The two joints of the first antennae of nearly the same length, well supplied with setae. The second antennae quite long, with the terminal hook sharply curved; a short, stout spine is attached to the basal joint. Maxillary hook stout, shorter than the claw of the second antenna. Rami of first maxilla somewhat dissimilar; the outer one is distinctly flanged, with a distinct constriction at the base, the inner slightly longer, without a noticeable flange, with its axis in a slightly different plane; neither branch is as long as the basal portion. The second maxillae are long and slender, the second joint being half as long again as the first. Maxillipeds stout, with the second joint almost as long as the first, the accessory spine scarcely noticeable. Furca short but very wide, wider at the tip than it is long and nearly this width throughout; the sinus between the rami reached half way to the base of the joint and the base of the sinus is made up of two concave portions meeting in the middle line; each ramus is bifid, each with a secondary sinus shaped like an inverted V; the four points thus formed are rather abruptly pointed but not rounded; the secondary sinuses are not so deeply cut as the primary sinus.

The first swimming legs are of medium length, the second joint being the longest; the first joint has a small spine on its antero-lateral border and a stouter one on its postero-lateral; the four setae on the terminal joint decrease in length distally, the most distal being as short as the shortest of the three terminal claws. There is a long seta on the basal joint of the second leg; the second joint is longer than broad; the exopod and endopod are much the same length; the inner side of the second joint of the endopod projects beside the terminal joint so that the setae on the end of it are in line with the setae on the terminal joint. The spine at the base of the third leg is stout and blunt. The fourth legs are four-jointed; the first joint is stout with a spine at its distal end; the third joint has a short, stout spine distally and the terminal joint has three spines. The fifth legs are well defined but do not show dorsally.

Total length 4.7 mm., length of carapace 2.9, width 2.9, length of genital segment 1.3, length of abdomen 0.3, length of egg strings 3.1.

Male: Carapace much similar in shape to that of the female. Free thoracic segment but slightly narrower than the genital segment. Genital segment with length and breadth nearly equal, well rounded anteriorly and posteriorly, scarcely one-third of the width of the carapace. The fifth and sixth legs show distinctly from the dorsal side. The abdomen is quadrangular, wider than long. The anal laminae are relatively long, each being provided with three long plumose setae and two small spines, one placed interiorly and the other exteriorly.

In the appendages the main differences from that of the female are in the second antennae and the first maxillae. The second antenna has a stout base, and the terminal claw has a small accessory claw on each side of it. The first maxilla is relatively smaller than that of the female; there is a spine present rising from the shoulder of the inner ramus and running parallel to it.

Total length 3.2 mm., length of carapace 2.1, length of genital segment 0.65, length of abdomen 0.4.

Colour: Uniformly yellowish.

Nauplius: Body oval, nearly twice as long as wide; anterior end truncate, posterior end rounded; balancers of medium size. Pigment present in large amount; a single large shovel-shaped mass reaches almost the whole length of the body, with the tip of the shovel at the posterior end; there is a small oval spot, sometimes two, in the median line in which the pigment is absent. The pigment is a bright purple. Length 0.39 mm., width 0.21.

(*bifidus*, referring to the bifid rami of the furca.)

Found on the outer surface of the flounder, *Lepidopsetta bilineata*.

LEPEOPHTHEIRUS BREVIVENTRIS new species

PL. III, FIGS. 36-46

Female: Body rather small; carapace slightly broader than long, rounded anteriorly and posteriorly; lateral grooves well in from the margin, transverse groove well forward; posterior sinuses deep but not very wide; lateral lobes narrow, median lobe five-ninths the width of the carapace, rounded posteriorly and projecting backward farther than the lateral lobes. Free thoracic segment, one-third the width of the carapace. Genital segment slightly broader than long, well rounded anteriorly and posteriorly with scarcely any sign of posterior lobes in dorsal view; on the ventral surface the two pairs of rudimentary legs are visible but only the setae of the outer pair are visible dorsally;

each of the outer pair has a seta and of the inner pair three, nearly equal in length. Abdomen very short, only one-fifth as long as broad. Anal laminae widely separated, small, each supplied with five setae, of which the three inner are much longer than the two outer. Egg-strings two-thirds the length of the body, with about 50 eggs in each string.

First antennae projecting beyond the carapace, the terminal joint slender, slightly longer than the basal joint. Second antenna with the terminal claw long, slender and abruptly bent near the end; the basal joint is provided with a short spine. Maxillary hook stout, tapering rapidly to a sharp point, strongly curved. First maxilla small, with both rami sharp-pointed, the inner much smaller than the outer. Just posterior to the outer portion of the maxilla there is a papilla provided with two spines, an inner, shorter and an outer, much longer. Furca, with rami rounded at the tip, but little separated at the base, looking like the fangs of a premolar tooth. The two joints of the second maxilla are nearly equal in length, both joints free of spines. Maxillipeds short and stout in both joints, no spines.

In the first swimming leg, the spine on the basal joint is strong; a small spine is present at the antero-dorsal margin of the second joint. Basal joint of the second leg with a strong spine on the posterior border. The rami of the third leg are not widely separated; the spine at the base of the exopod is as long as the breadth of the joint. Fourth leg stout; a short spine at the distal end of the basal joint; second joint with a short claw; third joint larger than the second, with a strong spine; terminal joint the shortest, with four spines, the inner short, the next one long, the fourth short but longer than the first.

Total length 3.68 mm., length of carapace 2.14, width 2.32, length of genital segment 1.2, width 1.4, length of egg strings 2.3.

Male: Body about half the length and half the width of the female. Carapace slightly longer than broad, rounded posteriorly and anteriorly. Posterior sinuses narrow and deep; lateral lobes wide and blunt; median lobe rounded, half the width of the carapace. Free segment broad but narrowed where it joins the other segments, relatively long. Genital segment broader than long, rounded anteriorly and posteriorly; each of the outer pair of legs is provided with four setae, the innermost one being the longest and the third, second and fourth following in order. There are three setae on each of the inner pair, of which the innermost is long, the next one much shorter and the third short and weak. The anal laminae are well separated; each is provided with three strong setae, the two inner being nearly equal in length, longer than the third, and three very small setae, one inside and two outside of the other three.

In the appendages the main differences, as compared with the female, are in the second antennæ, the first maxillæ and the maxillipeds. The basal joint of the second antenna is corrugated and the basal portion of the claw has also a ring of striæ and a small curved spine or claw near the bend; the main claw has a smaller, accessory claw on each side. The first maxilla is quite different in appearance to that of the female; the portion that corresponds to the outer ramus is blunted and in place of the inner ramus there are two spine-like projections, the one larger and stronger than the other. The terminal joint of the maxilliped is longer and more slender, relatively to the basal joint than it is in the female.

Total length 1·8 mm., length of carapace 1·23, width 1·16, length of genital segment 0·34, width 0·42.

Colour: Bright flesh colour in living specimens but this colour disappears in preserved specimens.

(*breviventris* is self-explanatory.)

Found attached to the mucous membrane of the roof of the mouth of the ling cod, *Ophiodon elongatus*.

LEPEOPHTHEIRUS HOSPITALIS new species

PL. IV, FIGS. 47-58.

Female: Body short and stout. Carapace ovate, narrower anteriorly, length slightly greater than breadth; lateral grooves well in from the margin; transverse groove well forward, dividing the carapace into nearly equal parts; posterior sinuses of medium depth and width; lateral lobes broad; median lobe a little less than half the width of the carapace. Free thoracic segment not distinctly separated from the genital segment, over half as broad as the median lobe. Genital segment much broader than long, rounded anteriorly and posteriorly; posterior lobes not showing dorsally. Abdominal segment undivided, short, about one-fourth the length of the genital segment, of nearly uniform width. Anal laminæ not large, well separated, six setæ on each lamina but two of them very small; a third one is much shorter than any of the other three. The egg strings are long and slender, a little longer than the carapace, with over 50 eggs in each string.

First antennæ short and stout, not projecting far past the carapace. Second antenna with a small spine at the base, the distal portion slender and abruptly curved. Maxillary hook, short, tapering. First maxilla with a broad base that projects laterally much farther than the outer ramus, but medially is almost in line with the

inner ramus; the inner ramus is slightly longer than the outer but rather blunt. The maxilliped is slender; the distal joint is provided with a long seta that reaches almost to the tip of the joint. Furca with stout, flaring rami, the flare being largely on the inside, the sinus somewhat key-hole-shaped, the base broad.

First swimming leg with the basal spine short and blunt and a small spine at the distal end of the intermediate joint. Second swimming leg slender, the joints of both exopod and endopod relatively long; the spine on the basal joint long and slender and a small spine at the distal end of the second joint. Third swimming leg of the usual type. Fourth leg well developed, the basal joint slightly longer than the next two, without spine or seta; the second joint provided with a short claw; the third joint is longer than the second and is provided with a spine distally; the terminal joint is shorter than the third; it has three well-developed setæ and a claw. Fifth and sixth legs are but little developed, only a small portion of the setæ showing in dorsal view.

Total length 7.7 mm., length of carapace 4.45, width 4.3, length of genital segment 2.2, width 2.8, egg strings 4.6.

Male. Male about half the length of the female. Carapace rounded, length and breadth equal; sinuses relatively deeper and lateral lobes larger than in the female. Free segment wide and long, not distinctly separated from the genital segment. Genital segment slightly broader than long, well rounded anteriorly and posteriorly; the fifth and sixth pairs of legs are not large; each is provided with three setæ. Abdominal segment broader than long of similar width throughout. Anal laminæ well separated and distinctly projecting, each with four strong setæ.

In the appendages the main differences, as compared with the female, are in the second antennæ and first maxillæ. The distal joint of the second antenna has a laterally projecting hook on each side, near the distal end, almost as prominent as the main portion of the joint. Besides these there is a long seta attached near the middle of the length, which extends almost as far as the claw. The first maxilla has three rami instead of two, or it seems as though the inner ramus was split in two throughout its length; the outer ramus and the base resemble those of the female.

Length 3.8 mm., length of carapace 2.3, width 2.3, length of genital segment 0.7, width 0.8.

Colour: Uniformly white.

Scores of specimens of this species were obtained and without exception they were so much covered with parasites that it was a difficult matter to be sure of the more minute surface structure.

(*hospitalis*, on account of the species being host to so many parasites.)

Found in large numbers in company with *L. parvicurris* on the flounder, *Platichthys stellatus*. Some specimens were also obtained on *Pleuronichthys caenosus* and *Gadus macrocephalus*.

LEPEOPHTHEIRUS NANAIMOENSIS, Wilson

PL. IV, FIGS. 59-61.

Lepeophtheirus nanaimoensis. WILSON, Contr. to Can. Biol.,
1912, p. 89.

Male: Body short and broad, about three-fifths of the size of the female. Carapace nearly as wide as long, frontal margin slightly curved, but slightly incised; posterior sinuses deeper than wide; median lobe four-ninths the width of the carapace; lateral lobes reaching nearly as far back as the median lobe. Free segment almost the same width as the genital segment, narrowed anteriorly. Genital segment two-sevenths the width of the carapace; separation into two segments plainly indicated on the ventral surface, each segment with a pair of legs, plainly visible from the dorsal as well as from the ventral surface. The fifth pair forms the postero-lateral angles, each with four setæ nearly equal in length, the exterior the shortest. Each of the sixth pair is provided with two setæ, the inner one being much the longer. Abdominal segment slightly wider than long. Anal laminae as long as broad, each with four setæ projecting posteriorly and a much smaller placed ventrally and projecting laterally. Of the posterior setæ, the second from the inside is the longest, the third being slightly longer than the first and the fourth the shortest. The appendages, with the exception of the second antennæ, are not very different from those of the female. The second antennæ are strongly developed; the basal joints are corrugated and the basal part of the claw is corrugated also; the claw is divided into two, near the tip and is provided with a spine a short distance proximal to where the division takes place.

Total length 2.4 mm., length of carapace 1.55, width 1.4, length of genital segment 0.45, width 0.4.

The female of this species was described by Wilson but he obtained no females. The only specimens obtained, male and female, were from a flounder of which the species was not determined, caught in Winter harbour, off Quatsino sound.

LEPEOPHTHEIRUS PARVICRURIS new species

PL. V, FIGS. 62-76

Female: Body long on account of the great length of the abdominal segment. Carapace somewhat quadrate, length and breadth equal; truncated anteriorly and posteriorly; lateral grooves well in from the margin; transverse groove less than one-third the distance from posterior border to anterior; posterior sinuses narrow and deep; lateral lobes broad, extending as far posteriorly as the median lobe; median lobe little rounded, four-ninths the width of the carapace. Free thoracic segment short, little more than half the width of the median lobe. Genital segment as broad as long, narrowing somewhat anteriorly but scarcely at all posteriorly; posterior lobes not showing in dorsal view; ventrally the two pairs of rudimentary legs are visible but they are but slightly developed, not even the setæ of the fifth pair showing dorsally. Abdominal segment undivided, somewhat longer than the genital segment, of uniform width but tapering slightly posteriorly. Anal laminae small, widely separated, each with three long setæ medially placed and three small ones, two to the outside and one to the inside of the larger. Egg strings long, as long as the whole body, with nearly 100 eggs in each.

First antennæ short and stout, projecting little past the carapace. Second antennæ, each with a blunt spine at the postero-medial angle of the base and a short spine on the distal margin of the basal joint; the terminal joint slender with the curve abrupt. Maxillary hook abruptly narrowed near the base, the remainder tapering but little. The first maxilla is constricted below the rami; these are of the same size, short and rather blunt. Furca with a base long, but narrower than the fork and tapering; the rami, short, blunt, irregular, with the sinus between them rounded. Second maxilla slender, without spines, the terminal joint being much larger than the basal. Maxilliped with stout base and sharply tapering terminal joint.

First swimming leg with posterior basal spine short; a small spine or claw at the distal end of the intermediate joint. In the second leg, the joints of the exopod and endopod are stout as compared with the size of the basal joint. The third leg is of the usual type, with the basal spine of the exopod short. The fourth leg is very small, almost minute when compared with those of other species. There is a small spine near the distal end of the basal joint; there is but one intermediate joint which is provided with a claw distally; the terminal joint is slightly longer than the intermediate; it has four spines, two of them much shorter than the other two, and one of them quite small, like a

claw. The three distal segments are together equal in length to the basal segment.

Total length 5·6 mm., length of carapace 2·4, width 2·4, length of genital segment 1·8, width 1·8, length of egg strings 5·5.

Male: Body about half the length and two-thirds the width of the female. Carapace slightly longer than broad, more nearly square than circular; posterior sinuses narrow but deep; lateral lobes narrow; median segment wide but narrowing anteriorly and posteriorly. Genital segment broader than long, rounded more anteriorly than posteriorly; there are three setæ from each of the fifth and sixth pairs of legs. The abdominal segment as long as broad, nearly the same width throughout. The anal laminæ are well separated; each is provided with three strong setæ, with one short one interiorly and two exteriorly to these. In the appendages, the main differences, as compared with the female, are in the second antennæ, first maxillæ and maxillipeds. The second antenna has a stronger hook at the base of the terminal joint and an extra one near the centre of the joint. The first maxilla is similar in shape to that of the female but on the inner side there is a tubercle at the base of the ramus, from which projects a long, claw-like spine, extended almost to the end of the ramus. The maxilliped is similar in shape to that of the female but is provided with a spine on the terminal joint, placed centrally and pointing towards the tip of the joint.

Total length 2·7 mm., length of carapace 1·7, width 1·5, length of genital segment 0·5, width 0·6.

Colour: Very light yellow, almost white, throughout.

Nauplius: Body nearly rectangular but slightly broader at the middle and tapering slightly anteriorly and posteriorly; four-sevenths as broad as long; anterior end slightly rounded, posterior end truncate; balancers short, far apart; No pigment noticeable. Length 0·37 mm., width 0·21.

(*parvicruris*, referring to the small size of the fourth leg.)

Found in large numbers on the light surface of the starry flounder, *Platichthys stellatus*.

LEPEOPHTHEIRUS PARVIVENTRIS, Wilson

Lepeophtheirus parviventris. WILSON, Proc. U.S. Nat. Mus., vol. 28, 1905, p. 635.

WILSON, Proc. U.S. Nat. Mus., vol. 35, 1909, p. 439.

WILSON, Contr. Can. Biol., 1912, p. 93.

This species has been found on a wide variety of hosts, although no others have been found on *Lepidopsetta bilineata*, from which they were previously recorded. They have been found on *Gadus macrocephalus*, however, and also on *Hexagrammus decagrammus*, *Sebastes pinniger*, *Scorpaenichthys marmorata*, *Enophrys bison*, *Anoplarchus atropurpureus* and *Raja binoculata*.

LEPEOPHTHEIRUS PRAVIPES, Wilson

Lepeophtheirus praviipes. WILSON, Contr. to Can. Biol., 1912, p. 90.

Numerous specimens of this species have been found on the same host as Wilson recorded, *Ophiodon elongatus*. Much of the colour is lost in the preserved specimens. In the living specimens, the body is not uniformly orange yellow, but while this forms the ground colour, it is thickly dotted over with reddish brown spots, each consisting of a central portion from which extends numerous processes, that each spot has the appearance of a nerve cell. These are found over the surface of the carapace, free thoracic segment and genital segment. The depth of the colour varies somewhat but the spots were present in all live specimens examined.

LEPEOPHTHEIRUS SALMONIS (Kröyer)

Caligus salmonis KRÖYER, Naturh. Tidsskrift, vol. I, 1838, p. 13.

Lepeophtheirus salmonis WILSON, Proc. U.S.N.M., vol. 28, 1905, p. 640.

WILSON, Proc. U.S.N.M., vol. 35, 1909, p. 440.

WILSON, Contr. Can. Biol., 1912, p. 93.

Found on all five species of the Pacific salmon, *Oncorhynchus*, and on the steelhead trout, *Salmo gairdneri*. It is possible to get any number of this species but the live specimens in general do not agree in every detail with descriptions that have been made from preserved specimens, although there is a large amount of variation in the relative size of parts. In specimens that may be considered typical for this region, the carapace of the female is about one-eighth longer than wide. The genital segment is only a little more than half as long as the carapace and a little over half as wide. The abdomen is nearly as long as the genital segment. There is no segmentation at the constriction.

In the male the relative size of the parts agrees more nearly. The genital segment is not concave posteriorly but the central portion extends to form a median lobe, where it is attached to the abdomen.

Although the abdomen is constricted at a point about one-third of the length from the base, there is no further evidence of segmentation.

Although they vary much in size, none of them are nearly so large as those described by Wilson. An average size would give the following measurements: Female: Total length 9.6 mm., length of carapace 4.75, width 4.25, length of genital segment 2.5, width 2.25, length of abdomen 2.3. Male: Total length 5.8 mm., length of carapace 3.5, width 3.2, length of genital segment 1.26, width 1.16, length of abdomen 0.97.

The ground colour is yellow but there is a strong and intricate mottling of reddish brown, which varies much in brightness in different specimens. In some cases it is so dark that it gives a dark colour to the whole specimen.

ECHTHROGALEUS COLEOPTRATUS (Guérin)

Dinematura coleoptrata GUÉRIN, Iconographie du Règne animal, 1837, pl. XXXV, Fig. 6.

Echthrogaleus coleoptratus WILSON, Proc. U.S. N.M., vol. 33, 1908, p. 367.

WILSON, Proc. U.S. N.M., vol. 35, 1909, p. 452.

Two specimens were obtained from a shark (species undetermined) caught in Northumberland channel, Sept. 21, 1916. The specimens reported from Unalaska by Wilson were also from a shark.

Family CHONDRACANTHIDÆ

CHONDRACANTHUS DELTOIDEUS new species

Pl. V, Figs. 77-80, Pl. VI, Figs. 81-83

Female.—General shape of the body short and stout. Cephalothorax nearly circular but with very slight lobes at the posterior end of the lateral margin, distinctly separated from the remainder of the thorax; about three-fifths as wide as the thorax; there is a definite median line dorsally. Second and third segments of the thorax are distinct; the second narrower than the cephalothorax, the third the same width as this. The remainder of the thorax shows an indication of division ventrally but not dorsally; it becomes wider posteriorly. The posterior lobes together at their bases are practically the whole width of the body; the tapering takes place on the inside only and the length is about equal to the width at the base. There are no definite lateral lobes. The genital segment is small, about one-fifth the width

of the body, wider than long. The abdomen is small, very weakly two-lobed. The egg strings are long, much longer than the body, nearly the same size throughout but tapering slightly towards the distal end; the eggs are arranged in five rows.

The first antennæ are large and rounded, with the joints fused except for one indication of a division, which corresponds to the distal one; the terminal joint is tipped with three small spines and another small one appears about half way along. The second antennæ are large and stout, tapering gradually but with no abrupt bend near the tip. Mandible curved and tapering, with the surface supplied with rows of short spines. The first maxilla has a stout base and slender, curved, terminal joint, with three curved teeth near the distal end of the convex side, the most distal being the largest; there is a stout spine on the basal joint projecting parallel to the terminal joint. The maxilliped has a stout basal joint that narrows abruptly just near the distal end; the terminal joint is also quite stout; the spine is stout and straight and the end of the joint projecting beside the base of this forms a rough knob. Each of the free thoracic segments has a pair of bilobed appendages.

Total length 6.2 mm., length of cephalothorax 1.6, width 1.9, greatest width of body 3.7, length of egg strings 7.3, width 0.9.

Male:—Body short and stout. Cephalothorax inflated, three-fourths as deep as wide. Second thoracic segment somewhat distinctly separated from the cephalothorax, much narrower than it is. The other free thoracic segments are shorter and narrower than the second. The genital segment is greater in each measurement than the last thoracic segment. The abdominal segment is about half the width and half the length of the genital segment. The anal laminae are slender, without setae.

The first antennæ are stout, almost to compare with those of the female; the joints are more definitely marked and there are more setae on the terminal joint. The second antennæ are more curved than in the female. The maxilliped has no rough knob on the terminal joint beside the spine. The other mouth parts are much similar to those of the female. The two pair of thoracic legs are very rudimentary, the first pair in particular, being little more than papillae.

Total length 0.8 mm., length of cephalothorax 0.53, width 0.35.

Colour: Uniformly yellowish.

(*deltoideus*, from the shape of the body of the female).

Two females of this species, each with male attached, were obtained from the gill cavity of *Hexagrammus decagrammus*, taken at Hardy bay, September 1st, 1915.

CHONDRACANTHUS GRACILIS new species

Pl. VI, Figs. 84-93

Female.—Body long and slender. Cephalothorax slightly broader than long, rounded posteriorly and anteriorly, a distinct joint separating it from the rest of the body. The second thoracic segment is free. The remainder of the body is elongated—oval in shape. A pair of lateral processes stand out distinctly from the body about half way back. The posterior processes are long and slender, gradually tapering and slightly curved, their length more than three-fourths the greatest width of the body. There are two dorsal processes along the median line, the anterior one being about one-third of the way back and the posterior not much anterior to the end of the segment; the former is not very strongly developed and in some specimens is scarcely noticeable; the latter is much more distinct, being nearly the same size as one of the lateral processes. The genital segment is small, about one-fourth the width of the body. The abdomen is nearly as wide but is constricted anteriorly and posteriorly. The egg strings are long and slender, not far from being as long as the whole body. The eggs are small and very numerous.

The first antennæ show indication of division into three joints; there is one seta on the intermediate joint and four on the terminal. The second antennæ are not particularly stout and they do not taper to so sharp a point as usual. The mandible is stout, strongly curved, with the teeth on both sides stout. The terminal joint of the maxilla is turned strongly forward, is slightly curved and has eight or nine small but sharp teeth on the convex surface. There is no accessory spine present. The terminal spine of the maxilliped is set well back from the end of the joint that supports it and is not in the same straight line with it. The end of the joint is roughened by very rough spines. The first pair of legs is attached to the free thoracic segment. The second pair is similar and is attached just behind the joint that separates the second segment from the remainder of the body.

Total length to end of posterior processes 8.2 mm., length of cephalothorax 1.2, width 1.4, width of body 2.1, width of genital segment 0.5, length of egg strings 7.4.

Male: Body short and deep. Cephalothorax five-eighths of the total length; breadth three-fourths of length; depth nearly as great as width. Little or no indication of segmentation between head and thorax. The second thoracic segment is free, much narrower than the cephalothorax. The third segment is smaller than the second and the fourth smaller than the third. The genital segment is longer than

the preceding thoracic segment but is not quite so broad. The abdominal segment is small. The anal laminae are quite long and each is armed with a terminal hook.

The first antenna has a short basal joint and a longer terminal joint; the latter has two lateral spines on its proximal half and four terminal spines. The terminal joint of the maxilla is not so much curved or so much turned forward as in the female and has not the spines on the convex border. The other mouth parts and appendages do not differ materially from those of the female.

The swimming legs are feebly developed. The first pair has one joint and a spine or claw and the second pair, an appearance of two joints with two terminal spines or claws.

Total length 0.88 mm., length of cephalothorax 0.55, width 0.40, depth 0.37.

Colour: White.

Nauplius: Body obovate, nearly twice as long as broad; anterior end broadly rounded, posterior end much more pointed. Balancers short and slender. The wine-coloured pigment occurs in a single large oval mass, a little nearer the posterior than the anterior end of the body. Length 0.22 mm., width 0.12.

Found in the gill cavity of *Scorpaenichthys marmorata*.

CHONDRACANTHUS IRREGULARIS new species

Pl. VII, Figs. 94-100

Female: Body stout, and on account of the many large processes, very irregular, looking not unlike a portion of a vertebral column. Cephalothorax broader than long; depth greater than the length but not so great as the breadth; more rounded anteriorly than posteriorly. Second thoracic segment narrower than the head and distinctly separated from it. A large process projects mid-dorsally and two bi-lobed legs are present. The third thoracic segment is larger; it has two small lateral process and a pair of legs similar to those on the second segment. The remainder of the thorax is somewhat distinctly divided into two parts; the anterior portion is provided with a long dorsal process, two dorso-lateral processes and two ventral processes that project laterally with smaller processes from these projecting posteriorly; the posterior portion has a long dorsal process, two small dorso-lateral processes, a ventral process or fold and two large posterior processes. The genital segment is small and rounded. The abdomen is less than half the width of the genital segment. The egg strings are of large size.

The first antennæ are heavy and rounded, with no indication of division into joints. The second antennæ are strong, taper gradually, regularly curved, with no abrupt curve near the tip. Mandible but slightly curved, palp very small. The terminal joint of the maxilla tapers gradually and is but slightly curved; the distal portion of the convex margin is provided with four curved teeth; there is a spine on the distal end of the basal joint. The terminal joint of the maxilliped is relatively stout; the terminal spine is straight; the end of the joint beside it is rough with teeth but does not form a very distinct knob.

Total length 7.3 mm., length of cephalothorax 1.4, width 2.1, greatest width of thorax 3.8, width of genital segment 0.7, length of egg strings 11.0, width 1.3.

Male: Body rather slender. Cephalothorax not inflated, much longer and slightly deeper than broad. A slight indication of separation between head and first thoracic segment; the remaining three segments free; the second and third much larger than the fourth. Genital segment about the same length as the second thoracic but scarcely any broader than the fourth. Abdomen small; anal laminae conical, without spines or setæ.

The first antenna is two-jointed, the basal joint being the longer; it has two short spines on the anterior surface; the terminal joint has a spine near the base, one half way along, and five spines or stiff bristles at the tip, one projecting forward and the others in the direction of the joint. The remaining appendages of the head are much similar to those of the female.

The two pairs of swimming legs are much similar except that the first one is biramous and the second uniramous, but all the terminal portions are very minute.

Total length 0.74 mm., length of cephalothorax 0.46, width 0.26.

Colour: Uniform yellowish.

(*irregularis*, on account of general shape of female).

Found on the gills of *Enophrys bison*.

CHONDRACANTHUS PALPIFER, Wilson

Chondracanthus palpifer. WILSON, Contr. to Can. Biol., 1912, p. 93.

Wilson did not give the host for this species. Specimens have been obtained in the gill cavity of *Gadus macrocephalus*.



CHONDRACANTHUS PINGUIS, Wilson

Chondracanthus pinguis. WILSON, Contr., to Can. Biol., 1912, p. 94.

Besides the host, *Sebastes auriculatus*, given by Wilson, this species has been found on *Sebastes pinniger*, *Hexagrammus decagrammus*, *Scorpaenichthys marmorata* and *Anoplarchus atropurpureus*.

CHONDRACANTHUS RECTANGULARIS, new species

PL. VIII, FIGS. 101-109

Female: Body long and slender, with no processes but the posterior. Cephalothorax, short, much broader than long, rounded posteriorly and anteriorly. Second thoracic segment much narrower than the head dorsally but broader ventrally. The third segment is about the same breadth as the head and is marked dorsally by a band running transversely along the anterior border; from this band of much the same width, passes backward along the median line for about three-fourths the distance to the posterior margin of the thorax. The remainder of the thorax tapers very gradually; one slight indentation on each side is present. The posterior processes are long and tapering. Genital segment small, about one-third the width of the body. The abdomen is narrow where it joins the genital segment, suddenly becomes almost as broad as the segment, but soon narrows quickly again and tapers to a rounded end. Egg strings long and slender, the same length as the body; eggs large.

The first antennæ are large, rounded and blunt, without any indication of joints. Second antennæ long, slender and straighter towards the tip than usual. Mandible but slightly curved, with teeth on both sides. The terminal joint of the maxilla has several teeth (9 or 10) on the posterior border, so much so that practically all this border is toothed; a spine from the base passes out parallel to the terminal joint. In the maxilliped, the terminal spine is supported on a papilla-like prominence and is turned backward so that it is not in line with the joint that supports it. The two pairs of legs are similar bilobed structures.

Total length 8.3 mm., length of cephalothorax 1.3, width 2.0, greatest width of body 2.3, egg strings 8.1 long and 0.25 broad.

Male: Body moderately stout. Cephalothorax longer than broad and broader than deep. No indication of separation between the head and first thoracic segment. The free segments gradually get smaller as they go posteriorly. Genital segment longer but not broader than the last thoracic. Abdomen not clearly distinct from the genital segment. Anal laminae long and tapering.

The first antenna is two-jointed, the terminal joint the longer, with four terminal setæ and one less than half way along. Second antenna and maxillipeds similar to those of the female. Mandible relatively shorter with coarser teeth. Maxilla with teeth lacking. The swimming legs are rudimentary, the second pair being somewhat more defined than the first.

Total length 0·9 mm., length of cephalothorax 0·63, width 0·39.

Colour: White.

(*rectangularis* from general body shape of the female.)

Found on the gills of the flounder, *Platichthys stellatus*.

Family LERNÆOPODIDÆ

CHAROPINUS DENTATUS (Wilson)

Brachiella dentata. WILSON, Contr. to Can. Biol., 1912, p. 97.

Charopinus dentatus. WILSON, Proc. U.S. Nat. Mus., vol. 47, 1915, p. 654.

Found only on the host originally reported, *Raja binoculata*.

CLAVELLA PARVA, (Wilson)

Clavella parva. WILSON, Contr. to Can. Biol., 1912, p. 95.

WILSON, Proc. U.S. Nat. Mus., vol. 47, 1915, p. 676.

Found on *Tæniotoca lateralis* and *Axyrius harringtoni* as well as on the original host, *Sebastes auriculatus*.

CLAVELLA UNCINATA (Müller)

Lernæa uncinata. MÜLLER, Zoological Danicae, vol. I, 1776, p. 38.

Clavella uncinata WILSON, Contr. to Can. Biol., 1912, p. 97.

WILSON, U.S. Nat. Mus., vol. 47, 1915, p. 688.

Found only on the original host, *Gadus macrocephalus*.

CLAVELLOPSIS ROBUSTA (Wilson)

Clavella robusta WILSON, Contr. to Can. Biol., 1912, p. 96.

Clavellopsis robusta. WILSON, Proc. U.S. Nat. Mus., vol. 47, 1915, p. 688.

Found on *Sebastes auriculatus* (original host), *S. pinniger* and *S. melanops*. Those found on the gills of *S. melanops* had much larger posterior processes than those found on *S. pinniger* and *S. auriculatus*.

Genus NECTOBRACHIA, new genus

Female: Body short, stout, dorso-ventrally compressed. Cephalothorax small, fused to the body without any indication of separation and without narrowing. No abdomen or anal laminae. A single small knob present at the posterior end. Eggs large and few in a string. First antennae two-jointed, tipped with setae. Second antennae small, uniramous. First maxillae strongly divided at the tip, without palp. Second maxillae placed ventro-laterally, passing upward at an acute angle with the body; fused for a large portion of the length; bulla single. Maxillipeds with short base, a much narrower second joint and a claw. No thoracic appendages.

Male: No specimens.

(*Nectobrachia*, referring to the joined maxillae.)

NECTOBRACHIA INDIVISA, new species

PL. VIII, FIGS. 110-112

Female: Body short, stout, dorso-ventrally compressed. Head forming a tapering projection from the anterior end of the body, without any indication of separation or any constriction to form a neck. Body, second maxillae and egg strings of the same length. No carapace. Body nearly rectangular, but slightly broader near the posterior end. A slight swelling posteriorly with a knob attached to the swelling. No abdomen, no anal laminae. Eggs strings the same length as the body and over one-third of its width. Eggs large, 25 to 30 in number, in three longitudinal rows.

First antennae short, two-jointed; the second joint curved, with a spine on the inner surface; terminal with five tubercles, three of which bear claw-like spines. Second antennae small, one-jointed, terminating in two spines, one of which is much larger than the other. Mouth tube longer than the antennae and first maxillae. Mandible with inner surface slightly irregular but not toothed. First maxillae terminating in two long tail-like rami, the outer one somewhat curved near the tip, the inner more nearly straight. Second maxillae placed well to the side but still on the ventral surface, passing outward and upward at an acute angle to the body, come together and are fused for two-thirds of their length. Bulla single. Maxillipeds with stout base; second joint much more slender and narrowing suddenly at the distal end; the terminal claw slightly curved; a small accessory claw present. There are no body appendages.

Length of body equals length of second maxillæ equals length of egg strings equals 2·2 mm., width of body 2·2.

Male: No specimens.

Colour: White.

(*indivisa*, since head and body are united so closely).

Numerous specimens found on the gills of the flounder, *Platichthys stellatus*.

Family LERNÆIDÆ

HÆMOBAPHES CYCLOPTERINA, (Müller)

Lernæa cyclopterina. MÜLLER, Zoologiæ Danicæ, 1776, p. 2745.

Hæmobaphes cyclopterina WILSON, Proc. U.S. Nat. Mus., vol. 35, 1909, p. 458.

WILSON, Contr. to Can. Biol., 1912, p. 99.

Found only on the original host for this locality, *Oligocottus borealis*.

EXPLANATION OF PLATES

NOTE:—The measured lines placed beside the figures of the complete animals represent the length of 1·0 or 0·1 mm., as indicated.

PLATE I

1. *Bomolochus Cuneatus*, female, dorsal view.
2. First antenna.
3. Second antenna.
4. Mouth parts
5. Maxilliped
- 6–10. First to fifth swimming legs
11. Genital segment and abdomen
12. *Ergasilus turgidus*, female, dorsal view
13. First antenna
14. Second antenna

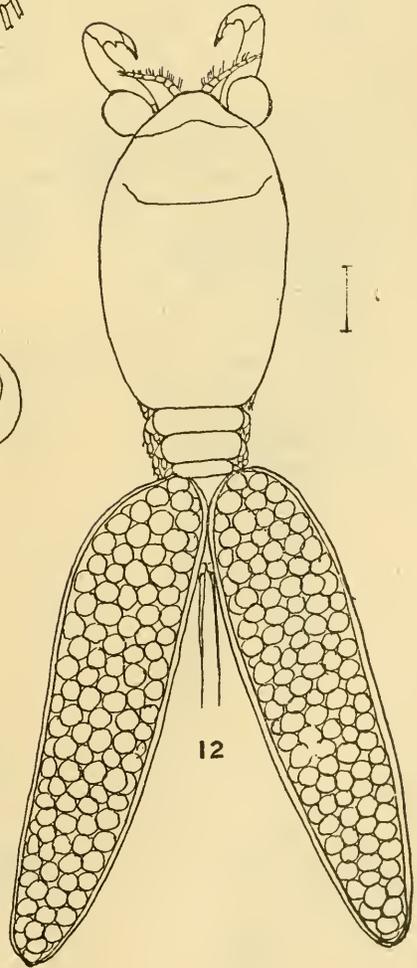
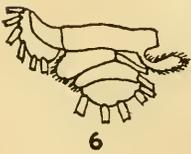
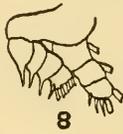
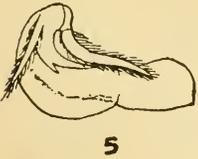
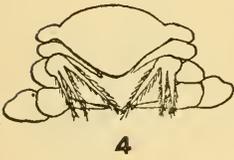
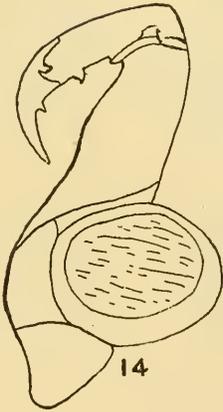
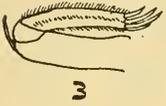
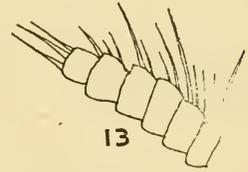
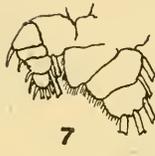
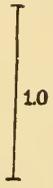
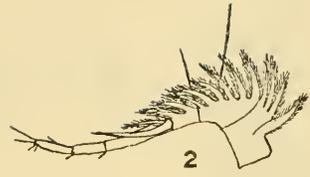
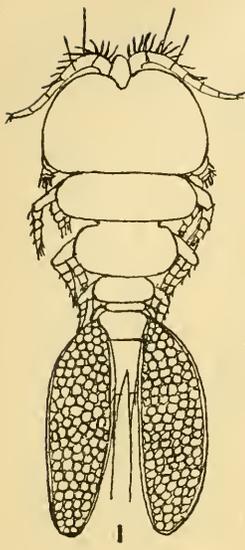


PLATE II

15. *Ergasilus turgidus*, mouth parts
- 16-20. First to fifth swimming legs
21. Genital segment and abdomen
22. *Lepeophtheirus bifidus*, female, dorsal view
23. Second antenna
24. Maxillary hook
25. First maxilla
26. Furca
27. Maxilliped
- 28-31. First to fourth swimming legs
32. Male, dorsal view
33. Second antenna
34. First maxilla
35. Nauplius

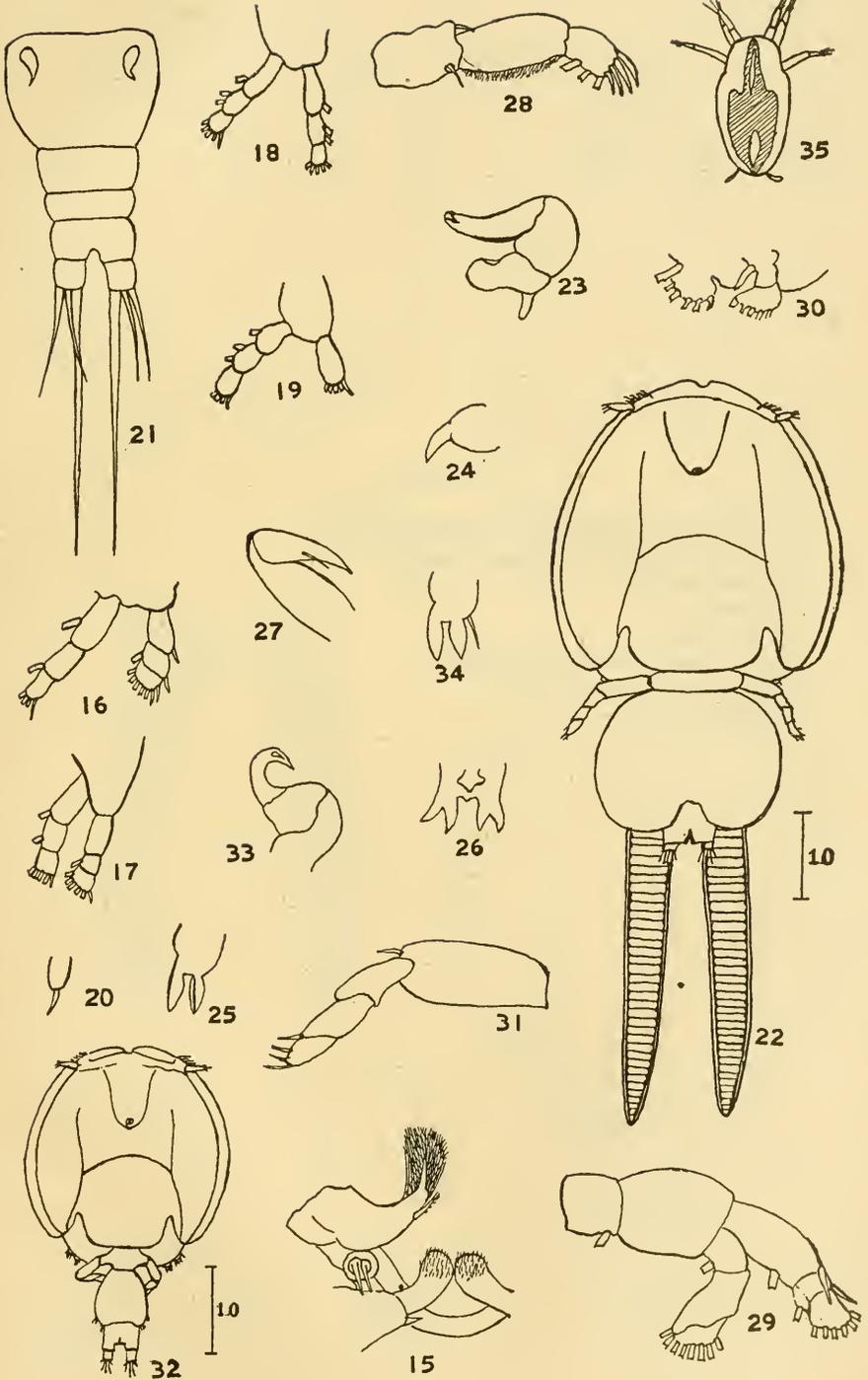


PLATE III

36. *Lepeophtheirus breviventris*, female, dorsal view
37. Second antenna and maxillary hook
38. First maxilla
39. Furca
40. Maxilliped
- 41-44. First to fourth swimming legs
45. Male, dorsal view
46. Second antenna

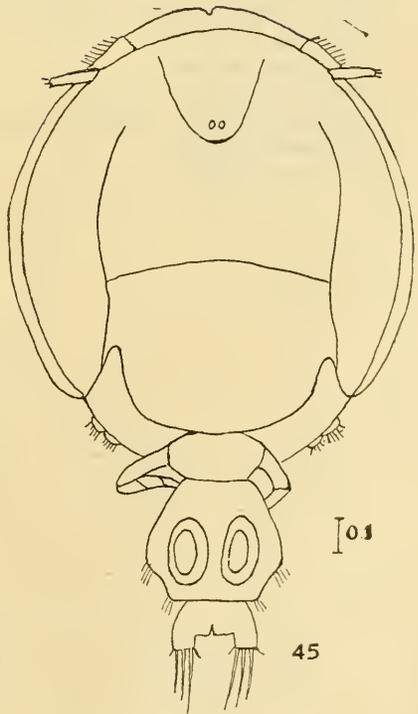
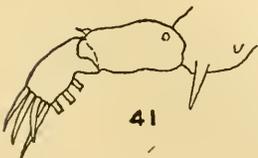
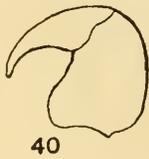
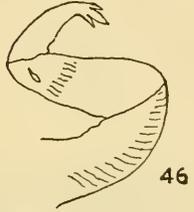
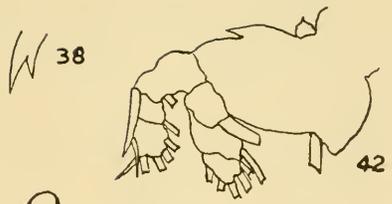
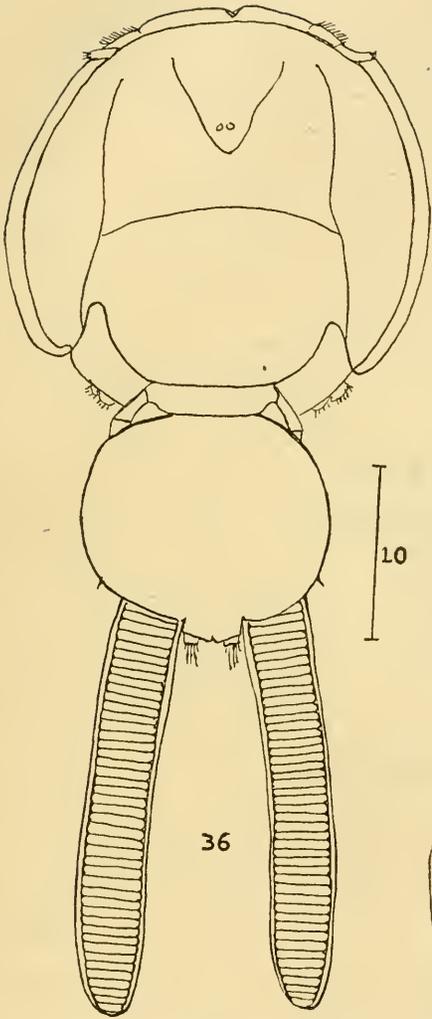


PLATE IV

47. *Lepeophtheirus hospitalis*, female, dorsal view
48. Second antenna and maxillary hook
49. First maxilla
50. Furca
51. Maxilliped
- 52-55. First to fourth swimming legs
56. Male, dorsal view
57. Second antenna
58. First maxilla
59. *Lepeophtheirus nanaimoensis*, male, dorsal view
60. Second antenna
61. Maxillary hook

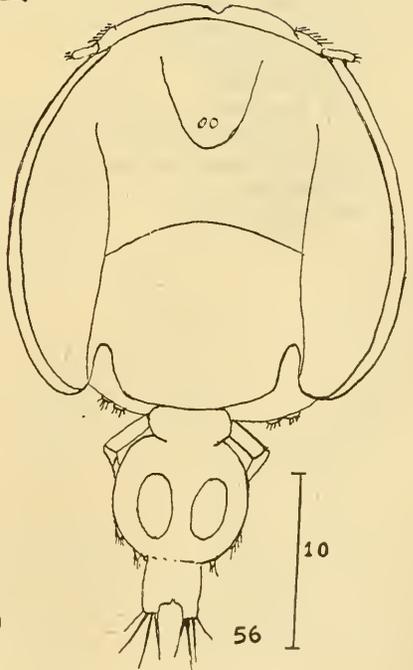
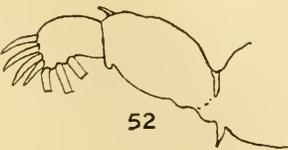
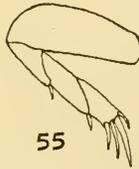
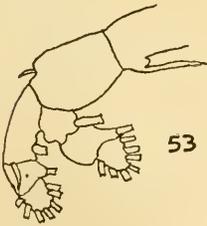
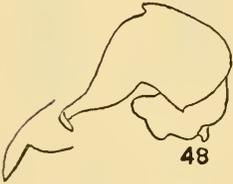
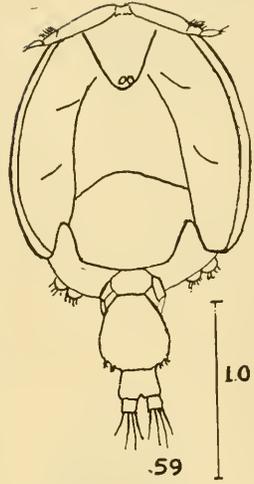
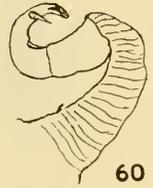
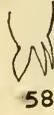
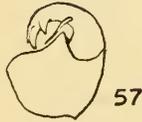
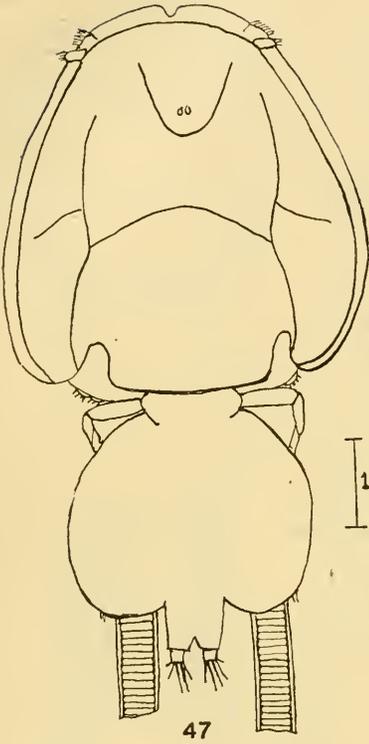


PLATE V

62. *Lepeophtheirus parvicuris*, female, dorsal view
63. Second antenna
64. Maxillary hook
65. First maxilla
66. Furca
67. Maxilliped
- 68-71. First to fourth swimming legs
72. Male, dorsal view
73. Second antenna
74. First maxilla
75. Maxilliped
76. Nauplius
77. *Chondracanthus deltoideus*, female, ventral view
78. First and second antennæ
79. Maxilla
80. Maxilliped

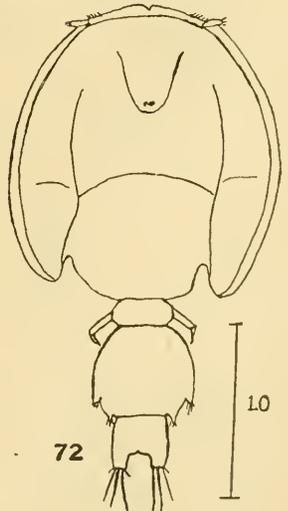
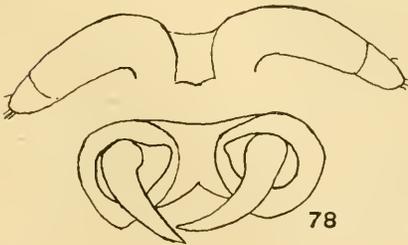
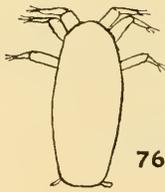
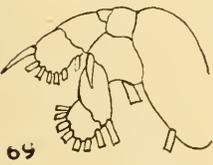
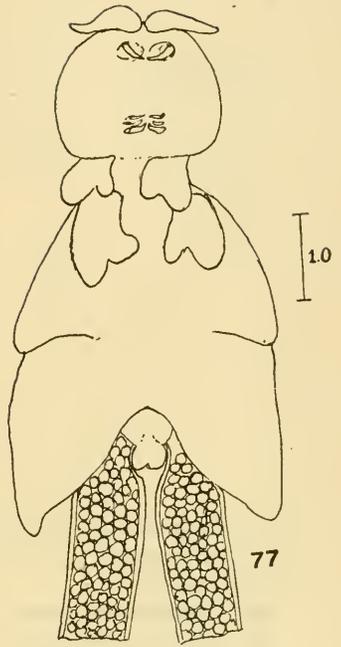
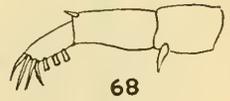
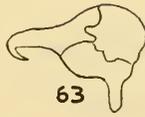
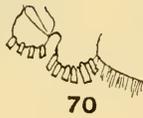
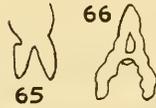
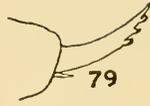
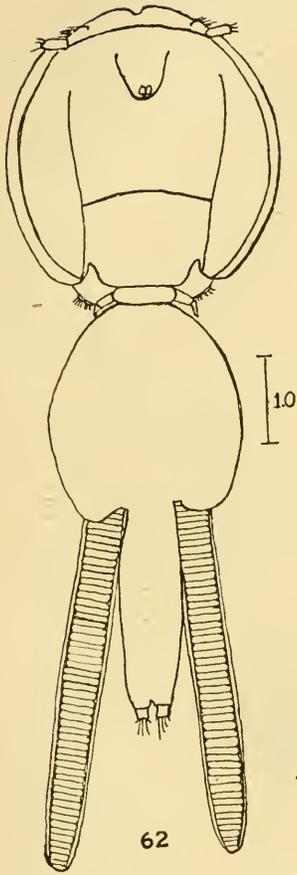


PLATE VI

81. *Chondracanthus deltoideus*, male, side view
82. First antenna
83. Maxilliped
84. *Chondracanthus gracilis*, female, ventral view
85. Female, lateral view
86. First and second antennæ
87. Maxilla
88. Maxilliped
89. Male, side view
90. First and second antennæ
91. Maxilla
92. First and second legs
93. Nauplius

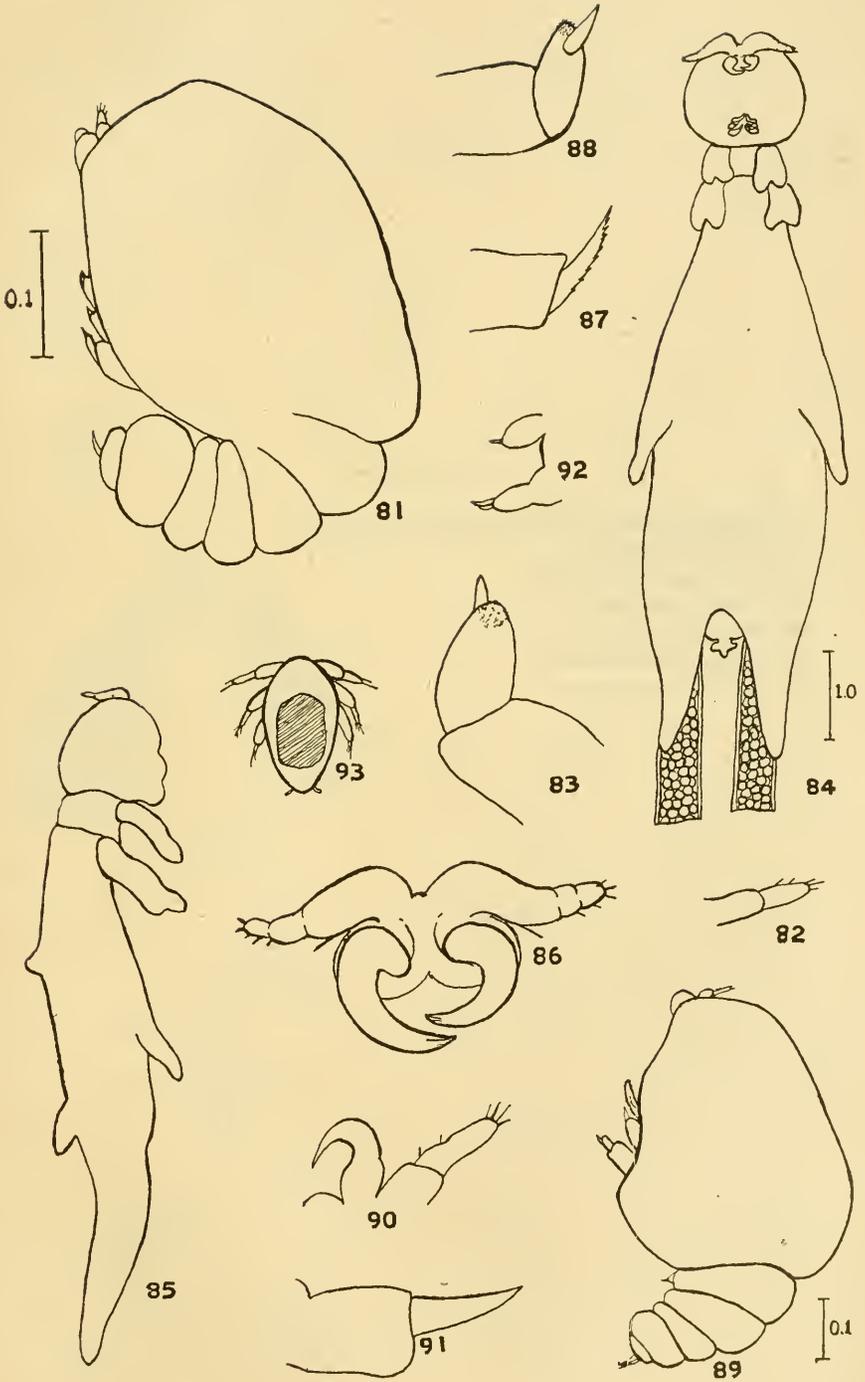


PLATE VII

94. *Chondracanthus irregularis*, female, ventral view
95. Female, lateral view
96. First and second antennæ
97. Maxilla and maxilliped
98. Male, side view
99. First and second antennæ
100. First and second legs

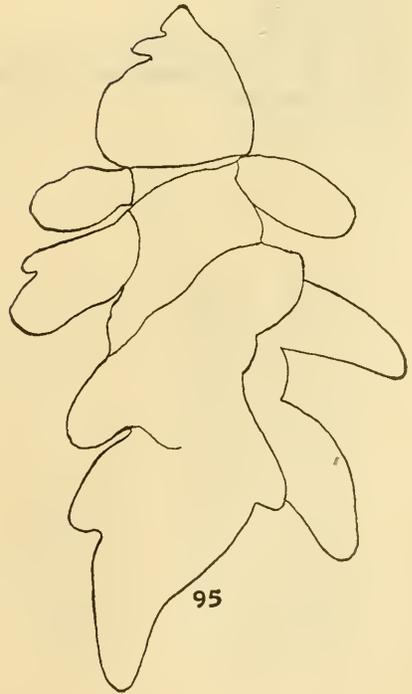
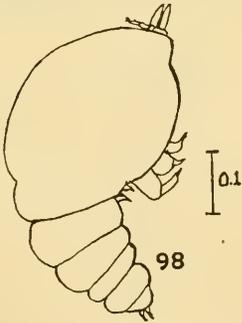
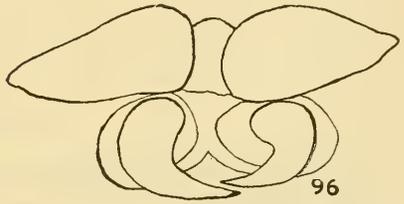
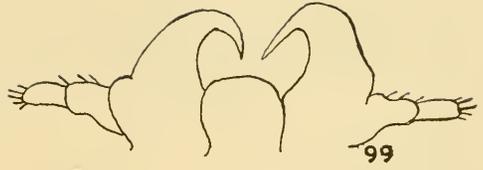
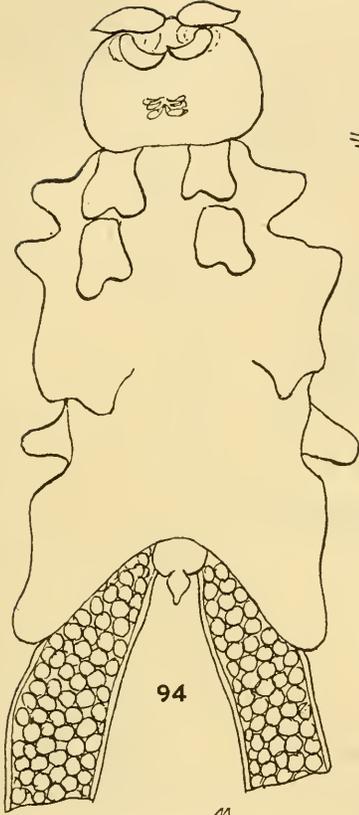


PLATE VIII

101. *Chondracanthus rectangularis*, female, ventral view
102. First and second antennæ
103. Maxilla
104. Maxilliped
105. Male, side view
108. First antenna
107. Maxilla
108. Maxilliped
109. First and second legs
110. *Nectobranchia indivisa*, female, dorsal view
111. Mouth parts
112. Maxilliped

