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Rhamnocercidae (Monogenea: Dactylogyroidea) in Sciaenid fishes from Perú, with description of *Rhamnocercoides menticirrhi n.* gen, n. sp. and two new species of *Rhamnocercus*

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Abstract: A new genus of the family Rhamnocercidae (Monaco, Wood & Mizelle, 1954) (Monogenea) was established: *Rhamnocercoides*. The type species, *R. menticirrhi* n. gen. n. sp. parasitic on *Menticirrhus ophicephalus* (Sciaenidae) from the Peruvian coast is described and illustrated. Distinctive characteristics of the new genus are the presence of a ventral echinodisc with concentrical arrangement of hook-like spines and cirrus with accessory piece. Two new species of *Rhamnocercus* (Monaco, Wood & Mizelle, 1954) parasitic on the gills of the Peruvian sciaenid fish *Stellifer minor* are described: *R. oliveri* and *R. stelliferi*, which differ from other closely related species in the cirrus morphology and the arrangement of haptor armature. A key to the species of *Rhamnocercus* is also provided. This is the first record of Rhamnocercid monogeneans from the South American Pacific Ocean.

Key words: Fish parasites, Monogenea, Dactylogyroidea, Rhamnocercidae, South American Pacific, Perú.

The studies concerning Monopisthocotylea monogeneans from the South American Pacific are scanty. Only seven species have been recorded, three of them in the coast of Perú: *Loimos scolodioni* (Manter, 1938); *Encotyllabe callaoensis* Tantaleán, 1974 and *Pseudohaliotrema paralonchuri* Luque & Iannacone, 1989, (Tantaleán 1974, Suriano & Beverley-Burton 1979, Oliva 1986, Tantaleán *et al.* 1988 and Luque & Iannacone 1989). No species of Rhamnocercidae are recorded in this region.

Rhamnocercidae (Monaco, Wood & Mizelle, 1954), a Dactylogyroid family, includes species with dorsal and/or ventral echinodiscs on the haptor and intestinal crura blind posteriorly. The type genus, *Rhamnocercus*, actually comprises three species, all parasitic on sciaenid fishes (Monaco *et al.* 1954, Seamster & Monaco 1956, Hargis 1955, Kohn *et al.* 1989).

During a parasitological survey of sciaenid fishes from the Peruvian coast, specimens of an new genus of Rhamnocercidae were collected from the gills of *Menticirrhus ophicephalus* (Jenyns). Two new species of *Rhamnocercus* parasitic on *Stellifer minor* (Tschudi) were also detected. The new monogeneans are described, illustrated and compared with the related species of Rhamnocercidae. A key for identification of the *Rhamnocercus* species is also provided.

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MATERIAL AND METHODS

Fishes were obtained from the fish market at Chorrillos (12° 30'S., 76° 50'W.), Lima, Perú. Fish nomenclature has been based in Chirichigno (1974). Preparation of heminths for study followed the procedures outlined by Krytsky *et al.* (1986).

The monogeneans were fixed in 70% ethanol and were stained with Semichon's carmine; sclerotinized structures were examined from specimens mounted in glycerine-gel medium. Measurements, in microns, were made according to the recomendations of Oliver (1968) and Euzet & Suriano (1977). A camera lucida was used in the preparation of the drawings. Type material has been deposited in the

Colección Hemintológica de la Universidad Ricardo Palma, Perú (CHURP).

RESULTS

Rhamnocercoides n. gen.

Diagnosis: Rhamnocercidae, Rhamnocercinae, Body elongate, divisible into cephalic region, trunk, peduncle and haptor; spinous posteriorly, Tegument thin, smooth. Eyes 4. Head organs present. Adhesive glands and median bladder-like structure present.

Ventral echinodisc consisting of two pairs of concentric rows of hook-like spines. Dorsal echinodisc absent.

Dorsal and ventral groups of strong, anteriorly directed spines situated midterminally and bilaterally on haptor. Additional hook-like spines and shorter often clumped spines also over anchors. One ventral and two dorsal bars. Two pairs of dissimilar anchors. Fourteen marginal hooklets.

Mouth subterminal, midventral. Pharinx spherical, muscular and glandular. Esophagus short. Intestinal crura blind posteriorly. Cirrus sclerotinized, accesory piece present. Gonads tandem. Testis post-ovarian. Vas deferens anteriorly sinistral to midline, seminal vesicle is a dilatation of vas deferens. Vagina sclerotinized, sinistral. Ovary pretesticular, lying to right intestinal crus. Oviduct observed, ootype not observed. Genital pore midventral. Vitellaria coextensive with intestinal crura. Parasites of marine teleost fishes.

Etymology: The generic name is based in the morphological similarity with the genus *Rhamnocercus*.

Type species: *Rhamnocercoides menticirrhi* n. sp.

Rhamnocercoides menticirrhi n. sp. (Figs. 1-9)

Host: *Menticirrhus ophicephalus* (Jenyns) (Sciaenidae)

Habitat: Gills

Locality: Chorrillos, Perú.

Holotype: CHURP N: 540

Paratype: CHURP N: 541-542

Description: (Based on six specimens). Body fusiform (Fig. 1), 943 (900-980), long, gratest width 102 (90-115), elongate with large glandular area. Cephalic lobes incipient, with three pairs of head organs. Small group of unicellular cephalic glands lying posterolateral to pharinx. Four eyes, anterior pair smaller, closer together than members of posterior pair. Tegumental scales not observed.

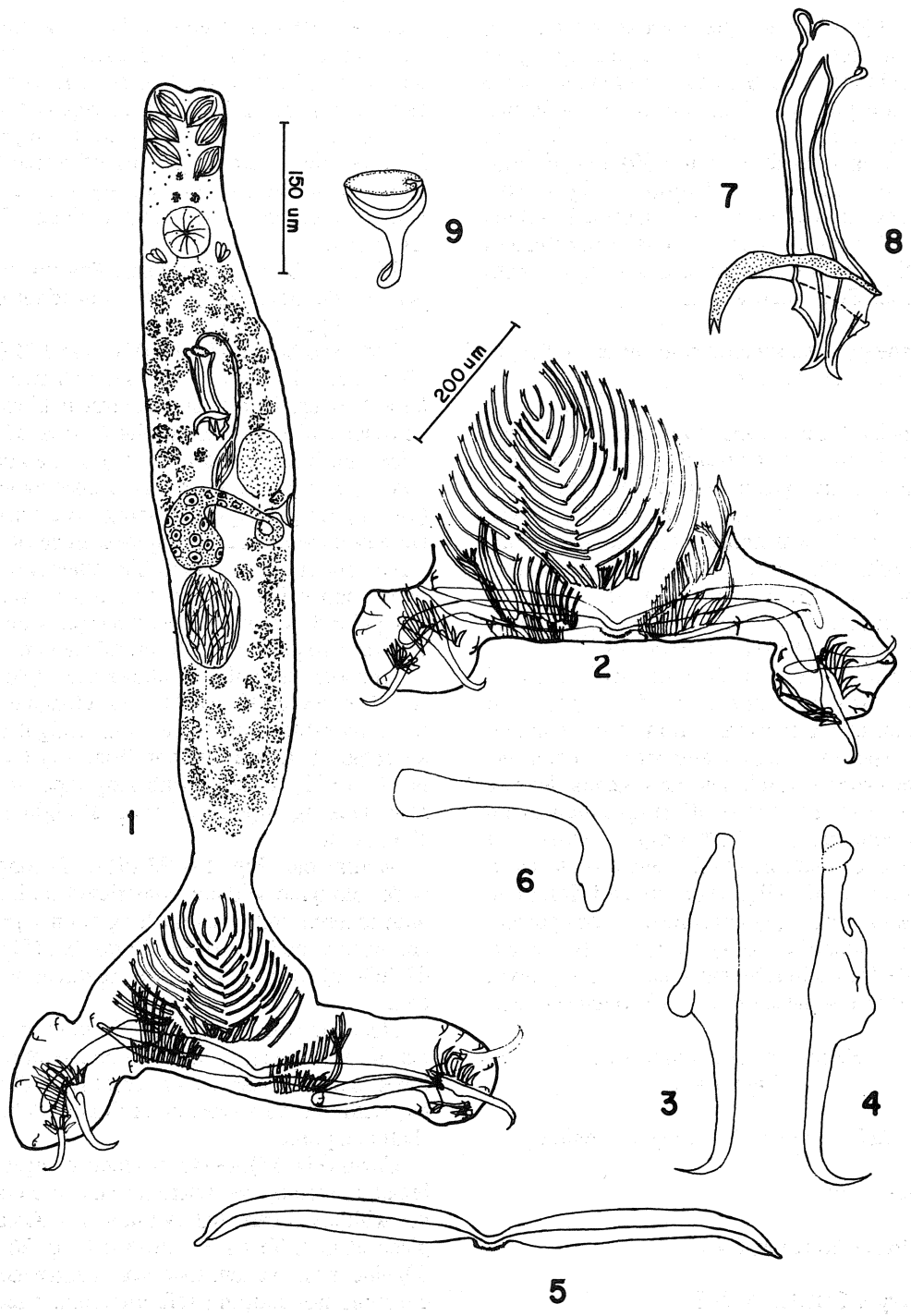
Pharinx subspherical, 36 (32-40) diameter. Intestinal crura blind posteriorly.

Peduncle broad, elongate. Haptor (Fig. 2) 398 (330-460) long, 315 (210-420) wide, with one ventral echinodisc ovate, lying in peduncle, anteromedial haptor and with two pairs of concentrical rows of hook-like spines, internal spines bifids, in number of 24, 66 (55-72) long; external spines bifid, in number of 22-24, with apex developed, 76 (67-83) long. 13 ventral, strong, anteriorly directed bifids spines situated midterminally on haptor 44 (30-80) long. 15-16 ventral and 14-17 dorsal strong, anteriorly directed spines situated bilaterally on haptor, 34 (27-40) long. 8-13 and 6-7 dorsal hook-like spines over anchors, bigger 50 (37-62) long, smaller 23 (17-30) long.

Anchors dissimilar. Ventral anchor (Fig. 3) (a=75, b=77.5, c=40), with large, elongate, depp root; poorly developed knob-like superficial root, straight shaft and short point. Dorsal anchor (Fig. 4) (a=80, b=82.5, c=39), with lateral superficial root and a concavity near to lying knob on deep-root, straight shaft and point. Ventral bar (Fig. 5) 245 (245-263) long, 19 (18-20) wide, with tapered ends, constricted midregion bearing anteromedial diminute serrations, ventral longitudinal groove. Dorsal bar (Fig. 6) 107 (106-108) long and 10 (9-12) width, rod-shaped with spatulate medial end.

Six pairs of hooklets (Fig. 7) lying on lateral haptor lobes, seventh pair usually located near tips of dorsal bar; hooklets 13 (12-14) long, similar with curved shank, erect thumb, curved shaft and point.

Cirrus (Fig. 8) 60 (57-62) long, 9 (7-9) wide, short and broad formed by 2 concentric tubes jointed at distal end and with 2 knobs on distal part. Accesory piece expanded and bifurcated distally, articulated to cirrus. Testis 66 (58-75)



Figs. 1-9. *Rhamnocercoides menticirrhi* n. gen. n. sp. 1. Entire worm, ventral view; 2. Haptor; 3. Ventral anchor; 4. Dorsal anchor; 5. Ventral bar; 6. Dorsal bar; 7. Hooklet; 8. Cirrus; 9. Vagina.

long, 49 (47-50) wide, post-ovarian and suboval. Vas deferens conspicuous anteriorly lying sinistral to midline. Seminal vesicle represented by inconspicuous dilatation of vas deferens. One prostatic reservoir with bilateral basal ducts. Ovary pyriform 58 (45-80) long, 63 (60-65) wide, anterior end looping rigth crus. Oviduct spiraled, ootype not observed. Vagina (Fig. 9) sinistral with proximal sclerotinized cup-like sheath. Vitellaria co-extensive with intestine. Eggs not observed.

Etymology: The specific name refers to the generic name of the host.

Remarks: Hargis (1955) claimed in his description of *Rhamnocercus bairdiella* the presence of intestinal crura apparently confluent posteriorly. Based on this afirmation, Oliver (1987) removed the subfamily Rhamnocercinae Monaco, Wood & Mizelle, 1954 from the family Diplectanidae Bychowsky, 1957 and proposed the family Rhamnocercidae, placed in the superfamily Heterotesioidea Euzet & Dossou, 1979.

The observation of the specimens described in the present paper showed the posterior junction of the intestinal crura in the rhamnocercid species, thus, the authors considered the Oliver criteria valid. The new genus defined above, can be easily distinguished from *Rhamnocercus* (the only genus of Rhamnocercidae) by (1) the single presence of a ventral echinodisc (ventral and dorsal in *Rhamnocercus*), (2) concentrical arrangement of the echinodisc hook-like spines (in "chevron-like" rows in *Rhamnocercus*) and (3) cirrus with accesory piece (absent in *Rhamnocercus*).

Rhamnocercus oliveri n. sp.
(Figs. 10-18)

Host: *Stellifer minor* (Tschudi) (Sciaenidae)

Habitat: Gills

Locality: Chorrillos, Perú

Holotype: CHURP N: 543

Paratypes: CHURP N: 544-545

Description: (Based on six specimens). Body fusiform (Fig. 10), 463 (440-490) long, greatest width 90 (80-100). Cephalic lobes incipient, 2 terminal and 2 bilateral. Adhesive glands and medial bladder-like structure present. Head organs large, four pairs lying in cephalic lobes and adjacent area. Cephalic glands comprising 2 indistinct bilateral groups of unicellular glands paralateral to pharinx. Eyes 4, anterior pair smaller, closer together than those of posterior pair.

Mouth subterminal, ventral. Pharinx subspherical, diameter 26 (23-28). Intestinal crura confluent posteriorly.

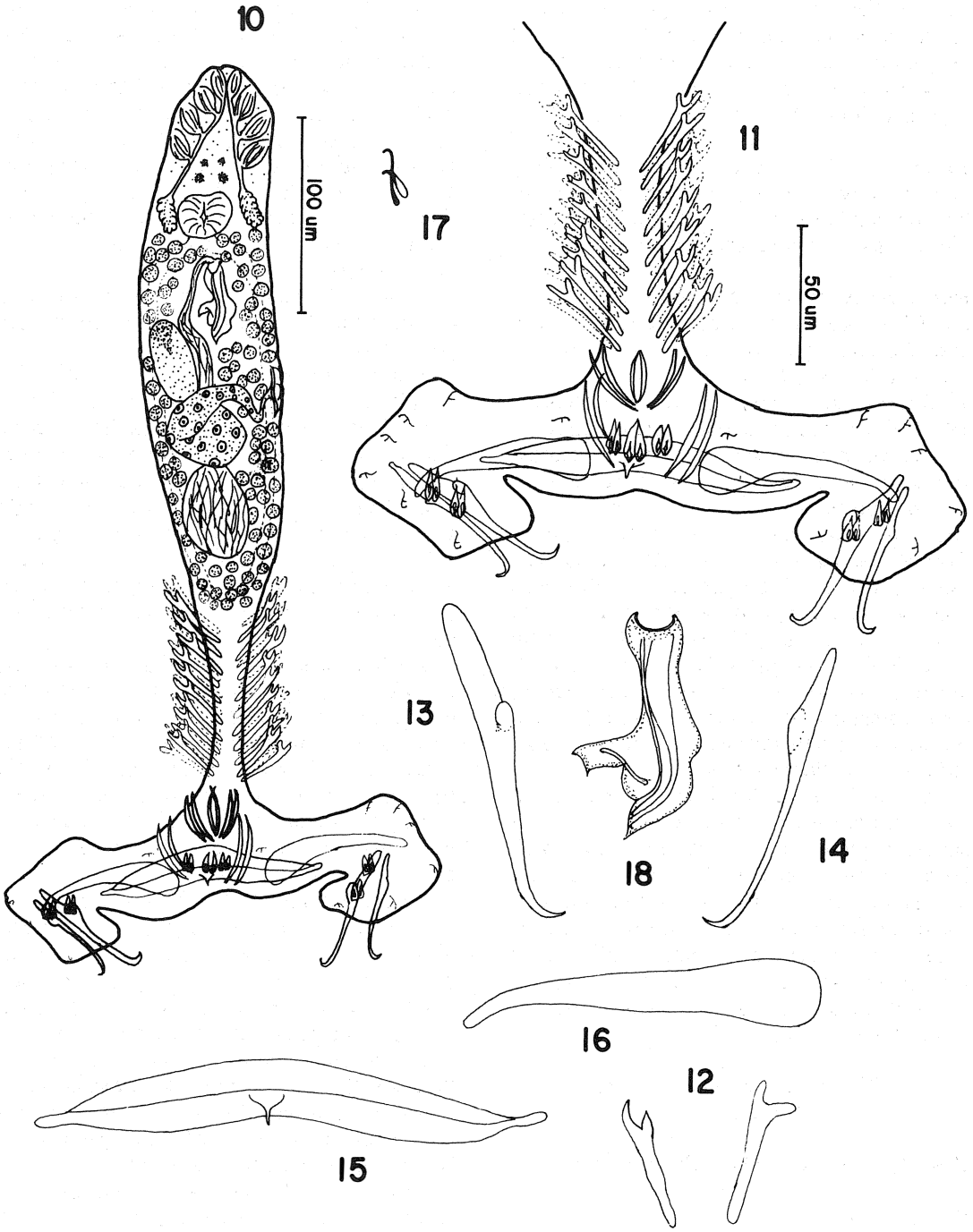
Peduncle broad, Haptor (Fig. 11) 123 (120-130) long, 176 (160-180) wide, with two large lateral lobes. Dorsal and ventral echinodiscs consisting of two "chevron-like" rows of 8-12 hook-like bifid spines (Fig. 12) on haptor peduncle, easily lost in preserved specimens, 24 (18-31) long. Haptor bearing five pairs of slightly curved accessory spines; three of them placed anteriorly to ventral bar, other two pairs over ventral bar and seven pairs of smaller triangular accessory spines, three pairs on ventral bar, two pairs on each ventral anchor.

Anchors dissimilar. Ventral anchor (Fig. 13) (a=57, b=56, c=32, d=21), with elongate deep root, knob-like superficial root, straight shaft, short point. Dorsal anchor (Fig. 14) (a= 57, b=54, c=32, d=20), with long tapered deep root, lacking superficial root, straight shaft, short point.

Ventral bar (Fig. 15) 97 (95-102) long, 10 wide, elongate without constricted midregion with tapered ends, ventral longitudinal groove and posteromedial process. Dorsal bar (Fig. 16) 62 (60-66) long, 9 wide, with spatulate medial end.

Hooklets (Fig. 17) 12 (11-13) long, in number of seven pairs, six of them on lateral haptor lobes, one pair near tips of dorsal bar. All similar, with curved shank, erect thumb, delicated shaft and point.

Cirrus (Fig. 18), 48 (45-50) long, elongate and broad, formed by two sclerotinized concentric tubes with distal part slightly bifurcated. Accesory piece absent. Testis 38 (30-43) long, 26 (23-30)wide, post-ovarian, spherical or subovate, vas deferens not looping left intestinal caecum. Seminal vesicle an indistinct dilatation of terminal vas deferens. Prostatic reservoir suboval. Ovary pyriform 32 (30-35) long, 27 (25-30) wide, lying to right of midline. Oviduct inconspicuous, ootype not observed, genital pore mid-



Figs. 10-18. *Rhamnocercus oliveri* n. sp. 10. Entire worm, ventral view; 11. Haptor; 12. Echinodisc hook-like spines; 13. Ventral anchor; 14. Dorsal anchor; 15. Ventral bar; 16. Dorsal bar; 17. Hooklet; 18. Cirrus.

ventral. Vagina sinistral comprising a distal sclerotinized pouch and proximal sclerotinized deep-plate shaped valve. Vitellaria trought trunk except in areas of reproductive systems. Eggs not observed.

Etymology: The specific name honors Guy Oliver (Université de Perpignan, France) for his contribution to the knowledge of diplectanid and rhamnocercid monogeneans.

Remarks: At present, three species of the genus *Rhamnocercus* have been described. They are: *Rhamnocercus rhamnocercus* (Monaco, Wood & Mizelle, 1954); *R. bairdiella* Hargis, 1955 and *R. stichospinus* Seamster & Monaco, 1956; all parasitic on marine sciaenid fishes.

Rhamnocercus oliveri n. sp. can be compared with the *Rhamnocercus* species with straight cirrus, *R. rhamnocercus* and *R. stichospinus*. The new species can be separated from *R. rhamnocercus* by (1) cirrus broad and tubular, with the distal part slightly bifurcated (very slender and with distal part not bifurcated in *R. rhamnocercus*), (2) 8-12 hook-like bifid spines in the echinodiscs (12-14 in *R. rhamnocercus*), (3) absence of clumped spines over anchors (present in *R. rhamnocercus*), (4) ventral bar with notorious tapered ends (without tapered ends in *R. rhamnocercus*).

R. oliveri n. sp. differs from *R. stichospinus* by (1) cirrus not enclosed in a thin pellicle-like structure (present in *R. stichospinus*), (2) 8-12 hook-like bifid spines in the echinodiscs (6 in *R. stichospinus*), (3) smaller triangular accesory spines present (absent in *R. stichospinus*) (4) without accessory curved spines adjacent to bars (present in *R. stichospinus*) and (5) ventral bar without anterior border notched (deeply notched in *R. stichospinus*).

Rhamnocercus stelliferi n. sp.
(Figs. 19-27)

Host: *Stellifer minor* (Tschudi) (Sciaenidae)

Habitat: Gills

Locality: Chorrillos, Perú

Holotype: CHURP N: 546

Paratypes: CHURP N: 547-548

Description: (Based on four specimens). Body fusiform (Fig. 19) 475 (470-480) long, greatest width 53 (50-55), elongate. Cephalic lobes moderately developed, two terminal and two bilateral. Head organs conspicuous, 4 pairs lying in cephalic lobes and adjacent area. Cephalic glands small and conspicuous comprising two groups of unicellular glands laterally to pharinx. Eyes 4, anterior pairs smaller and closer together than those of posterior pair, eyespot granules suboval.

Mouth subterminal, ventral. Pharinx spherical, diameter 21 (18-23), intestinal crura blind posteriorly.

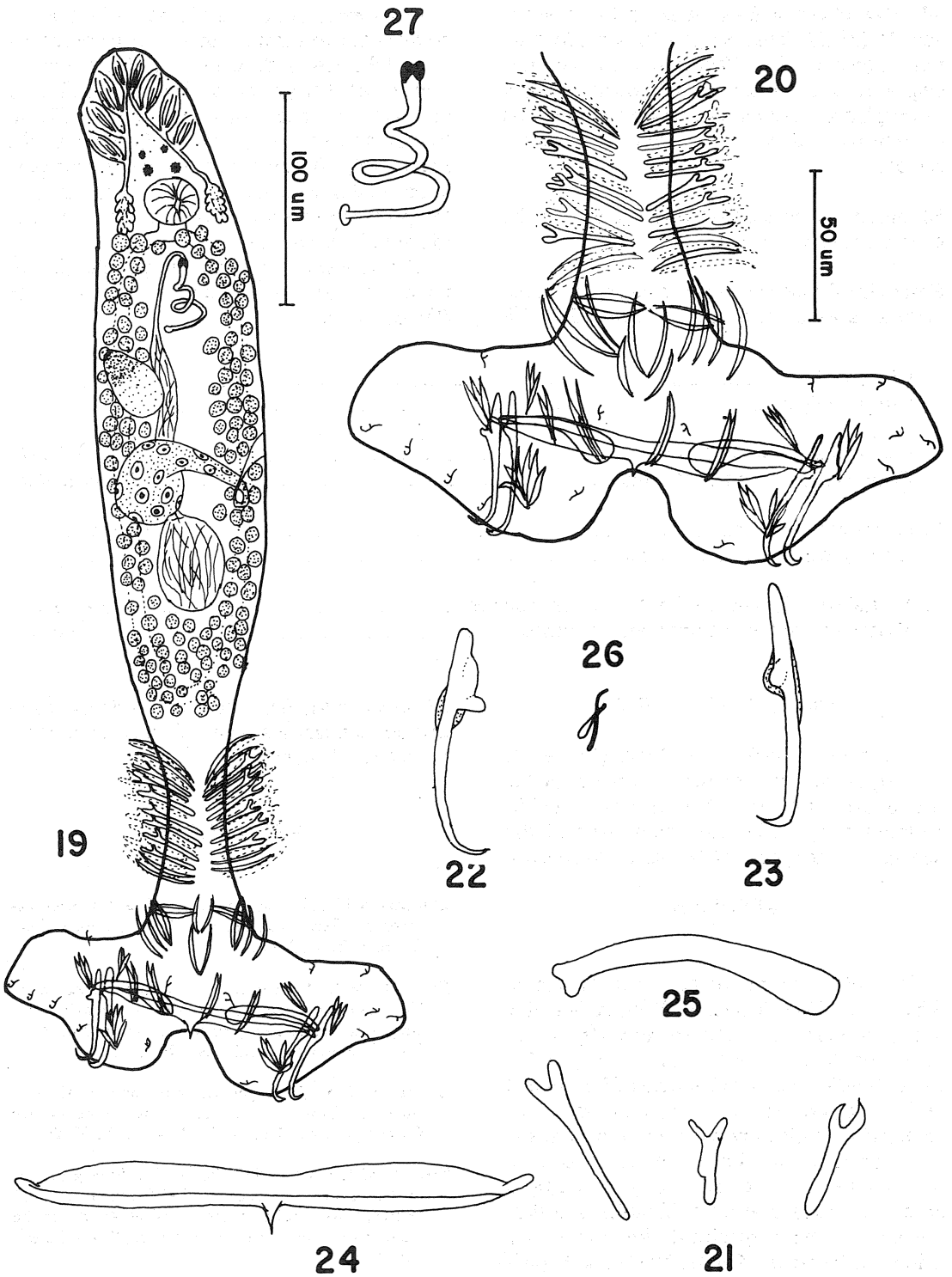
Peduncle broad. Haptor (Fig. 20) 123 (113-133) long, 159 (130-188) wide, with two lateral lobes. Dorsal and ventral echinodiscs consisting of two "chevron-like" rows of 10-13 hook-like spines (Fig. 21) on peduncle of haptor. Some spines are bifid and others are straight with pointed termination. Haptor bearing eight pairs of slightly curved accessory spines placed anteriorly to ventral bar and ten groups of accesory spines of minor size over anchors and bars.

Anchors dissimilar. Ventral anchor (Fig. 22) (a= 43, b=42, c=27, d=13), with large elongate deep root, knob-like superficial root, curved shaft, short point, anchor wings low and inconspicuous. Dorsal anchor (Fig. 23) (a=42, b=41, c=26, d=14), with elongate deep root, incipient superficial root, straight shaft and short point, anchor wings poorly developed and diminute.

Ventral bar (Fig. 24) 89 (87-90) long, 7 wide, slender and elongate, inconspicuous constricted medial portion, ventral longitudinal groove poorly developed and diminute postero-medial process. Dorsal bar (Fig. 25) 42 (41-43) long, 5 wide, row-shaped with spatulate medial end.

Seven pairs of hooklets (Fig. 26) 11 (10-12) long, six of them lying on lateral haptor lobes, the other pair usually located near tips of dorsal bar. All similar, with curved shank, perpendicular thumb, delicate shaft and point.

Cirrus (Fig. 27) coiled with two rings, distal part straight and sclerotinized, spiral tube base with two small inconspicuous salients. Accessory piece absent. Approximate cirrus length 32 (30-34). Testis post-ovarian, suboval, 30 (29-31) long, 18 (16-19) wide, vas deferens inconspicuous anteriorly near base of pyriform prostatic reservoir. Seminal vesicle an indistinct



Figs. 19-27. *Rhamnocercus stelliferi* n. sp. 19. Entire worm, ventral view; 20. Haptor; 21. Echinodisc hook-like spines; 22. Ventral anchor; 23. Dorsal anchor; 24. Ventral bar; 25. Dorsal bar; 26. Hooklet; 27. Cirrus.

dilatation of terminal vas deferens. Ovary subovate 25 (23-27) long, 30 (29-32) wide, looping rigth intestinal crus. Vagina sinistral, comprising a distal not sclerotinized pouch. Oviduct inconspicuous, ootype not observed. Vitellaria coextensive with intestinal crura. Eggs no observed.

Etymology: The specific name refers to the generic name of the host.

Remarks: By the coiled cirrus, the species described above can be compared with *Rhamnocercus bairdiella* Hargis, 1955; but can be distinguished from it by (1) cirrus bearing a spiral tube base with two salients (absent in *R. bairdiella*), (2) presence of spines bifid over echinodiscs (absent in *R. bairdiella*), (3) no triangular spines over haptor (present in *R. bairdiella*), (4) ventral bar with a diminute posteromedial process (absent in *R. bardiella*), and (5) presence of four head organs in cephalic (three in *R. bardiella*).

The following artificial key permits the separation of the known species of *Rhamnocercus:*

1. Cirrus coiled.....2
   Cirrus straight.....3

2. Echinodiscs with bifid spines.....*R. stelliferi*
   Echinodiscs without bifid spines.....*R. bairdiella*

3. Cirrus very slender.....*R. rhamnocercus*
   Cirrus gross.....4

4. Ventral bar with anterior border deeeply notched.....*R. stichospinus*
   Ventral bar without anterior border notched.....*R. oliveri*

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RESUMEN

Se propone un nuevo género de la familia Rhamnocercidae (Monaco, Wood & Mizelle, 1954) (Monogenea): *Rhamnocercoides*, la especie tipo, *R. menticirrhi* n. gen. n. sp., parásito de *Menticirrhus ophicephalus* (Sciaenidae) en la costa peruana, es descrita e ilustrada. Las características distintivas del nuevo género son la presencia de un echinodisco ventral con espinas en disposición concéntrica y de una pieza accesoria asociada al cirro. También son descritas dos nuevas especies de *Rhamnocercus* (Monaco, Wood & Mizelle, 1954) que parasitan las branquias del esciénido peruano *Stellifer minor*. Se incluye una clave para la identificación de las especies de *Rhamnocercus*. Estos son los primeros registros de monogeneos ramnocércidos en el océano Pacífico Sudamericano.

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