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Some Nereididae (Annelida: Polychaeta) from the Pacific Coast of Costa Rica

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Abstract: Fifteen species of Nereididae (Annelida: Polychaeta) belonging to nine genera are reported from the subtidal and intertidal of the Pacific Coast of Costa Rica. A new species, *Nereis costaricaensis*, is described. *Laeonereis brunnea* Hartmann-Schröder 1959 is removed from synonomy with *L. culveri* (Webster 1880) while *Perinereis seridentata* (Hartmann-Schröder 1959) is moved from the genus *Neanthes* based upon the presence of bar-shaped paragnaths on area VI of the proboscis. The presence of *Neanthes micromma* Harper 1979 is an extension of the range of this species from the Gulf of California and *Neanthes roosevelti* Hartman 1939 is the first record of this species since its description from the Galapagos. A taxonomic key to these nereidid species is included.

Key words: Polychaeta, Nereididae, Costa Rica, Tropical, Eastern Pacific.

Members of the family Nereididae are a common component of most marine (and some freshwater) communities ranging from the intertidal to abyssal depths. This family con-tains a large number of genera and species; Hilbig (1997), for example, recognized 37 genera and about 400 described species. The nereidids are considered to be discretely mo-bile, producing mucous tubes to form a tempo-rary living space. They are often viewed as carnivores due to their formidable jaws; how-ever, they have also been reported to be deposit feeders, feeding on such things as algae, bacte-ria and detritus (Fauchald & Jumars 1979). There is even evidence of filter feeding in at least one species of *Nereis* (Goerke 1966, Esselink & Zwarts 1989).

While the shallow water nereidids of the Mexican Province of the Tropical Eastern Pacific Biogeographic Region have been well studied (Hartman 1940; Fauvel 1943; de León-González & Solís-Weiss 1998, 2000), those of the Panamic Province are less well known. Monro (1928, 1933) listed twelve species of Nereididae from the Pacific side of Panama and the Galapagos Islands while Fauchald (1977) reported nine species mainly from rocky shores of Pacific Panama. Studies of the Jaltepeque estuary in El Salvador by Hartmann-Schröder (1959) and Molina-Lara & Vargas-Zamora (1995) recorded four species of nereidids. Dean (1996 a, b) listed ten species of nereidids from the Gulf of Nicoya and Golfo Dulce both on the Pacific side of Costa Rica although many of these were identified only to the genus level. This paper reexamines many of these nereidids previously collected subtidally and listed by Dean (1996 a, b) as well as more recently collected material from the intertidal and shallow subtidal of these two

estuaries. A total of fifteen species belonging to nine genera are included here.

MATERIALS AND METHODS

Subtidal material was collected in the Gulf of Nicoya using a modified Smith-McIntyre bottom grab. Subtidal station sites and sediment characteristics may be found in Maurer & Vargas (1984) and Vargas (1995). Intertidal specimens were collected in the Punta Morales area of the Gulf of Nicoya by the author during a series of collecting trips partially supported by the Universidad de Costa Rica's Centro de Investigación en Ciencias del Mar y Limnología (CIMAR) or by H. Buttner from the Center for Tropical Marine Ecology (ZMT), Bremen, Germany, who also collected at Jicaral. Shallow subtidal samples taken at Punta Islotes and Sandalo in Golfo Dulce were collected by J. Cortés and/or A. Fonseca. Voucher specimens of most of these species, as well as the type specimen and paratypes of *Nereis costaricaensis* n. sp. have been deposited in the Museum of Comparative Zoology (MCZ), Harvard Uni-versity, Cambridge, MA USA and the Museo de Zoología, Universidad de Costa Rica.

Morphology: The nereidids are easily recognized due to their large biramous palps, formidable jaws, and two to four pairs of tentacular cirri on the peristomium. With the exception of the first two setigers, the parapodia are usually biramous with varying numbers of parapodial lobes in each ramus. Both the notopodia and neuropodia may be composed of an acicular lobe as well as an upper and ventral ligule and the relative size and shape of these ligules are of great taxonomic value. The surface of the eversible proboscis may be subdivided into eight recognizable areas (Fig. 1 & 2) and the presence or absence of fleshy papillae or hard-ened paragnaths, as well as the shape of these paragnaths, is also of taxonomic importance. The regions of the proboscis may be easily seen if the animal is preserved with its probos-cis extruded, sometimes made possible just prior to fixation by the application of slight pressure just posterior to the proboscis region forcing the proboscis to evert. More usually the proboscis must be dissected by making a ventral incision to the side of the body midline, both through the body wall as well as the invert-ed muscular proboscis, in order to expose its inner surface. Other taxonomically valuable characters are presence or absence of eyes and the occurrence and morphology of falcigers in the notopodial and neuropodial setal bundles. The falcigers, especially those in the notopodia, may not be present in anterior or middle setigers so inspection of setae in far posterior setigers is often necessary.

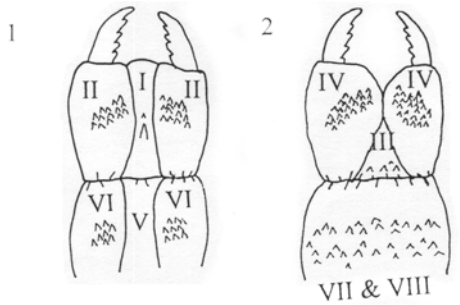

Fig. 1 & 2. *Nereis costaricaensis* n. sp.: Fig. 1, extended proboscis, dorsal view; Fig. 2, extended proboscis, ventral view.

Key to some species of Nereididae collected from the Pacific coast of Costa Rica

1. Proboscis lacking both papillae and paragnaths. Dorsal cirrus inserted subdistally on greatly expanded upper notopodial ligule in posterior setigers……. *Leptonereis laevis*
1a. Proboscis with papillae and/or paragnaths. …….2

2. Proboscis with papillae, paragnaths absent. …….3
2a. Paragnaths present…….4

3. Jaws lacking teeth, dorsal cirris long, slender in posterior setigers…*Gymnonereis crosslandi*
3a. Jaws with teeth, notacicular lobe long, conical, upper notopodial ligule absent in posterior setigers……..*Laeonereis brunnea*
4. Paragnaths present on maxillary ring of proboscis only, blades of falcigers unidentate...
…….*Ceratonereis singularis*

4a. Paragnaths present on both maxillary and oral ring of proboscis……...5

5. Pectinate and/or transverse paragnaths present……..
6
5a. Only conical paragnaths present…….……..8

6. Transverse, pectinate, and conical paragnaths present, dorsal cirrus inserted terminally on superior notopodial ligule in posterior setigers……. *Pseudonereis gallapagensis*
6a. Either transverse or pectinate paragnaths present in addition to cones but not both…….7

7. Pectinate paragnaths present in addition to cones, notopodial homogomph falcigers with strongly curved blade and small subdistal tooth. ……...*Platynereis dumerilii*
7a. Pectinate paragnaths absent, 16-24 transverse paragnaths in a single row on area VI…..
….……..*Perinereis seridentata*

8. Notopodial homogomph falcigers present..9
8a. Notopodial setae all compound spinigers
…….……...12

9. Area VII and VII of proboscis with paragnaths in two or three rows……
10
9a. Area VII and VIII of proboscis with a few (four in the single specimen examined) paragnaths in a single row……. *Nereis riisei*

10. Area I with numerous (14-22) paragnaths
……..…*Nereis oligohalina*
10a. Area I with one to four paragnaths……11

11. Area I of proboscis with three to four paragnaths; notopodial falciger a finely toothed, blunt-tipped rod……...*Nereis zonata*
11a. Area I of proboscis with one to two paragnaths; notopodial falciger with straight, coarsely toothed blades…….
…….. *Nereis costaricaensis* n. sp.

12. Upper notopodial ligule long, narrow, with distally inserted dorsal cirrus in posterior setigers, falciger blades short, curved, with blunt distal
tip……...*Neanthes pseudonoodti*
12a. Upper notopodial ligule not long and narrow……1
3

13. Paragnaths absent on areas I, II, II and V; falciger blades long with blunt distal hook; upper notopodial ligule foliose with subdistally inserted dorsal cirrus in posterior setigers……..*Neanthes micromma*
13a. Paragnaths present on all areas of the proboscis
……...……14

14. Upper notopodial ligule greatly expanded with subdistally inserted dorsal cirrus in posterior setigers; areas VII and VIII with two irregular rows of paragnaths…….…….
……..…*Neanthes succinea*
14a. Upper notopodial ligule reduced or absent in posterior setigers, areas VII and VIII with a broad band of cones……...*Neanthes roosevelti*

Species Descriptions

Ceratonereis singularis Treadwell, 1929
Fig. 3-6

Ceratonereis singularis Treadwell 1929: 1. --Perkins 1980: 17. --Salazar-Vallejo & Jiménez-Cueto 1997: 365. --De León-González and Solís-Weiss 2000: 550.
Ceratonereis singularis austalus Hartmann-Schröder 1985: 46-47.
Ceratonereis mirabilis: --Ehlers 1887: 117. --Treadwell 1939: 222. --Hartman 1956: 248; 1968: 505. --Rioja 1960: 249; 1962: 166. --Fauchald 1973: 21. --Gardiner 1976: 147.
Ceratonereis crosslandi: --Dean 1996b: 83.
Ceratonereis tentaculata : --Hartman 1940: 218. --Rioja 1941: 705.
Nereis (Ceratonereis) tentaculata: --Berkeley & Berkeley 1960: 359.

Material Examined: Golfo Dulce, Punta Islotes, 8°43'41" N, 83°23'8" W, from coral rubble, coll: J. Cortés, Mar 1997, (1); Sandalo, 8°34'35" N, 83°20'15" W, from coral rubble, coll: A. Fonseca, Mar 1996, (5).

Description: All specimens incomplete, most complete specimen 1.0 mm wide with 54 setigers,

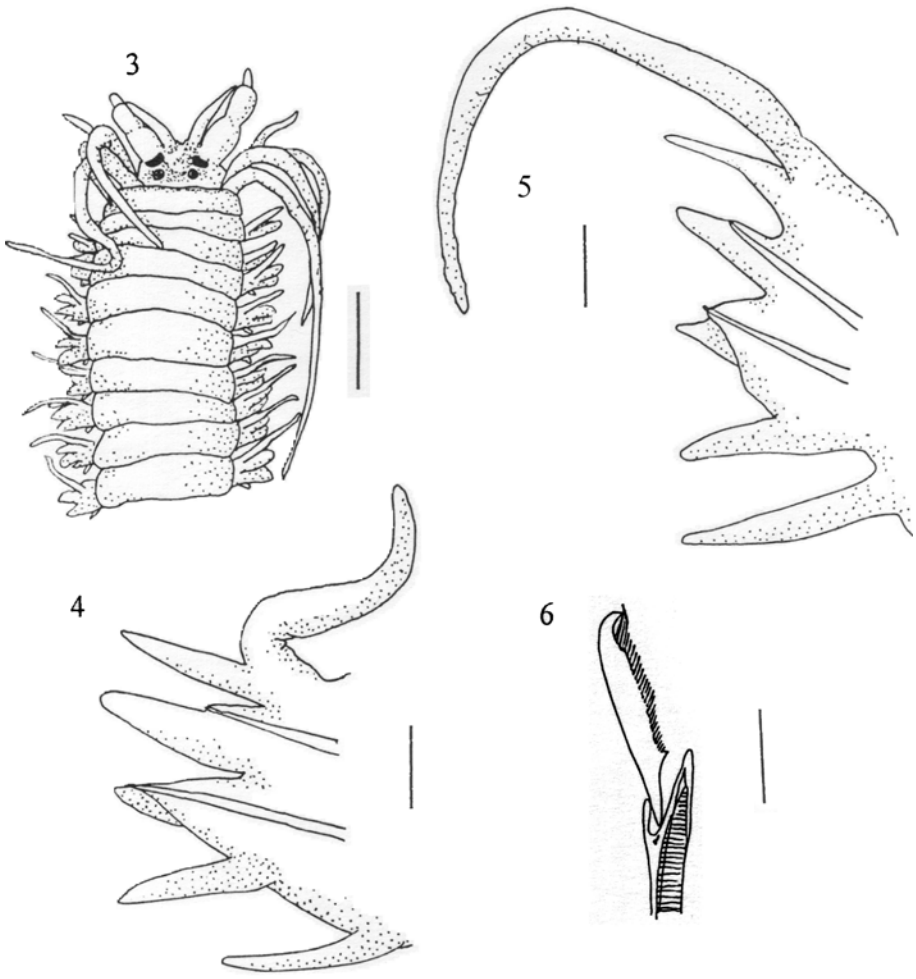

Fig. 3-6. *Ceratonereis singularis*: Fig. 3, anterior end, dorsal view, scale bar = 0.5 mm; Fig. 4, setiger 5, anterior view, scale bar = 100 μm; Fig. 5, posterior setiger, anterior view, scale bar = 100 μm; Fig. 6, neuropodial falciger, scale bar = 20 μm.

less complete specimen 1.2 mm wide with 28 setigers. Body widest in pharyngeal region, tapering in middle setigers. Color in alcohol tan, dorsum of pharyngeal region golden brown, sides and dorsum of prostomium and base of antennae with brown pigment.

Prostomium rounded, wider than long with two long, tapered antennae subequal in length to palps; palpophores long, slender, palpostyles short, conical (Fig. 3). Two pairs of eyes in rectangular arrangement, anterior pair elongate oval, posterior pair rounded. Proboscis with light yellow jaws with dark brown tips, each with six teeth; paragnath and papillae distribution: Area I: none, II: 10-11 cones in an elongate oval cluster, III: 6 cones in small cluster, IV: 11-12 cones in an oval cluster; V: none, VI: large, oval, cushion-like lobes, VII & VIII: none.

Peristomium longer than subsequent setigers with four pairs of tentacular cirri; posterior dorsal pair extending to setiger 12, anterior dorsal pair to setiger seven, ventral tentacular cirri sub-equal in length to palps. Parapodia subbiramous with long dorsal cirri and narrow

ligules with a deeply embedded slender acicula in first two setigers, biramous in following setigers. Noto-podia with long narrow upper ligules and long conical ventral ligules in anterior setigers; aci-cular lobes reduced; dorsal cirri narrow, greatly elongate, approximately four times length of notopodial ligules anteriorly, approximately two times their length in posterior setigers (Fig. 4 & 5). Anterior neuropodial acicular lobes with wide conical presetal lobes and pointed conical postsetal lobes; both lobes more narrow posteriorly; ventral neuropodial ligules slender, tapering, subequal in length to neuracicular lobes. Ventral cirri slender tapering, about one-half length of ventral neuropodial ligules in far anterior setigers, subequal in length to neuropodial lobes, relatively shorter in posterior setigers.

Notosetae long bladed spinigers with fine teeth accompanied by homogomph falcigers beginning at setiger 17; blades of falcigers long, finely toothed, ending in a distal blunt hook. Upper neurosetal fascicle with posterior row of homogomph, finely toothed spinigers and ante-rior group of heterogomph falcigers, ventral neurosetal fascicle with upper heterogomph finely toothed spinigers and lower heterogomph falcigers (Fig. 6), falciger blades similar to those of notopodial falcigers. Single yellow aciculum per ramus.

Remarks: Perkins (1980) reviewed several species in the genus *Ceratonereis* previously identified as *C. mirabilis*, including *C. singularis* Treadwell from the Pacific coast of Panama (Fauchald 1973). The present specimens have well developed upper notopodial ligules in posterior parapodia and all falcigers have unidentate tips (Fig. 6). Hartmann-Schröder (1985) established a subspecies, *C. singularis australis* with broad, rounded neuropodial postsetal lobes from Australia but these were not present in the Costa Rican material.

C. singularis is a shallow-water species and was collected from coral rubble in Golfo Duce. De León-González and Solís-Weiss (2000) have also collected this species from the lower intertidal to 12 m from western Mexico.

Gymnonereis crosslandi (Monro 1933)

Fig. 7-9

Chaunorhynchus crosslandi: --Monro 1933:46
Ceratocephala crosslandi: --Fauchald 1977:23
Ceratocephale crosslandi americana: --Hartman 1952: 16; 1968: 499. --Hartmann-Schröder 1977: 145.
Ceratocephale loveni: --Dean 1996a: 73.
Gymnonereis crosslandi: --Banse 1977: 623. --Taylor 1984: 31.4. --Hilbig 1997: 301. --de León-González & Solis Weiss 2000: 552.

Material Examined: Gulf of Nicoya STA 1, 9º57'30" N, 84º53'00" W, 46 m, sand, Jul. 1980, (1); STA 3, 9º52'00" N, 84º48'10" W, 33 m, sandy mud, Jul. 1980, (5, USNM # 800 47 & 80049); STA 15, 9º57'40" N, 84º47'00" W, 15 m, sandy mud, Jul. 1980 (1, USNM # 80050); STA 25, 9º57'05" N, 84º52'00" W, 20 m, mud/ sand, Jul 1980, (1): STA 28, 9º52'16" N, 84º45'30" W, 26 m, mud, Jun. 1981, (1): STA 30, 9º54'40" N, 84º45'50" W, 18 m, muddy sand, Jan. 1981, (2), Aug. 1981, (1): STA 35, 9º55'45" N, 84º47'40" W, 13 m, sand, Apr. 1998 (5); STA 37, 9º57'38" N, 84º48'20" W, 14 m, muddy sand, Jul. 1980, (2, USNM # 80051).

Description: All specimens incomplete, most complete specimen 1.0 mm (2.4 mm including parapodia) wide with 37 setigers. Body wide anteriorly, tapering in middle setigers. Color in alcohol uniform tan.

Prostomium wider than long with deep ante-rior cleft; antennae tapered, slightly shorter than palps; palps with large palpophores, longer than wide, palpostyles tapered, conical; two pairs of large eyes in trapezoidal arrange-ment, more widely spaced anterior pair elongate -oval, posterior pair rounded (Fig. 7). Proboscis with amber colored jaws, teeth lacking; distri-bution of papillae: areas VII & VIII: anterior row of seven conical papillae, posterior row of three flat oval papillae; areas V & VI: a row of three papillae.

Peristomium subequal in length to following setigers, with four pairs of tentacular cirri; first dorsal pair longest extending to setiger four, remaining tentacular cirri subequal, about 2/3 length of first dorsal cirri. First two setigers uniramous, remaining

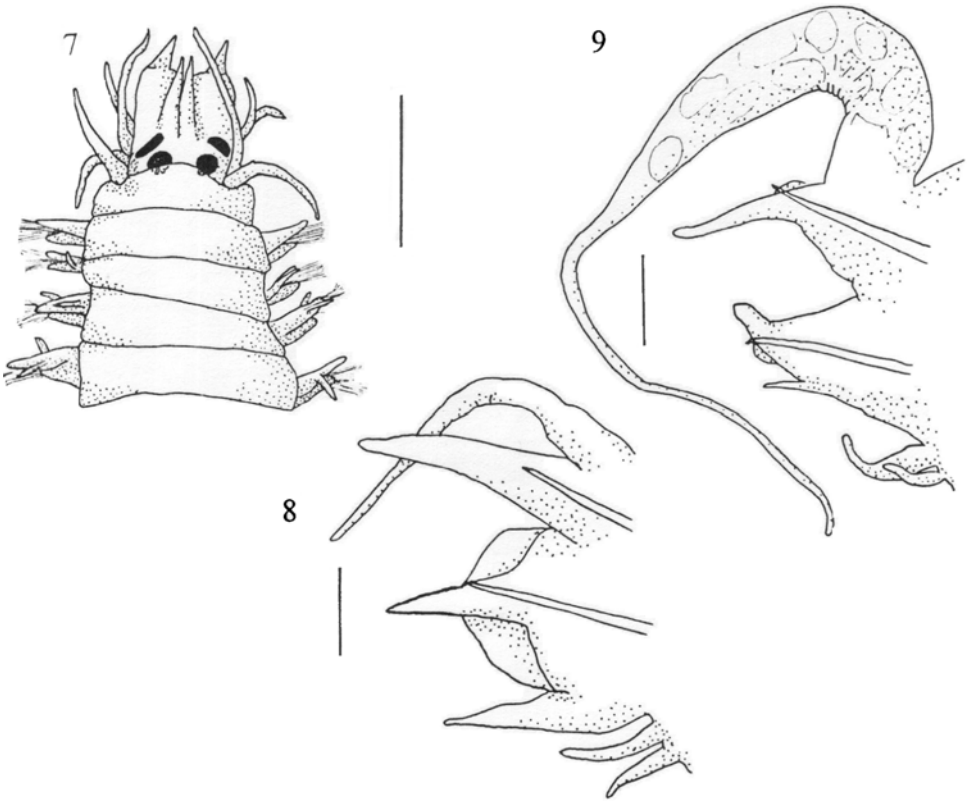

Fig. 7-9. *Gymnonereis crosslandi*: Fig. 7, anterior end, dorsal view, scale bar = 0.5 mm; Fig. 8, setiger five, anterior view, scale bar = 100 µm; Fig. 9, posterior setiger, posterior view, scale bar = 100 µm.

setigers biramous. Noto-podia with low rounded presetal lobes and long, narrow, tapered postsetal lobes anteriorly, post-setal lobes more narrow in posterior setigers (Fig. 8 & 9). Dorsal cirri long, narrow, slightly longer than acicular lobes anteriorly, elongate with filiform distal portion and conical proximal region in posterior setigers, containing large clear vacuoles: minute accessory dorsal cirri on setigers one and two (inserts at base of dorsal cirri and is difficult to find). Neuropodia with broad rounded acicular lobes and longer, pointed postsetal lobes in anterior setigers, short, conical presetal lobes and longer conical postsetal lobes in middle and posterior setigers, lower neuropodial ligules long, slender anterior-ly, short, slender posteriorly; ventral cirri double from setiger one. Single black acicula in each ramus.

All setae homogomph spinigers, very nume-rous in anterior setigers. Notosetae with finely toothed blades, neurosetae of upper fascicle with longer teeth than in the notosetae, neu-rosetae of ventral fascicle with finely toothed blades with teeth similar in length to those of the notosetae.

Remarks: Banse (1977) distinguished the genus *Gymnonereis* from other members of the sub-family Gymnonereididinae by the presence of accessory dorsal cirri in anterior setigers. In *Gymnonereis crosslandi*, however, the accessory dorsal cirri are quite small and may appress to the base of the main dorsal cirri making them quite difficult to see. Hilbig (1997) suggested the inspection of the jaws, which lack teeth in *Gymnonereis*, in order to distinguish members of this genus from the similar genus *Ceratocephale*.

G. crosslandi has been reported in the Eastern Pacific from Panama to California as well as from the Gulf of Mexico, It was collected subtidally in Costa Rica at 13-46 m depth on muddy to sandy sediments.

Laeonereis brunnea Hartmann-Schröder 1959
Fig. 10-13

Laeonereis brunnea Hartmann-Schröder 1959: 135-138. –Molina-Lara & Vargas-Zamora 1995: 198.
Laeonereis culveri (in part): --Pettibone 1971: 14-19.

Material Examined: Gulf of Nicoya, Punta Morales, 10º N; 84º58' W, north side, intertidal mud, sandy mud, and sand Jul. 1996 (7); mangrove sediments Dec. 1996 (1). Golfo Dulce, Golfito, 8º38' N, 83º10' W, intertidal mud, Sep. 1986 (6); mangrove sediments, Jan. 1997 (1).

Additional Material: El Salvador, Estero Jaltepeque, 13º17' N; 89º30' W, Dec. 1990 (1) (in MCZ collection).

Description: Length to 12.2 mm, width to 0.5 mm (without parapodia), up to 78 setigers. Body cylindrical anteriorly, flat, ribbon-like posteriorly; uniform in width and tapering pos-teriorly. Color in alcohol white with yellow-brown area on dorsum of upper notopodial ligules and latero-dorsal body surface of ante-rior setigers; dorsum of setiger two with light brown pigment.

Prostomium rounded with an anterior furrow, longer than wide, filiform antennae, shorter than palps; palps with short, rounded palpophores and papilliform palpostyles (Fig 10). Two pairs of round to oval eyes arranged in a rectangular pattern. Proboscis with light yellow, sharply pointed jaws each with 16-18 teeth; proboscis lacking paragnaths, distribution of papillae: Area I: 5, II: 8-10, III: 2 or 3 tufts of 5, IV: 10, VI: 1 large triangular papilla.

Peristomium longer than first setiger; four pairs of tentacular cirri, second dorsal pair longest, extending to setiger two, first dorsal pair extends to setiger one; ventral tentacular cirri short, subequal. First two setigers with conical notopodial ligules and short dorsal cirri; neuropodia similar to that of subsequent setigers, notosetae and noto-acicula absent; upper notopodial ligules of setigers three to five long, conical with a wide base; acicular lobes conical with a shorter tapered post-setal lobes slanted upward; posteriorly notopodial upper ligules absent and acicular lobes long, conical with subequal rounded pre- and postsetal lobes; dorsal cirri short tapered anteriorly, becoming small, slender in posterior setigers (Fig. 11 & 12). Anterior neuracicular lobes with short conical presetal lobes and long conical postsetal lobes, postsetal lobes conical with low rounded preacicular lobes in posterior setigers, conical ventral ligules becoming narrow in posterior setigers; robust, conical ventral cirri at base of ventral neuropodial ligules, subequal in length to dorsal cirri anteriorly, more robust, subequal in length to ventral neuropodial ligu-les in posterior setigers.

Notosetae homogomph spinigers throughout; blades long, slender, with short fine teeth. Neurosetae homogomph spinigers in upper fascicle, homogomph spinigers and homogomph falcigers beginning at setiger 15; blades of spinigers similar to those of notosetae, blades of falcigers with short teeth and distal blunt hook (Fig. 13). Acicular black, single in each ramous.

Pygidium conical, anus terminal, with a pair of long filiform ventro-lateral anal cirri.

Remarks: *Laeonereis brunnea* was described by Hartmann-Schröder (1959) from the Gulf of Fonseca, El Salvador in the Eastern Pacific. Pettibone (1971) subsequently placed *L. brunnea* in synonomy with *L. culveri* (Webster 1880), a species with a wide distribution in the North and South Atlantic as well as the Gulf of Mexico. Pettibone felt that any morphological variations between the two species could be attributed to allometry as she believed the specimens from El Salvador to be juveniles. My examination of specimens of *L. brunnea* collected from Costa Rica, as well as specimens collected from the type locality in El Salvador, reveals that *L. brunnea* should be retained as a species separate from *L. culveri*. The tentacular cirri are subequal in length in *L. culveri* while the second dorsal pair is longer than the other three pairs in *L. brunnea*. The

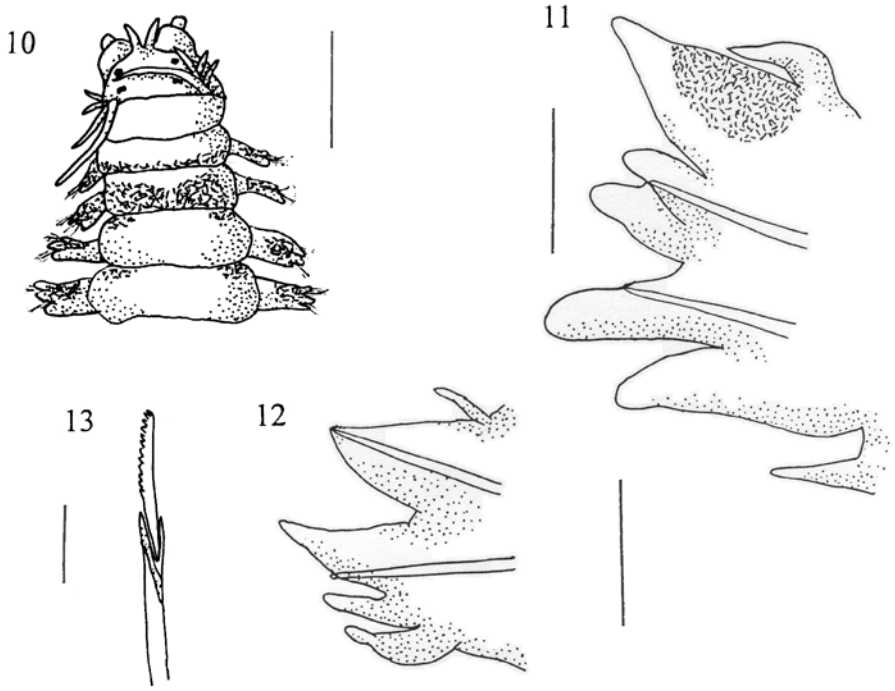

Fig. 10-13. *Laeonereis brunnea*: Fig. 10, anterior end, dorsal view, scale bar = 0.5 mm; Fig. 11, setiger five, anterior view, scale bar = 100 µm; Fig. 12, posterior setiger, anterior view, scale bar = 100 µm; Fig. 13, neuropodial falciger, scale bar = 20 µm.

prostomium of *L. culveri* possesses a deep anterior notch which is absent in *L. brunnea*. Finally, the neuropodial falcigers of *L. brunnea* are shorter and more coarsely toothed than those described for *L. culveri* (Webster 1886, Fig. 32; Pettibone 1971; Fig. 6h).

Hartmann-Schröder (1959) noted no apparent substrate preferences for *L. brunnea* collected in the intertidal in El Salvador and the Costa Ri-can specimens were collected intertidally from sediments ranging from muds to sands.

Leptonereis laevis Kinberg 1866
Fig. 14-17

Leptonereis laevis Kinberg 1866: 179. --1910: 53. --Hartman 1945: 21. --Pettibone 1971: 6-7. --Salazar-Vallejo 1981: 78. --van der Heiden & Hendrickx 1982: 7. --Padilla-Galicia 1984: 32. --Salazar-Vallejo, de León-González & Salaices-Polanco 1988: 93,154.
Neanthes sp. E: -- Dean 1996a: 73.

Material Examined: Gulf of Nicoya STA 24, 9°49'25" N, 84°41'20" W. 11 m, sand Jan. 1981 (1); Apr. 1981 (7); Jun. 1981 (1): STA 29, 9°54'55" N, 84°45'15" W 18m muddy sand, Jul. 1980 (3, USNM # 80048); Jan. 1981 (9); Apr. 1982 (14): STA 37, 9º57'38" N, 84º 48'20" W, 14 m muddy sand, Jul. 1980 (1, USNM # 80052).

Description: Length to 41 mm, width to 0.7 mm (not including parapodia), segments to 135. Body uniformly narrow, cylindrical, tapering in far posterior setigers. Body colorless in alcohol.

Prostomium pyriform, narrow anteriorly; antennae short, slender, much shorter than palps; palpophores slightly longer than prostomium, palpostyles small, digitiform (Fig. 14). Two pairs of round eyes in a rectangular pattern. Pro-boscis with amber colored jaws each with 12 teeth, paragnaths and papillae absent.

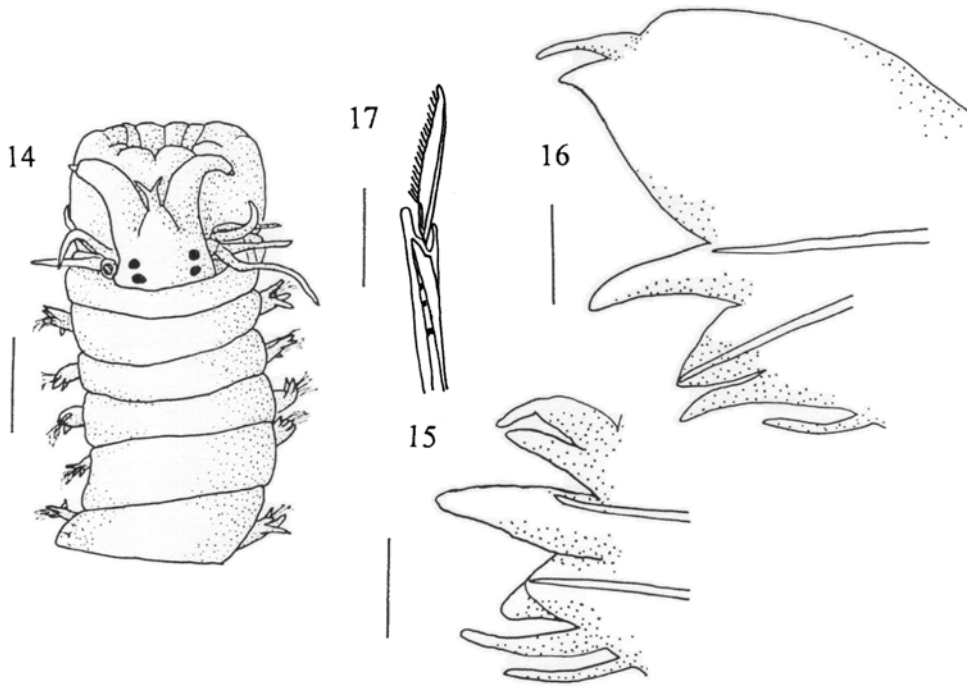

Fig. 14-17. *Leptonereis laevis*: Fig. 14, anterior end, dorsal view, scale bar = 0.5 mm; Fig. 15, setiger five, anterior view, scale bar = 100 µm; Fig. 16, posterior setiger, anterior view, scale bar = 100 µm; Fig. 17, neuropodial falciger, scale bar = 20 µm.

Peristomium shorter than subsequent setigers, with 4 pairs of tentacular cirri; second dorsal pair longest, extending to setiger three; remaining three pairs subequal, about as long as
prostomial width. Parapodia of first two setigers uniramous, remaining setigers biramous; notopodia with slender upper ligules enlarging in median and posterior setigers to form large foliacious ligules; ventral notopodial ligules long, tapering, extending beyond neuropodial lobes, notacicular lobes absent. Dorsal cirri slender, tapered, subequal to upper notopodial ligules in anterior setigers, inserting subterminally on the enlarged upper notopodial lobes posteriorly (Fig. 15 & 16). Neuropodial acicular lobes with short conical presetal lobes and longer conical postsetal lobes; ventral ligule long, slender, extending beyond neuracicular lobes; filiform ventral cirri from setiger one, subequal in length to ventral neuropodial ligules.

Notosetae slender homogomph spinigers throughout. Neurosetae heterogomph and homogomph spinigers in upper fascicle, heterogomph spinigers in the ventral fascicle, accom-panied by heterogomph falcigers from setiger 22; blades of neuropodial spinigers similar to those of notosetae, blades of falcigers finely serrated with distal hook (Fig. 17). Acicula black, single in each ramous.

Pygidium conical, anus ventral, two short lateral anal cirri.

Remarks: *Leptonereis laevis* was described from Guayaquil, Ecuador by Kinberg (1866) and Hartman (1945) later re-examined the type specimen and emended the original description. The present material agrees with the summary description given by Pettibone (1971) except for the insertion of the dorsal cirri on the enlarged notopodial ligules. Hartman (1945, Plate 3, Fig. 5), indicates that the dorsal cirri arise terminal-ly while those of the Costa Rican specimens are subterminal. The pointed

tip of the enlarged notopodial ligule was observed to appressed to the base of the dorsal cirris giving the appearance of a terminal dorsal cirris in Costa Rican spec-imens which had previously been dried. Hart-man (1945) mentioned that the type material was in poor condition when examined and this may explain the discrepancy.

L. laevis has previously been reported in the littoral zone in the Eastern Pacific from the Gulf of California to Ecuador. In the Gulf of Nicoya this species was collected subtidally from sand and muddy sand sediments.

Neanthes micromma Harper 1979
Fig. 18-21

Neanthes micromma Harper 1979: 93-110. --Taylor 1984: 31-39-10. --Hernandez-Alcántara & Solís-Weiss 1991: 255.
Neanthes sp. B (in part): --Dean 1996a: 73.

Material Examined: Gulf of Nicoya, subtidal: STA 2; 9º55'28" N, 84º52'05" W, 18 m, muddy sand, Jan. 1980 (1); STA 4; 9º53'40" N, 84º46'10" W, 40 m, mud, Jul. 1980 (1); STA 24; 9º49'25" N, 84º41'20" W, 11 m, sand, Oct. 1980 (12), Jan. 1981 (2), Apr. 1981 (2), Jun. 1981 (2), Aug. 1981 (3), Dec. 1993 (3); STA 27; 9º51'57" N, 84º50'50" W, 12 m, muddy sand, Jul. 1980 (1); STA 28; 9º52'16" N, 84º45'30" W, 26 m, mud, Aug. 1981 (1), Apr. 1982 (1); STA 29; 9º54'55" N, 84º45'15" W, 18 m, muddy sand, Aug. 1981 (1); STA 30; 9º54'40" N, 84º45'50" W, 18 m, muddy sand, Oct. 1980 (2); STA 44; 9º59'17" N, 84º54'25" W, 24m, muddy sand, Jul. 1980 (1). Intertidal: Punta Morales, 10º N; 84º58' W, north side; intertidal mud, Sep. 1988 (1), Jul. 1997 (19); intertidal sand Jul. 1997 (9); man-grove roots, Jan. 1996 (1): Punta Morales, south side; mid-intertidal muddy sand Jun. 1983 (1), Jun. 1986 (1); Lagartos Point, fine sand Sep. 1988 (1); soupy mud Jul. 1997 (10); Algal mat, tidal pool, Sep. 1988 (1). Golfo Dulce, Intertidal: Golfito, mid-intertidal mud Sep. 1986 (1).

Description: Length to 12.2 mm long, 2.8 mm wide (excluding parapodia), up to 253 setigers long. Body uniform tan in alcohol. Prostomium pyriform, as long as wide with a pair of thin, tapered antennae subequal to extended palposyles; palps large, with an elongate conical palpophore, palpostyles small, conical, extensible, nuchal pits along posterior border behind posterior eyespots (Fig. 18). Two pair of small dark eyespots in a trapezoidal arrangement. Proboscis with amber colored jaws each with 11-16 coarse teeth; paragnath distribution (n=6): I: none, II: none, III: none, IV: 2-10 cones in an arch, V: none, VI: 4-8, VII & VIII: 8 flattened conical paragnaths in a single row.

Peristomium equal in length to subsequent setigers with four pair of tentacular cirri; posterior dorsal pair longest, extending to setiger four, first dorsal pair to setiger two, ventral tentacular cirri short, subequal. First two setigers uniramous, remainder biramous. Notopodial acicular lobes with low presetal lobes and long postsetal lobes in setigers three to six, postsetal lobes short, conical lobes on ventral notopodial ligules in subsequent setigers, acicular lobes absent in posterior setigers; notopodial upper ligules long, narrow in anterior and middle setigers forming greatly expanded, foliacious ligules with a long, filiform distal extension, distal extension reduced to short conical tip in far posterior setigers (Fig. 19 & 20). Lower neuropodial ligules long tapering, slender dorsal cirri subequal to upper notopodial ligules in anterior and middle setigers, arising sub-apically from expanded upper notopodial ligules in pos-terior setigers. Narrow neuracicular lobes with subequal pre- and postsetal lobes anteriorly, pointed with reduced pre- and postsetal lobes in middle and posterior setigers, lower neuro-podial ligules tapering, elongate, twice as long as neuracicular lobes in anterior setigers, subequal to ventral notopodial ligules in middle and posterior setigers; ventral cirri slender elongate, approximately one-half length of neuracicular lobes throughout.

Notosetae finely toothed homogomph spinigers throughout. Upper and ventral neurosetal fascicles with homogomph and heterogomph spinigers and numerous heterogomph falcigers; blades of spinigers similar to those of notosetae, falciger blades long, finely toothed, distal end with blunt hook (Fig. 21).

Pygidium bilobed, anus ventral, a pair of thin, lateral anal cirri.

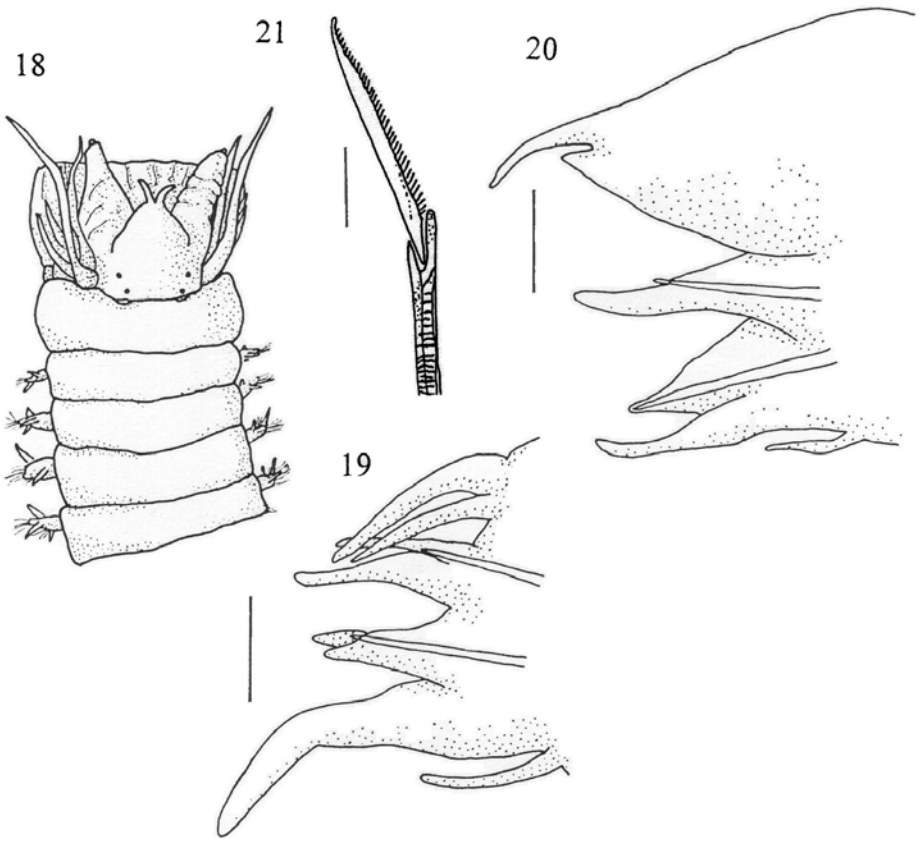

Fig. 18-21. *Neanthes micromma*: Fig. 18, anterior end, dorsal view, scale bar = 1.0 mm; Fig. 19, setiger five, anterior view, scale bar = 100 μm; Fig. 20, posterior setiger, anterior view, scale bar = 100 μm; Fig. 21, neuropodial falciger, scale bar = 20 μm.

Remarks: The Costa Rican specimens of *Neanthes micromma* agree quite closely with descriptions by Harper (1979) and Taylor (1984). This species is distinguished by the lack of paragnaths on areas I, II, III and V and the single row of eight paragnaths on areas VII and VII. The smaller specimens from Costa Rica were similar to those described by Taylor (1984) from the Gulf of Mexico in that upper notopodial ligules were absent in far anterior setigers. The larger specimens from Costa Rica possessed cirrus-like upper notopodial ligules on setigers three to six. Salazar-Vallejo (pers. comm. 2000) points out that specimens of *N. micromma* from the Gulf of Mexico have up to five paragnaths in pharyngeal regions VII-VIII instead of the eight paragnaths seen in the specimens from Pacific Costa Rica. Given the large variances in paragnath numbers demonstrated for *Nereis diversicolor* O. F. Müller by Barnes & Head (1977) and Gillet (1986,1990), this small difference in paragnath number is probably attributable to ecological factors and does not warrant the recognition of a new species.

N. micromma is known from the Gulf of Mexico on muddy sand and silt-clay sediments at depths of 10-50 meters and from the Gulf of California from fine and silty sands at 28-79 m. This species was collected intertidally in Costa Rica from muds and muddy sands and subtidally from muddy to sandy sediments at depths of 11-40 m.

Neanthes pseudonoodti Fauchald 1977.
Fig. 22-25

Neanthes pseudonoodti Fauchald 1977: 27.
Material Examined: Golfo Dulce, Punta Islotes, 8°43'41" N, 83°23'8" W, from coral rubble, coll: J. Cortés, Apr. 1977 (5).

Description: Length to 21.6 mm, width to 0.8 mm (not including parapodia), up to 93 setigers. Body cylindrical, tapering posteriorly, with a narrow middorsal groove extending from the anterior region to the far posterior. Color in alcohol tan with golden brown middorsal stripe in anterior third of body, two darkly pigmented stripes between eyes extending from the pos-terior of the prostomium to the base of the frontal antennae and the dorsum of the palpophores.

Prostomium pyriform, wider than long with a rounded anterior border; antennae short, tapered; palps with large oval palpophores and short papilliform palpostyles (Fig. 22). Two pairs of eyes in a rectangular arrangement. Jaws brown with clear tips, each with eleven coarse teeth; paragnath distribution: Area I: 4 (three in a row and one in front of the others), II: 11-13 in a triangular arrangement, III: 34 cones in four rows arranged in an oval pattern, IV: 20-22 cones in five rows in an oval pattern, V: single large pointed paragnath, VI: 2 large, pointed, widely separated cones, VII & VIII: two rows of larger paragnaths within a band of irregularly arranged smaller cones extending onto the lateral regions of area VI.

Peristomium similar in length to following setigers; four pair of tentacular cirri, posterior dorsal pair longest, extending to setiger 4, anterior dorsal pair one-half length of posterior dorsal pair, ventral cirri short, subequal in length. Parapodia subbiramous in first two setigers with conical notopodial ligules subequal in length to the dorsal cirri, biramous in subsequent setigers; upper and ventral notopodial ligules conical, subequal in anterior setigers, upper ligules greatly enlarged posteriorly, over three times the length of the other parapodial lobes; acicular lobes reduced or absent (Fig. 23 & 24). Dorsal cirri long, tapered in anterior setigers, short, conical, inserted distally on the upper notopodial ligules in posterior setigers. Wide conical neuracicular lobes with low rounded presetal and postsetal lobes; ventral neuropodial ligules short, conical; ventral cirri long, slender, tapering in posterior setigers.

Notosetae homogomph spinigers throughout; blades narrow with short teeth. Upper neurosetal fascicle with homogomph spinigers and hetero-gomph falcigers; ventral neurosetal fascicle with heterogomph spinigers and fascicles; blades of spinigers similar to those of notosetae in upper neuropodial fascicle, those of ventral neurosetal fascicle with longer teeth than those of noto-setae; blades of falcigers short, robust, with 4 or 5 long teeth proximally, distal tip blunt (Fig. 25). Single black acicula per ramus.

Pygidium with four rounded lobes, anus terminal; a pair of thin, lateral anal cirri.

Remarks: *Neanthes pseudonoodti* is characterized by its elongate upper notopodial ligules with short, apically inserted dorsal cirri and the possession of paragnaths on all areas of the pro-boscis.

N. pseudonoodti is known previously from the rocky intertidal of Paitilla Beach on the Pacific coast of Panama. It was collected in Golfo Dulce from coral rubble in the shallow subtidal.

Neanthes roosevelti Hartman 1939
Fig. 26-29

Neanthes roosevelti Hartman 1939: 11-13.

Material Examined: Golfo Dulce, Islotes, 8º43' 41.2" N, 83º23'8.4" W, vermetid reef, Mar. 1997, coll: J. Cortés (1).

Description: Length of single specimen 9.1 mm, width to 0.6 mm (excluding parapodia), with 48 setigers. Body cylindrical, tapering, parapodial lobes large, inflated in anterior and middle setigers. Body colorless in alcohol with brown pigmentation in anterior third of body, brown pigment on lateral surface of prostomium, dorso-

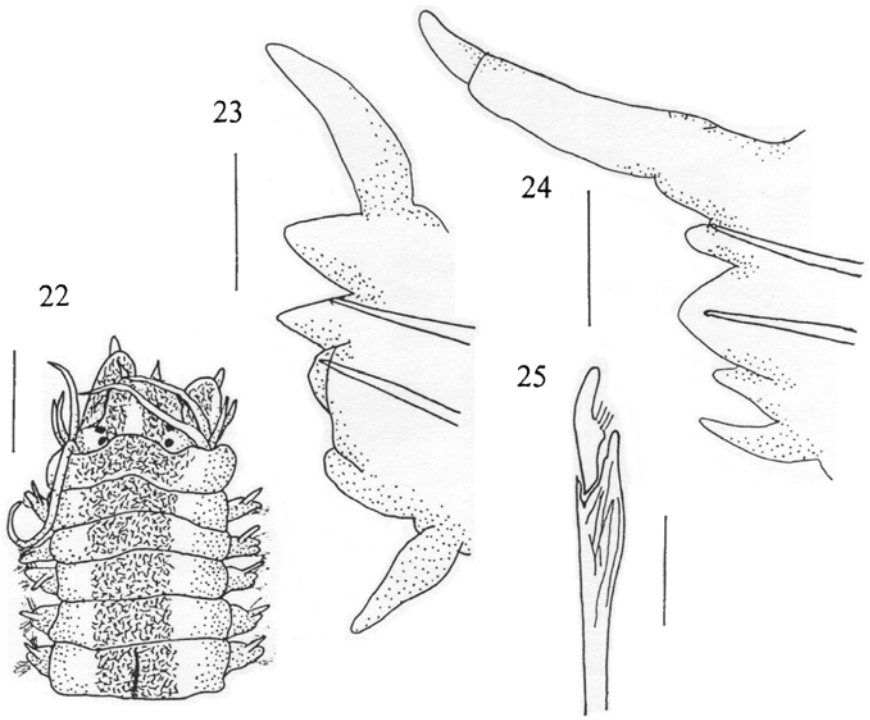

Fig. 22-25. *Neanthes pseudonoodti*: Fig. 22, anterior end, dorsal view, scale bar = 0.5 mm; Fig. 23, setiger five, anterior view, scale bar = 100 µm; Fig. 24, posterior setiger, scale bar = 100 µm; Fig. 25, neuropodial falciger, scale bar = 20 µm.

medial of palps, edge of anterior setigers with brown pigment across dorsum. Two pairs of brown pigment stripes on each side of the dorsum formed from noncontiguous pigmented regions on each setiger.

Prostomium pyriform, as long as wide, with a pair of tapered antennae subequal in length to palps; palpophores large conical, palpostyles
short, conical (Fig. 26). Two pairs of subequal round eyes in a rectangular arrangement, anterior pair located at lateral of prostomium. Proboscis with a pair of clear yellow jaws, dark brown distally and each with ten teeth along the cutting edge. Paragnath distribution; Area I: 2 larger paragnaths within a field of approximately 50 small paragnaths of varying sizes which extend onto area II; II: 10 larger paragnaths in an irregular double row; III: 21 cones in an oval patch; IV: 13 cones in an irregular double row; V: 2 large paragnaths within an area of numerous smaller paragnaths of varying sizes, extending onto area VI; VI: 8-9 conical paragnaths in a single row; VII & VII: a broad band of conical paragnaths of varying sizes.

Peristomium longer than subsequent setigers, with four pairs of tentacular cirri; second dorsal pair longest, extending to setiger five, first dorsal pair extending to setiger two, two ventral pairs short, second ventral pair shortest. Parapodia of first two setigers uniramous, remaining setigers biramous; notopodia with subequal upper and ventral ligules, conical in anterior setigers, upper ligules reduced to a small lobe at base of dorsal cirri in posterior setigers; acicular lobes reduced or absent; dorsal cirri large, tapering, projecting dorsally in posterior setigers (Fig. 27 & 28). Neuropodial acicular lobes conical with low pre- and postsetal lobes, acicular lobes broader in posterior setigers; ventral ligules short, rounded in anterior setigers,

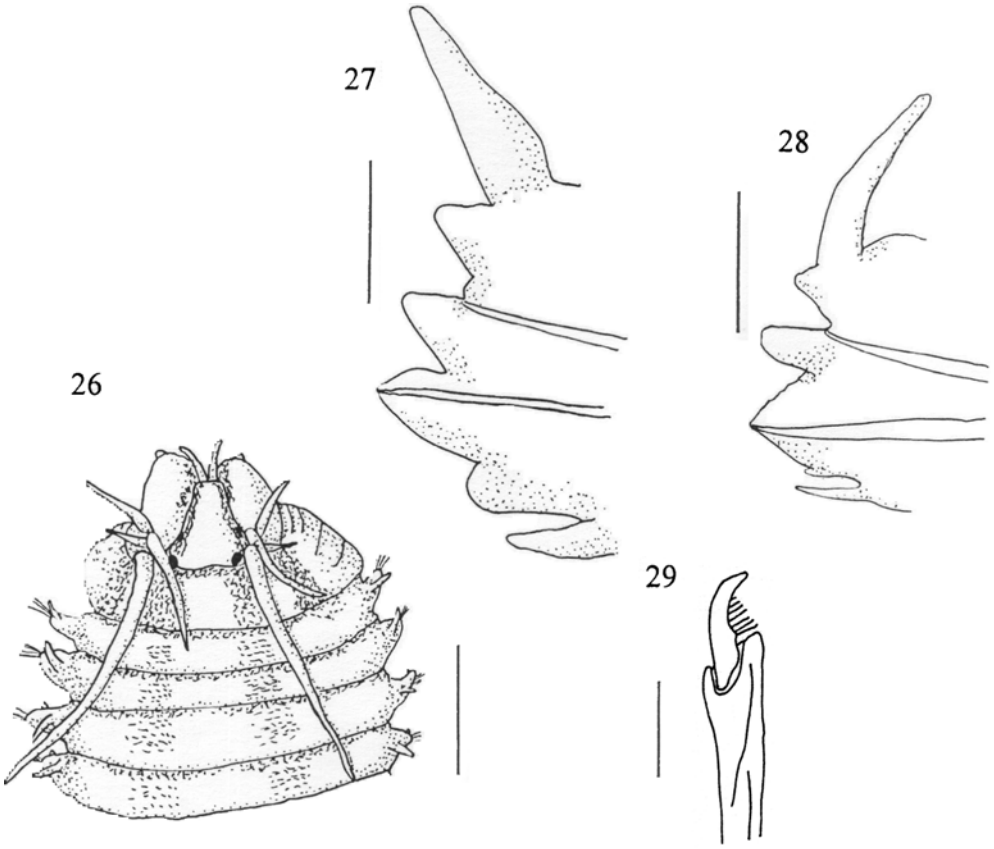

Fig. 26-29. *Neanthes roosevelti*: Fig. 26, anterior end, dorsal view, scale bar = 0.5 mm; Fig. 27, setiger five, anterior view, scale bar = 100 μm; Fig. 28, posterior setiger, anterior view, scale bar = 100 μm; Fig. 29, neuropodial falciger, scale bar = 20 μm.

much reduced in size in posterior setigers; ventral cirri from setiger one, tapered, shorter than acicular lobes.

Notosetae all homogomph spinigers with short, tapered blades with fine teeth throughout. Upper neurosetal fascicle with homogomph spinigers and heterogomph falcigers, lower neurosetal fascicle with homogomph spinigers and hetero-gomph falcigers; blades of spinigers all similar to those of notopodia, falciger blades short, sharply curved with pointed tip and fine teeth at the base (Fig. 29). Acicula black, single in each ramous.

Pygidium short, bilobed, with terminal anus and paired, short, ventral anal cirri.

Remarks: With the exception of some slight variations in paragnath distribution, the specimen of *Neanthes roosevelti* from Costa Rica agrees well with Hartman's (1939) original description. Area V of the proboscis has two larger cones in addition to the field of approximately 50 smaller cones described by Hartman and area VI has 8-9 conical paragnaths while Hartman reported 5 paragnaths in this area.

Type specimens were collected by Hartman by shore and tide pool collecting on James Island in the Galapagos Islands. The Costa Rican specimens were collected in the shallow subtidal of Golfo Dulce from a reef composed mainly of vermetid tubes.

Neanthes succinea (Frey & Leuckart 1847).
Fig. 30-33

Nereis succinea Frey and Leuckart 1847: 154.
Nereis succinea: --Monro 1933: 42. --Wilson 1984: 218-221.
Neanthes succinea (Frey & Leuckart): --Hartman 1945: 17-20; 1968: 529-530. --Rioja 1946a: 194. --Imajima 1972: 108-110. --Wu *et al.* 1985: 156-159. --de León-González & Solís Weiss 2000: 556.
Nereis (Neanthes) succinea: --Pettibone 1963: 165. --Gardiner 1976: 149.
Nereis sp. B (in part): --Dean 1996a: 73.

Material Examined: Gulf of Nicoya: STA. 24, 9º49'25" N, 84º41'20" W, 11M sand, Jan 1981, (1); Punta Morales intertidal, 10º N, 84º58' W, North side: mud, Sept 1988, (2); Jul 96, (1); gravel sand, Aug 1996, (2); mangrove roots Jul 1985, (2); Jan 1996 (1); mangrove sediments Dec. 1996, (3); decaying wood, mangroves Aug 1996, (6). South side: Lagartos Point, under rocks Aug 1996 (1). Cocorocas sand flat intertidal, 10º N, 84º57' W, mangrove roots Jan. 1996 (1). Jicaral intertidal, 9º58' N, 85º06' W, mangrove roots Jan 1996 (2). Isla Chira, 10º05' N, 85º07' W, mussel fras, floating platform Jul. 1994, (22).

Description: Length to 259 mm, width to 19 mm (not including parapodia) up to 91 setigers. Body cylindrical, tapering posteriorly, posterior ragged in appearance due to enlarged notopodial ligules. Color in alcohol colorless to light brown; some with dark brown pigmen-tation on dorsum of prostomium and palpo-phore, anterior segments brown with darkly pigmented middorsal spot, posterior setigers colorless with a middorsal brown pigmented spot.

Prostomium pyriform, with two slender tapered antennae subequal in length to palps; palpophores massive with short, conical palpostyles (Fig. 30). Two pairs of large round to oval eyes in a trapezoidal arrangement with anterior pair more widely spaced. Proboscis possessing amber colored jaws each with six to seven coarse teeth; paragnath distribution (N= 12): Area I: 1-3; II: 14-25 in an arch; III: 7-20 in an arch; IV: 16-29 in a triangle; V: 2-6; VI: 7-10; VII & VII: 2 irregular rows.

Peristomium similar in length to subsequent setigers; four pairs of tentacular cirri, second dorsal pair longest, extending to setiger six, first dorsal pair to setiger three; both ventral tentacular cirri short, subequal. First two setigers uniramous, remainder biramous; anterior notopodia with conical upper and lower ligules, subequal in length; upper notopodial ligules expands posteriorly to form a long, foliacious ligules with a short conical apex; acicular lobes with short conical presetal lobes in anterior setigers, absent posteriorly (Fig. 31 & 32). Anterior dorsal cirri long, narrow, longer than upper notopodial lig-ules, reduced in length posteriorly, arising sub-apically from the expanded upper notopodial lig-ules. Neuracicular lobes conical with longer conical postsetal lobes in anterior setigers, long, narrow with reduced presetal lobes and tapered postsetal lobes in posterior setigers; lower neuropodial ligules conical, extending beyond neuracicular lobes in anterior setigers, subequal to neuracicular lobes in posterior setigers; ventral cirri conical in anterior setigers, slender in middle and posterior setigers, shorter than acicular lobes throughout.

Notosetae slender finely serrated homogomph spinigers throughout. Upper neurosetal fascicle with homogomph spinigers and heterogomph falcigers; ventral fascicle with heterogomph spinigers and falcigers; blades of spinigers similar to those of notosetae, falciger blades of varying lengths with long, thin teeth and distal blunt hook (Fig. 33). Acicula black, single in each ramous.

Pygidium short, conical with a ventral anus and two long, robust lateral anal cirri.

Heteronereid 12.5 mm long, 0.5 mm wide (not including parapodia), with 68 setigers. Inflated dorsal cirri on setigers one through six; inflated ventral cirri on setigers one and two. Modified body region from setigers 17-28 with elongate parapodia and modified, paddle-like setae. Paragnath distribution: Area I: 2 in tandem; II: 18-22 in an arch; III: 18 in an oval patch; IV: 24 in an arch; V: 2; VI: 8-10 in an arch; VII and VIII: 2 irregular rows.

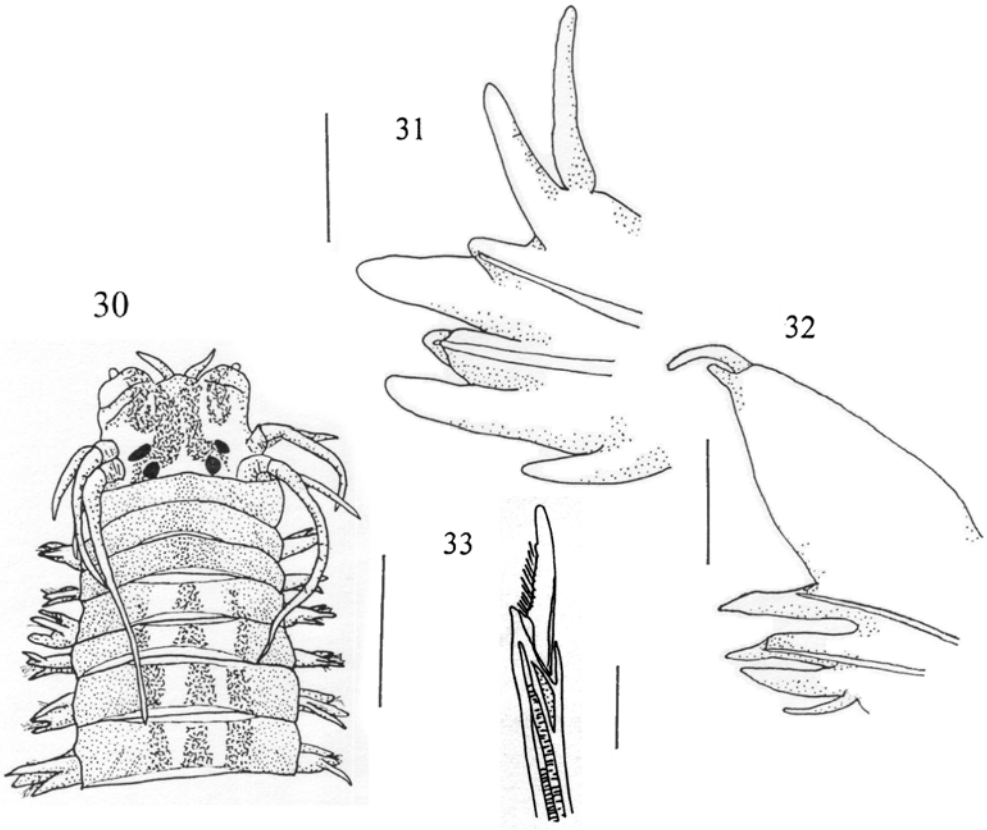

Fig. 30-33. *Neanthes succinea*: Fig. 30, anterior end, dorsal view, scale bar = 1.0 mm; Fig. 31, setiger five, anterior view, scale bar = 100 μm; Fig. 32, posterior setiger, anterior view, scale bar = 100 μm; Fig. 33, neuropodial falciger, scale bar = 30 μm.

Remarks: This species is distinguished by its large foliose upper notopodial ligules with subdistally inserted dorsal cirri in the posterior setigers, the presence of paragnaths on all areas of the proboscis, and the two rows of paragnaths on areas VII & VIII. The heteronereid individual is in general agreement with the descriptions of female heteronereids of this species by Pettibone (1963) and Wu *et al.* (1985). The first five setigers are only slightly modified, the reproductive region extends from setiger 17 to 28, the ventral cirri of setigers one and two are inflated (but not those of setiger 3 as described by Pettibone 1963), and the dorsal cirri of the epitokous region are smooth rather than papillated. The inflated lobes at the base of the dorsal and ventral cirri in the epitokous region mentioned by Pettibone (1963) and Wu *et al.* (1985) are absent in this individual.

N. succinea as presently described is a cosmopolitan species found from intertidal to 50 m depth on varying substrates. This species was collected intertidally and subtidally at 11 m depth from several sites in the Gulf of Nicoya on a variety of substrate types.

Nereis costaricaensis n. sp.
Fig. 1-2, 34-38

Material examined: Gulf of Nicoya, Punta Morales, 10º N; 84º58' W, north side, lower intertidal high organic mud, Aug. 1996 (2 Paratypes, UCR 2350); south side, Lagartos Point, lower intertidal soupy mud, Aug. 1996

(1 Holotype, MCZ 31246; 4 Paratypes, MCZ 31254).

Description: Length to 2.2 mm, width to 0.4 mm, up to 19 setigers. Body widest anteriorly, tapering posteriorly with short parapodial lobes. Body colorless in alcohol with dark green secretory material on upper and lower neuropodial ligules.

Prostomium rounded, two slender antennae similar in length to palps, palpophores large, conical, palpostyles short, conical (Fig. 34). Two pairs of narrowly separated eyespots, anterior pair smaller and more widely spaced. Proboscis with amber colored recurved jaws each with short rounded teeth; paragnath distribution (N=2) I: a single large, narrow paragnath (may be accompanied by a small conical paragnath), II: 12 paragnaths in two irregular rows, III: one, IV: 14-18 paragnaths in three irregular rows, V: none, VI: 6-8 paragnaths in an irregular cluster, VII & VIII: two rows of conical paragnaths, anterior row with 9-12 large paragnaths, posterior row with 5 medium sized paragnaths and 2-5 scattered small paragnaths (Fig. 1 & 2).

Peristomium subequal in length to subsequent setigers with four pairs of tentacular cirri, second dorsal pair longest extending to setiger three, first dorsal pair extending to setiger two, two ventral pairs short, subequal. First two setigers uniramous, remainder biramous. Notopodia slender, upper notopodial lobes narrow, subequal in length to dorsal cirri in anterior setigers, reducing in length and forming conical ligules with apically inserted dorsal cirri in middle and posterior setigers; acicular lobes reduced, at base of ventral notopodial ligules; ventral notopodial ligules with green granules, pointed in anterior setigers, conical in subsequent setigers, (Fig. 35 & 36). Neuropodia with wide conical acicular lobes, tapered conical ventral neuropodial lobes subequal in length to neuracicular lobes, may contain green secretory material in posterior setigers; ventral cirri slender, shorter than acicular lobes.

Notosetae homogomph spinigers accompanied by homogomph falcigers from setiger six; blades of spinigers of varying lengths, finely toothed; falciger blades straight, pointed, with short, fine teeth, occasionally with widely spaced coarse teeth. Upper neuropodial fascicle with homogomph spinigers and heterogomph falci-gers throughout; ventral neuropodial fascicle with heterogomph falcigers; blades of spinigers similar to those of notosetae; falciger blades with fine teeth and distal blunt hook (Fig. 38). Acicula black, single in each ramus.

Pygidium bilobed, anus subterminal with two flask-shaped anal cirri.

Remarks: *Nereis costaricaensis* n. sp. is most similar in parapodial morphology to *N. jacksoni* Kinberg 1865 in that the upper notopodial ligules are reduced in posterior setigers with longer dorsal cirri, inserted sub-apically. *N. costaricaensis* n. sp. differs, however, in that its upper notopodial ligules are reduced posteriorly to low rounded lobes and are relatively small compared to the lower notopodial ligules. The paragnath distribution of *N. costaricaensis* n. sp. is also somewhat similar to that of *N. jacksoni* as described by Wilson (1985) for specimens collected in Australia except that paragnaths are absent in area V while Wilson's *N. jacksoni* possessed 2 to 7 paragnaths. Finally, the blades of the homogomph notopodial falci-gers of *N. costaricaensis* are much longer and narrower than those of *N. jacksoni* with short, fine teeth along the cutting edge. The falciger blades of *N. jacksoni* are relatively short with the shorter blades possessing two or three robust teeth.

N. costaricaensis was collected intertidally in soupy muds from Punta Morales, Costa Rica.

Nereis oligohalina (Rioja 1946).
Fig. 39-43

Neanthes oligohalina --Rioja 1946b: 207-210, 1962: 165-166. --Hartman 1951: 46.
Nereis (Neanthes) oligohalina --Berkeley & Berkeley 1958: 402.
Nereis (Nereis) occidentalis Hartman 1945 (in part): 20. --Pettibone 1956 (in part): 291-293.
Nereis oligohalina --Berkeley & Berkeley 1960: 359.

Material Examined: Gulf of Nicoya, Punta Morales 10ºN; 84º58' W North side, upper inter-

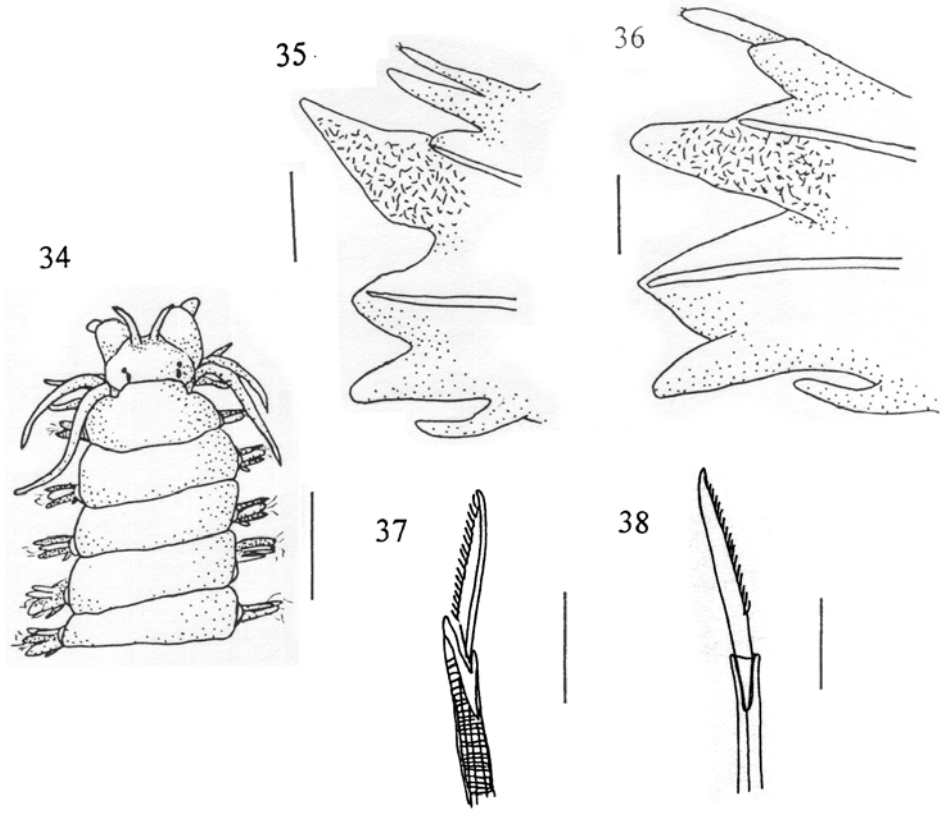

Fig. 34-38. *Nereis costaricaensis*: Fig. 34, anterior end, dorsal view, scale bar = 0.25 mm; Fig. 35, setiger five, anterior view, scale bar = 50 μm; Fig. 36, posterior setiger, anterior view, scale bar = 50 μm; Fig. 37, neuropodial falciger, scale bar = 20 μm; Fig. 38, notopodial falciger, scale bar = 20 μm.

tidal sand Aug 96 (2); Jicaral intertidal, 9º58' N, 85º06' W, mangrove roots Jan 1996 (1). Golfo Dulce, Islotes, 8º43'41.2" N, 83º23' 8.4" W, vermetid reef, Mar. 1997, coll: J. Cortés (3); Golfito, 8º38' N, 83º10' W, mangrove sediments, Jan. 1997 (4).

Description: Length to 23 mm, width to 1.0 mm (excluding parapodia) up to 70 setigers long. Body cylindrical, tapered throughout, sexually mature individuals with broad, dorsoventrally flattened middle region, white with glan- dular material. Antero-lateral margin of prosto-
mium, proximal dorsal surface of palpophores and dorsum of peristomium with brown pigment; first ten setigers with a row of brown spots on either side of the midline and diffuse brown pigment dorsolaterally at the base of the parapodia; remainder of body colorless in alcohol.

Prostomium pyriform, as long as wide, paired antennae tapered, subequal in length to palps; palpophores large, rounded, palpostyles short, conical (Fig. 39). Two pairs of eyes in rectangular arrangement, anterior pair larger. Proboscis with light brown jaws each with 10 teeth on cutting edge; paragnath distribution: Area I: 14-22 in a triangular patch; II: 23-32 in a double row; III: 36-60 in an oval patch; IV: 29-50 in a V-shaped patch; V: 1-3 (one large tooth sometimes accompanied by 2 smaller teeth); VI: 4 teeth in a diamond shaped pattern; VII and VIII: 37-50 in three irregular rows of varying size para-gnaths.

Peristomium equal in length to subsequent setigers with four pairs of tentacular cirri, second

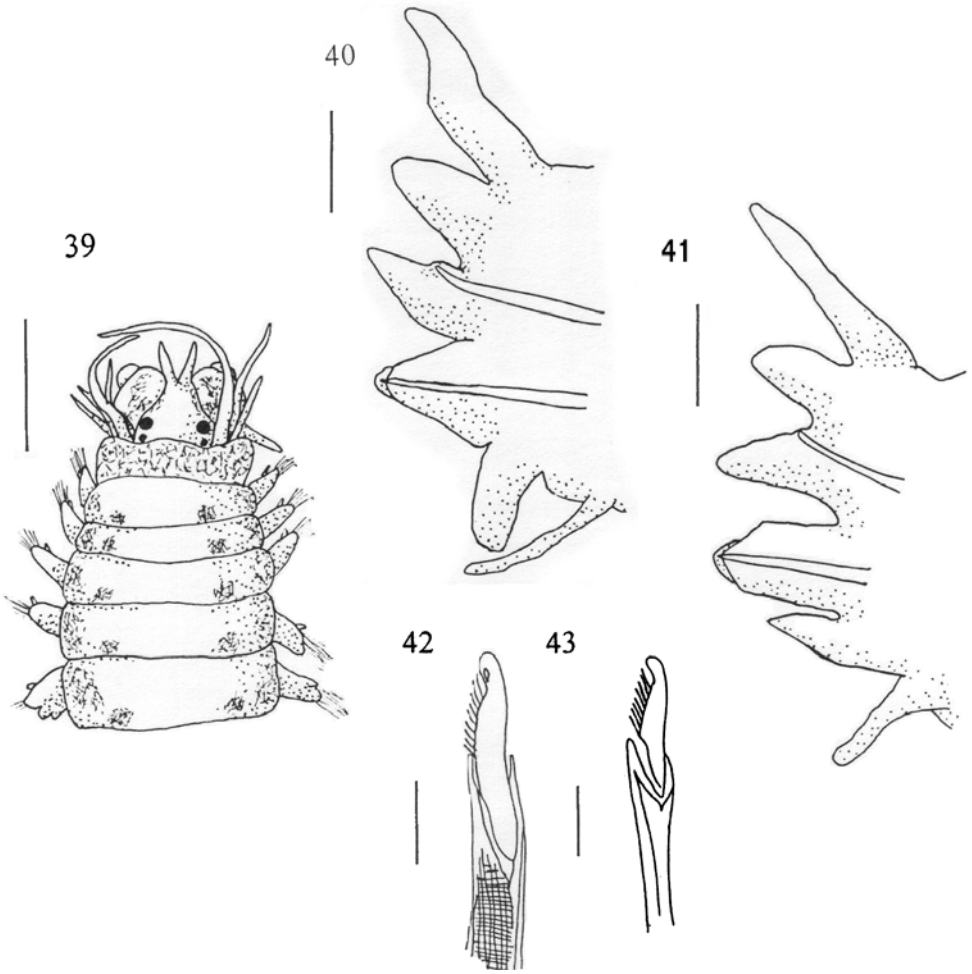

Fig. 39-43. *Nereis oligohalina*: Fig. 39, anterior end, dorsal view, scale bar = 0.5 mm; Fig. 40, setiger five, anterior view, scale bar = 50 μm; Fig. 41, posterior setiger, anterior view, scale bar = 50 μm; Fig. 42, notopodial falciger, scale bar = 20 μm; Fig. 43, neuropodial falciger, scale bar = 20 μm.

dorsal pair longest extending to setiger three, first dorsal pair extending to setiger one, ventral tentacular cirri short, subequal. First two setigers sub-biramous with ventral notopodial ligules and dorsal cirri, notopodial aciculae absent, remaining setigers biramous; notopodia with subequal, conical upper and ventral ligules throughout; acicular lobes reduced or absent; dorsal cirri extends beyond notopodial ligules throughout, slightly swollen proximally in anterior setigers, uniformly narrow in posterior setigers (Fig. 40 & 41). Neuropodial acicular lobes with low, rounded pre-setal and slightly longer conical post-setal lobes throughout, acicular lobes more elongate in posterior setigers, ventral neuropodial ligules thick, conical, subequal to notopodial lobes throughout; ventral cirri short, filiform, basally attached.

Notosetae homogomph spinigers anteriorly, homogomph spinigers and falcigers from middle body region; blades of spinigers long, narrow with fine teeth, those of falcigers recurved with fine teeth (Fig. 42). Neurosetae homogomph spinigers and a single heterogomph falciger in upper fascicle,

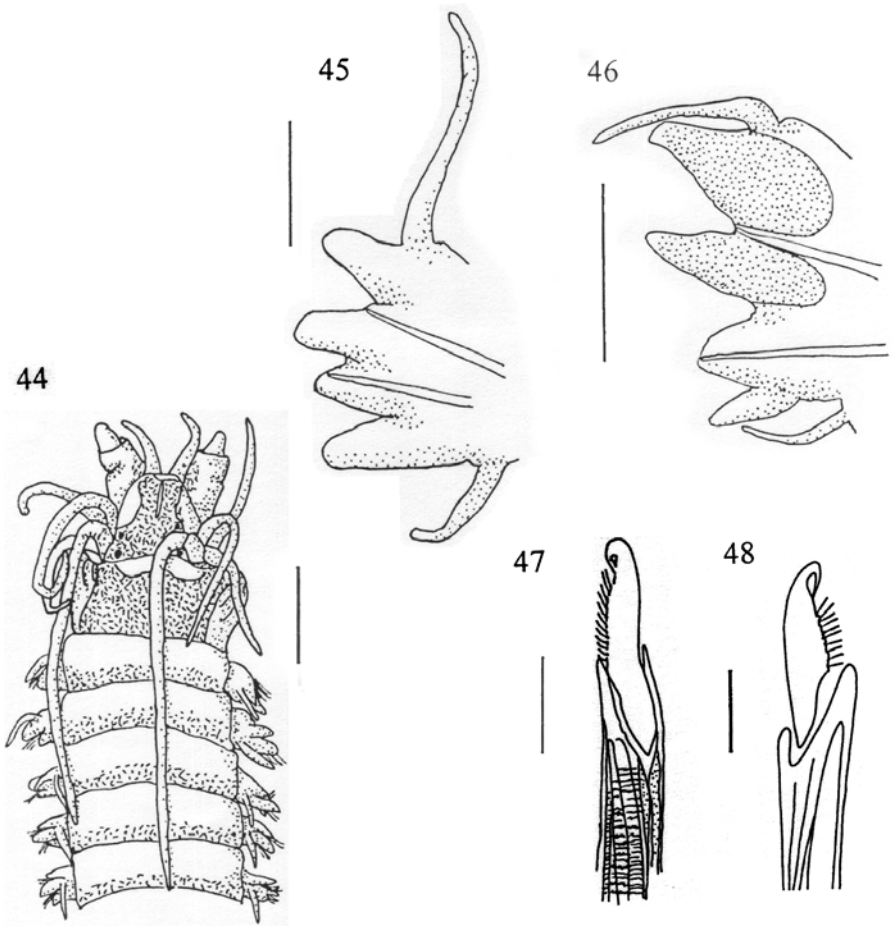

Fig. 44-48. *Nereis riisei*: Fig. 44, anterior end, dorsal view, scale bar = 1.0 mm; Fig. 45, setiger five, anterior view, scale bar = 50 µm; Fig 46, posterior setiger, anterior view, scale bar = 50 µm; Fig. 47, notopodial falciger, scale bar = 50 µm; Fig. 48, neuropodial falciger, scale bar = 20 µm.

heterogomph spinigers and falci-gers in lower fascicle; blades of spinigers similar to those of notosetae, blades of falcigers short with blunt tip and fine teeth (Fig. 43). Acicula black, single in each ramous

Pygidium conical with terminal anus, a pair of long filiform anal cirri extending for about eight setigers.

Remarks: *Nereis oligohalina* has a confused taxonomic history. Rioja (1946b) described *Neanthes oligohalina* from the Gulf of Mexico and it was later also reported from the Pacific coast of Mexico (Berkeley & Berkeley 1960, Rioja 1962). It is unclear why Rioja reported this species as a *Neanthes* as he clearly noted the notopodial falcigers which are characteristic of *Nereis* (Salazar-Vallejo 1988). Hartman (1951) reported it from Verecruz but stated that it appeared to be inseparable from *Nereis pelagica occidentalis* Hartman 1945. Pettibone (1956) included it in synonomy with *N.* (*Nereis*) *occi-dentalis* but mentioned the differences in para-gnath distribution in the variety *oligohalina*. De León-González *et al.* (1999) eventually synono-mized *N. occidentalis* with *Nereis falsa* Qua-trefages, 1865 and, based on recent examina-tion of specimens from the Caribbean, now accepts

Nereis oligohalina as a valid species (de León-González, pers. comm. 2000).

Nereis oligohalina was described by Rioja from the Gulf of Mexico and has been reported from North Carolina to Mexico in the western Atlantic and from California to Mexico in the eastern Pacific. It is reported here from intertidal and shallow subtidal sites in the Gulf of Nicoya and Golfo Dulce on mud to sand sediments.

Nereis riisei Grube 1857.
Fig. 44-48

Nereis riisei Grube 1857: 162-163. --Monro 1933: 43-44. --Hartman 1940: 221-222. --Fauchald 1977: 31. --Taylor 1984: 31.38-40. -- León-González & Solís-Weiss 2000: 560-561.
Nereis ambiguus: --Treadwell 1937: 149-150.

Material Examined: Golfo de Papagayo, Playa Panama, 10°35'42" N, 85°41' W, rocky intertidal tide pools, Colls: H. Dean & J. Vargas, Aug. 1999 (1).

Description: Length of single specimen to 73 mm, width to 2.0 mm (excluding parapodia) with 111 setigers. Body cylindrical anteriorly, dorsoventrally flattened in middle and posterior setigers, segments wider than long. Dorsum of prostomium and peristomium with dark grey-brown pigment; antero-lateral surface of prostomium, median surface of palpophores and posterior dorsal surface of anterior setigers with light brown pigment, remainder of body colorless in alcohol.

Prostomium pyriform, as long as wide, with broad anterior border; paired antennae tapering, subequal in length to palps; palpophores long, conical, palpostyles conical (Fig. 44). Two pairs of eyes in a rectangular arrangement, an-terior pair smaller and hidden by dense surface pigment. Proboscis with dark brown jaws each with ten teeth on cutting edge. Paragnath distri-bution: Area I: 2; II: 33-34 in an arch; III: 36 cones in an oval pattern; IV: 33 & 35 teeth of irregular sizes and shapes; V: none; VI: 8 & 11 in a cluster; VII & VIII: single row of 4 small cones.

Peristomium longer than subsequent setigers, with four pairs of tentacular cirri; second dorsal pair longest extending to setiger five, first dorsal pair extending to setiger three, second ventral pair extending to setiger two, first ventral pair short, extending beyond palps. First two setigers uniramous, remainder biramous; notopodia with subequal, conical upper and lower notopodial ligules in anterior setigers, upper ligules wider and more triangular in posterior setigers; noto-podial ligules of middle and posterior setigers containing oval, white or light yellow colored secretory material; acicular lobes of notopodia reduced or absent (Fig. 45 & 46). Neuropodia with conical acicular lobes in anterior setigers, becoming more rounded in posterior setigers; lower neuropodial ligules large, conical, subequal to notopodial ligules in anterior setigers, less robust, shorter than notopodial lobes in posterior setigers. Ventral cirri from setiger one, narrow, tapering throughout.

Notosetae homogomph setigers anteriorly, homogomph spinigers and falcigers from setiger 39; blades of spinigers long, thin with fine teeth, those of falcigers with sharply recurved tip and fine teeth. Neurosetae homogomph spinigers and heterogomph falcigers in upper fascicle, heterogomph spinigers and falcigers in lower fascicle; blades of spinigers similar to those of notosetae, blades of falcigers short, with recurved tip and fine teeth (Fig. 48). Acicula black, single in each ramous.

Pygidium funnel-shaped with terminal anus and two long filiform anal cirri extending for approximately 11 setigers.

Remarks: *N. riisei* is recognized by the recurved falciger tips in both parapodial rami, the small number (five or less) of paragnaths in a single row in areas VII & VIII, the enlarged upper notopodial ligule relative to the lower notopodial ligule in posterior setigers and the darkly colored areas on the notopodial lobes.

N. riisei has been considered to be amphi-american and has been reported from Pacific Mexico (de León-González & Solís-Weiss, 2000), however, Salazar-Vallejo (pers. comm. 2000) points out that these specimens from

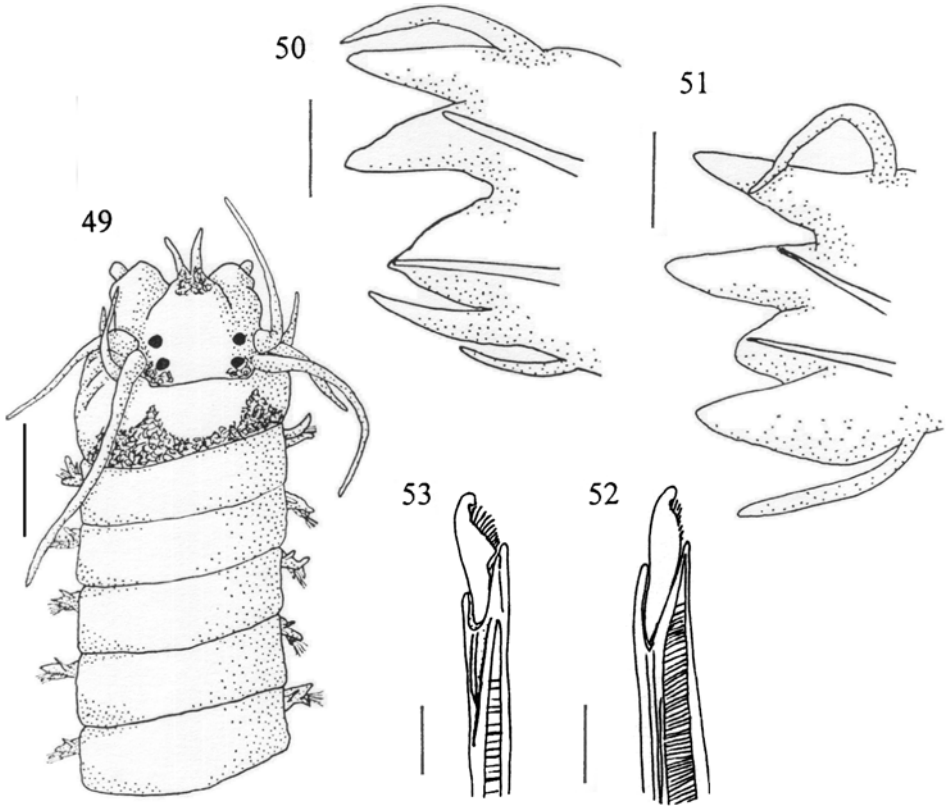

Fig. 49-53. *Nereis zonata*: Fig. 49, anterior end, dorsal view, scale bar = 0.5 mm; Fig. 50, setiger five, anterior view, scale bar = 50 µm; Fig. 51, posterior setiger, anterior view, scale bar = 50 µm; Fig. 52, notopodial falciger, scale bar = 40 µm; Fig. 53, neuropodial falciger, scale bar = 20 µm.

Pacific Costa Rica, as well as other records of *N. riisei* from the Pacific, may be a separate species from those in the Caribbean-Atlantic. *N. ambiguus* Treadwell 1937 was described from California (USA) and was subsequently synonomized with *N. riisei* by Hartman (1940) but may, in fact be a valid species. In the Costa Rican specimens the antennae are subequal in length to the palps (Fig. 44) but in specimens from the Caribbean the palps are much greater in length than the antennae. The parapodial ligules are rounded in the anterior setigers of Costa Rican specimens, similarly to the description for *N. ambiguus* (Treadwell 1937, Fig. 20), while all parapodial ligules are pointed in Caribbean specimens of *N. riisei* (Taylor 1984, Fig. c). Additionally, the dorsal cirri of anterior setigers are much longer than the parapodial ligules in specimens from Pacific Costa Rica. Paragnath numbers and distributions are in agreement with descriptions of specimens from the Caribbean (Taylor 1984, Fig. a&b) as well as being in general agreement with Hartman's (1938) re-examination of Treadwell's type specimen of *N. ambiguus*. A more rigorous analysis of these two populations of what has been referred to as *N. riisei* is called for before this taxonomic problem can be resolved.

This intertidal species has been reported in the Eastern Pacific from California to Panama and the single specimen from Costa Rica reported on here was collected from the rocky intertidal of Playa Panama.

Nereis zonata Malmgren 1867.
Fig. 49-53

Nereis zonata Malmgren 1867: 46. --Fauvel 1923: 338-339. --Pettibone 1963: 181-183. --Hartman 1948: 25-26; 1968: 553. –Imajima 1972: 146. --Wu *et al*. 1985: 156-159. --de León-González & Solís-Weiss 2000: 561.
Nereis riisei: --Dean 1996a: 73.

Material Examined: Gulf of Nicoya, subtidal, STA 24, 9º49'25" N, 84º41'20" W, 11 m, sand, Apr. 1981 (1): STA 29, 9º54'55" N, 84º45'15" W, 18 m, muddy sand, Jan. 1981 (2).

Description: Length to 23 mm, width to one mm, up to 70 setigers long. Body slender, cylindrical, tapered posteriorly. Color in alcohol light tan with brown pigment along the posterior dorsum of the peristomium.

Prostomium pyriform with a pair of slender tapered antennae subequal in length to palps; palpophores massive, conical with a small conical palpostyle (Fig. 49). Two pairs of large rounded eyes in a trapezoidal arrangement. Proboscis with amber colored jaws each with eight or nine teeth; paragnath distributions: Area I: 3-4; II: 18-21 in a double row; III: 36-41 in an oval patch; IV: 22-38 in a V-shaped patch; V: none; VI: 4-6 in a small group; VII and VIII; 52-64 in three irregular rows of varying size paragnaths.

Peristomium longer than subsequent setigers; four pair of tentacular cirri, second dorsal pair longest extending to setiger four; first dorsal pair to setiger two, two ventral pairs of tentacular cirri short, subequal. First two parapodia subbiramous with notopodial ligules and dorsal cirri, notaciculae lacking, remaining parapodia biramous. All notopodia with tapered, conical, subequal upper and ventral notopodial ligules; acicular lobes reduced, dorsal cirri filiform, subequal in length to notopodial ligules anteriorly, longer than notopodial ligules in posterior setigers (Fig. 50 & 51). Neuropodia with conical acicular lobes with low pre- and postsetal lobes, acicular lobes shorter relative to notopodial ligules in posterior setigers; ventral neuropodial ligules subequal in length to neuropodial acicular lobes in anterior setigers, extending beyond acicular lobes in posterior setigers; ventral cirri filiform, shorter than ventral neuropodial ligules in anterior setigers, long slender, subequal in length to ventral neuropodial ligules in posterior setigers.

Notosetae homogomph spinigers accompanied by homogomph falcigers from setiger 25; blades of falcigers smooth to finely toothed blunt tipped rods (Fig. 52). Upper neurosetal fascicle with homogomph spinigers and single heterogomph falciger; ventral fascicle with heterogomph spinigers and falcigers; blades of spinigers similar to those of notosetae, falciger blades short with fine teeth, distal end a blunt hook (Fig. 53). Acicula black, single in each ramous.

Pygidium short with a straight posterior border and a pair of long filiform anal cirri extending five to seven setigers in length. Anus subtermi-nal, ventral.

Remarks: *Nereis zonata* may be identified by its single row of large paragnaths accompanied by a few irregular rows of smaller paragnaths on areas VII and VII, the relatively unmodified, pointed notopodial ligules throughout, and the long dorsal cirris relative to the length of the notopodial ligules. It may be differentiated from the morphologically similar *Nereis persica* by the small teeth on the homogomph falcigers rather than large, coarse teeth.

As described, *N. zonata* is a cosmopolitan species known from both sides of the Atlantic Ocean, the Mediterranean Sea, Japan, and the Eastern Pacific. It has been reported from Baja California by de León-González and Solís-Weiss (2000). *N. zonata* was collected subtidally in Costa Rica at depths of 11-18 m on sand and mud-sand sediments.

Perinereis seridentata (Hartmann-Schröder 1959) New Combination.
Fig. 54-57

Neanthes seridentata Hartmann-Schröder 1959: 138. –Molina-Lara and Vargas-Zamora 1995: 198.

Material Examined: Punta Morales, 10º N; 84º58' W, north side, mangrove roots, Jul 1995 (1), Jul 1996 (17) (col. H. Butner).; south side, intertidal mud, Jun. 1986 (1) (col. J. Vargas); Lagartos intertidal sand, Aug. 1999 (1). Golfo

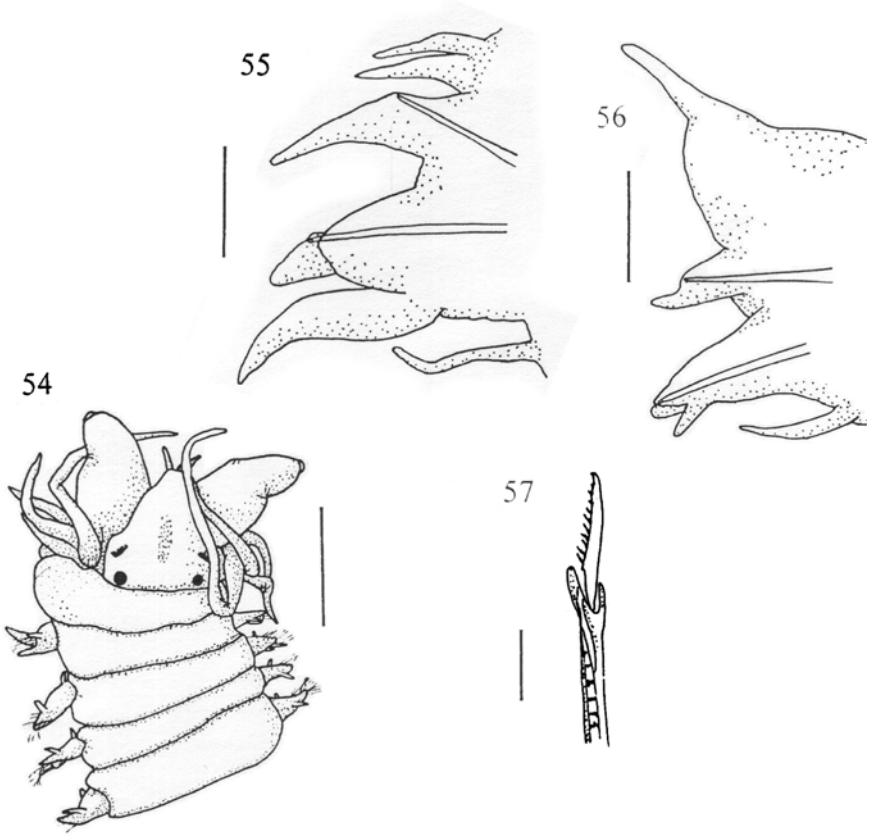

Fig. 54-57. *Perinereis seridentata*: Fig. 54, anterior end, dorsal view, scale bar = 0.5 mm; Fig. 55, setiger five, anterior view, scale bar = 100 µm; Fig. 56, posterior setiger, anterior view, scale bar = 100 µm; Fig. 57, neuropodial falciger, scale bar = 20 µm.

Dulce, 8º38' N, 83º10' W; intertidal mud, Sep. 1986 (1) (coll: J. Vargas), mangrove roots, Jan. 1997 (1) (coll: H. Butner).

Additional Material: El Salvador, Estero Jaltepeque, 13º 17' N; 89º30' W, Dec. 1990 (1) (in MCZ collection).

Description: Length to approximately 220 mm, width to 3.5 mm (not including parapodia), longest complete specimen 31 mm long, 0.9 mm wide, with 112 setigers. Body narrow, elongate, tapered posteriorly. Color olive green, colorless in alcohol, some specimens with light brown pigment on dorsum of prostomium and peristomium.

Prostomium pyriform, longer than wide, paired antennae tapered, much shorter than palps; palpophores large, cylindrical, palpostyles
short, conical (Fig. 54). Two pairs of eyes in trapezoidal arrangement, anterior pair more widely spaced, smaller than posterior pair. Proboscis with dark brown jaws armed with 10-12 coarse teeth; paragnath distribution (n = 5): Area I: 0-1; II: 0-2; III: none; IV: 4-10 in an arch; V: 0-1; VI: 16-24 short bars in a single row; VII & VIII: 2 alternating rows of widely spaced, paragnaths with an additional irregular row of smaller paragnaths posteriorly.

Peristomium similar in length to subsequent setigers, bearing four pairs of tentacular cirri, second dorsal pair longest, extending to setiger six, first dorsal pair extending to fourth setiger, ventral tentacular cirri short, subequal. First two setigers sub-biramous with long conical notopodial ligules, remaining setigers bira-mous; notopodia with tapered upper ligules in anterior setigers, upper ligules gradually en-larges in middle and posterior setigers forming foliacious ligules with apically inserted dorsal cirri; ventral notopodial ligules long, tapered in anterior setigers, reduced in length, conical, in middle and posterior setigers; acicular lobes reduced to a low lobe on base of ventral notopodial ligules throughout; dorsal cirri narrow, tapering, shorter than or subequal to upper notopodial ligules in anterior setigers (Fig. 55 & 56). Neuropodial acicular lobes rounded conical with slightly longer, conical postsetal lobes anteriorly, pre- and postsetal lobes subequal in posterior setigers, lower ligules long, tapering, extending beyond neu-ropodial lobes anteriorly, short, digitate pos-teriorly; ventral cirri long, narrow, shorter than acicular lobes.

All notosetae homogomph spinigers with long thin blades and fine, short teeth. Upper neurosetal fascicle with homogomph spinigers and heterogomph falcigers, ventral fascicle with homogomph spinigers and heterogomph falcigers; blades of spinigers similar to those of notosetae, falciger blades short with short, widely spaced, teeth and distally pointed tip. Acicula black, single in each ramous (Fig. 57).

Pygidium short, rounded, with terminal anus and a pair of short, tapered anal cirri.

Remarks: Hartmann-Schröder (1959) described *Neanthes seridentata* from the Gulf of Fonseca in El Salvador with 16 paragnaths in a single row on area VI. Upon examination of material from the type locality collected by Molina Lara and Vargas Zamora (1995) it is apparent that this is the same species as that encountered in Costa Rica. It is also clear that the line of para-gnaths, interpreted as cones by Hartmann-Schrö-der, are actually flattened bars which are cha-racteristic of the genus *Perinereis*. Within this genus those species with a row of numerous bar-shaped paragnaths on area VI are included within the *Perinereis nuntia* group. Comparison of *P. seridentata* with the other species within this group indicates it to be most similar to *P. nuntia*, collected mainly from the Indo-Pacific region, due to the absence of bars on area IV, the high number (16-24) of bars on area VI, and the relatively low number of paragnaths on areas VII & VIII. *P. seridentata* differs from *P. nuntia* in the greater relative length of the second dorsal tentacular cirri, the presence of a wide upper notopodial ligule in posterior setigers, the more narrow and coarsely toothed blades of the neuropodial falcigers, the absence of para-gnaths on area III, and the presence of a pos-terior row of minute paragnaths on areas VII and VIII. Five species of nereidids in the genus *Perinereis* have been recorded from the Pacific coast of Mexico (de León-González & Solís-Weiss 1998) but the only species of the *P. nuntia* group previously reported from the eastern Pa-cific was *P. vallata* (Grube, 1858) from Chile (Wilson & Glasby 1993).

P. seridentata has been collected from intertidal sand and muddy sand flats as well as mangrove sediments in the Gulf of Nicoya and Golfo Dulce.

Platynereis dumerilii (Audouin & Milne-Edwards 1834).
Fig. 58-62

Nereis dumerilii Audouin & Milne-Edwards 1834: 196-199.
Platynereis dumerilli (Audouin & Milne-Edwards): --Hartman 1951: 47. --Pettibone 1963: 154-160. --Taylor 1984: 31.24-25. --Wu *et al.* 1985: 86-90.

Material Examined: Golfo de Papagayo, Playa Panama, 10°35' 42" N, 85°41' W, rocky intertidal tidepools, coll: H. Dean & J. Vargas, Aug. 1999 (1).

Description: Length of single specimen 13.0 mm, maximum width 1.3 mm (excluding parapodia), with 58 setigers. Body widest in pharyngeal region, uniformly tapered otherwise Body colorless in alcohol.

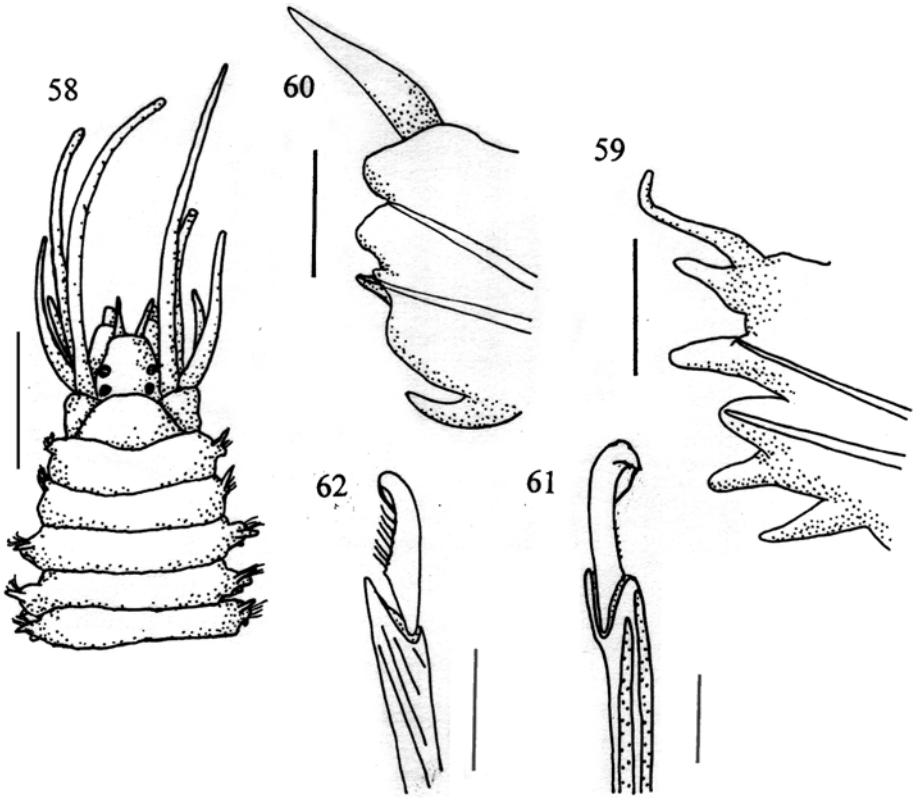

Fig. 58-62. *Platynereis dumerilli*: Fig. 58, anterior end, dorsal view, scale bar = 1.0 mm; Fig. 59, setiger five, anterior view, scale bar = 250 µm; Fig. 60, posterior setiger, anterior view, scale bar = 250 µm; Fig. 61, notopodial falciger, scale bar = 20 µm; Fig. 62, neuropodial falciger, scale bar = 20 µm.

Prostomium pyriform with a straight anterior border; two slender, tapering antennae, subequal in length to the palps; palpophores conical, as long as prostomium, with large conical palpo-styles (Fig. 58). Two pairs of subequal, rounded eyes arranged in a rectangular pattern, anterior pair subdermal. Proboscis with broad, clear jaws possessing a dark brown cutting edge, each with seven coarse teeth on the cutting edge. Paragnath distribution: Area I: none, II: none; III: two short rows of 5 and 3 cones; IV: 4 irregular arched rows of pectinate paragnaths; V: none; VI: single row of 6 cones; VII & VII: three small groups of paragnaths, one with a row of 5 and a row of 2 cones, remaining two groups each composed of a single row of 6 cones.

Peristomium longer than subsequent setigers, inflated dorsally in this specimen to form a dome-shaped dorsum; with four pairs of tentacular cirri; second dorsal pair longest, extending to setiger nine; first dorsal pair extending to setiger six; second ventral pair extending to setiger three, first ventral pair short, subequal in length to palps. First two parapodia uniramous, remainder biramous; notopodial upper and ven-tral ligules long, tapering, subequal on setigers three and four, becoming low, rounded lobes from setigers 5 to 15, long, tapering, both sub-equal in length to lower neuropodial ligules in remaining setigers; notopodial acicular lobes reduced or absent; dorsal cirri longer than para-podial lobes throughout, tapered in anterior setigers, narrow, tapering in posterior setigers (Fig. 59 & 60). Neuropodial acicular lobes large, conical with low pre- and postsetal lobes in setigers

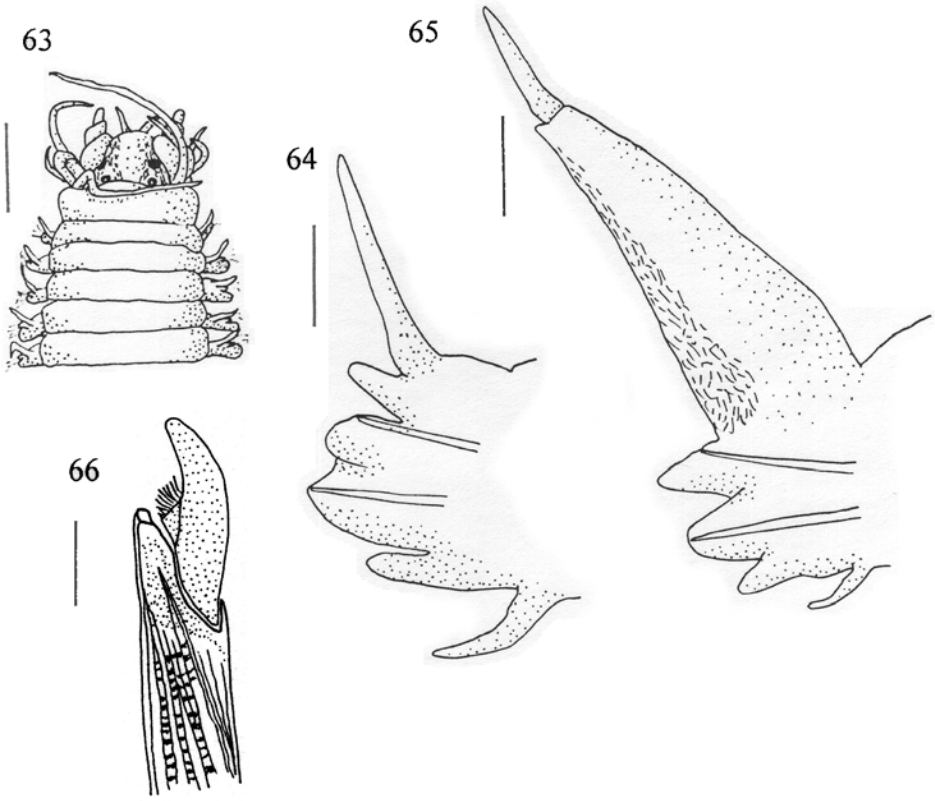

Fig. 63-66. *Pseudonereis gallapagensis*: Fig. 63, anterior end, dorsal view, scale bar = 1.0 mm; Fig. 64, setiger five, anterior view, scale bar = 200 μm; Fig. 65, posterior setiger, anterior view, scale bar = 200 μm; Fig. 66, neuropodial falciger, scale bar = 20 μm.

one to four; low, rounded, with short, conical pre- and postsetal lobes in setigers 5-15; large, conical with low pre- and postsetal lobes in remaining setigers; ventral neuropodial ligules a low swelling in anterior setigers, be-coming digitate, subequal in length to acicular lobes in middle and posterior setigers.

Notosetae homogomph spinigers accompanied by homogomph falcigers beginning at setiger ten; spiniger blades long, narrow, with fine teeth, falciger blade large, distal end strongly recurved, with a small subdistal tooth (Fig. 61). Upper neuropodial fascicle with homogomph spinigers and heterogomph falcigers, ventral fascicle with heterogomph spinigers and falcigers; blades of spinigers similar to those of notosetae, falciger blades short with recurved tip, subdistal knob and fine teeth (Fig. 62). Acicula black, single in each ramous.

Pygidium small, bilobed, with a pair of long filiform anal cirri extending approximately ten setigers, anus terminal.

Remarks: *P. dumerilii* may be recognized by the pectinate paragnaths in all areas of the proboscis except for areas I, II and III, by the lack of simple notosetae in middle and posterior parapodia, and the presence of hooded homogomph falcigers with a small subdistal tooth in the noto-podia and sharply bent falcigers with a small subdistal knob in the neuropodia.

P. dumerilii is considered a cosmopolitan species and has been reported from intertidal to abyssal depths in tropical and subtropical regions. The single specimen described here

was collected in the rocky intertidal of Playa Panama, Costa Rica.

Pseudonereis gallapagensis Kinberg 1866.
Fig. 63-66.

Pseudonereis gallapagensis Kinberg 1866: 174. --Hartman 1940: 231. --Imajima 1972: 97-99. --Fauchald 1977: 32-33. --Rozbaczylo & Bolados 1980: 219-221. --Wu *et al.* 1985: 220-222. --de León-González *et al.* 1999: 678-679.

Material Examined: Golfo Dulce, Punta Islotes, 8°43'41" N, 83°23'8" W, from coral rubble, Mar. 1997, (2) (coll: J. Cortés).

Description: Length of complete specimen 35.8 mm, width 1.8 mm (not including parapodia), 91 setigers. Body widened in pharynxgeal region, tapered posteriorly. Color in alcohol tan, brown pigment on dorso-lateral of prostomium.

Prostomium pyriform, as long as wide, tapered antennae subequal in length to palps; palpophores small, rounded, palpostyles papilliform (Fig. 63). Two pairs of large round eyes in rectangular arrangement. Proboscis with a pair of wide, dark brown jaws, each with ten short flat teeth; paragnath distribution: Area I: 2 large cones in tandem, II: a triangular region of 44-46 teeth in four rows, III: 64 pectinate teeth in four rows, IV: 58 pectinate teeth in five rows and 29 teeth in three additional rows oriented perpendicularly to the others, V: a single large pointed tooth, VI: single large trans-verse paragnath, VII and VIII: two rows of co-nical paragnaths, anterior row of conical para-gnaths alternating with the larger, pointed para-gnaths of posterior row.

Peristomium longer than subsequent setigers; four pair of tentacular cirri, posterior dorsal pair longest, extending back to setiger six; anterior dorsal pair extending to the second setiger; ventral cirri subequal, about one-half length of anterior dorsal cirri. First two setigers uniramous, remaining setigers biramous; notopodial acicular lobes short, rounded in anterior setigers, conical posteriorly; upper notopodial ligules conical, subequal in length to acicular lobes in anterior setigers, greatly enlarged, tapering, much longer than parapodial lobes in posterior setigers; la-teral face of upper notopodial ligules glandular in appearance (Fig. 64 & 65). Dorsal cirri long, slender, extending beyond parapodial lobes in anterior setigers, inserted apically on upper notopodial ligules in posterior setigers. Neuropodia with short, conical presetal and postsetal acicular lobes and short conical ventral neuropodial ligules throughout; ventral cirri narrow, tapered, shorter than dorsal cirri.

Notosetae homogomph spinigers with long thin blades and fine teeth throughout. Upper neurosetal fascicle homogomph spinigers and hetero-gomph falcigers; blades of falcigers short, curved, bearing 2 rows of fine teeth proximally; ventral neurosetal fascicle with heterogomph spinigers and falcigers; blades of spinigers similar to those of notosetae, blades of falcigers dark amber color, contrasting with yellow color of setal shaft (Fig. 66). Single black acicula in each ramous.

Pygidium small, anus terminal with a pair of long robust anal cirri.

Remarks: *P. gallapagensis* may be recognized by the single bar on area VI, the distally inserted dorsal cirris in posterior setigers, and the alter-nating paragnaths of different size on areas VII and VII of the proboscis.

P. gallapagensis is considered cosmopolitan in tropical to temperate coastal regions on rock or coral substrates and has been reported in the eastern Pacific from western Mexico to Chile. The specimens from Costa Rica were collected from shallow water in coral rubble.

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manuscript has corrected many typographical errors and taxonomic mistakes.

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