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REVISION OF *HYDROIDES* GUNNERUS, 1768 (POLYCHAETA: SERPULIDAE) FROM THE WESTERN ATLANTIC REGION

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ABSTRACT

A taxonomic revision of the *Hydroides* species (Polychaeta: Serpulidae) from the Western Atlantic Region is presented. Twenty-six taxa are described, including a comparison between four species with 'winged' verticil spines: *Hydroides alatalateralis*, *H. elegantulus*, *H. floridanus* and *H. spongicola*, between two forms of the *H. mongeslopezi* complex, and between two forms of the *H. brachyacanthus* complex. Three widespread species are recorded: *H. dianthus*, *H. diramphus* and *H. elegans*. Five new forms are recorded, including one with 7-9 thoracic chaetigers. Three species are newly described: *H. lambecki* n. sp., *H. similoides* n. sp. and *H. salazarvallejoi* n. sp. Seven specific names are placed into synonymy: *H. abbreviatus* Krøyer [in] Mörch, *H. benzoni* Mörch, *H. decorus* Treadwell, *H. dianthoides* Augener, *H. dunkeri* Mörch, *H. hexagonus* Bosc and *H. serratus* Bush. A glossary, standard terminology and a key to all species from the Western Atlantic region are given.

Key words: Caribbean, Gulf of Mexico, key, new species, Serpulinae, South America, standard diagnosis

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INTRODUCTION

Among polychaetes, the Serpulidae Rafinesque, 1815 are easily recognized by their calcareous tube and the presence of an operculum. Their body is divided in two regions by the chaetal inversion: in the thorax chaetae are situated dorsally, uncini ventrally, in the abdomen this pattern is reversed. Furthermore, the anterior region is marked by the projection of the thoracic membranes.

Serpulids have a branchial crown, with a double function: feeding and respiration. The operculum may block the tube when the animal is disturbed (Ten Hove, 1984). Almost all serpulid tubes are attached to hard substrates as rocks, corals, mollusk shells and crustacean carapaces (Ten Hove & Wolf, 1984). Some serpulids are commonly called 'Christmas Tree Worms' or 'Marine Flowers', due to their branchial crown, with one to seven brightly coloured whorls.

The Sabellidae Johnston, 1846 form the sister group of the serpulids, sharing the chaetal inversion and the branchial crown. Serpulids have two autapomorphies: the thoracic membranes and a calcareous tube of aragonite, calcite or a mixture of both. Only one sabellid genus, *Calcisabella* Perkins, 1991, has a calcareous tube, but its construction is different, consisting of a calcareous matrix including sand grains (Perkins, 1991).

Within the Serpulidae, *Hydroides* Gunnerus, 1768 is the most diverse genus with over 80 species recognized. Its operculum consists of two concentric funnels, autapomorphic for the genus. In comparison with two closely related genera, *Serpula* Linnaeus, 1758 and *Crucigera* Benedict, 1887, *Hydroides* has a more complex operculum, useful to distinguish the species (Pillai, 1972, Ten Hove & Jansen-Jacobs, 1984, Ten Hove, 1990).

Most species of *Hydroides* are found in tropical and subtropical waters, although there are a few species in temperate and cold waters. The bathymetrical distribution of the species is essentially limited to shallow shelf depths, exceptionally down to 830 m (*H. heterocerus*, Ilan et al., 1994), although there is a doubtful record of *H. azoricus* Zibrowius, 1972c from 1360 m. The species are not homogeneously distributed over the different biogeographical regions: most species have been described from the Indo-Pacific (42 species, 52%), followed by the Western Atlantic (15, 19%) and the Eastern Atlantic (including Mediterranean, 13, 16%). The Eastern Pacific appears to be the least diverse region with only nine species (11%). Also, there are at least four widely distributed species, *H. elegans* (Haswell, 1883), *H. diramphus* Mörch, 1863, *H. dianthus* (Verrill, 1873) and *H. ezoensis* Okuda, 1934. *Hydroides brachyacanthus* Rioja, 1941a (reported from the Mexican Pacific, Caribbean, Eastern Mediterranean, Australia and Hawaii) poses a problem; so far we have not been able to define whether this is a widespread (ship-transported) species, or a complex of different species. For the time being we treat it as a species-complex and have indicated our material with cf. *brachyacanthus*.

Although *Hydroides* is a genus rich in species, knowledge of most species is restricted to taxonomy, and most descriptions are not up to modern standards. Some species, mainly the more widely distributed *H. elegans* and *H. dianthus* mentioned above, received almost all attention with respect to larval development, reproduction, genetics and molecular studies (cf. Kupriyanova et al., 2001). Probably, improving the understanding of remaining species will provide the base-line for new studies in other research fields.

HISTORICAL REVIEW

Hydroides was erected by Gunnerus (1768), with *H. norvegicus* Gunnerus, 1768 as the type species.

Later, Philippi (1844) established *Eupomatus* for those species that have verticil spines without lateral spinules, with *E. uncinatus* Philippi, 1844 as the type species. *Hydroides* was thus maintained for those species that have lateral spinules.

Mörch (1863) was the first to revise the serpulids, including the genus *Hydroides*. He described five species from different regions and erected the subgenus *Eucarphus* for those species whose spines have distal lateral processes, with *H. cruciger* Mörch, 1863 as the first species, of which he states that it is different from the other *Eucarphus* species by its cross-shaped (Danish 'korsdannede') spines. De Quatrefages (1866) erected *Polyphragma* for *E. uncinatus*. Bush (1905, 1910) described five species from the Western Atlantic and Eastern Pacific; she proposed *Glossopsis* for *Serpula minax* Grube, 1878, to recognize the asymmetrical arrangement of the verticil spines, and *Schizocraspedon* for *Serpula furcifera* Grube, 1878, because of its peculiar operculum in which radii and spines are similar, long and thin with two or three bifurcations.

Pixell (1913) described two species, reviewed *Hydroides* and *Eupomatus*, and regarded *Glossopsis* and *Eucarphus* to be junior synonyms of *Hydroides*. Rioja (1941a, b, 1942, 1944, 1946, 1958) recorded many, including seven new, species of *Hydroides* from Pacific and Atlantic coasts of Mexico. Rioja (1941b) erected *Olgaharmania* for *H. glandifer* Rioja, 1941a, a peculiar species with a verticil supposedly consisting of a single bulbous spine. However, the general pattern of the operculum is not different from other *Hydroides* species. Upon close inspection the 'single bulbous spine' is a composite of a huge dorsal hooked spine with four smaller verticil spines inserted halfway up, and there is no reason for a separate generic status. In three essays Rioja (1919, 1934, 1947) explored the phylogenetic relationships within the genus *Hydroides*, and its relation to *Crucigera* and *Serpula*.

The names *Eucarphus*, *Glossopsis*, *Olgaharmania*, *Polyphragma* and *Schizocraspedon*, have not be used extensively and their generic status is not justified by apomorphies. On the other hand, *Eupomatus* has been widely used and included up to 23 species (Hartman, 1959). Pillai (1960, 1961, 1971) recorded the serpulid fauna from Sri Lanka, synonymized *Eupomatus* with *Hydroides*, and described six species of *Hydroides*. Later, he proposed a phylogenetic scheme for almost 40 species, in 12 groups, based upon the opercular form (Pillai, 1972). Apparently, he did not have access to the Western Atlantic literature and largely missed the species of this region. Straughan (1967a, b) recorded many species from Eastern Australia, among which five were new to science.

Zibrowius (1968, 1971, 1972a, c, 1973a) exhaustively reviewed species mainly from the Eastern Atlantic, including nine new species from this region, and two more from the Banda Sea (Indonesia) and the Yellow Sea (China); he recognized a single genus, *Hydroides* and clarified the taxonomic status of many species. Uchida (1978) proposed *Protohydroides* for *H. elegans*, based on the apparent absence of the verticil in some specimens and on collar chaetae with more than two or three teeth. However, the verticil of *H. elegans* is very easily lost, and Ten Hove (1984) showed that the collar chaetae in *Hydroides* (and in related *Serpula*) show a complete morphological cline from one to many teeth. Uchida's two 'distinguishing' characters are not distinguishing at all and *Protohydroides* has no viable basis.

Imajima (1976a, b, 1978, 1982) reviewed the species from Japan and Micronesia, describing three new species. Later, Imajima & Ten Hove (1984, 1986, 1989) added two more species, one from Japan and the other from the Solomon Islands. Chen & Wu (1978, 1980) and Wu & Chen (1981) described six new species from China. Ten Hove & Jansen-Jacobs (1984) proposed standard methods for the study of serpulids, based principally on the variation in *Crucigera*, *Serpula* and *Hydroides*. Ten Hove (1990) proposed a standardized nomenclature for the *Hydroides* operculum and described a new species. Bailey-Brock (1991) described a new species (from Hawaii), however the absence of a funnel makes its attribution to *Hydroides* debatable. In their study of the serpulids from the South China Sea, Fiege & Sun (1999) included eight species of *Hydroides* and were the first to illustrate some with SEM microphotographs.

For almost 200 years - *Hydroides* was erected by Gunnerus in 1768 - the number of described species in *Hydroides* increased more or less gradually. However, between 1967 and 1991 (25 years) the number of species almost doubled (Fig. 1).

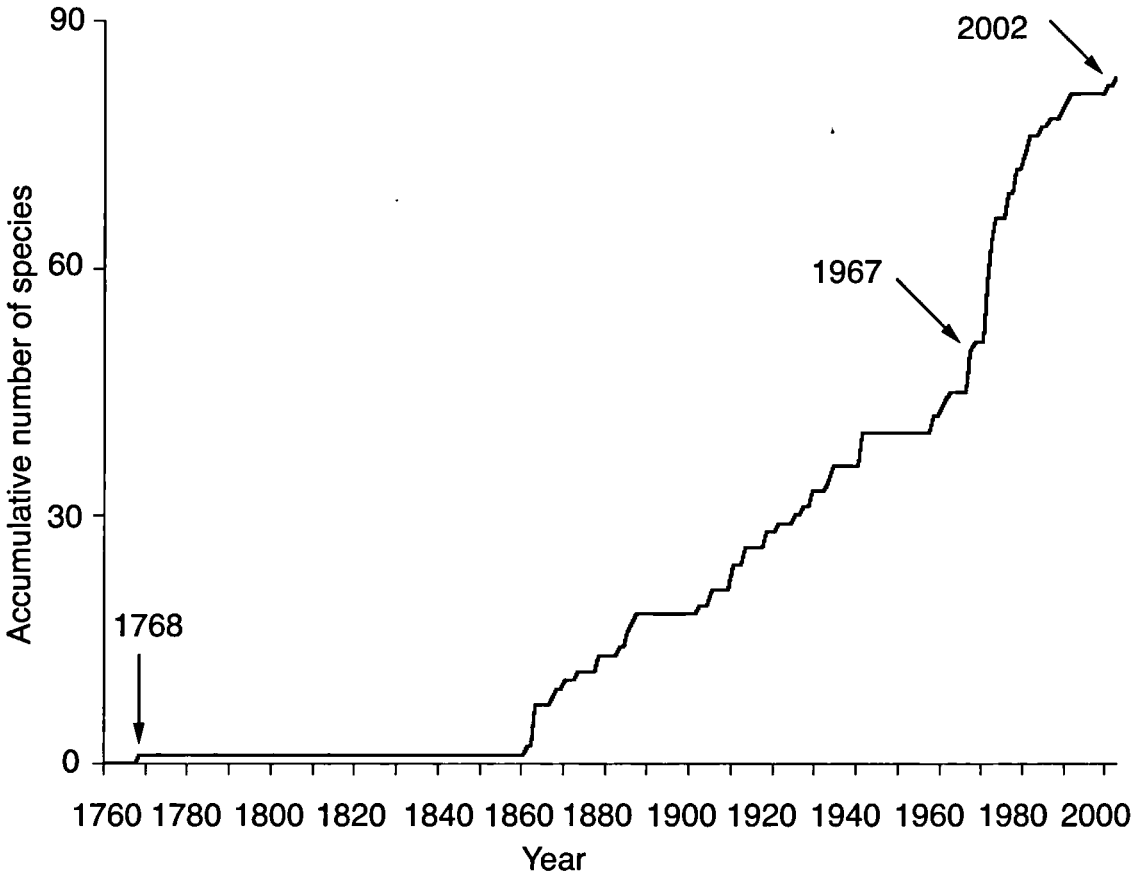

Fig. 1. Accumulative number of *Hydroides* species described.

Nevertheless, the graph still is far from asymptotic, indicating that perhaps many more species remain to be discovered. The most recent descriptions of new species (two) are by Sun & Yang (2000) and by Bastida-Zavala & de León-González (2002), from the South China Sea and Western Mexico respectively.

Many taxonomic problems exist, descriptions are incomplete, and long and complex lists of synonyms are indicative of confused identifications (Ten Hove & Jansen-Jacobs, 1984). The aim of this paper is to review the species of *Hydroides* from the Western Atlantic region.

METHODS

This study includes material from the Western Atlantic Ocean, from Martha's Vineyard (Massachusetts), U.S.A. to Puerto Madryn, Argentina (Fig. 2). We studied type material as far as available to us. Specimens of *Hydroides* were studied in a standardized way, following the suggestions of Ten Hove & Jansen-Jacobs (1984) and Ten Hove (1990). Most specimens were collected from hard substrates as rocks or shells. In Table 1 a checklist of *Hydroides* from the Western Atlantic region is presented. The order of the species is strictly alphabetical.

The arrangement for each species in the taxonomic account follows the next sections:

SYNONYMS. - In each species we mention the original reference and type locality. Additional references are included if presenting better descriptions and/or figures, and/or relevant distributional records in the same biogeographical area, and/or giving some other important data as a good description of reproduction, embryology

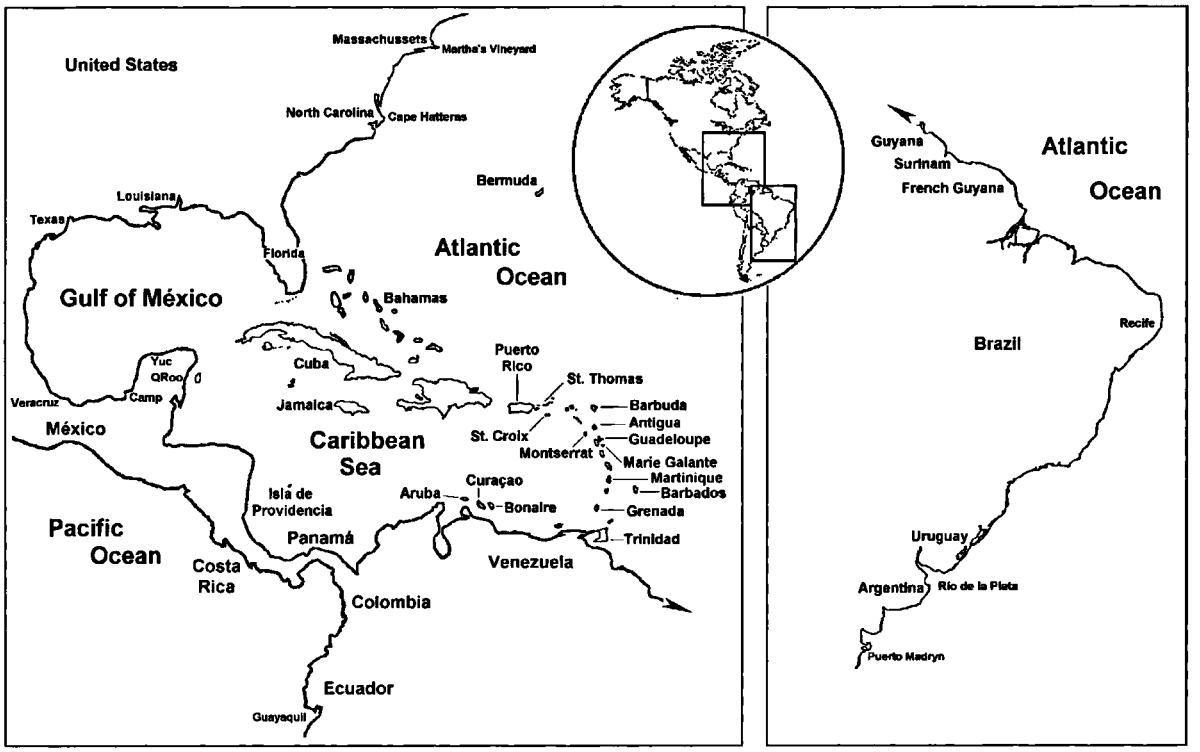

Fig. 2. Study area. The Western Atlantic region with geographical names mentioned in text (abbrevations: Camp= Campeche, Yuc=Yucatán, Qroo=Quintana Roo).

or settling. Such additional references only include material that in our opinion unquestionably belongs to the taxon involved.

MATERIAL. - The number of specimens per locality is one, unless mentioned otherwise. When giving new distributional records, sometimes specimens "not studied in detail" have been included, if of certain identification.

DESCRIPTION. - This section has subsections that correspond to different structures: tube, colour and size, branchial crown, peduncle, operculum, collar chaetae, number of chaetigers and chaetae of the thorax and abdomen. Colour notes, unless mentioned otherwise, have been taken from preserved material. Characters of the operculum have been observed in lateral and apical views, radii and spines have been counted, recording number and form of all spinules, internally, laterally or externally. If verticil spines were closely compressed, applying pressure at the base of the verticil will separate them and study of interior elements becomes possible. When specimens were plentiful, a longitudinal section of the operculum was made.

In order to study chaetae and uncini, thoracic and abdominal parapodia were pulled out and mounted in semi-permanent preparations. We routinely checked if thoracic membranes formed an apron; it may be short and difficult to find but is always present in our opinion. Thoracic and abdominal chaetigers were counted.

Because it is very difficult or impossible to discover in preserved material if a specimen is sexually mature, the *Hydroides* 'juveniles' are arbitrarily defined as specimens whose thoracic width is smaller than half of the maximal width (cf. Ten Hove & Jansen-Jacobs, 1984). Statistics are given for non-'juvenile' specimens only. To avoid loss of information, values observed in 'juveniles' have been given between parentheses next to the range.

The notation in the diagnosis is slightly modified with respect to the proposal of Ten Hove & Jansen-Jacobs (1984) as follows: opercular spines (n=9, r:(17)26-42, μ=32.6±5.6). Measurements were taken with a millimetre ruler. Scales of fig-

Table 1. Checklist of *Hydroides* from the Western Atlantic Region.

H. alatalateralis (Jones, 1962)
H. bispinosus Bush, 1910
H. cf. *brachyacanthus* Rioja, 1941
H. dianthus (Verrill, 1873), including *H. hexagonus* Bosc, 1802; (partim) *H. dianthoides* Augener, 1922
H. diramphus Mörch, 1863, including *H. benzoni* Mörch, 1863 and *H. serratus* (Bush, 1910)
H. elegans (Haswell, 1883), including *H. abbreviatus* Mörch, 1863
H. elegantulus (Bush, 1910)
H. floridanus (Bush, 1910), including *H. decorus* Treadwell, 1931
H. gairacensis Augener, 1934, including *H. dunkeri* Mörch, 1863
H. lambecki n. sp.
H. microtis Mörch, 1863
H. mongeslopezi Rioja, 1958
H. mucronatus Rioja, 1958
H. cf. *mucronatus* Rioja, 1958
H. cf. *operculatus* (Treadwell, 1929)
H. parvus (Treadwell, 1902)
H. plateni (Kinberg, 1867)
H. protulicola Benedict, 1887
H. salazarvallejoi n. sp.
H. sanctaecrucis Krøyer [in] Mörch, 1863, including (partim) *H. dianthoides* Augener, 1922
H. similoides n. sp.
H. spongicola Benedict, 1887
Hydroides sp. 1
Hydroides sp. 2
Hydroides sp. 3
Hydroides sp. 4

Invalid names in the region:

H. abbreviatus Krøyer [in] Mörch, 1863, senior synonym of *H. elegans*, nomen oblitum
H. benzoni Mörch, 1863, junior synonym of *H. diramphus*
H. decorus Treadwell, 1931, junior synonym of *H. floridanus*
H. dianthoides Augener, 1922, partim junior synonym of *H. sanctaecrucis* and of *H. dianthus*
H. dunkeri Mörch, 1863, senior synonym of *H. gairacensis*, to be suppressed
H. hexagonus (Bosc, 1802), indeterminable, but later records probably see *H. dianthus*
H. serratus (Bush, 1910), Bermuda, junior synonym of *H. diramphus*

ures and measurements in text are in millimetres, unless indicated otherwise. Discrepancies between numbers counted within a given character of a species are due to the fact that it is not always possible to count all characters in every single specimen; for instance in *H. alatalateralis* the number of radioles has been counted in 13 specimens, but terminal filaments could be observed in 14 specimens.

TAXONOMIC CHARACTERS. - The two concentric funnels of the *Hydroides* operculum are usually called funnel, basally, with radii and verticil, distally, with spines. The operculum is the primary structure with useful characters for the identification of the species. The number of radii and spines, and especially the shape of the latter, are important for the diagnosis of each species. Bayonet chaetae are a less specific character, but in combination with the operculum, are often useful for the separation of species (Ten Hove & Jansen-Jacobs, 1984). Verticil spines may be of same size and shape (Fig. 4H), or widely differing (Figs. 4F, G).

The verticil spines can be entirely smooth or have internal, lateral and/or external spinules; these spinules may be located basally, in half position of the spine or distally; they can be long or short, unique or multiple (Figs. 4E, G, H). In some species verticil spines show 'wings' (lateral

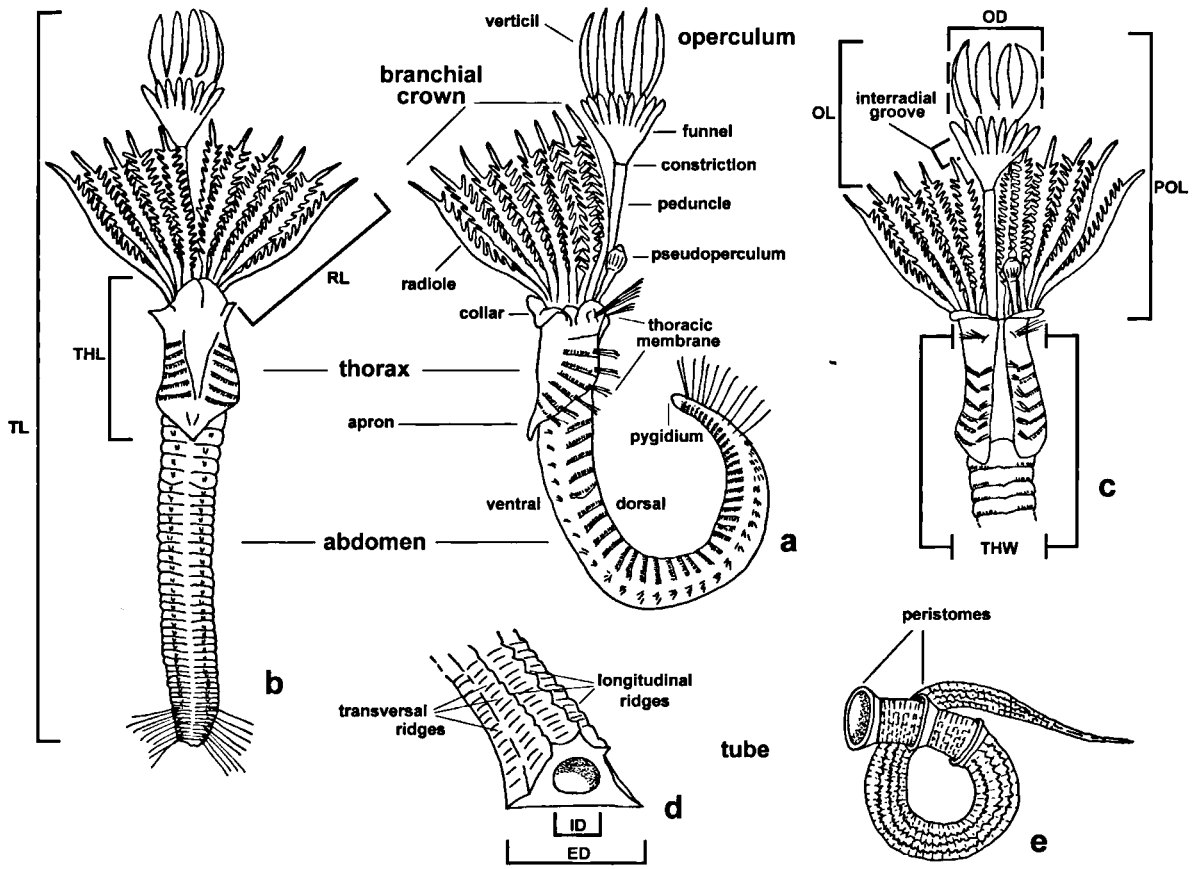

Fig. 3. Standardized terminology for *Hydroides*. A-C, body. D-E, tubes (for abbreviations see text).

projections), or a lateral flat expansion distally, or a subdistal knob (Figs. 4E-G). The central disk may or may not bear one tooth (Figs. 4E, G). The funnel radii may have differently shaped tips (Figs. 4E-H); groove length, a relative measure (Fig. 3C), may be useful to characterize some species. The bayonet chaetae show several states in number, shape and size of the teeth, presence or absence of a proximal rasp and/or small teeth in the distal blade (Figs. 4I, J).

Species are compared by morphometric analyses, as recommended in previous work (Ten Hove & Jansen-Jacobs, 1984; Bastida-Zavala & Salazar-Vallejo, 2001a): width of thorax, length of radioles and peduncle, and numbers of radioles, radii and spines (Figs. 9, 19, 31).

MEASUREMENT AND OBSERVATIONS OF BODY. - The following measurements and observations have been made routinely (Figs. 3, 4):

BODY

Total length: from most distal part of operculum to and including pygidium (Fig. 3B). Coiled specimens (Fig. 3A), have been stretched out.

Thoracic length: in ventral view, from posterior edge of apron to the anterior edge of collar (Fig. 3B).

Thoracic width: this more rigid body part has been measured over the ventral side of the collar region (Fig. 3C).

Radiolar length: the longest dorsal radiole, from base of branchial crown to tip (Fig. 3B).

Number of thoracic chaetigers: most *Hydroides* species have seven thoracic chaetigers (Fig. 3A), but some have more (Imajima & Ten Hove, 1984; Bailey-Brock, 1991; Ten Hove & Perkins, in prep.).

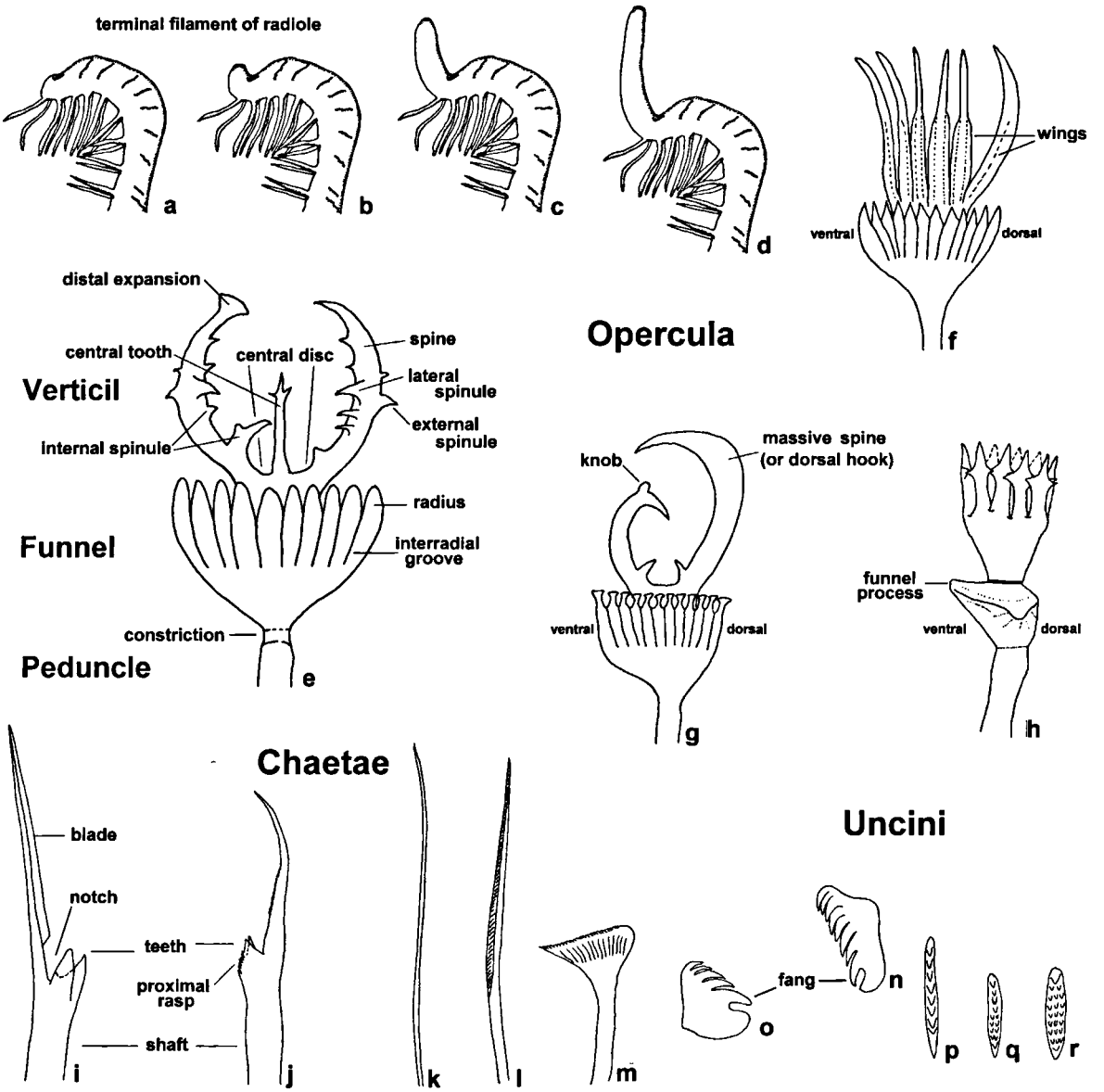

Fig. 4. Standardized terminology. Length of terminal filament: A, none. B, short. C, long. D, very long. E-H, schematic opercula. I-M, chaetae. I-J, bayonet chaeta. K, hooded (capillary) chaeta. L, thoracic hooded (limbate) chaeta. M, abdominal flat-trumpet chaeta. N-R, uncini. N, thoracic uncinus (lateral view). O, abdominal uncinus (lateral view). P, saw-shaped uncinus (frontal view). Q, uniseriate-biseriate uncinus (frontal view). R, rasp-shaped uncinus (frontal view).

Number of abdominal chaetigers: sometimes difficult to count, especially near the pygidium (Fig. 3A). Ten Hove & Jansen-Jacobs (1984) recorded an error of 10% for their counts; older literature may just give estimated numbers, with an error of up to 30% (Ten Hove, unpubl.). Using lateral light, it is possible to reduce the error to less than 5% with well preserved specimens, as calculated from repeated counting by four colleagues with 10 replicates (specimens) each.

Number of radioles: radioles in each half of the crown (Fig. 3B). Although all specimens should show a pseudoperculum (Fig. 3A), we always checked.

Terminal filament length: recorded as none, short, long or very long (Figs. 4A-D), relative to the length of the nearest pinnules; it is 'short' when the terminal filament is shorter than the pinnules and it is 'long' if it is longer than the

pinnules. 'Very long' means a length of twice the pinnules or longer.

Peduncular insertion: either left or right, or (exceptionally) at both sides of the branchial crown (Fig. 3C).

TUBE

Diameter: internal and external diameter of distal part of tube perpendicular to substrate. This measurement does not include any epibiotic layer (Fig. 3D).

Peristomes and transversal ridges: presence or absence of peristomes and transversal ridges (Figs. 3D, E). All peristomes in the present material are annular and not flaring like in *Ficopomatus* spp.

Longitudinal ridges: number of longitudinal ridges (Fig. 3D); to observe these, epibionts, if any, must be removed, which is not always possible without damaging the tube.

OPERCULUM

Peduncle-operculum length: measured from the insertion of peduncle to the most distal part of verticil spine (Fig. 3C).

Opercular length: measured from the base of funnel, or constriction, if present, to the most distal part of verticil spines (Fig. 3C).

Opercular diameter: measured across the widest (distal) part of the funnel, in the dorso-ventral axis (Fig. 3C).

Length of grooves: the length of the groove (interradial) relative to the distance to the constriction or natural inflexion (Fig. 3C).

Operculum colour: colour and pattern of colouration in funnel and verticil.

Funnel radius or process: most *Hydroides* species have funnel radii (Figs. 4E-G), but some species (e.g. *H.* cf. *mucronatus*) have triangular or globular processes (Fig. 4H).

Number of funnel radii or processes: in previous studies, a 10% error for the number of radii is recorded (Ten Hove & Jansen-Jacobs, 1984); with help of a Petri dish full of small glass spheres to immobilize the operculum, the error can be reduced to almost 0. When radii were many, counts were repeated.

Shape of tip of radius: for the Atlantic species there are three main states: pointed (Fig. 4F), blunt (Fig. 4E) and T-shaped (Fig. 4G).

Number of verticil spines: counted more easily in apical view (Figs. 4E, F).

Distal expansion of spines: tip of spines may be more or less spherical or have lateral projections (Fig. 4E).

Spines curvature: inward, outward, straight or a combination of these curves (Figs. 4E, F).

Dorsal larger spine: presence or absence of one or more larger dorsal verticil spine(s) or hook(s) (Fig. 4G); when there is only one, it may occupy the central part of the verticil.

Internal spinule: presence and number of internal medial spinules, localized in basal and/or halfway position (Fig. 4E). Ten Hove (1990) used the expression basal tubercle for the internal spinules in basal position; we regard it to be homologous with other internal spinules.

External spinule: presence and number of external spinules (Fig. 4E).

Number of lateral spinules or wings: presence and number of lateral spinules (Fig. 4E); or, in absence of these, presence or absence of wings (Fig. 4F).

Symmetry of lateral spinules: if symmetrically arranged, number of symmetric lateral spinules (Fig. 4H).

Central tooth: presence or absence of central tooth (Fig. 4E) and, if present, shape of this tooth.

CHAETAE AND UNCINI

Bayonet chaetae: with two main types: 1) basal boss with one to three heavy teeth (Fig. 4I), 2) basal boss with several main teeth and well developed proximal rasp (Fig. 4J). Shape and size of the main teeth are recorded as: blunt-short, blunt-rounded, blunt-elongate, pointed-short, pointed-elongate, blunt-elongate and curving outwards. At least part of these states may be caused by erosion of the chaetae in the tube and/or differences in age.

Hooded (capillary) chaetae (Fig. 4K): not always mentioned in existing descriptions. We routinely checked if 'capillaries' were present in the collar bundle and always found them.

Hooded (limbate) chaetae (Fig. 4L): as above, not always mentioned in the literature, routinely checked by us and always present in two sizes.

Abdominal flat-trumpet chaetae: record of symmetry of flat-trumpet-shaped chaetae (Fig.

4M). Apparently all specimens show asymmetrical flat-trumpet chaetae, proximal tooth larger than remaining teeth. Nevertheless, to make certain, we always checked.

Abdominal capillary: presence or absence of capillary chaetae in posterior abdomen (Fig. 3A).

Thoracic uncinus: saw or rasp-shaped uncini in the fourth chaetiger (Figs. 4N, P).

Anterior abdominal uncinus: saw or rasp-shaped uncini in anterior abdominal chaetiger (Figs. 4O, Q).

Posterior abdominal uncinus: saw or rasp-shaped uncini in posterior abdominal chaetiger (Fig. 4R).

GLOSSARY

A standard description or characterization should use an equally standardized terminology. A glossary is therefore provided.

Essentially adapted from Fauchald (1977), Ten Hove & Jansen-Jacobs (1984) and Glasby et al. (2000), this terminology also contains terms exclusive to *Hydroides*.

Apomatus chaetae: chaetae of overall sickle shape, with a basal limbate zone and distal zone with fine rectangular teeth.

Apron: thoracic membranes joined ventrally past the last thoracic chaetigers.

Bayonet chaetae: special chaetae in first thoracic chaetiger: collar chaetae (Fig. 4j).

Biramous: parapodium consisting of two (chaetae bearing) parts, neuro- and notopodium.

Blade: distal, seemingly flat portion of a chaeta (see, however, hooded (capillary) chaetae).

Branchial crown: consisting of two lobes, each with a number of (branchial) radioles bearing pinnules.

Capillary chaetae: see preferred term hooded (capillary) chaetae.

Chaetiger: segment bearing chaetae.

Collar segment: first chaetiger, with an anterior encircling fold or flap covering the base of the branchial crown. Usually longer than other thoracic chaetigers; uniramous, lacking uncini.

Constriction: narrowing of the opercular peduncle, at funnel basis.

Fang: anterior tooth of uncinus, if pointed.

Flat-trumpet chaeta: chaeta with a terminal thin flat sheet with small teeth on its edge.

Funnel: proximal part of the operculum, inverted cone-like.

Hooded (capillary) chaetae, hooded (limbate) chaetae: type of thoracic chaetae, stiff, elongate, narrowly hooded and tapering (formerly called 'limbate'), or slender, elongate, very narrowly hooded and tapering (formerly called 'capillaries'). These chaetae consist of densely packed fibrils; distally they seem to have a limbus or blade, which on close inspection is an outer layer where the fibrils are packed less tightly than in the central axis (or shaft), enveloping 1/2 to 2/3 of the axis.

Interradial groove: groove on funnel outside, marking radius insertion.

Neuropodium (pl. neuropodia): ventral part of a parapodium.

Notopodium (pl. notopodia): dorsal part of a parapodium.

Operculum (pl. opercula): tip of modified radiole that serpulids use to plug their tubes when the worm is retracted.

Parapodium (pl. parapodia): fleshy lateral projection from a body segment which usually bears chaetae.

Peduncle: modified radiole, supporting the operculum.

Peristome: collar-like widening of tube around (former) mouth.

Pinnules: small side branches of the radioles, giving each radiole a feathery appearance.

Pseudoperculum (pl. pseudopercula): modified radiole (generally the second dorsal one), generally without pinnules, which in case of loss of the functional operculum can develop into a functional one.

Pygidium: post-segmental terminal body-part surrounding the anus.

Radioles: pinnulate filaments of branchiae used for respiration and feeding.

Radius (pl. radii): radial projection of the funnel.

Rasp uncinus: uncinus with two (biseriate) or more rows of teeth (multiseriate).

Saw uncinus: uncinus with only one row of teeth (uniseriate).

Shaft: proximal part of chaeta.

Spinule: each of the tubercular or tooth-like projections of a spine. By their position relative to

the axis, spinules may be internal, lateral or external. By their position along the spine they may be proximal, medial or distal.

Thoracic membranes: thin fold extending at both sides of thorax, from dorsal part of collar to lateral and/or ventral side of posterior thorax.

Torus (pl. tori): transverse elevation of parapodium surrounding the uncini.

Transversal ridge: annular elevation of tube, less pronounced than peristome.

Trumpet chaetae: abdominal chaetae formerly thought to be hollow (like a trumpet; in French 'soies en calice comprimé'); however, more recently proven to be flat, not hollow at all. See preferred term flat-trumpet chaetae.

Unciniger: segment carrying uncini.

Uncinus (pl. uncini): deeply embedded chaeta with only its dentate edge protruding from the body wall; uncini usually arranged in tori, elevated rows transverse to the axis of the animal.

Uniramous: parapodium with only one (chaetae bearing) part.

Verticil: distal part of operculum.

Verticil spine: any of the radial elements, generally around a central disc, together forming the verticil.

Wing: lateral and flat expansion of verticil spine.

ABBREVIATIONS

The following abbreviations are used in the text:

Institutes

AMNH	American Museum of Natural History, New York
BMNH (ZB.)	collection number of the MNH, formerly British Museum of Natural History, London
CP-ICML-UNAM	Universidad Nacional Autónoma de México, México City
ECOSUR (Serp.)	Reference Collection, El Colegio de la Frontera Sur, Chetumal, Mexico (collection)
ICZN	International Code of Zoological Nomenclature
IOC	Instituto de Oceanología, Cuba
LACM-AHF	Los Angeles County Museum of Natural History, Allan Hancock Foundation
MNH	Museum of Natural History of London
MNHN	Museum national d'Histoire naturelle, Paris
RMNH	Rijksmuseum voor Natuurlijke Historie, Leiden (presently Naturalis)
UANL	Universidad Autónoma de Nuevo León, Mexico
UMML	Marine Invertebrate Museum, Rosenstiel School of Marine and Atmospheric Science, University of Miami
USNM	US National Museum of Natural History, Washington D.C.
YPM	Peabody Museum of Natural History, Yale University, New Haven, Connecticut
ZMA (V. Pol.)	Zoölogisch Museum, Universiteit van Amsterdam (collection)
ZMH (V.)	Zoologisches Museum und Institut, Hamburg (collection)
ZMK	Zoologisk Museum, København

Characters

ED	external diameter of tube
ID	internal diameter of tube
OD	opercular diameter
OL	opercular length
POL	peduncle plus operculum length
RL	radiolar length
THL	thorax length
THW	thorax width
TL	total length of the body

Statistical terms

n	sample size
r	range of data
μ	mean
±	standard deviation

Text (mostly Latin)

cf.	confer (compare with)
don.	donated by
fide	according to (literally: trusting)
legit	collected by
nom. nov.	nomen novum (new name)
partim	partially, in part
s.n.	sine numero (without number)
s.str.	sensu stricto (in the strict sense)
syn.	synonymous
unpubl.	unpublished
vs.	versus (in opposition)
w/o	without

KEY TO WESTERN ATLANTIC SPECIES OF *HYDROIDES*

1 a. Verticil spines with lateral spinules (e. g. Figs. 12A, B, 16A-C) 2
b. Verticil spines with expanded tips (e.g. Figs. 14A-C) 9
c. Verticil spines without lateral spinules, sometimes with wings (e.g. Figs. 7C, 25A, 26A, F) 10

2 (1) a. Verticil spines with only one pair of lateral spinules (e.g. Figs. 12A, B) 3
b. Verticil spines with more than one pair of lateral spinules (e.g. Figs. 16A, E, 37A, C) 5

3 (2) a. Funnel formed by radii; verticil spines curving inwards, pointed tip (e.g. Figs. 11A-D) 4
b. Funnel formed by radii; verticil with straight spines, blunt tip (e.g. Figs. 20A-C) ... *H. mucronatus*
c. Funnel without radii, with 3-6 blunt processes only; verticil with straight spines, blunt tip (e.g. Figs. 21A-C) ..... *Hydroides* cf. *mucronatus*

4 (3) a. Verticil spines abruptly curving inwards, with a pronounced distal knob; radii with pointed tip (e.g. Figs. 12A-C) ..... *H. parvus*
b. Verticil spines curving inwards rather smoothly, without or at most with faint knob; radii with blunt tip (e.g. Figs. 11A-D) ..... *H. bispinosus*

5 (2) a. Verticil spines complex, with many side- and external spinules; dark-brown basally and hyaline distally (e.g. Figs. 16A, B, 18A, C) 6
b. Verticil spines simple, with few side- and without external spinules; colour pattern uniform (e.g. Figs. 35A-E, 37A-D, 38A, B) 7

6 (5) a. Funnel with 17-28 radii; verticil spines with 8-10 lateral spinules and 5-7 external spinules (e.g. Figs. 16A, B, E-G) ..... *H. mongeslopezi*
b. Funnel with 11-14 radii; verticil spines with 2-4 lateral spinules and 3-5 external spinules (e.g. Figs. 18A, C, E) ..... *H. lambecki* n. sp.

7 (5) a. Verticil spines similar in shape and size (e.g. Figs. 35B, E, 37A, C, D) 8
b. Verticil with one dorsal spine larger than the others (e.g. Figs. 38A, B) ..... *Hydroides* sp. 3

8 (7) a. Verticil spines straight or curving outwards (e.g. Figs. 35A-C) ..... *H. elegans*
b. Verticil spines curving inwards (e. g. Figs. 37A-D) ..... *Hydroides* sp. 1

9 (1) a. Verticil spines with rounded tips; bayonet chaetae with two teeth and proximal rasp (e.g. Figs. 14A-D, F, G) ..... *H. microtis*
b. Verticil spines with flat almost T-shaped tips; bayonet chaetae with two teeth, without proximal rasp (e.g. Figs. 34A-D) ..... *H. diramphus*

10 (1) a. Radii with laterally expanded tips, T-shaped (e.g. Figs. 13B, E, F) ..... *H. gairacensis*
b. Radii with blunt or pointed tips (e.g. Figs. 26A-C, 32A, B, D, E, 37P) 11

11 (10) a. Verticil spines straight or curving outwards (e.g. Figs. 26A, D, F, 27B, D, 37P) 12
b. Verticil with at least dorsal - if not all - spines curving inwards (e.g. Figs. 6K, 23A, 25A, C) ... 14
c. Verticil with few straight or outward curving spines, fused to large dorsal hook (e. g. Figs. 32A-G) ..... *H. salazarvallejoi* n. sp

12 (11) a. Funnel with blunt radii (e.g. Fig. 37P) ..... *Hydroides* sp. 2
b. Funnel with pointed radii (e. g. Figs. 26A, F, 27A, D) 13

13 (12) a. Funnel with 26-51 radii, bayonet chaetae with 2-3 teeth, lacking proximal rasp (e.g. Figs. 26C, E, I, K, L) ..... *H. plateni* (partim)
b. Funnel with 16-37 radii, bayonet chaetae with two teeth and proximal rasp (e.g. Figs. 27B, E, F-J) ..... *H. protulicola*

14 (11) a. Dorsal spines curving inwards, ventral spines curving outwards (Figs. 23A, D, 25A, C) 15
b. All spines curving inwards (e.g. Figs. 7C, 26F, 29B, L) 16

15 (14) a. Verticil spines without external spinule and wings (e.g. Figs. 23A, D) ..... *H. dianthus*
b. Verticil spines with external spinule (at least ventral ones) and wings (e.g. Figs. 25A, C-E) ..... *H. sanctaecrucis*

16 (14) a. Verticil spines long and slender, gradually curving inwards (e.g. Figs. 7C, 8A) 17
b. Verticil spines short and thick, strongly curving inwards (e.g. Figs. 29B, L, 30A, K) 22

17 (16) a. Branchial crown with more than 29 pairs of radioles; funnel with 45 - 61 radii (e.g. Figs. 8A, K-M) ..... *H. spongicola*
b. Branchial crown with less than 25 pairs of radioles; funnel with less than 51 radii (e.g. Figs. 6L, 7C-E) 18

18 (17) a. Verticil spines with wings (e.g. Fig. 7C) 19
b. Verticil spines lack wings (e. g. Figs. 26D, 39A) 21

19 (18) a. Internal spinule short, never crossing mid-point of central disc (e.g. Figs. 6B, 7D) 20
b. Internal spinule long, crossing mid-point of central disc (e.g. Figs. 5D, F, G) ..... *H. alatalateralis*

20 (19) a. Wings occupying less than half of the length of the verticil spines (e.g. Figs. 6L, 7C, E) ..... *H. floridanus*

b. Wings occupying more than half the length of the verticil spines ..... *H. elegantulus*

21 (19) a. Funnel with 26-51 radii; verticil with 9-11 spines (e.g. Figs. 26B-F) ..... *H. plateni* (partim)

b. Funnel with 17 radii; verticil with seven spines (e.g. Figs. 39A, B) ..... *Hydroides* cf. *operculatus*

22 (16) a. Radii with pointed tips; verticil with 7-8 spines, one dorsal spine larger than the others (e.g. Figs. 29B, C) ..... *H.* cf. *brachyacanthus*

b. Radii with blunt tip; verticil with 7-8 spines, all spines similar in shape and size (e.g. Figs. 39A-C) ..... *Hydroides* sp. 4

c. Radii with blunt tip; verticil with 11-13 spines, 2-3 dorsal spines larger than the others (e.g. Figs. 30A, H, J) ..... *H. similoides* n.sp.

TAXONOMIC ACCOUNT

The following arrangement of the species is without phylogenetic or systematic significance; it is just for comparative purposes. First, morphologically similar species have been grouped together. Two species with a world-wide distribution and four undescribed species are placed at the end. Cladistic analyses are needed to elucidate the phylogenetic relationship of these species.

Hydroides Gunnerus, 1768

Eupomatus Philippi, 1844: 189.
Eucarphus Mörch, 1863: 371 (partim).
Polyphragma De Quatrefages, 1866: 507.
Glossopsis Bush, 1905: 225.
Schizocraspedon Bush, 1905: 225.
Olgaharmania Rioja, 1941b: 733.
Protohydroides Uchida, 1978: 27.

DIAGNOSIS. - Tube typically with flattened upper surface, with or without transversal ridges, with or without longitudinal ridges, with or without peristomes. Seven thoracic chaetigers, exceptionally eight or nine. Branchial crown in two lobes; radioles arranged in semicircles. Opercular peduncle smooth, without pinnules, wings or horns; operculum consisting of two funnels placed one on top of the other. Proximal funnel usually ending in marginal radii, exceptionally formed by globular processes or absent; distal funnel or verticil formed by chitinous spines. Thoracic membranes forming an apron posteriorly. First thoracic chaetiger or collar uniramous, with bayonet chaetae and hooded (capillary) chaetae. Other thoracic chaetigers biramous: neuropodium with saw-shaped uncini; notopodium with hooded (limbate) chaetae in two sizes. *Apomatus*-chaetae absent. Abdominal neuropodia with flat-trumpet chaetae, which change posteriorly to 'capillaries'; anterior notopodia with saw-shaped uncini, changing posteriorly to rasp-shaped ones.

Hydroides alatalateralis (Jones, 1962)
Figs. 5A-O, 9A-F, 10, Table 2

Eupomatus alatalateralis Jones, 1962: 205-207, figs. 139-146. Type locality: Port Royal, Jamaica.
Eupomatus floridanus sensu Augener, 1925a: 16 (St. Croix, Lesser Antilles). [Non: Bush, 1910].
Hydroides (Eupomatus) floridanus; Augener, 1927: 80 (Curaçao).
Hydroides floridanus; Augener, 1934: 116 (Jamaica).
Hydroides uncinatus sensu Fauvel, 1953: 19 (fide Zibrowius, 1971: 694, Antilles). [Non: Philippi, 1844].
Hydroides alatalateralis; Laverde-Castillo, 1986: 128, 1988: 88 (Colombian Pacific); Bastida-Zavala & Salazar-Vallejo, 2001b: 842-844 (Cuba).

MATERIAL. - Fourteen 'adult' and one 'juvenile'specimen.
CUBA: IOC 6 (Bahía Vita, Provincia de Holguín, NE Cuba, 21-IV-1988, sta. 5).
JAMAICA: AMNH 3617, holotype, and AMNH 3618, paratype (Port Royal, May, 1960).
PUERTO RICO: ECOSUR Serp-32a, as *H. decora* (Joyuda, 30-100 cm, from rocks and boulders on sand, covered by a thin layer of muddy sand, 4-X-1970, legit H.A. Ten Hove, sta. 2133).
MONTSERRAT: UMML 22.666 (British Antilles, near Montserrat, 17°11'N 62°39'W, 20 m, 19-VII-1969, R/V Pillsbury, cruise 6907, sta. 958).
CURAÇAO: ECOSUR Serp-32b, 4 specimens (Sint Jorisbaai, Coral Tabak, Punta Blanco, 40-60 cm, *Rhizophora*-roots with *Crassostrea* and *Isognomon*, 12-IX-1975, legit H.A. Ten Hove, sta. 75-30. Lagún Blancu, near Awa Blancu, 60-70 cm, on old *Strombus*, *Thalassia*-bed in soft mud, 15-IX-1975, legit H.A. Ten Hove, sta. 75-34 (± 2089)); ZMA V. Pol. 3403, 4 specimens (Spaanse Baai, Barbara Beach, reeflet on sand bottom, *Penicillus*, 4-6 m, 21-V-1970, from corals and

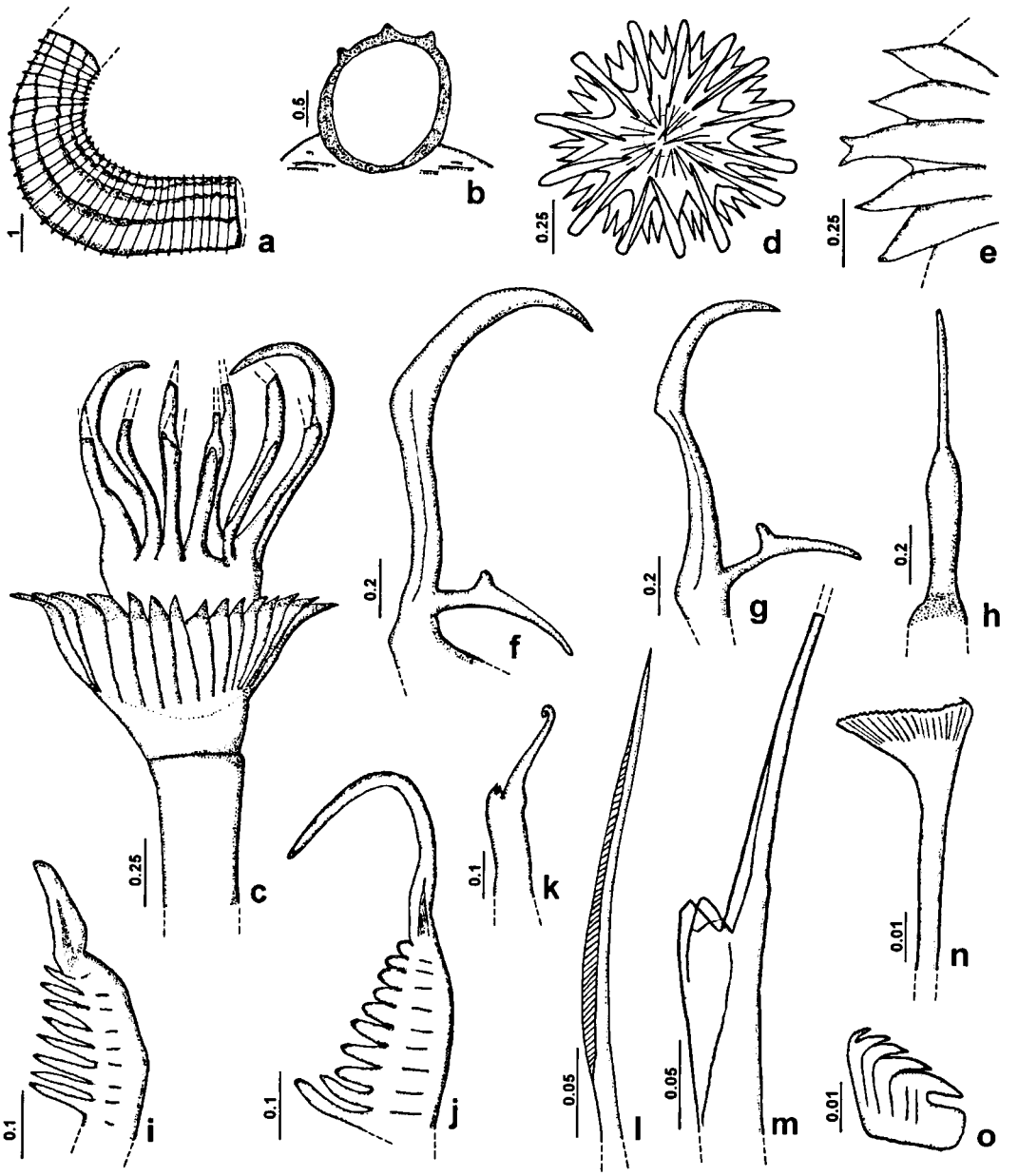

Fig. 5. *Hydroides alatalateralis*. From Curaçao, ZMA V. Pol. 3403: A-B, tube, from above and cross-section. C-D, operculum, lateral and apical view. From Colombia, ZMA V. Pol. 3602: E, detail of funnel, showing radius with split tip. From Curaçao, ZMA V. Pol. 3403: F-G, verticil spines, lateral view. H, same, dorsal view. I-J, tips of radioles, with short respectively long tips. K, M, bayonet chaetae. L, hooded (limbate) chaeta. N, anterior abdominal flat-trumpet chaeta. O, anterior abdominal uncinus.

Pinna, legit H.A. Ten Hove, sta. 2073Aa); ZMA V. Pol. 3456 (Schottegat, legit Boeke, 22-IX-1905).
COLOMBIA, ATLANTIC: ZMA V. Pol. 3602 (Bahía de Cartagena, 1983, legit J. Laverde-Castillo).

DESCRIPTION. - Tube: white, ID=1.7 mm (n=9, r:1.4-2.3, μ=1.7±0.3), ED=2.1 mm (n=9, r:1.6-3.0, μ=2.1±0.4); most tubes fragmentary and/or covered by epibionts, six anterior ends lack peristomes; four tubes have transversal ridges, lacking in the rest; four tubes show three longitudinal ridges (Figs. 5A, B), two show two, and two show none.

Colour and size: body beige. TL=19.9 mm (n=9, r:11-28, μ=19.9±6.9).

Branchial crown: with 17 radioles (n=13, r:(10)13-23, μ=17.3±2.7) left, and 17 right (n=13, r:(10)12-23, μ=17±3.2). RL=3.9 mm (n=13, r:(2.1)2.5-6.0, μ=3.9±1.3). Terminal filament long in 11 specimens (79%, Fig. 5J), short in two (14%, Fig. 5I) and absent in one (7%).

Peduncle: POL=5.5 mm (n=16, r:(3.2)3.3-8.5, μ=5.5±1.4). Insertion left (n=7; 54%), right (n=4; 31%), or at both sides (n=2; 15%); constriction ill-defined in almost all specimens (contrary to Fig. 5C). Pseudoperculum present in nine specimens (69%), not found in four (31%).

Operculum: OL=2.0 mm (n=16, r:(1.3)1.5-2.6, μ=2.0±0.3), OD=1.2 mm (n=16, r:(0.8)0.8-1.7, μ=1.2±0.2). Funnel with 34 radii (n=16, r:(25)26-44, μ=34.5±5.0) with pointed tip, exceptionally with split tip (Fig. 5E). Interradial grooves 1/3 of funnel length in seven opercula, 2/5 in four and 1/2 in three. Verticil with 13 yellowish spines (n=15, r:(8)11-16, μ=13.4±1.4), curving inwards. All spines similar in shape and size (Figs. 5C, D), with pointed tip. Spines with one long basal internal spinule, presenting a knob (Figs. 5F, G); without external or lateral spinules; wings extending for more than half of spine length (n=13; 81%), few specimens with wings occupying half of spine length (n=3; 19%). Verticil without central tooth (Fig. 5D). Two specimens (14%) with two opercula each (both ZMA V. Pol. 3403), in both cases in a different stage of development, but all spines with wings.

Collar chaetae: Bayonet chaetae with two blunt-short teeth, distal blade smooth (Figs. 5K, M); hooded (capillary) chaetae present.

Thorax: THL=3.8 mm (n=13, r:2.5-5.0, μ=3.8±0.8), THW=1.6 mm (n=(0.7)13, r:1.1-2.2, μ=1.6±0.3). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 5L) of two sizes, saw-shaped uncini.

Abdomen: With 92 (n=9, r:77-120, μ=92.4 ±14.1) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 5N). Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Fig. 5O), posterior uncini rasp-shaped.

HABITAT. - Depth: 0.6-20 m, on corals and sponges. Mainly in lagoonal waters.

DISTRIBUTION. - Amphiamerican. Caribbean Sea, Colombian Pacific (Fig. 10).

TAXONOMIC REMARKS. - This species is very similar to *H. elegantulus* Bush, 1910, *H. floridanus* (Bush, 1910) and *H. spongicola* Benedict, 1887. The four species share wings along the verticil spines (Figs. 5H, 7C, E, 8F. The main difference between *H. alatalateralis* and *H. floridanus* is the length of these wings: in the first species more than half of the spine length (Figs. 5F-H, 9F), in *H. floridanus* less than half (Figs. 7C, E, 9F). A further difference is the long basal spinule in the first species (Figs. 5F, G), while it is short in the second (Figs. 7A, B, F), however one 'juvenile' specimen of *H. alatalateralis* (ECOSUR Serp-32b, from Puerto Rico) has a short basal spinule. In other characters both species are very similar. For instance, in *H. alatalateralis* the mean number of radioles was 17, the range of number of radii of 26-44 and the range of number of spines 11-16; in *H. floridanus* the same characters were 19, 29-38 and 10-13, respectively (Figs. 9B-E). These three meristic characters, especially the number of radioles and radii, are higher in *H. spongicola*: 33, 45-61 and 13-18, respectively (Figs. 9B-E). *Hydroides elegantulus* is intermediate between *H. alatalateralis* and *H. floridanus*: wings of more than half of the spine length, short internal spinule, 19 radioles, 32 radii and 11 spines. See 'Taxonomic remarks' of *H. elegantulus*.

The four related species were studied together by Creyghton-Schouten (1980, unpubl.), based upon a hundred or more specimens of each species. She recognized as main differences between *H. alatalateralis* and *H. floridanus* with respect to *H. spongicola*, that the first two species have fewer radioles (10-14 pairs) than *H. spongicola* (about 26 pairs; cf. Fig. 9E). The number of radii is 29-30 in *alatalateralis/floridanus*, about 50 in *spongicola* (cf. Fig. 9B). According to Creyghton-Schouten, the first two species show internal basal spinules with knob (Figs. 5F, G), without such a knob in *H. spongicola* (Fig. 8B); however, in material of *H. spongicola* from Florida studied by us the internal basal spinules did show a knob (Figs. 8N, O), just like in *H. alatalateralis*. Besides this, we can confirm Creyghton-Schouten's observations. *Hydroides spongicola* shows thinner walled tubes (cf. Fig. 8C vs. 5B), and is larger than

Table 2. Main differences between *Hydroides floridanus* and *H. alatalateralis*.

Character	*H. floridanus*	*H. alatalateralis*
Length of wings along verticil spines	< half length	≥ half length
Verticil spines curvature	smooth (Fig. 7a)	with angle (Fig. 5f)
Verticil	zygomorph	radially symmetrical
Peduncle insertion to funnel	eccentric, dorsal	centric
Length of basal internal spinule	≤half diameter of central disc	> half diameter of central disc

the other species (Fig. 9A). We disagree with Creyghton-Schouten's observation that *H. spongicola* does not show wings along the verticil spines, in some of our specimens such wings were present (Figs. 8F, G). For further differences between *H. alatalateralis* and *H. floridanus* see taxonomic remarks with the latter and Table 2.

One other Caribbean species, *H. sanctaecrucis*, sometimes shows wings in its verticil spines, but the pattern is different: dorsal spines curving inwards and ventral ones curving outwards (Figs. 25A, C, E, F). A further difference is the external spinule of the spines of *H. sanctaecrucis* (Figs. 25A, C-F).

Hydroides elegantulus (Bush, 1910)
Figs. 6A-J, 9A-F, 10

Eupomatus elegantulus Bush, 1910: 497-498, without figures. Type locality: Bermuda.
Hydroides elegantula; Zibrowius, 1971: 695.
Hydroides elegantulus; Day, 1973: 134.

MATERIAL. - BERMUDA: YPM 1323, not studied in detail (paratype, A.E. Verrill & party), ZMA V. Pol. 4536 (St. George's Bay, between Nonsuch and Castle Island, algae on rocks, 0-5 m, 14-IV-1951, Président Théodore Tissier, sta. 231).

DESCRIPTION (based on non-type specimen only). - Tube: white, ID=1.9 mm, ED=2.5 mm; mostly fragments, lacking peristomes and/or transversal ridges; three longitudinal ridges are present.

Colour and size: body beige. TL=13.5 mm.

Branchial crown: with 19 pairs of radioles. RL=3.0 mm. Terminal filament long.

Peduncle: POL=5.0 mm. Insertion left; constriction very ill-defined (Fig. 6A). Pseudoperculum not observed.

Operculum: OL=1.6 mm, OD=1.0 mm. Funnel with 32 radii with pointed tip (Figs. 6A, B). Interradial grooves 2/5 of funnel. Verticil with 11 yellowish spines, curving inwards (Figs. 6A, B). All spines similar in shape, with pointed tip; dorsal spines somewhat longer. Spines with one short basal internal spinule; without external and lateral spinules; wings extending for more than half of spine length. Verticil without central tooth (Fig. 6B).

Collar chaetae: bayonet chaetae with two blunt-short teeth (Fig. 6C), distal blade smooth; hooded (capillary) chaetae present.

Thorax: THL=3.5 mm, THW=1.5 mm. Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Figs. 6D, E), saw-shaped uncini (Fig. 6F).

Abdomen: with 90 chaetigers. All abdominal chaetigers with flat-trumpet chaetae (Figs. 6G, I); 'capillary' chaetae not observed posteriorly. Anterior uncini saw-shaped (Fig. 6H), posterior uncini rasp-shaped (Fig. 6J).

HABITAT. - Depth: 0-5 m, on algae and rocks.

DISTRIBUTION. - Only known from Bermuda (Fig. 10).

TAXONOMIC REMARKS. - The characters of the two specimens we studied were more in accordance with *H. alatalateralis* than with *H. floridanus*, but somewhat intermediary. A decision whether or not the two taxa are synonymous can be taken only on the basis of more material from Bermuda. It might lead to the conclusion that the name *elegantulus* should have precedence over *alatalateralis*.

Hydroides floridanus (Bush, 1910)
Figs. 6K-P, 7A-F, 9A-F, 10, Table 2

Eupomatus Floridanus Bush, 1910: 498, nom. nov.

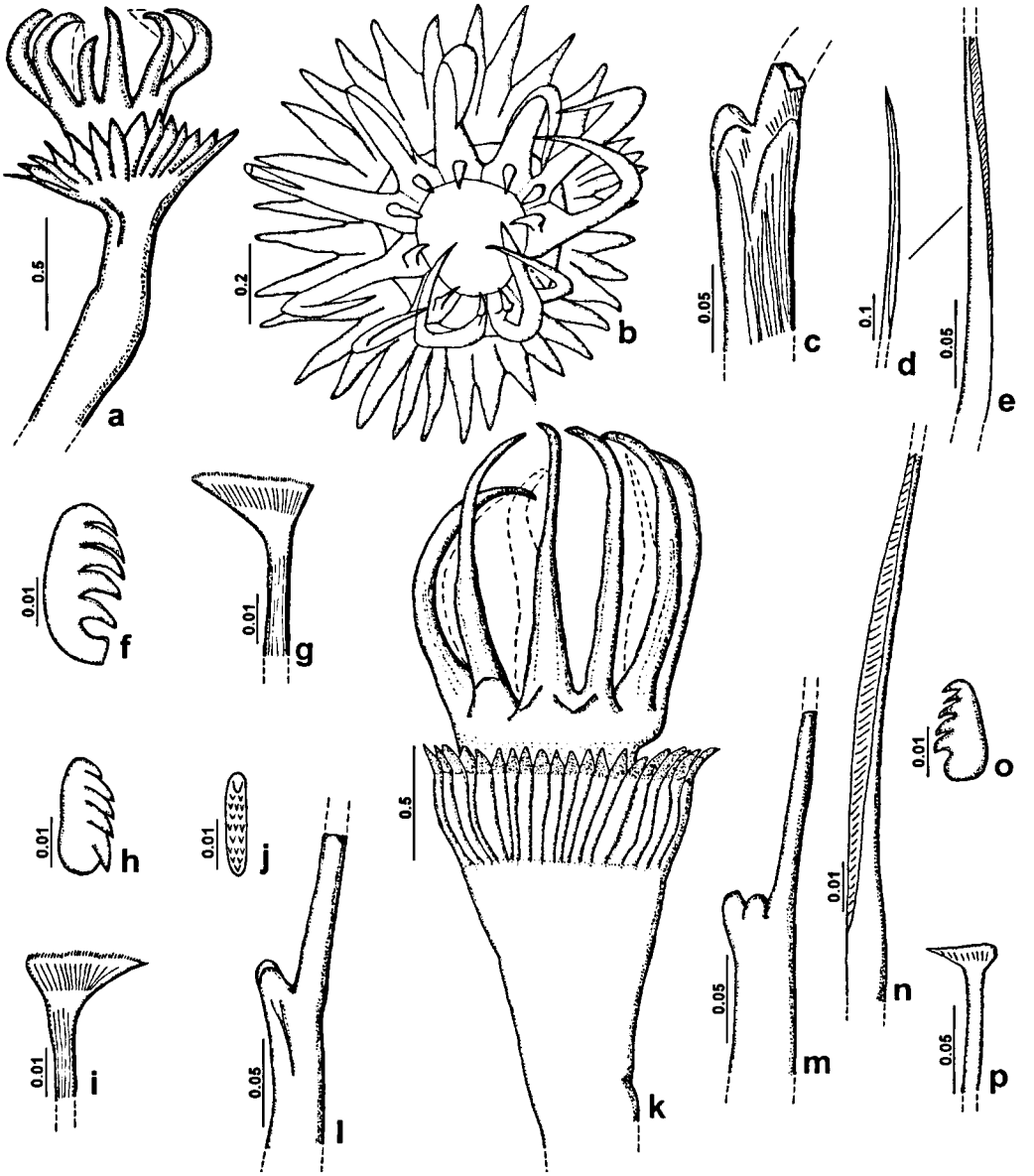

Fig. 6. *Hydroides elegantulus*. From Bermuda, ZMA V. Pol. 4536: A-B, operculum, lateral and apical view. C, bayonet chaeta. D-E, hooded (limbate) chaetae. F, thoracic uncinus. G, anterior abdominal flat-trumpet chaeta. H, anterior abdominal uncinus. I, posterior abdominal flat-trumpet chaeta. J, posterior abdominal uncinus. *H. floridanus*. From Louisiana, ZMA V. Pol. 3208: K, operculum, lateral view. L-M, bayonet chaetae. N, hooded (limbate) chaeta. O, thoracic uncinus. P, anterior abdominal flat-trumpet chaeta.

for *Eupomatus uncinatus* Ehlers, 1887: 285. [Non: Philippi, 1844]. Type locality: Cape Dear Rio, Florida, U.S.A.

Hydroides rostrata Iroso, 1921: 53 (=nom. nov. for *Eupomatus uncinatus* Ehlers, 1887).

Eupomatus decorus Treadwell, 1931: 4-5, fig. 3 (Grand Isle, Louisiana).

Eupomatus floridanus; Wells & Gray, 1964: 74 (Cape Hatteras).

Hydroides uncinata sensu Day, 1973: 132 (North Carolina); Johnson & Vittor, 1982: 137 (Caribbean and Florida). [Non: Philippi, 1844].

Hydroides floridanus; Robertson & Mau-Lastovicka, 1979: 323 (Northeastern and Northwestern Florida).

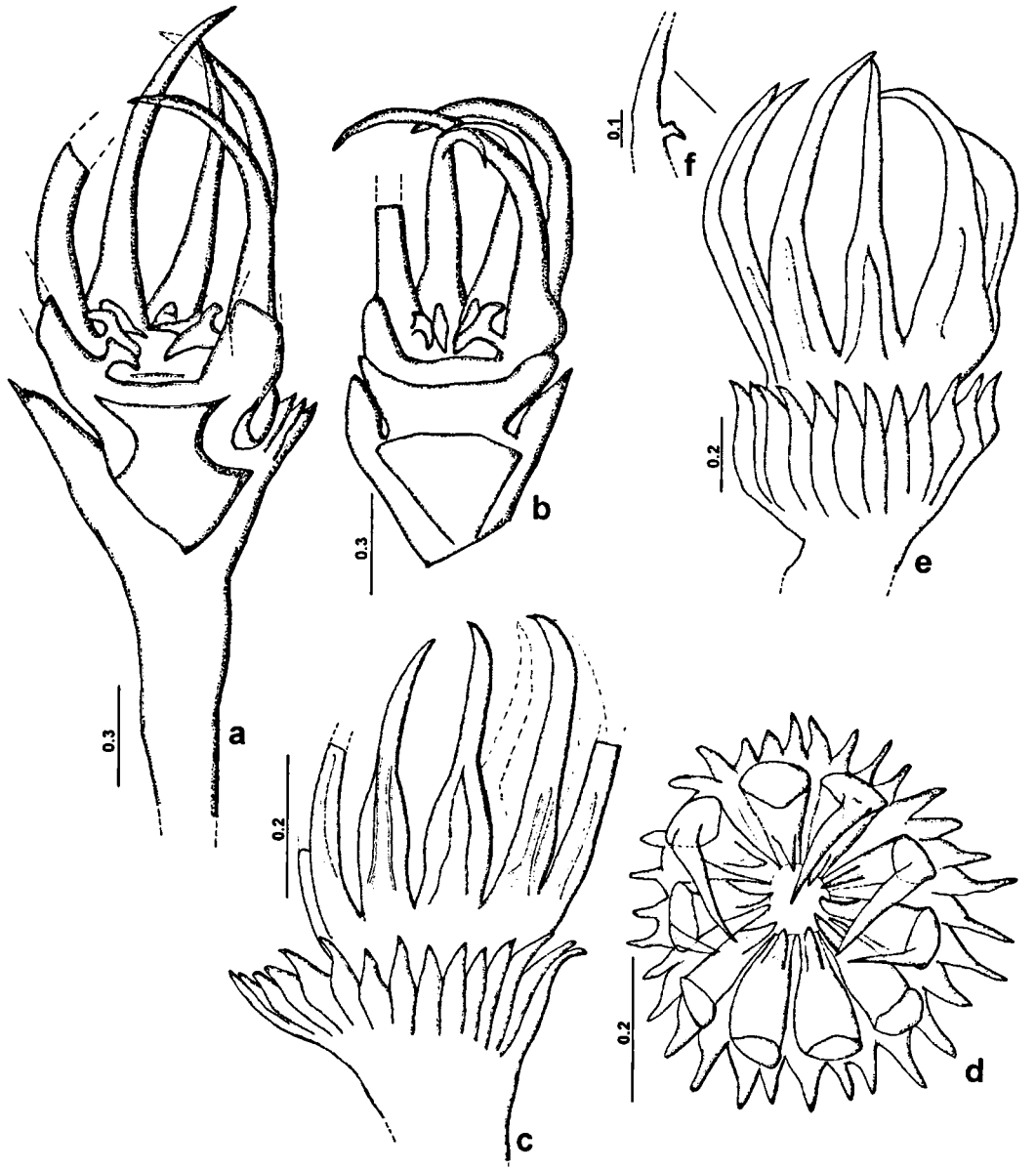

Fig. 7. *Hydroides floridanus*. From North Carolina, ZMA V. Pol. 3393: A-B, two halves of bisected operculum viewed from centre. C-D, other operculum, lateral and apical view. From Campeche, ZMA V. Pol. 3923: E-F, operculum and detail of verticil spine, lateral view.

Records of *H. floridanus* from the Caribbean Islands by Augener (1922: 52; 1925a: 16; 1927: 80, 1934: 116) all see *H. alatalateralis*.

MATERIAL. - Six 'adult' and seven 'juvenile' specimens.
NORTH CAROLINA: ZMA V. Pol. 3393, 9 specimens (Off Cape Lookout Shoals, on shells of *Argopecten gibbus*, 10-20 m, 15-III-1971, legit W. Kirby-Smith, R/V Ensign).
LOUISIANA: AMNH 2033, 2 syntypes of *H. (Eupomatus) decora* (Grand Isle, w/o date, legit W.W. Anderson), ZMA V. Pol. 3208 (part of remaining type series of *H. (Eupomatus) decora* in USNM 19624).
MEXICO: ZMA V. Pol. 3923 (19°17'5'N 92°10'2'W, Campeche Bank, from derrick about 4 years under water, 40 m, 29-XII-1983, legit N.J. Mobach).

DESCRIPTION. - Tube: white, ID=1.1 mm (n=2, r:(0.8)1.0-1.2, μ=1.1±0.1), ED=1.5 mm (n=2,

r:(1.1)1.5, μ=1.5±0.0); most tubes fragmentary and/or covered by epibionts, three anterior ends lack peristomes; only one tube has transversal ridges, lacking in the rest; three tubes show three longitudinal ridges.

Colour and size: body beige. TL=16.1 mm (n=4, r:(4.5)12.0-21.5, μ=16.1±4.1).

Branchial crown: with 14 radioles (n=6, r:(4)7-23, μ=14.1±7.3) left, and 18 right (n=4, r:(4)11-22, μ=18.1±5.2). RL=3.1 mm (n=6, r:(1.0)1.5-5.0, μ=3.1±1.5). Terminal filament long in five specimens (83%), short in one (17%).

Peduncle: POL=4.5 mm (n=7, r:(1.5) 3.0-7.0, μ=4.5±1.8). Insertion left (n=6; 43%), right (n=5; 36%), or at both sides (n=3; 21%); constriction very ill-defined, if any (Figs. 6K, 7A). Pseudoperculum present in four specimens (29%), not found in 10 (71%).

Operculum: OL=1.9 mm (n=7, r:(0.6)1.1-3.0, μ=1.9±0.7), OD=1.0 mm (n=7, r:(0.4)0.7-1.3, μ=1.0±0.3). Funnel with 33 radii (n=7, r:(18)27-38, μ=32.7±4.4) with pointed tip (Figs. 7C-E). Interradial grooves 2/5 of funnel length in three opercula, 1/2 in two and 1/3 in two. Verticil with 11 yellowish spines (n=7, r:(9)10-13, μ=11.3 ±1.0), curving inwards (Figs. 6K, 7C, E). All spines similar in shape, with pointed tip; dorsal spines somewhat longer, giving the verticil a slightly bilateral symmetry. Tip of spines pointed. Spines with one basal internal spinule (Figs. 7A, B, F); without external and lateral spinules; most specimens (n=6) have spines with wings extending for less than half of spine length (86%), one specimen without wings (14%). Verticil without central tooth (Figs. 7A, B). Three specimens (20%), including two 'juveniles', present two opercula each (all ZMA V. Pol. 3393). In the 'adult' specimen (Figs. 7A, B), the left operculum is more developed and the verticil spines show wings (although not visible in Fig. 7A). However, the right operculum (Fig. 7B) does not show wings. In one 'juvenile' specimen both opercula are very similar, with the same number of radii and spines; however, the left and presumably older operculum shows wings, absent in the right. The other 'juvenile' has two opercula in different stages of development, both have wings.

Collar chaetae: bayonet chaetae with two blunt-rounded teeth, distal blade smooth (Figs. 6L, M); hooded (capillary) chaetae present.

Thorax: THL=3.1 mm (n=6, r:(1.0)2.1-3.5, μ=3.2±0.6), THW=1.4 mm (n=6, r:(0.2)1.0-2.0, μ=1.4±0.4). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 6N) of two sizes, saw-shaped uncini (Fig. 6O).

Abdomen: with 55 (n=4, r:(42)49-61, μ=54.6 ±5.3) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 6P). Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped, posterior uncini rasp-shaped.

HABITAT. - Depth: 0.7-40 m, on shells of *Argopecten gibbus* (Linnaeus, 1758), on sand, exceptionally fouling.

DISTRIBUTION. - Gulf of Mexico and Eastern U.S.A. (Fig. 10).

TAXONOMIC REMARKS. - The main difference between *Hydroides floridanus* and *H. alatalateralis* is the length of the wings of the verticil spines, in the first it is less than half of the length of the spines and in *H. alatalateralis* more than half (Fig. 9F). A further difference is the short basal spinule in *H. floridanus* (Figs. 7A, B, F), which is long in *H. alatalateralis* (Figs. 5F, G). In other characters, mean number of radioles, range of number of radii and spines (Figs. 9B-E), both taxa are very similar (see taxonomic remarks for *H. alatalateralis*). Differences between *H. floridanus* and *H. spongicola* can be found in mean number of radioles, 19, range of number of radii, 29-38, and range of number of spines, 10-13, in *H. floridanus*; in *H. spongicola* these counts were 33, 45-61 and 13-18, respectively (Figs. 9B-E). For differences between *H. alatalateralis* and *H. floridanus* with respect to *H. spongicola* see taxonomic remarks under *H. alatalateralis*.

The differences between *H. floridanus* and *H. alatalateralis* as observed by Creyghton-Schouten (1980) and confirmed by us are given in Table 2. Not every single specimen will conform to all possible differences. However, the specimens from Florida scored three or more plusses in the *floridanus* column, from Curaçao in the *alatalateralis* column.

Hydroides floridanus has two junior synonyms: not aware that Bush (1910) already had proposed

Eupomatus floridanus for *E. uncinatus* Ehlers (non Philippi, 1844), Iroso (1921) coined *Hydroides rostrata* for the same taxon. Treadwell (1931) summarily described *E. decorus*; his type material was studied by us and found to be *H. floridanus*.

Hydroides spongicola Benedict, 1887
Figs. 8A-O, 9A-F, 10

Hydroides spongicola Benedict, 1887: 549-550, Pl. 20, figs. 11-12; Pl. 21, figs. 13-16. Type locality: off Venice, Florida.

Hydroides spongicola; Zibrowius, 1971: 695; 1972a: 158; Ten Hove, 1979a: 887, 1979b: 287 (Caribbean), 1989: 136 (Caribbean); Humann, 1992: 138-139 (Florida, Bahamas, Caribbean, as symbiont of the sponge *Neofibularia nolitangere* (Duchassaing & Michelotti, 1984)); Fosså & Nilsen, 1996: 139 (symbiosis with the sponge *N. nolitangere*); Bastida-Zavala & Salazar-Vallejo, 2001b: 852 (Florida).

MATERIAL. - Ten 'adult' and one 'juvenile' specimen. FLORIDA: USNM 975, 5 syntypes (27°04'N 83°21'15'W, off Venice, 50 m, 18-III-1885, R/V Albatross, sta. 2409); ZMA V. Pol. 3209 1 syntype and one slide (part of type series of USNM 975); ZMA V. Pol. 3678 (27°37'N 83°28'W, sponge, algae and coral, 40 m, 2-III-1967, R/V Hourglass, sta. C(EJ-67-75)); ZMA V. Pol. 3679 (27°37'N 83°58'W, sponge and bryozoa, 60 m, 28-II-1968, R/V Hourglass, sta. D(EJ-67-68)); ZMA V. Pol. 3680 (26°24'N 82°58'W, sponge and seagrass, 40 m, 5-VIII-1966, R/V Hourglass, sta. K(EJ-66-315)); ZMA V. Pol. 3681 (26°24'N 83°22'W, sponge and bryozoa, 60 m, 12-X-1967, R/V Hourglass, sta. L(EJ-67-352)), ZMA V. Pol. 3682 (26°24'N 83°43'W, sponge, bryozoa and sand, 80 m, 6-VII-1967, R/V Hourglass, sta. M(EJ-67-263)).
CURAÇAO: ZMA V. Pol. 3390, 20 specimens, not studied in detail (Piscadera Baai, outer bay, in front of Carmabi, 9-VI-1970, sandy reef; 15 m, from sponge *Neofibularia nolitangere*, legit H.A. Ten Hove, Sta. 2054).

DESCRIPTION. - Tube: white, ID=2.3 mm (n=1), ED=2.5 mm (n=1); the only tube was fragmented, did not have peristomes; it had faint transversal and three longitudinal ridges (Fig. 8C).

Colour and size: body yellow. TL=30.2 mm (n=5, r:(20.5)22.0-35.0, μ=30.2±5.3).

Branchial crown: with 33 radioles (n=8, r:(27)29-35, μ=32.6±2.0) left, and 33 right (n=8, r:(27)30-36, μ=32.7±2.2). RL=7.6 mm (n=8, r:(5.0)5.5-9.5, μ=7.6±1.3). Terminal filament very long in one specimen (11%), long in eight (89%).

Peduncle: POL=10.7 mm (n=9, r:(7.0)7.7-12.5, μ=10.7±1.6). Insertion left (n=4; 40%), right (n=6; 60%); constriction very ill-defined, if any (Figs. 8A, L). Pseudoperculum present in six specimens (67%), not found in three (33%).

Operculum: OL=3.2 mm (n=10, r:(1.8)2.0-4.0, μ=3.2±0.6), OD=2.2 mm (n=9, r:(1.7)1.8-3.0, μ=2.2±0.4). Funnel with 51 radii (n=9, r:(49)45-61, μ=51.3±4.6) with pointed tip (Fig. 8a). Interradial grooves 1/4 of funnel length in six opercula, 1/3 in three and 1/2 in one. Verticil with 15 yellowish spines (n=9, r:(16)13-18, μ=15.4±1.5), curving inwards (Figs. 8A, B, L). All spines similar in shape and size (Fig. 8A), with pointed tip. Spines with one long basal internal spinule without knob (Fig. 8B) or with knob (Figs. 8N, O); without external or lateral spinules; four specimens have spines with wings extending for more than half of spine length (40%), in two they occupy less than half (20%; Fig. 8F), four specimens (Fig. 8A) lack wings (40%). Verticil without central tooth (Figs. 8K, M). None of the specimens revised has a double operculum. About half of the specimens from Curaçao showed 2 pseudopercula only.

Collar chaetae: bayonet chaetae with two blunt-short (Figs. 8D, E) or blunt-elongate (Fig. 8G) teeth, distal blade smooth; hooded (capillary) chaetae present.

Thorax: THL=4.5 mm (n=8, r:(3.5)3.5-6.1, μ=4.5±0.8), THW=2.8 mm (n=8, r:(1.5)2.4-3.5, μ=2.8±0.4). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae of two sizes, saw-shaped uncini.

Abdomen: with 124 (n=4, r:(83)109-157, μ=123.7±21.7) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Figs. 8H, I). Posterior chaetigers with 'capillary" chaetae. Anterior and posterior uncini saw-shaped (Fig. 8J).

HABITAT. - Depth: 4-80 m, exclusively associated with sponges: *Neofibularia nolitangere* and possibly *Mycale microsigmatosa* Arndt, 1927 (Ten Hove, 1989).

DISTRIBUTION. - Both sides of Florida, Bahamas and Curaçao (Fig. 10).

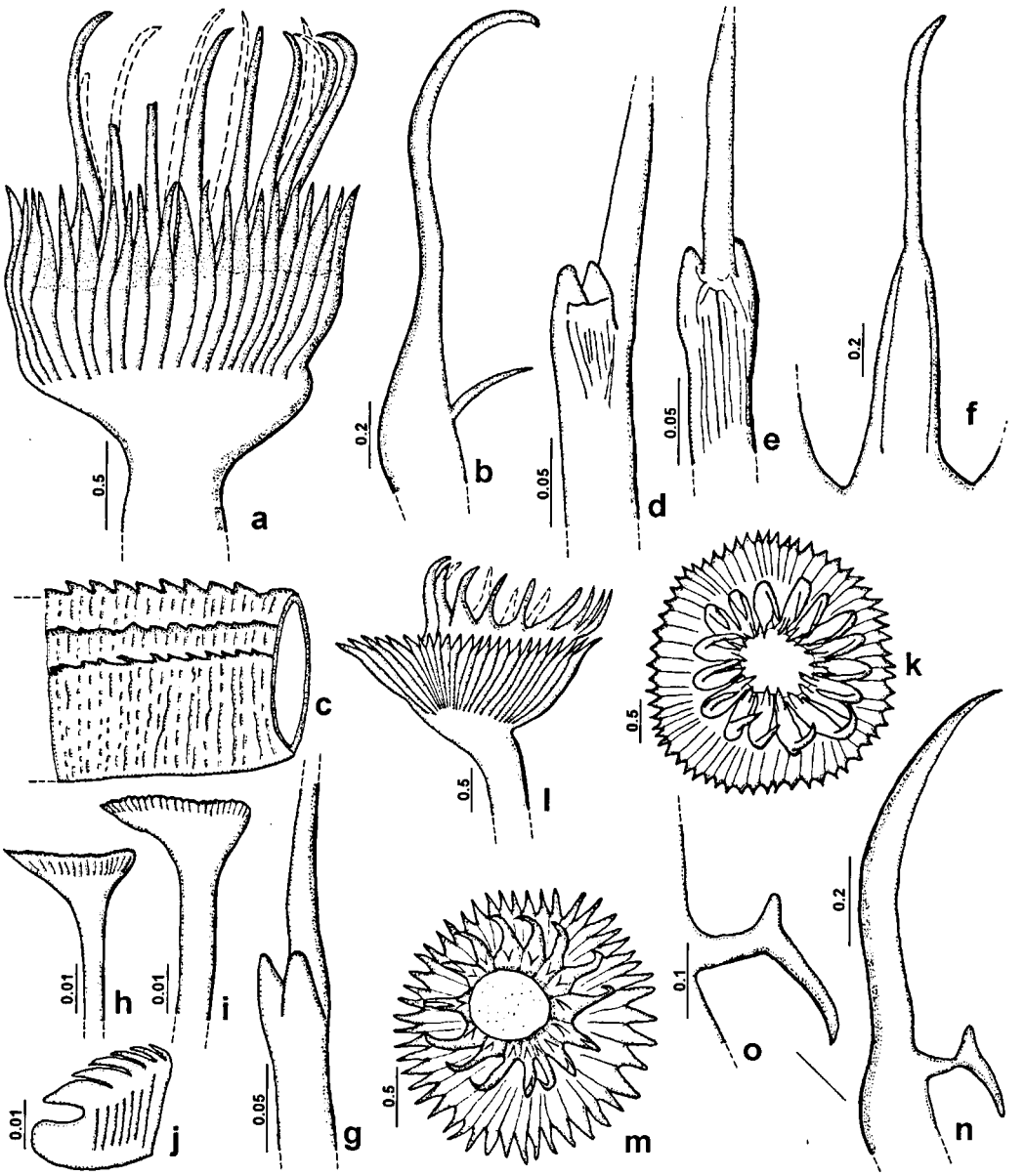

Fig. 8. *Hydroides spongicola*. Paratype, ZMA V. Pol. 3209: A, operculum, lateral view. B, verticil spine, lateral view. C, detail of tube. D-E. bayonet chaetae. From Florida: F, verticil spine, dorsal view. From Curaçao, ZMA V. Pol. s.n. (slide): G, bayonet chaeta. H-I, anterior and posterior abdominal flat-trumpet chaeta. J, posterior abdominal uncinus. From Florida, ZMA V. Pol. 3679: K, operculum, apical view. ZMA V. Pol. 3681: L-M, operculum, lateral and apical view. N, verticil spine, lateral view. O, internal basal spinule, lateral view.

TAXONOMIC REMARKS. - *Hydroides spongicola* can be distinguished from *H. alatalateralis* and *H. floridanus* by the following characters: in *H. spongicola* the mean number of radioles is 33, number of radii is 45-61 and number of spines is 13-18; in *H. alatalateralis* the same characters are 17, 26-44 and 11-16, respectively 19, 29-38 and 10-13 in *H. floridanus* (Figs. 9B-E). Further the size of the thorax in 'adult' specimens of *H. spongicola* is larger than in *H. alatalateralis* and *H. floridanus* (Fig. 9A).

According to Creyghton-Schouten (1980) the main differences between *H. spongicola* with

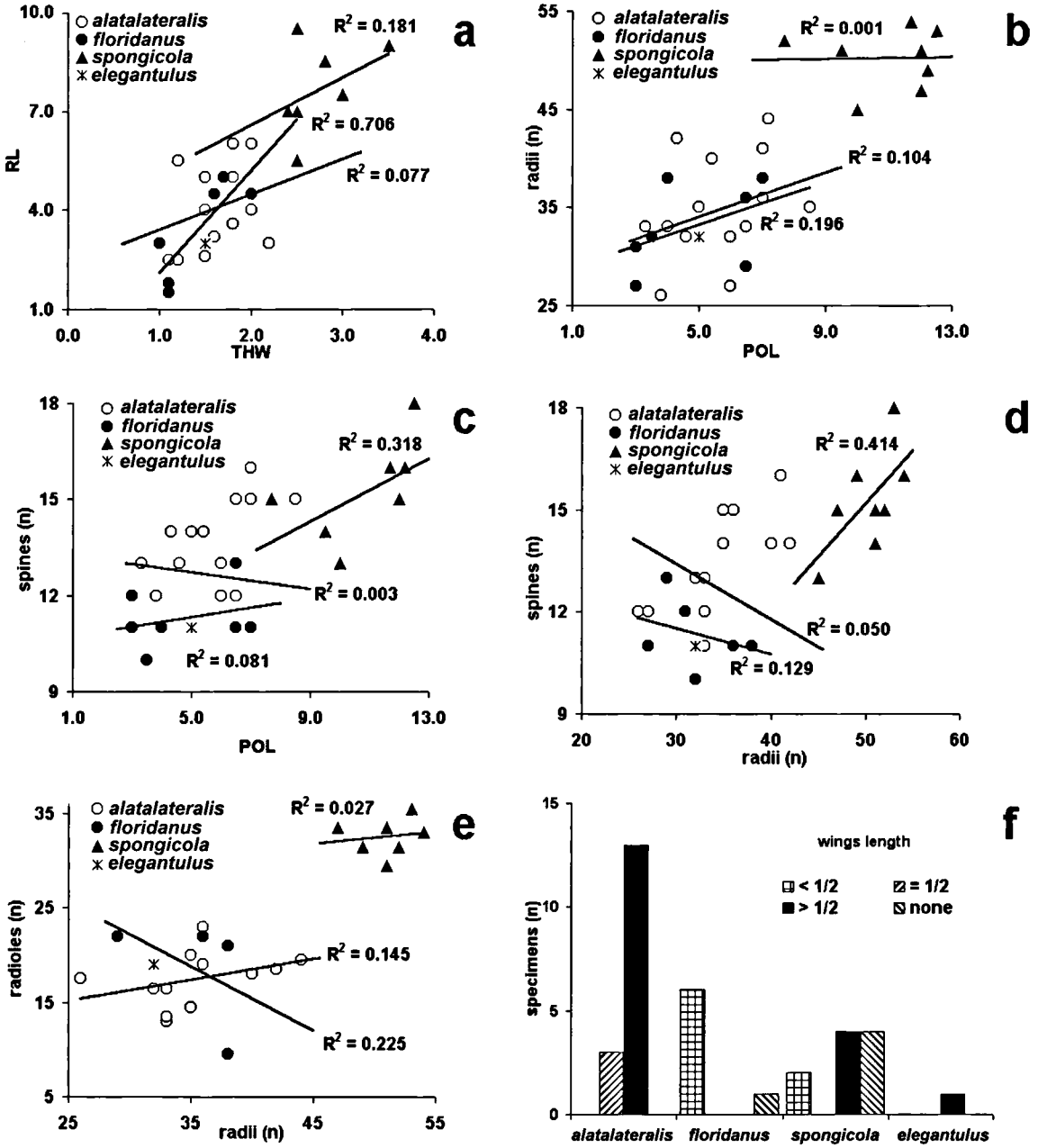

Fig. 9. Morphometric comparisons between *Hydroides alatalateralis*, *H. elegantulus*, *H. floridanus* and *H. spongicola*.

respect to *H. alatalateralis* and *H. floridanus* are that the first species has more radioles and radii (Figs. 9B, E), internal spinules without knob (Fig. 8B), very thin tubes (Fig. 8C), is a larger species (Fig. 9A) and does not show wings in the verticil spines (Figs. 8A, B). We can confirm this except for the internal spinules, which rarely present a knob in the middle (Figs. 8N, O) and the presence of wings in most specimens (60%).

The fact that *H. spongicola* is most probably only associated with the skin-irritating sponge *Neofibularia nolitangere* - as HAtH observed to his distress when collecting the species - can explain the lack of records in the 80 years between its description by Benedict (1887) and its rediscovery in the collections of the R/V Hourglass and in

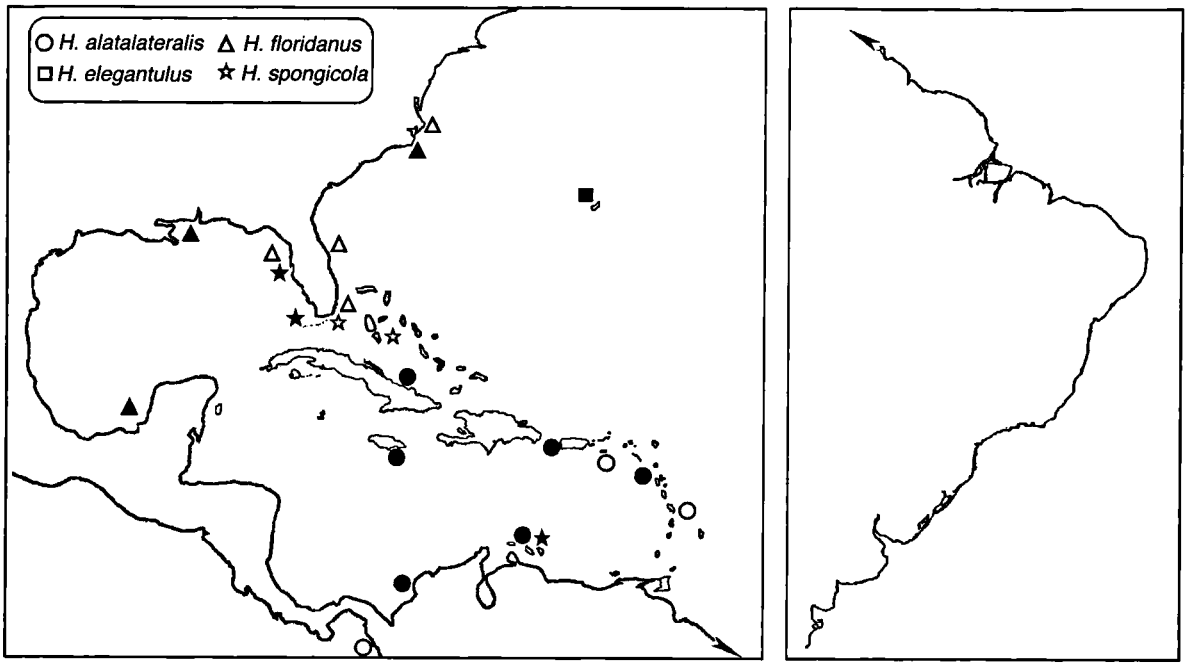

Fig. 10. Distribution of *Hydroides alatalateralis, H. elegantulus, H. floridanus* and *H. spongicola*. Closed symbols denote examined material, open symbols literature records.

the Netherlands Antilles by Ten Hove in the seventies.

Hydroides bispinosus Bush, 1910
Figs. 11A-I, 15

Hydroides bispinosa Bush, 1910: 496 (material studied). Type locality: Bermuda.

Hydroides bispinosus; Díaz, 1994: 618 (Barbados, settlement and succession); Bastida-Zavala & Salazar-Vallejo, 2001b: 844 (Yucatán Peninsula and Cuba).

Hydroides bispinosa; Hartman, 1942: 88-89; Weisbord, 1964: 156 (fossil and recent records); Wells & Gray, 1964: 74 (Cape Hatteras); Ten Hove & Wolf, 1984: 55.18-55.19 (Northern Gulf of Mexico); Díaz Díaz & Liñero Arana, 2001: 11 (Venezuela).

Hydroides crucigera sensu Rioja, 1958: 250-251; 1959: 290 (Isla Verde and Isla Santiaguillo, Veracruz); Day, 1973: 132 (North Carolina); Johnson & Vittor, 1982: 137 (Caribbean and Florida). [Non: Mörch, 1863].

Hydroides sanctaecrucis sensu Díaz Díaz & Liñero Arana, 2001: 13-14 (Venezuela). [Non: Krøyer [in] Mörch, 1863].

MATERIAL. - Twelve 'adult' and five 'juvenile' specimens. BERMUDA: YPM 1367, 2 specimens not studied in detail (types, A.E. Verrill & party).

FLORIDA: UMML 22.710 (Red Head, Margot Fish Shoal, near Miami, corals, 3-VIII-1961, legit J.A. Jones); ZMA V. Pol. 3415 (Blue Water off Tampa Bay, partly attached to shell of pagurid, 13 m, 14-IV-1966).

CAMPECHE: ECOSUR Serp-23c (La Manteca, 20 km off Champotón, rocks, 6 m, 16-II-1999, legit J.R. Bastida-Zavala & S. Salazar-Vallejo).

QUINTANA ROO: ECOSUR Serp-23b, 3 specimens (Isla Contoy, fouling, wooden pier, 1 m, 21-II-1999, legit J.R. Bastida-Zavala & S. Salazar-Vallejo).

ARUBA: ECOSUR Serp-23a, 9 specimens (Bucuti, N, lagoon-side, entrance of harbour, coarse coral debris, sand, 1 m, 26-VIII-1970, legit H.A. Ten Hove, sta. 2034); LACM-AHF s.n., 2 specimens (Mangel Altu, mouth of Spaans Lagoen, near raised reef, 21-VIII-1970, muddy sand, about 15 m, from coral debris, legit H.A. Ten Hove, sta. 2023Da).

DESCRIPTION. - Tube: white, ID=0.7 mm (n=7, r:(0.4)0.5-0.8, μ=0.7±0.1), ED=1.0 mm (n=7, r:(0.8)0.8-1.4, μ=1.0±0.2); most tubes fragmentary and/or covered by epibionts, six anterior ends lack peristomes and/or transversal ridges; all seven tubes show two longitudinal ridges.

Colour and size: body beige. TL=9.9 mm (n=7, r:(4.5)5.5-14.2, μ=9.9±2.7).

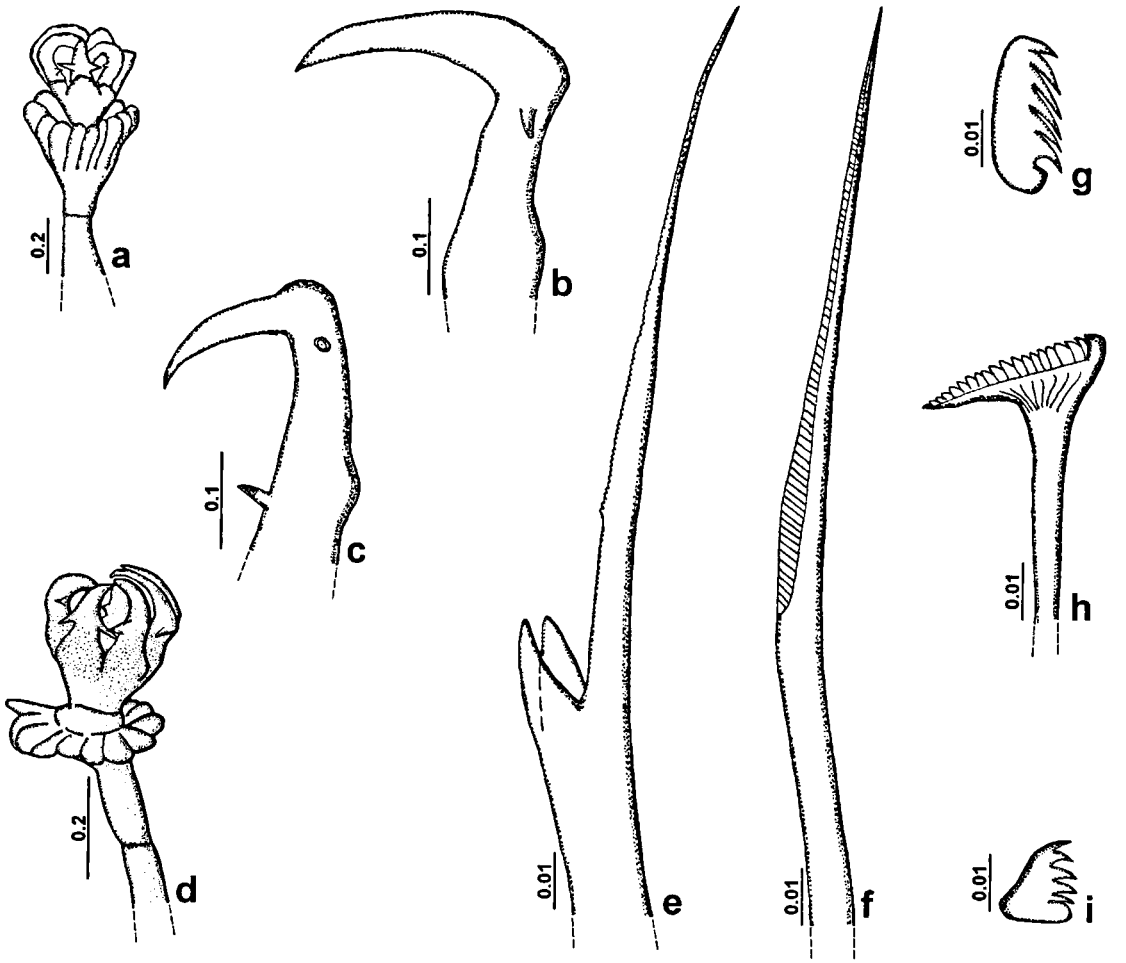

Fig. 11. *Hydroides bispinosus*. From Aruba, ECOSUR Serp-23a: A, operculum, lateral view. B, most dorsal verticil spine, lateral view. C, other verticil spine, lateral view. From Campeche, ECOSUR Serp-23c: D, operculum, lateral view. From Aruba, ECOSUR Serp-23a: E, bayonet chaeta. F, thoracic hooded (limbate) chaeta. G, thoracic uncinus. H-I, flat-trumpet chaeta and uncinus from posterior abdomen.

Branchial crown: with eight radioles (n=12, r:(5)7-10, μ=8.1±1.1) left, and eight right (n=12, r:(5)7-10, μ=8.0±1.1). RL=2.1 mm (n=12, r:(1.2)0.8-3.5, μ=2.1±0.7). Terminal filament very long in two specimens (17%), long in seven (58%), short in two (17%) and absent in one (8%).

Peduncle: POL=2.8 mm (n=12, r:(1.7)1.5-4.5, μ=2.8±0.9). Insertion left (n=5, 42%), right (n=7, 58%); constriction very ill-defined (Figs. 11A, D). Pseudoperculum present in 10 specimens (83%), not found in two (17%).

Operculum: OL=0.8 mm (n=12, r:(0.4)0.6-1.2, μ=0.8±0.2), OD=0.4 mm (n=12, r:(0.2)0.3-0.6, μ=0.4±0.1). Funnel with 16 radii (n=11, r:(12)12-19, μ=16.4±2.5) with blunt tip (Figs. 11A, D). Interradial grooves 2/5 of funnel length in five opercula, 1/2 in four and 1/3 in three. Verticil with eight spines (n=12, r:(7)7-10, μ=8.0±1.0), curving abruptly inwards at about 1/2 of their length, almost geniculate, colour pale, yellowish or black. Spines similar in shape, but dorsal spines somewhat longer (Figs. 11B-D). Tip of spines pointed. Spines with basal internal spinule, sometimes lacking in most dorsal spine (Fig. 11B); with two lateral spinules in middle position (Figs. 11A, D); without external spinules or wings.

Verticil without central tooth.

Collar chaetae: bayonet chaetae with two pointed-elongate teeth, distal blade with small teeth (Fig. 11E); hooded (capillary) chaetae present.

Thorax: THL=1.9 mm (n=11, r:(1.1)1.0-2.8, μ=1.9±0.6), THW=0.5 mm (n=12, r:(0.3)0.4-0.7, μ=0.5±0.1). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 11F) of two sizes, saw-shaped uncini (Fig. 11G).

Abdomen: with 53 (n=8, r:(26)40-89, μ=53.2 ±16.0) chaetigers. Anterior, middle and posterior abdominal chaetigers with flat-trumpet chaetae (Fig. 11H). The most posterior chaetigers with 'capillary' chaetae. Anterior and posterior uncini saw-shaped (Fig. 11I).

HABITAT. - Depth: 1-15 m, on coral debris, wooden piers and *Strombus* shells. Mainly in shallow coral reefs and lagoonal waters.

DISTRIBUTION. - Gulf of Mexico, Eastern U.S.A. and Caribbean Sea (Fig. 15).

TAXONOMIC REMARKS. - In collections checked by us, *Hydroides bispinosus* has been confused with *H. parvus* and *H. cruciger* Mörch, 1863, although the last is an Eastern Pacific species. The three species share inwardly curving verticil spines with one pair of lateral spinules (Figs. 11A-D, 12A-C). *Hydroides bispinosus* can be distinguished by its blunt radii, pointed in *H. parvus* and *H. cruciger*. A further difference between *H. parvus* and *H. bispinosus* is that the spines curve in an almost straight angle in the first species, with a medial knob in all spines (Fig. 12C), while they curve smoothly in the second, without medial knob (Fig. 11B) or, if present, it is very shallow and only in few verticil spines (Fig. 11C).

H. bispinosus resembles *Hydroides* sp. 1, recorded before as *Hydroides* sp. A (Ten Hove & Wolf, 1984), because both species share blunt radii and lateral spinules (Figs. 11A-D, 37A-D). However, the verticil spines curve smoothly inwards at 1/3 to 1/2 of their length and have only one pair of lateral spinules (Figs. 11A-D) in *H. bispinosus*; in *Hydroides* sp. 1 the verticil spines curve smoothly inwards only at the tips and they show two or three (exceptionally four) pairs of lateral spinules (Figs. 37A-D).

Differences between *H. mucronatus* and *H.* cf. *mucronatus* with respect to *H. bispinosus* are given in the taxonomic remarks of these species. *Hydroides sanctaecrucis* recorded by Díaz Díaz & Liñero Arana (2001) clearly belongs to *H. bispinosus* by their description and figure of operculum (Fig. 3G): verticil spines with one pair of lateral spinules.

Hydroides parvus (Treadwell, 1902)
Figs. 12A-K, 15

Eupomatus parvus Treadwell, 1902: 210, figs. 79-80 (material studied). Type locality: Boqueron Bay, Puerto Rico.

Hydroides dianthus sensu Webster, 1884: 327 (Bermuda; fide Zibrowius, 1971: 699). [Non: Verrill, 1873].

Eupomatus parvus; Augener, 1925a: 16 (St. Croix, Lesser Antilles); Bush, 1910: 496-497 (Bermuda).

Hydroides (Eupomatus) parvus; Augener, 1927: 80 (Schottegat, Curaçao), 1934: 116 (Santa Marta, Colombia).

Hydroides parvus; Treadwell, 1939: 305-306 (Puerto Rico); Rioja, 1958: 251-254 (Veracruz, Gulf of Mexico), 1959: 289-290 (key, Veracruz); Wells & Gray, 1964: 74 (Cape Hatteras); Zibrowius, 1970: 6-7 (Recife, Brazil); Day, 1973: 132 (North Carolina); Rullier & Amoureux, 1979: 194 (Brazil); Jones & Gardiner, 1986: 256-257 (Bermuda); Díaz, 1994: 618 (Barbados, settlement and succession); Ten Hove & San Martín, 1995: 16 (Cuba); Dueñas, 1999: 14 (Atlantic of Colombia); Bastida-Zavala & Salazar-Vallejo, 2001b: 851 (northwestern Caribbean).

Hydroides sp. Hartman, 1944: 25-26 (southwest of Cabo de la Vela, Colombia).

Hydroides parva; Díaz Díaz & Liñero Arana, 2001: 13 (Venezuela).

MATERIAL. - Nine 'adult' and seven 'juvenile' specimens. FLORIDA: UMML 22.240, 2 specimens (Elbow Channel, John Pennekamp Coral Reef State Park, Florida Keys, 12-VI-1980, site 7); UMML 22.244 (Basin Hill Shoals, John Pennekamp Coral Reef State Park, Florida Keys, 26-VI-1980, site 9); UMML 22.709 (Red Head, Margot Fish Shoal, corals, 9-VII-1961, legit J.A. Jones).
VERACRUZ: ECOSUR Serp-13a (fouling, aquarium water

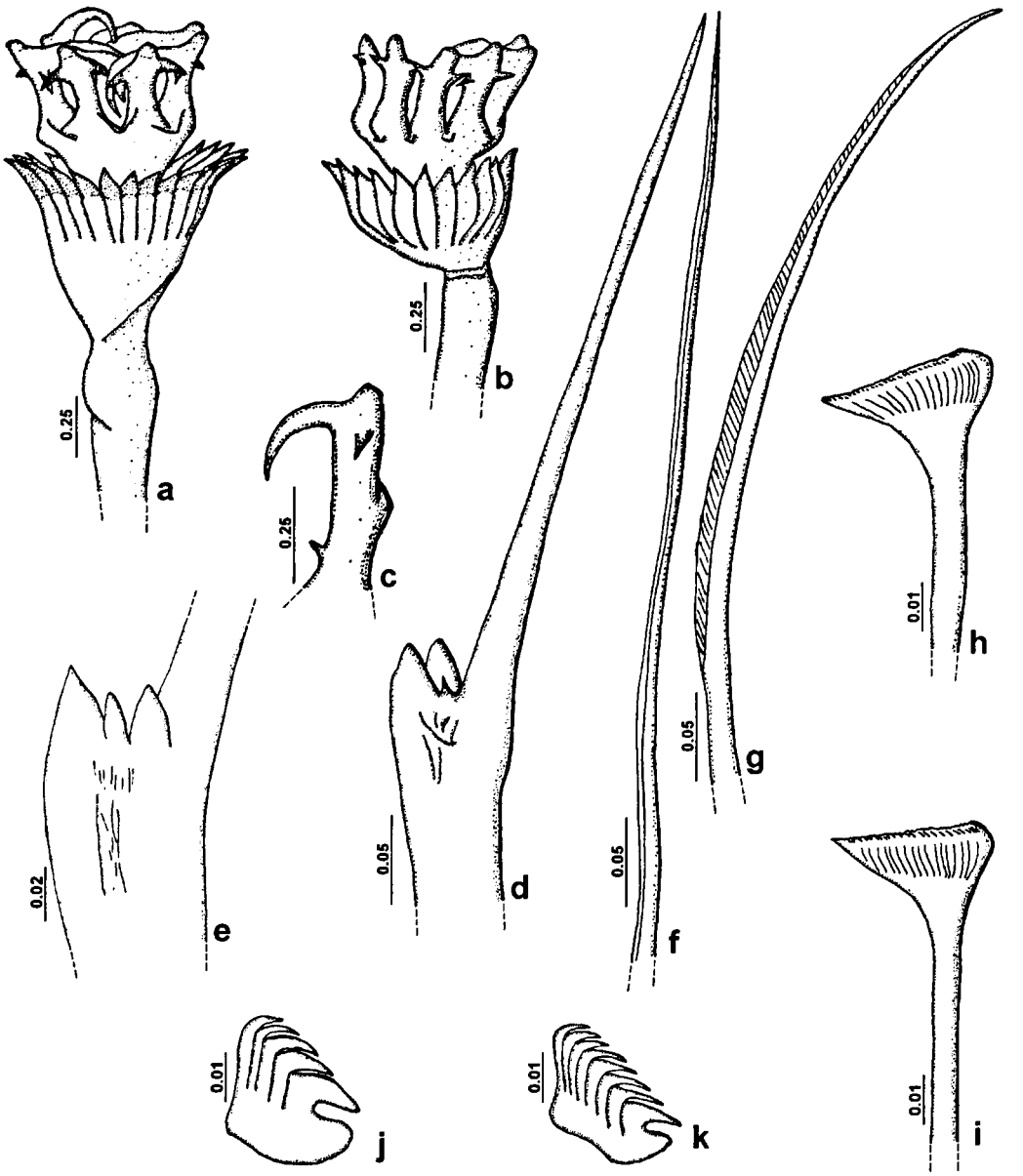

Fig. 12. *Hydroides parvus*. From Curaçao, LACM-AHF s.n.: A, operculum, lateral view. From Brazil, MNHN AK-540: B, operculum, lateral view. C, most dorsal spine, lateral view. From Curaçao, LACM-AHF s.n.: D-E, bayonet chaetae and detail. F, hooded (capillary) chaeta. G, thoracic hooded (limbate) chaeta. H-I, anterior and middle abdominal flat-trumpet chaeta. J-K, anterior and posterior abdominal uncinus.

supply cover, 7 m, 14-VII-2000, legit J.R. Bastida-Zavala & J.A. de León-González).

CAMPECHE: CP-ICML-UNAM PO-75-001 (near Puerto Real, Laguna de Términos, in *Thalassia testudinum* Banks ex König, 0.8 m, 9-VII-1982, legit B. Reveles & A.L. Ibáñez, sta. 1).

YUCATAN: ECOSUR Serp-13b (22°02'N 87°02'W, Yucatán channel, epibiont of sponge *Aplysina lacunosa*, 41 m, Apr 1985, legit P. Gómez, sta. 4-5).

QUINTANA ROO: ECOSUR Serp-13c (Isla Contoy, fouling, wooden pier, 1 m, 21-II-1999, legit J.R. Bastida-Zavala & S. Salazar-Vallejo); ECOSUR Serp-13d (Rodman shipyard, Puerto Morelos, epibiont on spines of sea-urchin *Eucidaris tribuloides*, 19 m, 28-VI-1995, legit F. Solís et al.); ECOSUR Serp-13e (Cayo Cedros, Ascensión Bay, mangrove root, 6-V-1987, legit S. Jiménez).

PUERTO RICO: USNM 016173, 2 specimens not studied in detail (types, Boqueron Bay, R/V Fish Hawk, 1898); ZMA

V. Pol. 3426 (8 mi off Isla Matei, near buoy of marine institute, 2-X-1970, horizontal reef, nearly no sand; 20-25 m, from living corals (*Agaricia*); vertical reef with surge-channels, no sand; 31-37 m, from living corals, legit H.A. Ten Hove, sta. 2136, 2136A).
MONTSERRAT: UMML 22.708, 2 specimens (17°11'N 62°39'W, 20 m, 19-VII-1969, R/V Pillsbury, cruise 6907, sta. 958).
PANAMA, ATLANTIC: ECOSUR Serp-13f, not studied in detail (09°20.9'N 79°54.2'W, Panamá Canal Yacht Club, salinity= 31‰, 3-VI-2002, legit S.I. Salazar-Vallejo).
CURAÇAO: LACM-AHF s.n. (Spaanse Water, Brakkeput Ariba, NE Isla Grandi, muddy vertical reef with many bivalves; about 7-9 m, 4-IX-1970, from in and above mud, on shells and corals, legit H.A. Ten Hove, sta. 2075B).
COLOMBIA, ATLANTIC: UMML 22.707 (11°04'N 74° 30'W, off Barranquilla, tubes attached to shells of bivalves, 18 m, 31-VII-1968, R/V Pillsbury, cruise 6806, sta. 787).
BRAZIL: MNHN AK-540 (8°27'S 34°55'W, near Recife, dredge, algae and coral, 27 m, 21-XI-1961, Calypso, sta. 28).

DESCRIPTION. - Tube: white, ID=1.1 mm (n=6, r:(0.5)0.8-1.4, μ=1.1±0.3), ED=1.5 mm (n=6, r:(0.7)1.0-2.0, μ=1.5±0.3); most tubes missing, remaining ones fragmentary and/or covered by epibionts; five anterior ends lack peristomes; four tubes have transversal ridges, lacking in two; three tubes show three longitudinal ridges, two show two and one none. One tube has two lateral longitudinal ridges larger (as crest) than the central third ridge.

Colour and size: body yellow to light brown. TL=17.6 mm (n=3, r:(5.8)12.5-26.5, μ=17.6 ±7.2).

Branchial crown: with 10 radioles (n=9, r:(6)8-13, μ=10.2±1.5) left, and 11 right (n=7, r:(6)9-13, μ=10.7±1.4). RL=2.7 mm (n=9, r:(1.0)1.3-4.5, μ=2.7±1.0). Terminal filament very long in four specimens (45%), long in two (22%) and short in three (33%).

Peduncle: POL=3.6 mm (n=9, r:(1.5)2.5-5.0, μ=3.6±0.8). Insertion left (n=4, 44%) or right (n=5, 56%); constriction ill- to well-defined (Figs. 12A, B). Pseudoperculum present in all 'adult' specimens.

Operculum: OL=1.2 mm (n=9, r:(0.6)0.8-1.7, μ=1.2±0.3), OD=0.7 mm (n=9, r:(0.4)0.6-1.0, μ=0.7±0.1). Funnel with 22 radii (n=9, r:(17)19-26, μ=22.1±2.3) with pointed tip (Figs. 12A, B). Interradial grooves 1/4 of funnel in five opercula, 1/3 in two, 2/5 in one and 1/2 in one. Verticil with eight yellowish spines (n=9, r:(6)6-10, μ=7.9 ±1.3), abruptly curving inwards and forming an external knob (Figs. 12A-C). All spines similar in shape and size, with pointed tip, sometimes the most dorsal spine is slightly bigger than the others (Fig. 12C). Spines with one basal internal spinule (Fig. 12C), absent in one specimen, with a pair of well-developed lateral spinules (Figs. 12A-C); without external spinules and/or wings. Verticil without central tooth.

Collar chaetae: bayonet chaetae with two blunt-short to pointed-short teeth and a small accessory tooth, distal blade smooth (Figs. 12D, E); hooded (capillary) chaetae present (Fig. 12F). Thorax: THL=2.5 mm (n=9, r:(1.2)1.7-3.5, μ=2.5±0.5), THW=0.9 mm (n=9, r:(0.3)0.7-1.2, μ=0.9±0.2). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 12G) of two sizes, saw-shaped uncini.

Abdomen: with 81 (n=3, r:(39)58-101, μ=81.4 ±22.7) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Figs. 12J, K). Posterior chaetigers with 'capillary' chaetae. Anterior and posterior uncini saw-shaped (Figs. 12H, I).

HABITAT. - Depth: 0.6-41 m, fouling, on wooden piers, epibiont on mangroves, the sponge *Aplysina lacunosa* (Pallas, 1766) and the sea urchin *Eucidaris tribuloides* (Lamarck, 1840). Salinity tolerance 31-37‰.

DISTRIBUTION. - Gulf of Mexico, Eastern U.S.A., Caribbean Sea and Brazil (Fig. 15).

TAXONOMIC REMARKS. - *Hydroides parvus* resembles *H. cruciger* in having a pair of lateral spinules and radii with blunt tip (Figs. 12A-C). However, the verticil spines curve in an almost straight angle with knob in *H. parvus* (Fig. 12C), while they are smoothly curving without knob in *H. cruciger* (Rioja, 1944, fig. 4).

See 'Taxonomic remarks' for *H. bispinosus*, *H. mucronatus* and *H.* cf. *mucronatus* as well.

Hydroides gairacensis Augener, 1934
Figs. 13A-P, 15

Hydroides (Eupomatus) dunkeri Mörch, 1863: 373.
Type locality: La Guayra, Venezuela.

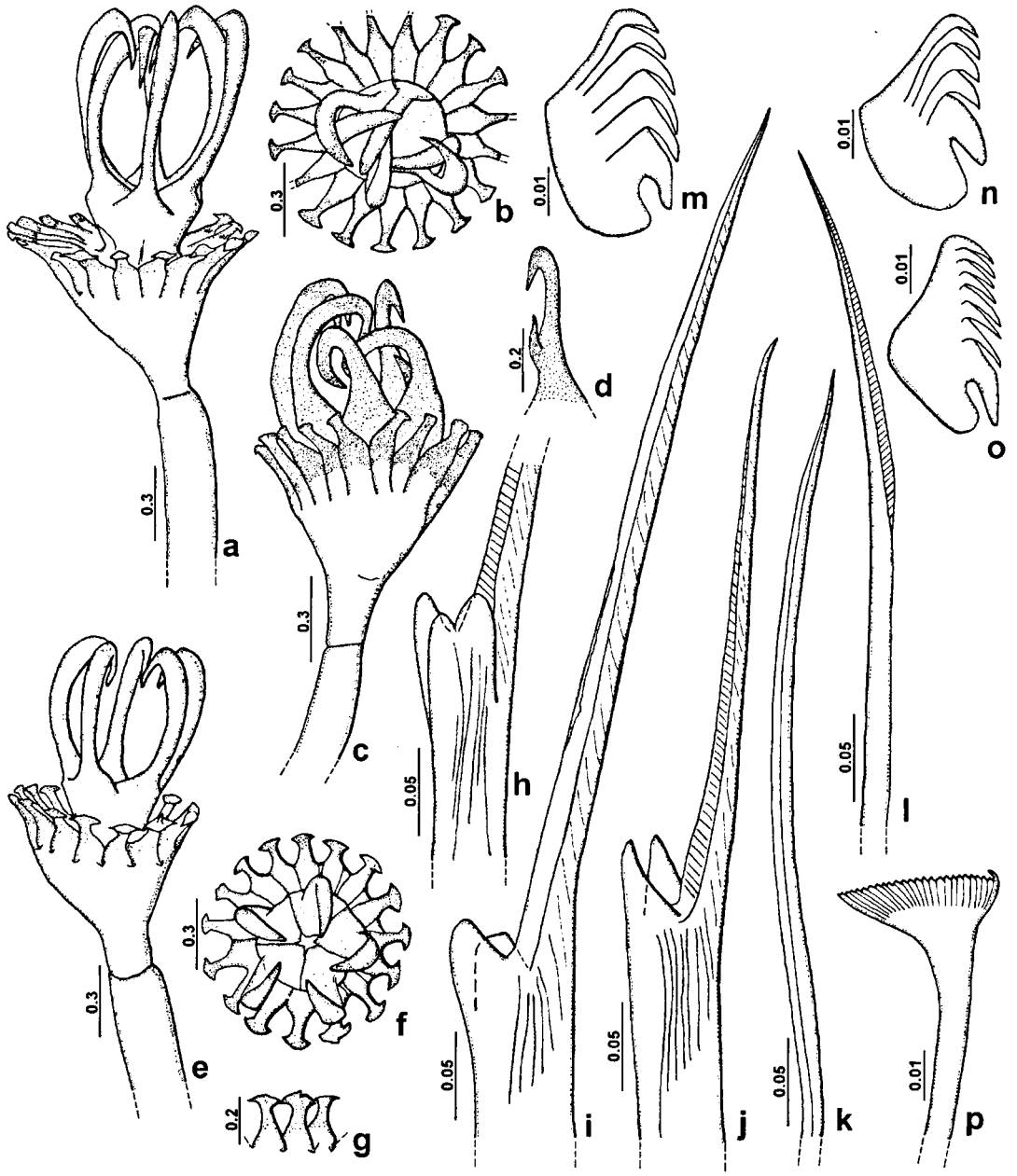

Fig. 13. *Hydroides gairacensis*. From Florida, UMML 22.711: A-B, operculum, lateral and apical view. From Quintana Roo, ECOSUR Serp-12c: C, operculum, lateral view. D, detail of a spine. From Florida, UMML 22.711: E-F, operculum, lateral and apical view. G, detail of radii. From Quintana Roo, ECOSUR Serp-12c: H-I, bayonet chaetae. From Brazil, MNHN AK-537: J, bayonet chaeta. K, hooded (capillary) chaeta. L, hooded (limbate) chaeta. From Quintana Roo, ECOSUR Serp-12b: M, thoracic uncinus. N-O, anterior and posterior abdominal uncinus. P, posterior abdominal flat-trumpet chaeta.

Vermilia dunkerii; [sic] De Quatrefages, 1866: 534 (abstract of Mörch).

Hydroides uncinata sensu Monro, 1933: 1082, text-fig. 25 (Panamá). [Non: Philippi, 1844].

Hydroides (Eupomatus) gairacensis Augener, 1934: 117, figs. 20a-c (material studied). Type locality: Gairaca, Santa Marta, Colombia.

Hydroides (Eupomatus) dunkeri; Hartman, 1959: 578 (name in catalogue).

Hydroides gairacensis; Zibrowius, 1968: 111; 1969: 366-376 (revision, Colombia, Mexican Caribbean, Pacific of Panamá, South Brazil);

1970: 4-5; 1972a: 158; Rullier & Amoureux, 1979: 194 (Brazil); Ibarzábal, 1986: 17 (Golfo de Batabanó, Cuba); Ten Hove & San Martín, 1995: 15 (Cuba); Dueñas, 1999: 14 (Colombian Atlantic); Bastida-Zavala & Salazar-Vallejo, 2001b: 848 (Mexican Caribbean and Cuba).

Hydroides dunkeri; Perkins & Savage, 1975: 59 (name in list).

MATERIAL. - Ten 'adult' and two 'juvenile' specimens.
FLORIDA: UMML 22.711 3 specimens (Red Head, Margot Fish Shoal, near Miami, corals, 16-II-1962, legit J.A. Jones et al.).
QUINTANA ROO: ECOSUR Serp-12a (Ixchen, Cozumel Island, 4-VI-1995, legit S. Salazar-Vallejo & L. Carrera-Parra); ECOSUR Serp-12b (Paraíso, Cozumel Island, 5-VI-1995, legit S. Salazar-Vallejo & L. Carrera-Parra); ECOSUR Serp-12c (Majagual, coral, 2 m, 18-II-2001, legit J.R. Bastida-Zavala); USNM 36599 (Bahía Ascensión, 1.5 m, 14-IV-1960, Smithsonian Bredin Expedition, sta. 7260).
CUBA: IOC 2 (NW of Punta Los Barcos, Golfo de Batabanó, sea grass bed, 5 m, 29-VIII-1981, sta. E-13).
BARBUDA: LACM-AHF s.n. (Lobster Point, N of Palm Beach, 23-VII-1967, *Rhizophora* in sandy mud with *Thalassia* and *Halodule*; 0-1 m, legit P. Wagenaar Hummelinck, sta. 1534).
COLOMBIA, ATLANTIC: ZMA V. Pol. 0458, holotype (Gairaca, Santa Marta, 0-15 m, 29-II-1896, Chazalie Expedition); UMML 22.648 (11°04'N 74°30'W, off Barranquilla, tubes attached to shells of bivalves, 18 m, 31-VII-1968, R/V Pillsbury, cruise 6806, sta. 787).
BRAZIL: MNHN AK-537 (18°09.5'S 40°48'W, N of Vitória, dredged, rocks, algae and corals, 50 m, 28-XI-1961, Calypso, sta. 80).

DESCRIPTION. - Tube: white, ID=1.4 mm (n=2, r:1.3-1.5, μ=1.2±0.1), ED=1.7 mm (n=3, r:1.5-2.0, μ=1.7±0.3); most tubes missing, the rest fragmentary and/or covered by epibionts; peristomes lacking; two tubes have transversal and three longitudinal ridges.

Colour and size: body yellow to beige. TL= 22.5 mm (n=6, r:(15.0)15.0-39.0, μ=22.5±8.6).

Branchial crown: with 14 radioles (n=9, r:(10)10-21, μ=14.1±3.3) left, and 14 right (n=8, r:(9)9-21, μ=13.9±3.5). RL=4.2 mm (n=9, r:(2.5)2.5-7.0, μ=4.2±1.4). Terminal filament long in seven specimens (78%) and short in two (22%).

Peduncle: POL=4.8 mm (n=14, r:(3.5)3.5-7.0, μ=4.8±1.1). Insertion left (n=4; 44%) or right (n=5; 56%); constriction well-defined (Figs. 13A, C, E). Pseudoperculum present in eight 'adult' specimens, not found in one.

Operculum: OL=1.5 mm (n=10, r:(0.7)0.7-2.2, μ=1.5±0.4), OD=0.9 mm (n=10, r:(0.5)0.5-1.2, μ=0.9±0.2). Funnel with 18 radii (n=10, r:(14)14-24, μ=17.8±3.4) with T-shaped tips, colour dark-gray to black (Figs. 13A-C, E-G). Interradial grooves 1/3 of funnel length in four opercula, 1/4 in four, 2/5 in one and 1/5 in one more. Verticil with six spines (n=10, r:(5-8)5-7, μ=6.4±0.7), distinctly curving inwards (Figs. 13E, F, sometimes twisted laterally (Figs. 13A-C), colour pale-yellow with black tips (Figs. 13A, E) to dark-gray (Figs. 13C, D). All spines similar in shape and size, with pointed tip. Spines without basal internal spinule (Fig. 13F); without external and lateral spinules and/or wings. Verticil without central tooth (Fig. 13F).

Collar chaetae: bayonet chaetae with two or three blunt-short (Figs. 13H, I) to pointed-elongate teeth (Fig. 13J), distal blade smooth; hooded (capillary) chaetae present (Fig. 13K).

Thorax: THL=3.5 mm (n=9, r:(2.1)2.6-4.5, μ=3.5±0.6), THW=1.4 mm (n=9, r:(0.9)1.1-2.2, μ=1.4±0.4). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 13L) of two sizes, saw-shaped uncini (Fig. 13M).

Abdomen: with 119 (n=6, r:(78)89-167, μ=118.5±30.4) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 13P). Posterior chaetigers with 'capillary' chaetae. Anterior and posterior uncini saw-shaped (Figs. 13N, O).

HABITAT. - Depth: 0.3-50 m, on corals, bivalve shells, rocks, and between sea grasses and algae. Mainly in coral reefs and lagoonal waters.

DISTRIBUTION. - Amphiamerican. South Florida, Caribbean Sea, South Brazil and Pacific side of Panamá (Fig. 15).

REMARKS. - Monro (1933: 1082) recorded the colour in living specimen from Crossland's observations: "Gills crimson like and primrose yellow with longitudinal dashes of orange on back of rachis". Most preserved material has lost colour (even of the operculum), but, in a recently collected specimen from the Mexican Caribbean,

we recorded the colour of the branchial crown: two orange spots on each side in the basis of the radioles, followed by four alternating pale and pink stripes; finally, in the distal third section the pinnules have an orange colour. The pseudoperculum has a white stripe. The opercular peduncle is pale white, but the operculum has black radii and dark-gray spines (Fig. 13C). The latero-medial black spinule observed in only one verticil spine (Fig. 13D) could be an incomplete regeneration.

TAXONOMIC REMARKS. - Within the American representatives of the genus *Hydroides*, *H. gairacensis* is unique because of this T-shaped radii (Figs. 13B, F, G), otherwise only known from Indo-Pacific species: *H. albiceps* Grube, 1870, *H. ancorispina* Pillai, 1971, *H. heterocerus* (Grube, 1868), *H. malleolaspina* Straughan, 1967a, *H. minax* (Grube, 1878), and *H. trivesiculosus* Straughan, 1967b. All these species have an asymmetrical verticil, the verticil spines in *H. gairacensis* are similar in shape and size (Figs. 13A, E).

Hydroides dunkeri was described by Mörch (1863) from La Guaira, Venezuela, however, without figure. Mörch's description is short but significant: "*T. gracilis quadrangularis, latere dorsali plane, liris tribus validis* [?] *aequalibus, subnodulosis; rugae incrementi irregulares, confertae. Diam. 1 m. circ. Operculum spinis longis, apicem versus subito incurvis; margine geminatim subulato-dentato Hab. La Guayra, in Millepora, una cum Spirobrancho giganteo var. v.d. Hoeven.*" ("Tube narrow and quadrangular, dorsal side flat with three equally strong lines [longitudinal ridges], somewhat nodular; with irregularly increasing wrinkles, closely packed. Diameter about 1 mm. Operculum with long verticil spines, with tips suddenly curving inwards; near the apex; with doubly toothed funnel radii. Habitat La Guayra, in *Millepora*, one with *Spirobranchus giganteus* var. v.d. Hoeven." (= *Spirobranchus giganteus* s. str.).

Both suddenly inwards curving verticil spines and bidentate funnel radii, as well as the Caribbean locality - corroborated by the presence of *S. giganteus* s. str. (Pallas, 1766) - leave no doubt that *H. dunkeri* is a senior synonym of *H. gairacensis* and should have precedence (Principle of Priority, ICZN, 1999, art. 23). Although both conditions for reversal of precedence (ICZN, 1999, art. 23.9) are not met, in our opinion stability will not be promoted by re-introducing the oldest available name. The main reasons for this opinion are that the type material of *H. dunkeri* apparently is lost, its description is very short, and the name has only been used four times in the literature, and not even as a 'valid' name under art. 23.9.6. On the other hand, type material as well as good descriptions are available for *H. gairacensis*, and it has been mentioned over 20 times in the literature, though not always in the sense of art. 23.9.6. We, therefore, will ask the Commission for a ruling.

Hydroides microtis Mörch, 1863
Figs. 14A-N, 15

Hydroides (Eucarphus) microtis Mörch, 1863: 380, without figures. Type locality: North America.
Eupomatus microtis; Wells & Gray, 1964: 74 (Cape Hatteras).
Hydroides microtis; Ten Hove & Wolf, 1984: 55.23-55.25 (Northern Gulf of Mexico).

MATERIAL. - Nine 'adult' and one 'juvenile' specimen. VENEZUELA: ZMA V. Pol. 3331, 9 specimens (25 miles N of Margarita, 40 m, 9-XII-1954, legit Teun Blok). GUYANA: UMML 22.630 (7°42'N 57°32'W, 27 m, 15-VII-1968, R/V Pillsbury, cruise 6806, sta. 687).

DESCRIPTION. - Tube: white, ID=0.9 mm (n=4, r:(0.4)0.8-1.1, μ=0.9±0.1), ED=1.3 mm (n=4, r:(0.5)1.1-1.5, μ=1.3±0.2); most tubes missing, remaining ones fragmentary and/or covered by epibionts, peristomes have not been observed; only one specimen has transversal ridges, not observed in the rest of the tubes; longitudinal ridges not found in the three tube fragments.

Colour and size: body yellow to dark brown. TL=16.0 mm (n=1).

Branchial crown: with 11 radioles (n=3, r:(7)9-12, μ=10.6±1.5) left, and 10 right (n=4, r:(6)9-12, μ=10.4±1.3). RL=3.6 mm (n=7, r:(2.0)1.7-4.5, μ=3.6±1.0). Terminal filament long (Fig. 14E) in six specimens (74%), short in one (13%) and absent in another (13%).

Peduncle: POL=4.5 mm (n=9, r:(2.0)2.3-6.0, μ=4.5±1.3). Insertion left (n=3; 60%), right (n=1; 20%) or at both sides (n=1; 20%); no constriction (Fig. 14A). Pseudoperculum present in all 'adult' specimens.

Operculum: OL=1.4 mm (n=8, r:(0.6)1.2-1.7,

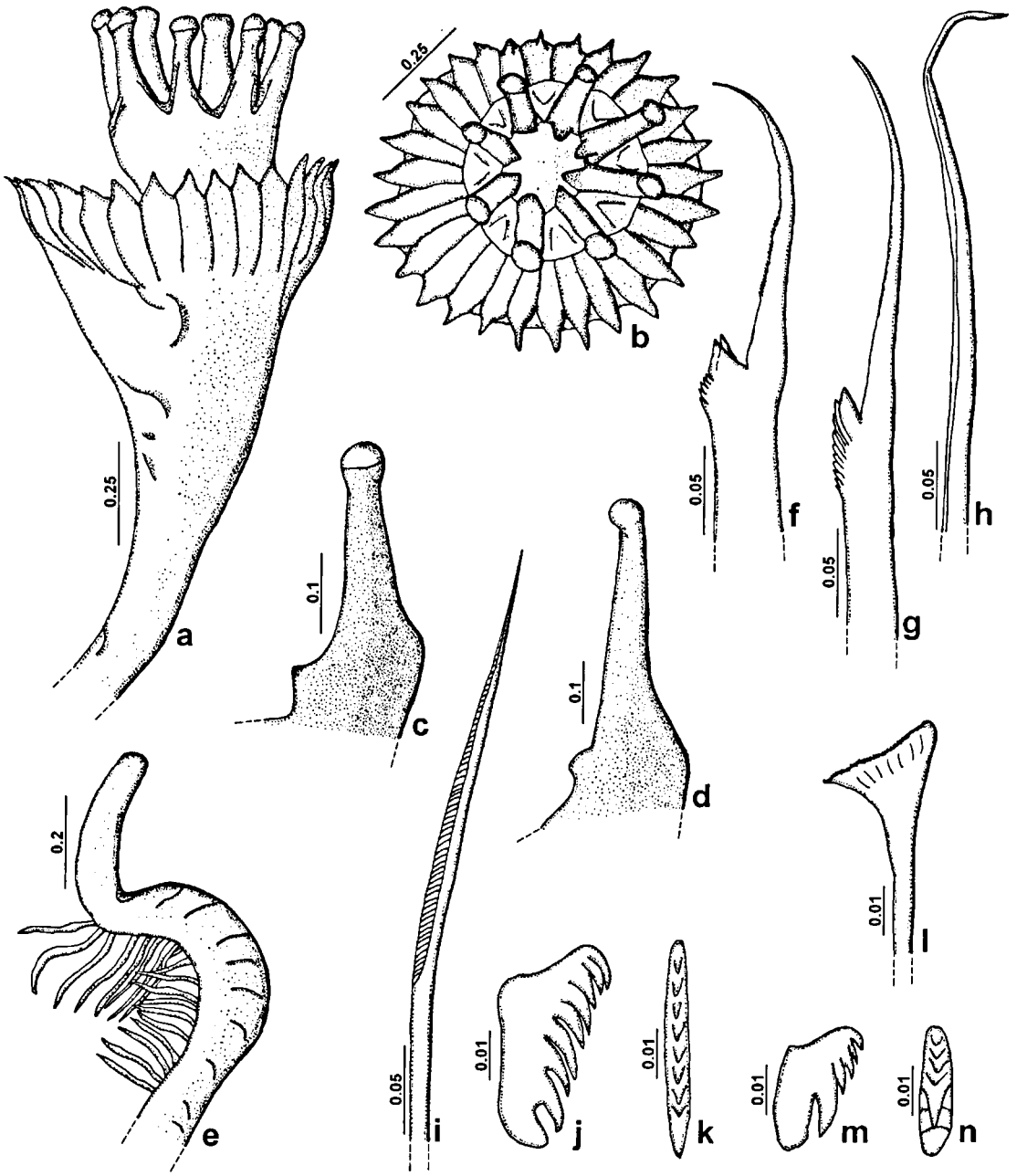

Fig. 14. *Hydroides microtis*. From Venezuela, ZMA V. Pol. 3331: A-B, operculum, lateral and apical view. C, verticil spine of same operculum, lateral view. D, verticil spine of other specimen. E, distal part of radiole, lateral view. F-G, bayonet chaetae. H, hooded (capillary) chaeta. I, thoracic hooded (limbate) chaeta. J-K, thoracic uncini. L, anterior abdominal flat-trumpet chaeta. M-N, anterior abdominal uncini.

μ=1.4±0.2), OD=0.7 mm (n=10, r:(0.4)0.5-0.8, μ=0.7±0.1). Funnel with 25 radii (n=11, r:(17)20-30, μ=24.5±3.0) with pointed tip (Figs. 14A, B). Interradial grooves 1/4 of funnel length in six opercula, 1/3 and 1/5, respectively in the others. Verticil with eight spines (n=11, r:(6)6-9, μ=7.8 ±0.9), straight (Figs. 14A, C, D); colour variable: yellowish, pale or dark-brown. All spines similar in shape and size. Tip of spines expanded globularly. Spines with one short basal internal spinule

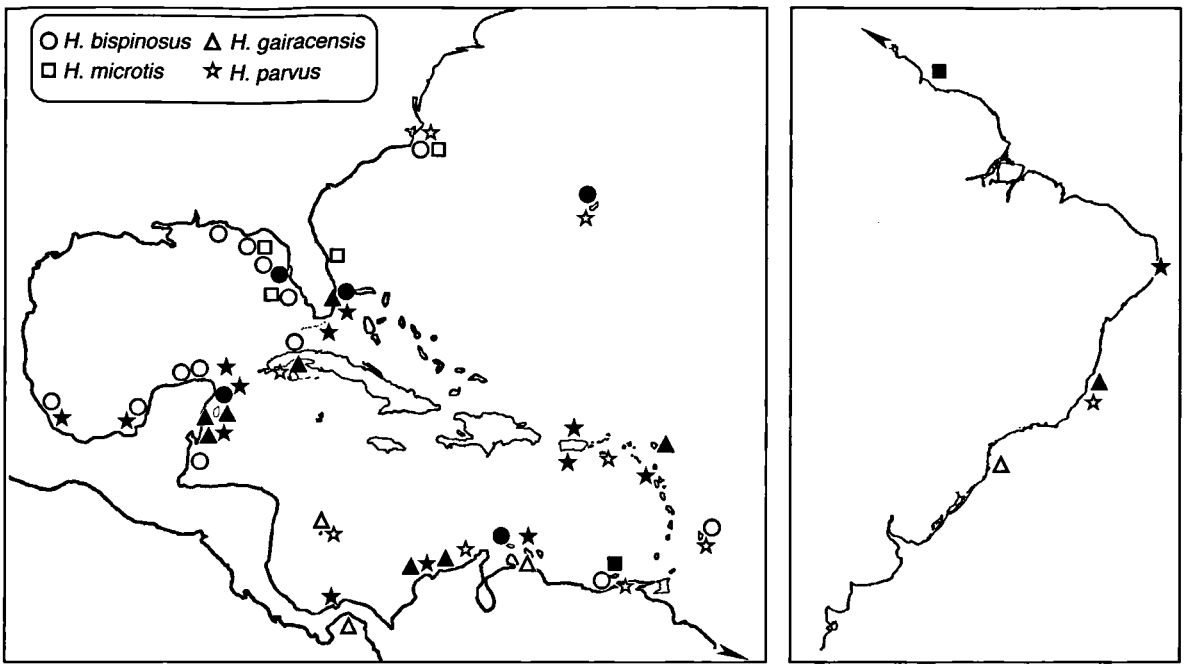

Fig. 15. Distribution of *Hydroides bispinosus, H. gairacensis, H. microtis* and *H. parvus*. Closed symbols denote examined material, open symbols literature records.

(Figs. 14C, D), sometimes very small (Fig. 14C); without external and lateral spinules and/or wings. Verticil without central tooth (Fig. 14B).

Collar chaetae: bayonet chaetae with two pointed-short teeth and small proximal rasp, distal blade denticulate (Figs. 14F, G); hooded (capillary) chaetae present (Fig. 14H).

Thorax: THL=2.3 mm (n=4, r:(1.5)1.7-3.5, μ=2.3±0.8), THW=0.9 mm (n=4, r:(0.3)0.8-1.1, μ=0.9±0.2). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 14I) of two sizes, saw-shaped uncini (Figs. 14J, K).

Abdomen: all specimens incomplete, with the exception of a juvenile with 28 chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 14L). Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Figs. 14M, N), posterior uncini rasp-shaped.

HABITAT. - Depth: 27-40 m.

DISTRIBUTION. - Gulf of Mexico, Eastern U.S.A., Caribbean Sea and Guyana (Fig. 15).

TAXONOMIC REMARKS. - Apart from relatively unadorned straight verticil spines, *Hydroides microtis* shares a funnel with short interradial grooves, of 1/3 or less (Figs. 14A, 26A, D, 27A, D, 37P) with *H. plateni, H. protulicola* and *Hydroides* sp. 2. However, *H. microtis* has verticil spines with tip globular, pointed in *H. plateni, H. protulicola* and *Hydroides* sp. 2 (Figs. 26A, D, F, G, 27B-E, 37P, Q). Both *H. microtis* and *H. protulicola* have collar chaetae with a proximal rasp.

In the Caribbean *H. microtis* has been mistaken for *H. diramphus* due to the distal expansion of verticil spines. However, this expansion is globular in *H. microtis* (Figs. 14A-D), T-shaped and flattened in *H. diramphus* (Figs. 34A, B). Furthermore, both species are easily distinguished by their collar chaetae, simple with two large teeth in *H. diramphus* (Figs. 33C, D), with proximal rasp in *H. microtis* (Figs. 14F, G).

Hydroides mongeslopezi Rioja, 1958
Figs. 16A-I, 17A-M, 19A-D, 22, Table 3

Hydroides mongeslopezi Rioja, 1958: 257-259, figs. 4a-h. Type locality: Playa Norte and Isla Santiaguillo, Veracruz, Gulf of Mexico.

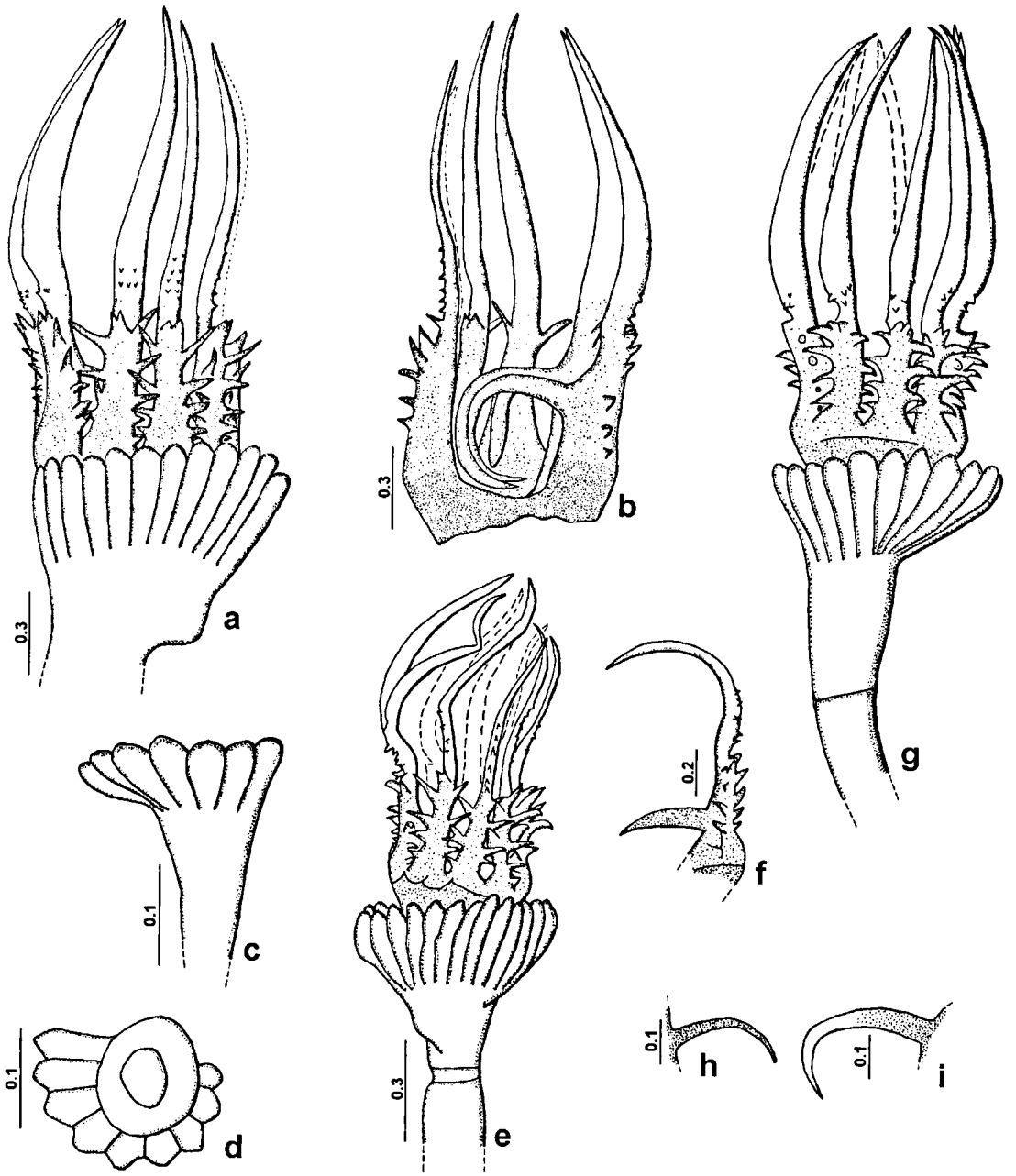

Fig. 16. *Hydroides mongeslopezi.* From Curaçao, ZMA V. Pol. 3686: A-B, operculum with verticil sectioned, left respectively right side. C-D, pseudoperculum, lateral and apical view. LACM-AHF s.n.: E, operculum, lateral view. F, detail of dorsal spine. From Cuba, IOC 3: G, operculum, lateral view. H-I, detail of ventral and dorsal internal spinule.

Hydroides mongeslopesi; (in errore) Díaz, 1994: 618 (Barbados, settlement and succession).

Hydroides mongeslopezi; Bastida-Zavala & Salazar-Vallejo, 2001b: 848 (Gulf of Mexico and Cuba).

MATERIAL. - Ten 'adult' and four 'juvenile' specimens.

GULF OF MEXICO: CP-ICML-UNAM PO-75-003 (Triángulos Oeste Reef, in coral, 1 m, Oct 1990, B/O Justo Sierra, DINAMO II).

CUBA: IOC 3, 2 specimens (Reef Lagoon of Cayo Juan García, Golfo de Batabanó, 10 m, 2-III-1988, sta. P1).

JAMAICA: UMML 22.706 (17°28'N 75°55'W, 27 m, 3-VII-

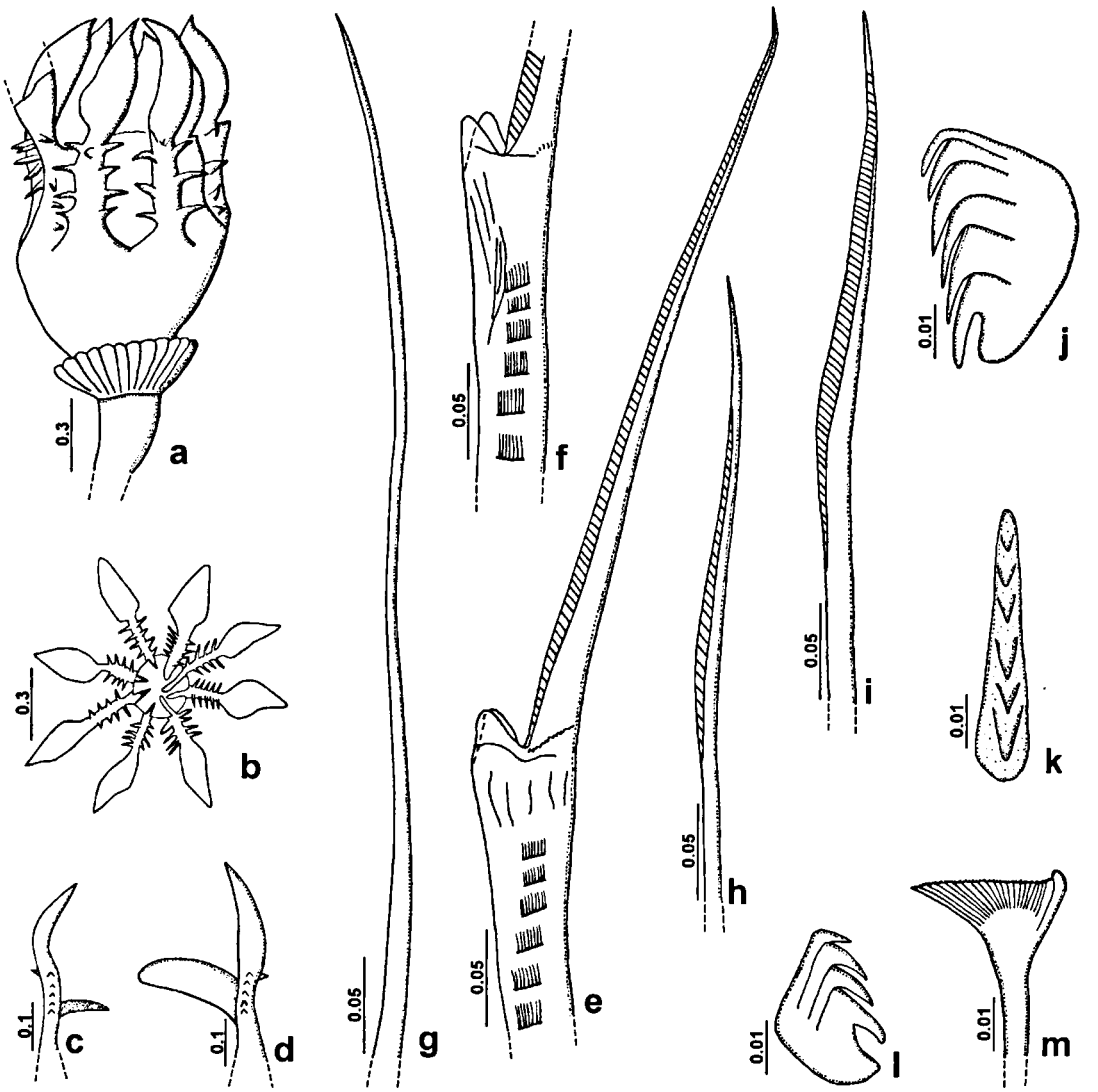

Fig. 17. *Hydroides mongeslopezi*. From Gulf of Mexico, CP-ICML-UNAM PO-75-003: A-B, operculum, lateral and apical view. C-D, detail of ventral and dorsal spines. From Cuba, IOC 3: E-F, bayonet chaetae. G, hooded (capillary) chaeta. H-I, hooded (limbate) chaetae. J-K, thoracic uncini. L-M, uncinus and flat-trumpet chaeta from anterior abdomen.

1970, R/V Pillsbury, cruise 7006, sta. 1192).

CURAÇAO: LACM-AHF s.n. (Piscadera Baai, outer bay, iron and wooden poles, 0-1 m, 14-X-1967, legit P. Wagenaar Hummelinck, sta. 1620); LACM-AHF s.n. (Fuikbaai, raised reef opposite Newport, sea-side, sandy limestone; 2 m, 14-IV-1970, from coral boulders and *Millepora*, legit H.A. Ten Hove, sta. 2083); ZMA V. Pol. 3686, 6 specimens (Klein Curaçao, 0.5 miles NW of lighthouse, reef, little sand, from corals, 18-42 m, 16-XI-1970, legit H.A. Ten Hove, sta. 2103A-B).

BONAIRE: LACM-AHF s.n. (Lac, central part of basin, Binnenklip, 1 km WSW of Cai, sand on limestone, 2.5 m, 10-III-1970, legit P. Wagenaar Hummelinck, sta. 1568A); LACM-AHF s.n. (Santa Barbara, near Hato, rim of tidal pool, calcareous algae, *Millepora*; in surf till 20 cm, 29-VI-1970, from calcareous algae, legit H.A. Ten Hove, sta. 2112Bc).

DESCRIPTION. - Tube: white, ID=1.0 mm (n=5, r:(0.5)0.7-1.4, μ=1.0±0.3), ED=1.5 mm (n=6, r:(0.7)0.8-2.5, μ=1.5±0.6); most tubes missing, remaining fragmentary and/or covered by epibionts; one anterior end shows a peristome, not found in five others; one 'juvenile' specimen has transversal ridges, not observed in the rest of the material; one specimen shows two longitudinal ridges, another shows one and four more show none.

Colour and size: body yellow. TL=14.6 mm (n=7, r:(5.7)10.0-19.5, μ=14.6±3.3).

Branchial crown: with 11 radioles (n=8, r:(7)8-14, μ=11.2±2.2) left, and 11 right (n=8, r:(7)8-13, μ=11.1±1.8). RL=3.5 mm (n=8, r:(1.1)2.0-5.5, μ=3.5±1.2). Terminal filament long in seven specimens (78%) and short in two (22%).

Peduncle: POL=5.6 mm (n=9, r:(1.7)3.1-8.0, μ=5.6±1.7). Insertion left (n=4) or right (n=4), one specimen (CP-ICML-UNAM PO-75-003) has a branchial crown very damaged and not recognizable; constriction ill-defined (Fig. 16G) to well-defined (Fig. 16E). Pseudoperculum present in all 'adult' specimens. One specimen has a pseudoperculum that resembles an incomplete funnel with nine radii (Figs. 16C, D).

Operculum: OL=2.1 mm (n=9, r:(0.8)1.3-3.0, μ=2.1±0.6), OD=0.9 mm (n=9, r:(0.2)0.6-1.8, μ=0.9±0.4). Funnel with 23 radii (n=9, r:(17)17-28, μ=23.2±3.2) with blunt tip (Figs. 16A, E, G, 17A). Interradial grooves 1/3 of funnel length in three opercula, 1/2 in two and 2/5 in two. Verticil with 10 spines (n=10, r:(8)8-11, μ=9.5 ±0.9), curving inwards (Figs. 16A, B, E, G, 17A), colour of the base black, gradually changing to yellow in middle and distal part (Fig. 16B). All spines similar in shape but the dorsal spines are a little wider than the ventral spines (Figs. 16A, E, G, 17C, D). Tip of spines pointed. Verticil spines with one long basal internal spinule almost in a semicircle dorsally (Fig. 16B), gradually changing to nearly straight (Figs. 16F, H, I, 17C, D) from lateral to ventral spines. Smaller spinules tend to be more pigmented (Figs. 16I, 17D). All verticil spines with groups of seven tiny external spinules halfway (n=9, r:(5)5-13, μ=6.8±3.4), yellow; 4-5 pairs of black lateral spinules in basal-middle position (Figs. 16A, B, E-G); without wings. Verticil without central tooth.

Collar chaetae: bayonet chaetae with two blunt-elongate teeth, distal blade smooth (Figs. 17E, F); hooded (capillary) chaetae present (Fig. 17G).

Thorax: THL=2.2 mm (n=8, r:(1.1)1.6-3.0, μ=2.2±0.4), THW=1.0 mm (n=8, r:(0.5)0.7-1.3, μ=1.0±0.2). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae of two sizes (Figs. 17H, I), saw-shaped uncini (Figs. 17J, K).

Abdomen: with 73 (n=6, r:(43)67-82, μ=72.9 ±6.4) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 17M). Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Fig. 17L), posterior uncini rasp-shaped.

HABITAT. - Depth: 0.2-27 m. Mainly in coral reefs and lagoonal waters.

DISTRIBUTION. - Gulf of Mexico and Caribbean Sea (Fig. 22).

REMARKS. - Rioja (1958) described *Hydroides mongeslopezi* from the reefs of Veracruz, the type material is regarded to be lost. Subsequent 'topotypical' collecting (Isla Santiaguillo, by Bastida-Zavala) was unsuccessful. The only specimen from the Gulf of Mexico available to us (CP-ICML-UNAM PO-75-003) apparently was badly preserved and the operculum maybe is distorted: the funnel is very small, the verticil has eight spines with flat and lanceolate distal parts (Figs. 17A, B) and the dorsal internal spinules appear to be more expanded (Fig. 17C). It is not impossible that this specimen is a juvenile, see 'Remarks' *H. lambecki*, below.

The specimens from Cuba have bayonet chaetae in which the shaft shows a series of grooved patches (Figs. 17E, F); however, this character is not present in other specimens revised, although one specimen from Curaçao was slightly grooved. Rioja (1958) did not mention anything on this respect.

TAXONOMIC REMARKS. - Altogether, Lambeck (a former assistant to HAtH) and Ten Hove (unpubl. data) revised more than 250 specimens of '*Hydroides mongeslopezi*' from the Antilles, from 0-80 m depth. Two forms appeared to be present, *H. mongeslopezi* s. str. and an atypical form, especially in deeper samples (40 m or more). They regarded a lower number of funnel radii in the atypical form and different implantation of the internal spinules as main differences, which is confirmed by our present observations. The 'atypical' form is regarded to be a different species by us. See further remarks under the next species.

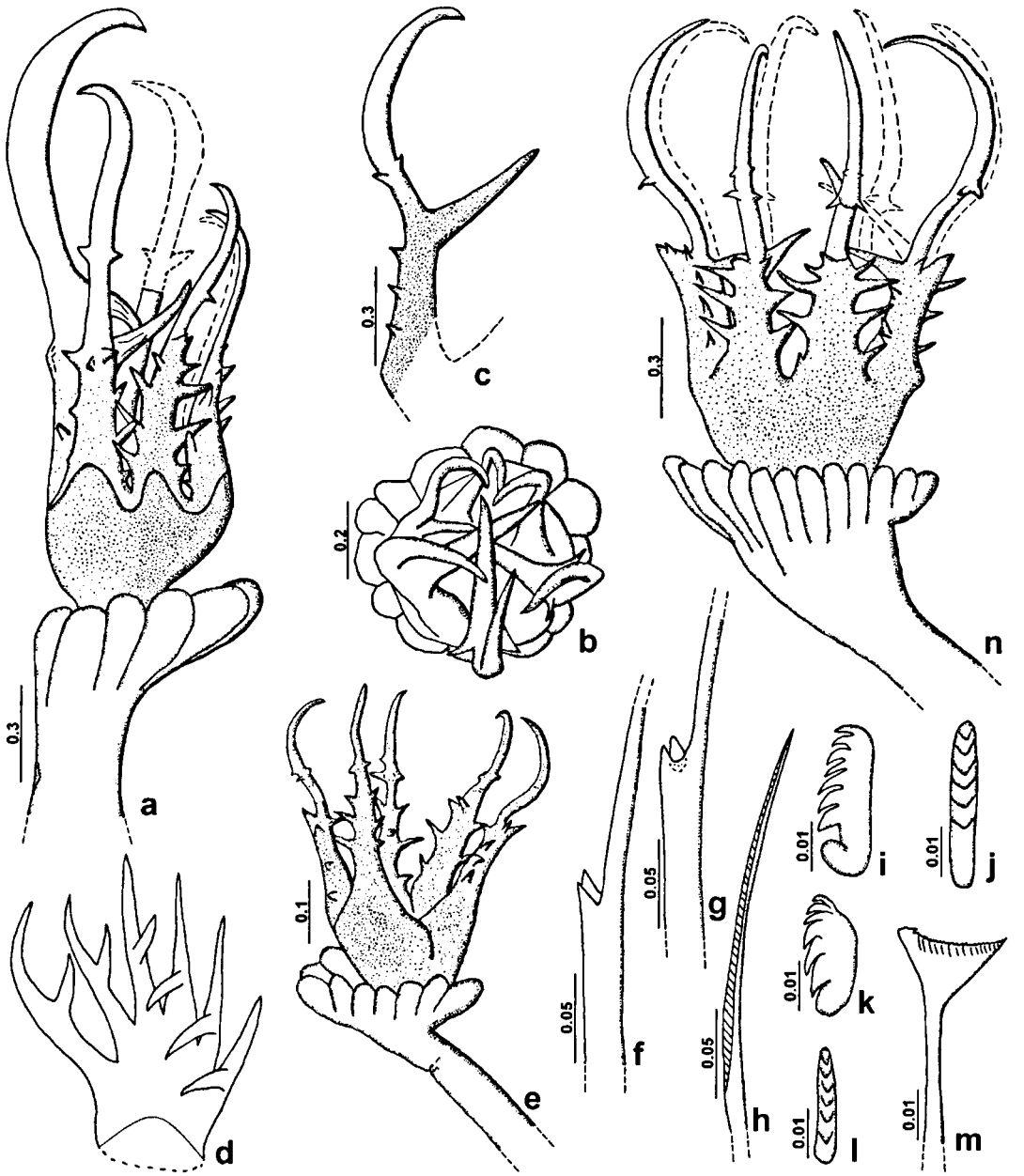

Fig. 18. *Hydroides lambecki* n. sp. From Curaçao, ZMA V. Pol. 3411: holotype: A, operculum, lateral view. Paratypes: B-C, other operculum, apical view and detail of dorsal spine. D, schematic operculum, right inner side, note the arrangement of internal spinules, shifting from base (ventrally) to middle (dorsally) of verticil spines. From Quintana Roo, ECOSUR Serp-31: E, operculum, lateral view. From Curaçao, ZMA V. Pol. 3411: F-G, bayonet chaetae. H, hooded (limbate) chaeta. I-J, thoracic uncini. K-L, anterior abdominal uncini. M, anterior abdominal flat-trumpet chaeta. *H.* cf. *lambecki*, same sample: N, operculum, lateral view.

Hydroides lambecki n. sp.
Figs. 18A-M, 19A-D, 22, Table 3

Hydroides cf. *mongeslopezi* Ten Hove & Nishi, 1996: 93.

MATERIAL. - Six 'adult' and three 'juvenile' specimen.
QUINTANA ROO: ECOSUR Serp-31 (off Punta Herradura, on black coral, 80 m, 30-XI-2000, legit S. Salazar-Vallejo & L. Carrera-Parra).
CURAÇAO: ZMA V. Pol. 3411, holotype and 7 paratypes, one intermediate specimen not included in typeseries

Table 3. Main differences between *Hydroides mongeslopezi* and *H. lambecki* n. sp.

Character	*H. mongeslopezi*	*H. lambecki* n. sp.
Number of radii	17-28	11-14
Number of verticil spines	8-11	6-7
Position of internal spinules	basal-medial	medial
Direction of internal spinules	recurving towards bottom of verticil	pointing distally
Number of external spinules	5-13	2-4

(Vaarsenbaai, W, wreck tugboat below reef, 50 m, 18-V-1970, from wreck and calcareous algae, legit H.A. ten Hove, sta. 2050A).
BONAIRE: ZMA V. Pol. 5081, not studied in detail (Klein Bonaire, North, 0.5 mi E of Westpunt, 1-VII-1970. Reef, little sand, 17 m. From corals, legit H.A. ten Hove, sta. 2105).
JAMAICA: ZMA V. Pol. 3226, 27 specimens not studied in detail (Discovery Bay, fore-reef slope, 40 m; interior of artificial (asbestos) caves, 1974-1975, legit J.B.C. Jackson).

DESCRIPTION. - Tube: white, ID=0.9 mm (n=4, r:(0.4)0.8-1.2, μ=0.9±0.2), ED=1.3 mm (n=4, r:(0.5)1.2-1.5, μ=1.3±0.1); most tubes missing, remaining fragmentary and/or covered by epibionts; peristomes, transversal ridges and/or longitudinal ridges have not been observed, not even in the single larger fragment.

Colour and size: body yellow. TL=9.2 mm (n=2, r:(6.3)9.2-9.3, μ=9.2±0.1).

Branchial crown: with 11 radioles (n=7, r:(6)9-12, μ=10.5±1.0) left, and 11 right (n=7, r:(6)9-12, μ=10.5±1.1). RL=3.0 mm (n=7, r:(2.0)2.5-3.5, μ=3.0±0.4). Terminal filament long in all measured specimens.

Peduncle: POL=4.2 mm (n=7, r:(2.6)3.8-4.5, μ=4.2±0.3). All 'adult' specimens have right insertion (n=7); constriction ill-defined (Figs. 18A, E). Pseudoperculum present in six 'adult' specimens, not observed in other.

Operculum: OL=1.9 mm (n=7, r:(0.8)1.4-2.2, μ=1.9±0.3), OD= 0.6 mm (n=7, r:(0.3)0.5-0.7, μ=0.6±0.1). Funnel with 12 radii (n=7, r:(11)11-14, μ=12.2±1.4) with blunt tip (Figs. 18A, B, E). Interradial grooves 1/3 of funnel length in three opercula, 2/5 respectively 1/2 in two. Verticil with six spines (n=7, r:(5)6-7, μ=6.4±0.5), curving inwards at tip (Figs. 18A, C, E); colour of the base black, gradually changing to yellowish in middle and distal parts. Some dorsal spines larger than ventral spines (Fig. 18A), exceptionally spines similar in shape and size (Fig. 18E), with pointed tip. Spines with one internal spinule, directed downwards and situated in almost basal position ventrally, but displaced to about halfway in dorsal spines, where it is large and directed down or up (Figs. 18A, C, D). All verticil spines with groups of four small external spinules halfway (n=7, r:(2)2-4, μ=3.5±0.9), yellow; 3-5 pairs of black lateral spinules in basal-middle position (Figs. 18A, C, E); without wings. Verticil without central tooth.

Collar chaetae: bayonet chaetae with two pointed-short teeth, distal blade smooth (Figs. 18F, G); hooded (capillary) chaetae present.

Thorax: THL=1.8 mm (n=3, r:(1.3)1.6-2.0, μ=1.8±0.2), THW=0.6 mm (n=7, r:(0.3)0.5-0.7, μ=0.6±0.1). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 18H) of two sizes, saw-shaped uncini (Figs. 18I, J).

Abdomen: number of abdominal chaetigers unknown, all specimens incomplete. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 18M). Anterior abdominal uncini saw-shaped (Figs. 18K, L).

HABITAT. - Depth: 17-80 m, on various hard substrates.

DISTRIBUTION. - Caribbean Sea (Fig. 22).

ETYMOLOGY. - Named after Hugh J.P. Lambeck, a deceased assistant of one of us (HAtH), who first realised that this was a separate taxon.

REMARKS. - Ten Hove & Nishi (1996: 93) mentioned that the operculum of *H. lambecki* n. sp. (as *H.* cf. *mongeslopezi*) has a series of compound eyes in the tips of the radii, observed in fresh material. Unfortunately, such compound eyes could not be found in preserved material from Curaçao, but the ventral radii have bulging tips.

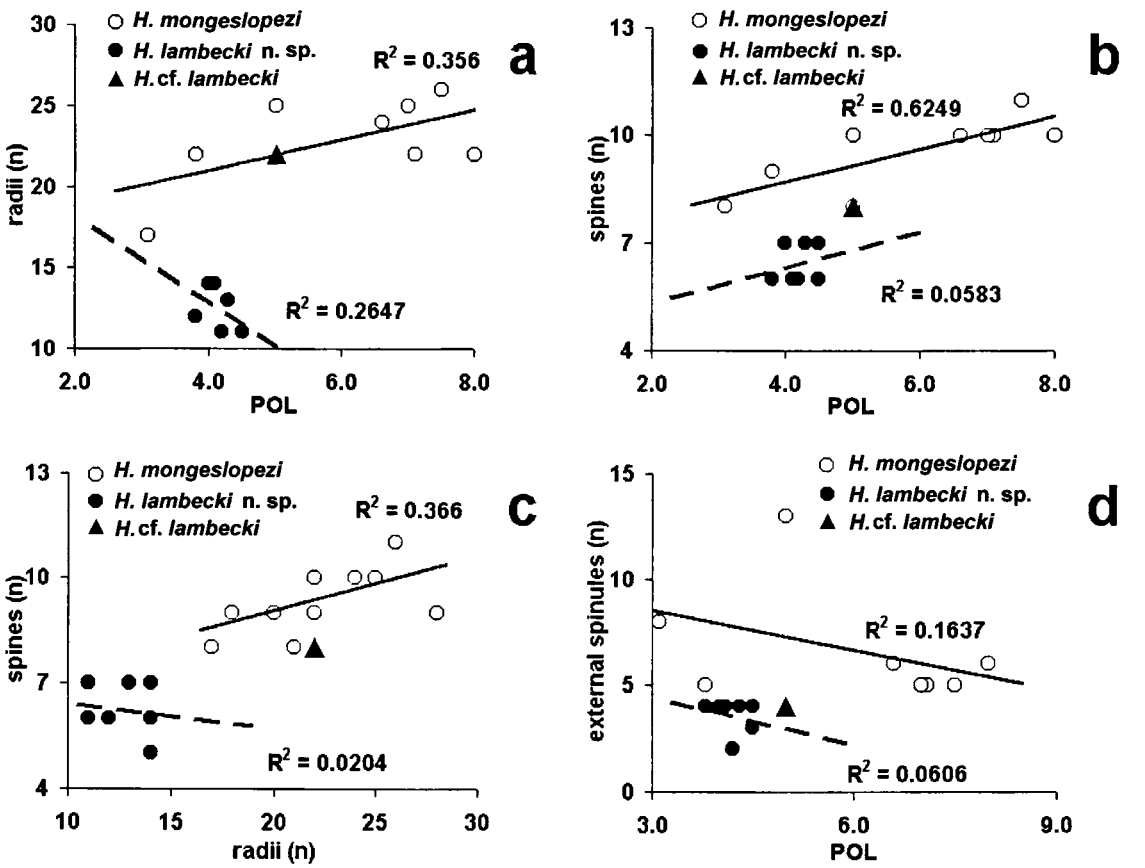

Fig. 19. Morphometric comparisons between *Hydroides mongeslopezi* and *H. lambecki* n. sp. The intermediate specimen was included (as a black triangle), but not used in the calculation of the regression lines.

TAXONOMIC REMARKS. - As stated above, Hugh Lambeck and Ten Hove (unpubl. data) revised more than 250 specimens of '*Hydroides mongeslopezi*' and concluded that the opercula of *H. mongeslopezi* s.str. had more spines and radii and the taxon occurred predominantly between 0-25 m; on the other hand, *H. mongeslopezi* 'atypical' form, indicated herein as *H. lambecki* n. sp., occurred predominantly from 40 m down; between 5 and 40 m both taxa were co-occurring, but *H. lambecki* n. sp. never formed more than 25% of the population. Specimens with an intermediate shape of operculum formed less than 1.6% of the total number. In this case, the operculum shows internal spinules pointing upwards and inserted almost halfway the verticil spine (as in *H. lambecki* n.sp.) but a high (24) number of radii, typical for *H. mongeslopezi* (Fig. 18N). These observations are corroborated by the present material. The first taxon has 17-28 radii (μ=23; Rioja, 1958: 257 recorded 20-30) and *H. lambecki* n. sp. has 11-14 (μ=13). Moreover, *H. mongeslopezi* has 8-11 verticil spines (μ=10) and *H. lambecki* n. sp. has 6-8 (μ=7).

Hydroides mongeslopezi generally has internal spinules in basal-middle position curving inwards (Fig. 16B), more or less conform Rioja (1958: 257, Fig. 4C); *H. lambecki* n. sp. on the other hand shows straight internal spinules in middle position (Fig. 18C). Both taxa differ in the number of external spinules (Fig. 19D): 5-13 (μ=7) in *H. mongeslopezi* (Rioja, 1958, recorded 2); 2-4 (μ=3) in *H. lambecki* n. sp. The external spinules are very tiny in *H. mongeslopezi* (Fig. 16A), well-developed in *H.*

lambecki n. sp. (Fig. 18D). A summary of the differences is shown in Table 3.

Although all morphometric characters show differences (Fig. 19), the best separation between *H. lambecki* n. sp. and *H. mongeslopezi* is found when number of spines is plotted against number of radii (Fig. 19C).

A juvenile specimen (ZMA V. Pol. 5081) showed two opercula: one like Fig. 18A, typically *Hydroides lambecki* n. sp.; the other, however, more or less like Fig. 17A. This might indicate that the specimen figured there is a juvenile as well (of *H. mongeslopezi*).

Hydroides mucronatus Rioja, 1958
(Figs. 20A-J, 22)

Hydroides mucronata Rioja, 1958: 254-257, figs. 3a-h. Type locality: Isla de Sacrificios, Veracruz, Gulf of Mexico.

Hydroides mucronata; Bastida-Zavala & Salazar-Vallejo, 2001b: 848-851 (Gulf of Mexico).

MATERIAL. - CAMPECHE: ECOSUR Serp-36 (beach 20 km SW Champotón, sea grass (*Syringodium*) and algae (*Udotea flabellum, Penicillus dumetosus* and *Halimeda incrassata*), 1 m, 14-II-1999, legit J.R. Bastida-Zavala & S. Salazar-Vallejo).

DESCRIPTION. - Tube: lost.

Colour and size: body beige. TL=2.2 mm.

Branchial crown: with four pairs of radioles, without terminal filament. RL=0.4 mm.

Peduncle: POL=0.9 mm. Insertion right; constriction ill-defined (Fig. 20A). Pseudoperculum present.

Operculum: OL=0.25 mm, OD=0.2 mm. Funnel with 14 radii with pointed tip (Fig. 20A). Interradial grooves 1/3 of funnel length. Verticil small, with seven straight spines (Figs. 20A-C), colour beige. All spines similar in shape and size, with blunt tip. Spines with a pair of lateral spinules (Figs. 20A-C), some with one middle internal spinule (Figs. 20B, C); without external spinules and/or wings. Verticil without central tooth.

Collar chaetae: bayonet chaetae with two blunt-elongate teeth, distal blade with small denticles (Figs. 20D, E); hooded (capillary) chaetae present.

Thorax: THL=0.7 mm, THW=0.25 mm. Thoracic membranes poorly developed. Six chaetigers with hooded (limbate) chaetae (Fig. 20F) of one size (see remarks), saw-shaped uncini (Fig. 20G).

Abdomen: with 19 chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae. Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Figs. 20H, I), posterior uncini rasp-shaped (Fig. 20J).

HABITAT. - Depth: 1 m, in bed of sea grass (*Syringodium*) and algae (*Udotea flabellum* (J. Ellis & Sol.) Lamouroux, *Penicillus dumetosus* (Lamouroux) de Blainville and *Halimeda incrassata* (Ellis) Lamouroux).

DISTRIBUTION. - Gulf of Mexico (Fig. 22).

REMARKS. - Rioja (1958) described *H. mucronatus* from Veracruz, the type material is regarded to be lost. Subsequent 'topotypical' collecting (Isla Verde, by Bastida-Zavala) was unsuccessful. Although our single specimen is smaller than those described by Rioja, it agrees in all other aspects, but for the presence of a middle internal spinule (Fig. 20A), which may have been overlooked by Rioja. With the similarly small specimen of *Hydroides* cf. *operculatus*, this is the only material in which we were not able to find two sizes in the thoracic (hooded) limbate chaetae. Whether this is a real difference, or due to insufficient (and too small) material remains to be decided from more specimens.

Specimens that share most opercular characters are described below as *H.* cf. *mucronatus*, where taxonomic discussion is given as well.

Hydroides cf. **mucronatus** Rioja, 1958
Figs. 21A-O, 22

Hydroides cf. *mucronatus* Ten Hove, 1984: 191, figs. 6a-c, Aruba, Curaçao, Puerto Rico; Ten Hove & San Martín, 1995: 15, Cuba; Bastida-Zavala & Salazar-Vallejo, 2001b: 849-851 (Yucatán Peninsula and Cuba).

Hydroides mucronatus; Díaz, 1994: 618 (Barbados, settlement and succession).

MATERIAL. - Thirteen 'adult' and four 'juvenile' specimens. VERACRUZ: ECOSUR Serp-24a (Arrecife La Gallega, 12-VII-2000, legit J.R. Bastida-Zavala & J.A. de León-González); ECOSUR Serp-24b (Isla de Enmedio, 13-VII-2000, legit J.R. Bastida-Zavala & J.A. de León-González).

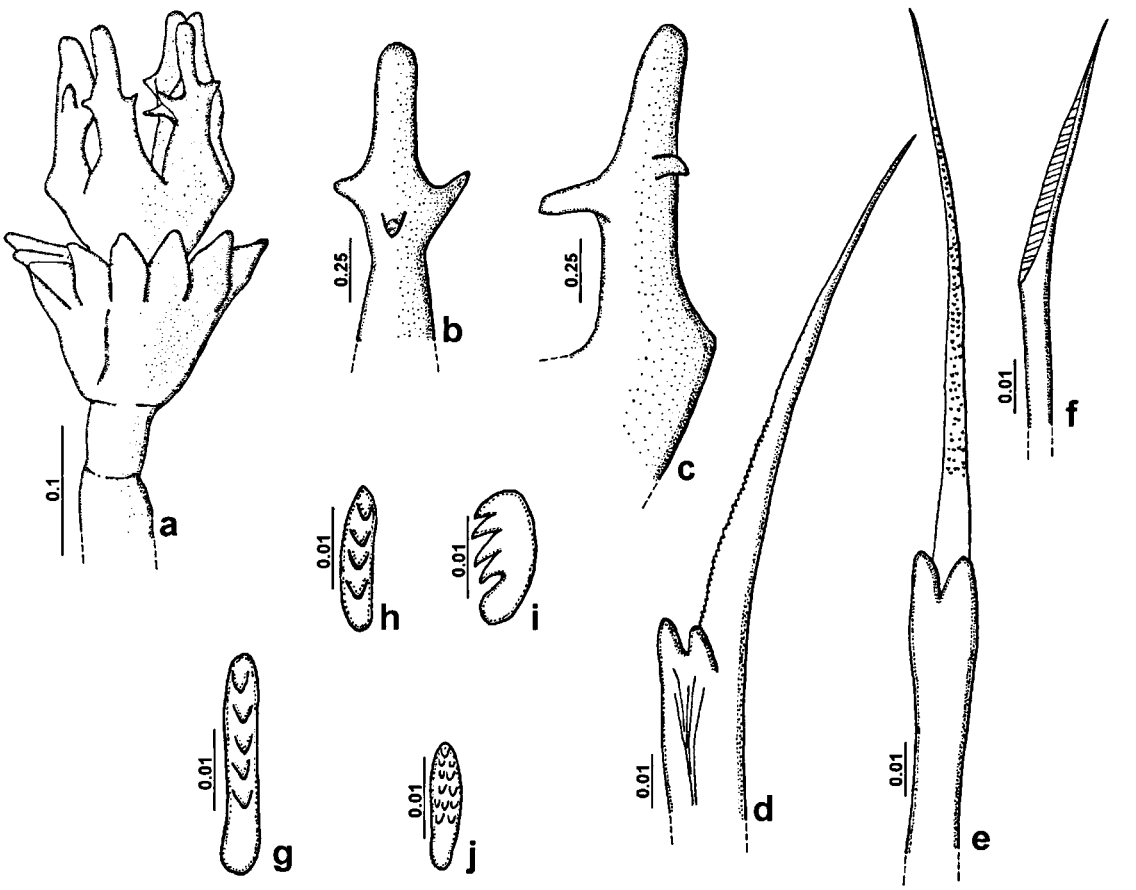

Fig. 20. *Hydroides mucronatus*. From Campeche, ECOSUR Serp-36: A, operculum, lateral view. B-C, verticil spines, from inside respectively in lateral view. D-E, bayonet chaetae, lateral and frontal view. F, hooded (limbate) chaeta. G, thoracic uncinus. H-I, anterior abdominal uncini. J, posterior abdominal uncinus.

QUINTANA ROO: ECOSUR Serp-24c (Isla Contoy, fouling wooden pier, 21-II-1999, legit J.R. Bastida-Zavala & S. Salazar-Vallejo); ECOSUR Serp-24d, 3 specimens (Aventuras, DIF, in dead coral (*Acropora palmata*), 2 m, 28-II-1999, legit J.R. Bastida-Zavala & S. Salazar-Vallejo).

CUBA: IOC 4, 2 specimens (Cayo Juan García, Golfo de Batabanó, 5 m, Mar 1988).

MARIE GALANTE: MNHN UC-348 (16°04'N 61°16.5'W, in corals, 30-80 m, 19-III-1957, Président Théodore Tissier, sta. 172).

PANAMA, ATLANTIC: ECOSUR Serp-28g, not studied in detail (Fuerte Sherman, dock and nearby tidal creek, salinity=30‰, 2-VI-2002, legit S.I. Salazar-Vallejo).

CURAÇAO: LACM-AHF s.n., 5 specimens (10 m, 31-X-1977).

BONAIRE: ZMA V. Pol. 3339, 3 specimens (Klein Bonaire, near jetty, barrier reef of *Acropora palmata, Millepora* sp. and *Tubastrea* sp., 20 m offshore, in surf, 1-VII-1970, legit H.A. Ten Hove, sta. 2107).

DESCRIPTION. - Tube: white, ID=0.5 mm (n=10, r:(0.3)0.3-0.8, μ=0.5±0.2), ED=0.8 mm (n=10, r:(0.5)0.5-1.7, μ=0.8±0.3); some tubes lost, the rest fragmentary and/or covered by epibionts; seven anterior ends without peristomes; two specimens have transversal ridges, not observed in two other tubes; one specimen shows three longitudinal ridges, one shows two, and three are without longitudinal ridges.

Colour and size: body yellow. TL=7.9 mm (n=10, r:(3.8)4.2-11.6, μ=7.9±2.4).

Branchial crown: with seven radioles (n=13, r:(5)5-9, μ=6.9±1.2) left, and seven right (n=13, r:(5)5-17, μ=7.4±3.1). RL=1.5 mm (n=12, r:(0.9)1.0-2.3, μ=1.5±0.4). Terminal filament long in four specimens (31%), short in nine (69%).

Peduncle: POL=1.8 mm (n=14, r:(1.0)1.0-2.5, μ=1.8±0.4). Insertion left (n=4; 33%), right (n=7;

58%) or at both sides (n=1; 8%); constriction ill- to well-defined (Fig. 21A). Pseudoperculum present in nine 'adult' specimens, not found in the other three specimens.

Operculum: OL=0.6 mm (n=14, r:(0.2)0.2-0.7, μ=0.6±0.2). 'Funnel' with four globular processes (n=14, r:(2)2-6, μ=3.8±1.4) (Figs. 21A, C). Verticil with 11 straight spines (n=13, r:(8)8-14, μ=10.6±2.1; Figs. 21A, B), colour yellow to light brown. All spines similar in shape and size, with pointed tip. Spines with one basal internal spinule (Figs. 21B, C), absent in only one specimen; with a pair of lateral spinules (Figs. 20A-C); without external spinules and/or wings. Verticil without central tooth (Fig. 20B).

Collar chaetae: bayonet chaetae with 3-4 blunt-short to pointed-elongate teeth, distal blade with small denticles (Figs. 21D-F); hooded (capillary) chaetae with denticles (Fig. 21G).

Thorax: THL=1.3 mm (n=10, r:(0.7)0.8-1.5, μ=1.3±0.2), THW=0.4mm (n=10, r:(0.2)0.3-0.6, μ=0.4±0.1). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 21H) of two sizes, saw-shaped uncini (Figs. 21I, J).

Abdomen: with 52 (n=8, r:(39)39-78, μ=51.9 ±12.2) chaetigers. All abdominal chaetigers with flat-trumpet chaetae (Figs. 21K, L). Posterior chaetigers with 'capillary' chaetae (Fig. 21L). Anterior uncini saw-shaped (Figs. 21M, N), posterior uncini rasp-shaped (Fig. 21O).

HABITAT. - Depth: 10-55 m, on rocks, shells and dead corals.

DISTRIBUTION. - Gulf of Mexico, Bahamas and Caribbean Sea (Fig. 22).

TAXONOMIC REMARKS. - These specimens differ from *H. mucronatus* Rioja, 1958, s.str., since they do not have a complete funnel (Fig. 20A), but a series of 2-6 globular processes instead (Fig. 21A). Ten Hove (1984) hypothesized that this anomalous character may reflect a neotenic development. Such specimens without a funnel are found in many Caribbean sites, including the *H. mucronatus* type-locality.

Other species with one pair of lateral spinules are *H. bispinosus* and *H. parvus*. They are easily distinguished from *H.* cf. *mucronatus* and *H. mucronatus* s.str. by their incurving verticil spines (Figs. 11A-D, 12A-C), which are straight in the latter (Figs. 20A-C, 21A, B). In addition, *H. bispinosus*, *H. parvus* and *H. mucronatus*, have a funnel with radii (Figs. 11A, D, 12A, B, 20A), *H.* cf. *mucronatus* shows only globular processes (Fig. 21A).

An additional difference between *H.* cf. *mucronatus* and the stem form is the shape of the bayonet chaetae, with 3-4 teeth in the first taxon (Figs. 21D-F), against two teeth in the latter (Figs. 20D, E).

Hydroides dianthus (Verrill, 1873)
Figs. 23A-M, 24A-K, 28

Serpula dianthus Verrill, 1873: 620, without figures (material studied). Type locality: New Jersey to Massachusetts, USA.

Serpula dianthus var. *citrina* Verrill, 1873: 620-621 ("in the same cluster of tubes" of *Serpula dianthus*).

Hydroides (Eupomatus) dianthoides Augener, 1922: 49-50 (partim syn., Veracruz, material studied).

Eupomatus dianthus; Hartman, 1945: 48 (North Carolina), 1951: 118-119 (Gulf of Mexico); Wells & Gray, 1964: 74 (Cape Hatteras).

Hydroides dianthus; Rioja, 1958; 260-262 (Veracruz); Zibrowius, 1971: 726-727 (extensive review, Mediterranean, Atlantic coast of Europe, western Africa and North America); Ten Hove & Wolf, 1984: 55:20-55-21 (Northern Gulf of Mexico); Bastida-Zavala & Salazar-Vallejo, 2001b: 845 (Yucatán Peninsula); Kupriyanova et al., 2001: 10 (reproduction and development synthesis).

MATERIAL. - Eleven 'adult' and nine 'juvenile' specimens. CONNECTICUT: YPM 2698, 2699, 12 specimens not studied in detail (types, Off New Haven, 6-8 fms).

MASSACHUSETTS: USNM 7805 (unknown locality, maybe Vineyard Sound, 1881); USNM 8730, 5 specimens (South end of Hope Island, 23-VIII-1880, USS Fish Hawk, sta. 819 and 822), USNM 10148, 2 specimens (off Lacke's Bay, Vineyard Sound, 20-VII-1881, USS Fish Hawk, sta. 932).

NORTH CAROLINA: ZMA V. Pol. 3118 (Bogue Sound, on *Crassostrea* shell, 20-V-1970, don. J.M. Neff).

VERACRUZ: ECOSUR Serp-11c (San Juan de Ulúa, fouling, rock pier, together with vermetids, oysters and ascidians, 1-1.5 m, 11-VIII-1996, legit M.A. Muro); UANL s.n., 6 specimens (Tamiahua Lagoon, shells, salinity=20‰, 19-VIII-2000, legit J.A. de León-González, sta. T-13A); ZMH

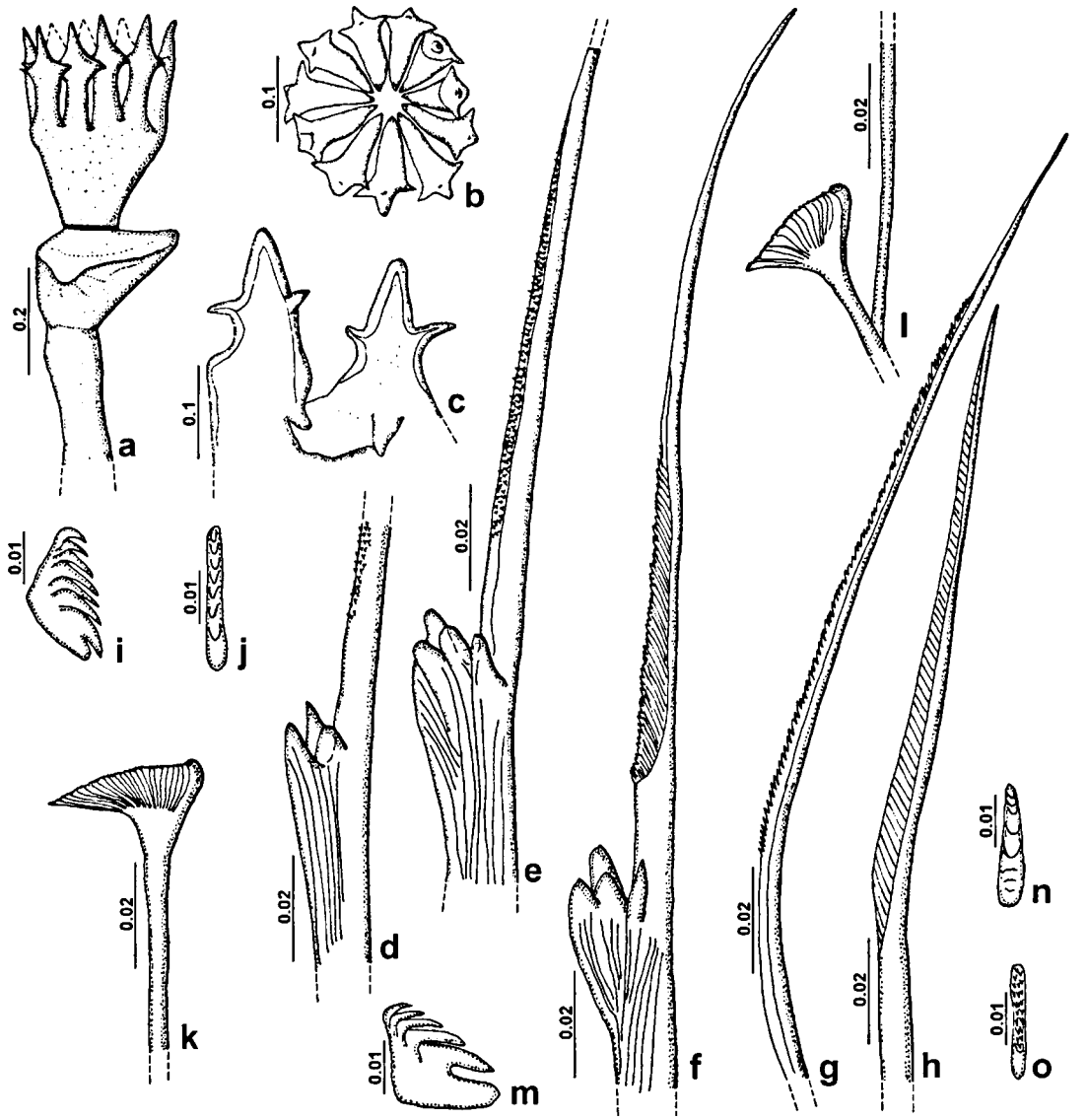

Fig. 21. *Hydroides* cf. *mucronatus*. From Bonaire, ZMA V. Pol. 3339: A-B, operculum, lateral and apical view. From Marie Galante, MNHN UC-348: C, two verticil spines, detail. D-F, bayonet chaetae, lateral view. G, hooded (capillary) chaeta. H, thoracic hooded (limbate) chaeta. I-J, thoracic uncini. K-L, anterior and posterior abdominal flat-trumpet chaetae. M-N, anterior abdominal uncini. O, posterior abdominal uncinus.

V. 9751, 1 specimen not studied in detail (Veracruz, legit Bråkenhielm).

YUCATAN: ECOSUR Serp-11a, 2 specimens (Celestún, rocks, 0.6 m, 17-II-1999, legit J.R. Bastida-Zavala & S. Salazar-Vallejo).

QUINTANA ROO: ECOSUR Serp-11b, 2 specimens (Isla Contoy, fouling wooden pier, 1 m, 21-II-1999, legit J.R. Bastida-Zavala & S. Salazar-Vallejo).

DESCRIPTION. - Tube: white, ID=1.8 mm (n=4, r:(0.5)1.7-2.0, μ=1.8±0.2), ED=2.4 mm (n=4, r:(0.7)2.0-2.7, μ=2.4±0.3); most tubes missing, remaining ones fragmentary and/or covered by epibionts, four anterior ends lack peristomes; three specimens have transversal ridges, not observed in the rest; two specimens show two longitudinal ridges and one none.

Colour and size: yellow to light brown. TL= 16.5 mm (n=5, r:(5.0)8.0-30.0, μ=16.5±7.9).

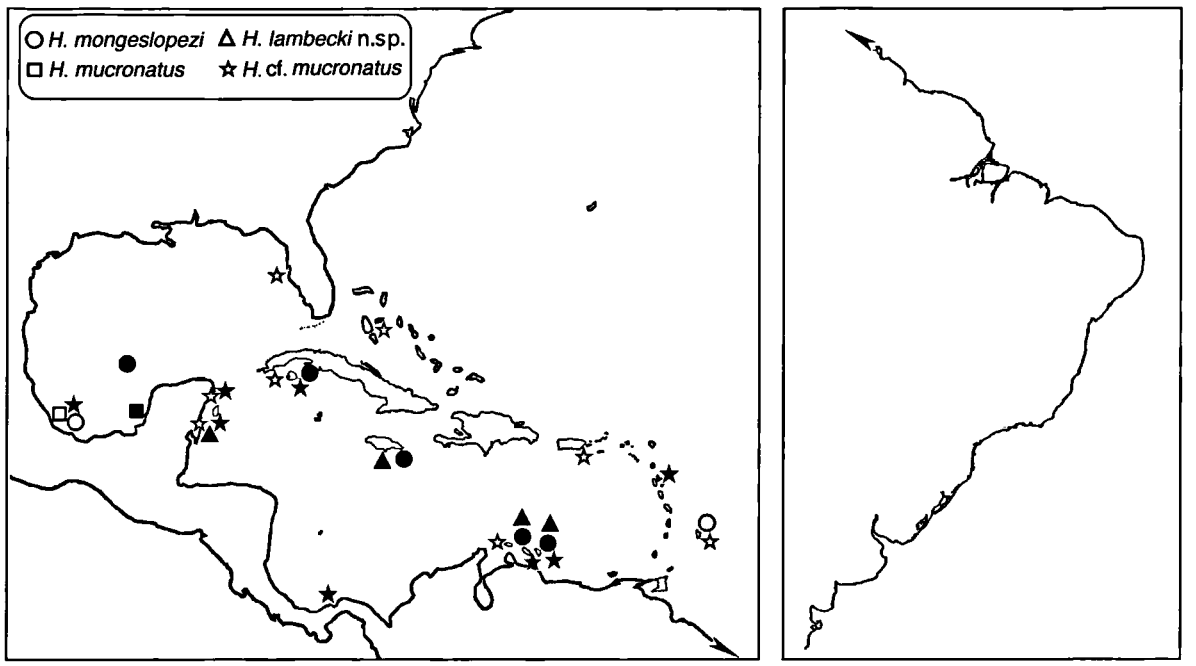

Fig. 22. Distribution of *Hydroides mongeslopezi*, *H. lambecki* n. sp., *H. mucronatus* and *H.* cf. *mucronatus*. Closed symbols denote examined material, open symbols literature records.

Branchial crown: with 16 radioles (n=10, r:(5)10-20, μ=16.0±3.4) left, and 17 right (n=10, r:(6)13-22, μ=16.7±3.0). RL=3.7mm (n=11, r:(0.9)2.3-5.5, μ=3.7±1.1). Terminal filament long in eight specimens (73%) and very long in three (27%).

Peduncle: POL=5.0 mm (n=11, r:(1.0)3.5-6.5, μ=5.0 ±1.1). Insertion left (n=6; 55%) or right (n=5; 45%); constriction ill-defined (Figs. 23A, D, G, M) or lacking (Figs. 23E, F, H, I). Pseudoperculum present in all 'adult' specimens.

Operculum: OL=1.7 mm (n=11, r:(0.3)1.1-2.5, μ=1.7±0.4), OD=1.2 mm (n=11, r:(0.2)0.8-1.7, μ=1.2±0.3). Funnel with 31 radii (n=11, r:(12)24-37, μ=31.3±4.2) with pointed tip (Figs. 23A, B, D-I, K-M). Interradial grooves 1/3 of funnel length in four opercula, 2/5 in four and 1/4 in three. Verticil with 10 yellowish spines (n=11, r:(8)8-13, μ=10.4±1.4), all curving ventrally (Figs. 23A-F), sometimes twisted (Figs. 23I-K). Dorsal spines larger than ventral ones (Figs. 23A, D), in 'juvenile' specimens the dorsal verticil spines are less developed (Figs. 23E, H, I, M), in one 'juvenile' a verticil is lacking completely (Fig. 23G). Tip of spines pointed (Figs. 23A-D, L); in 'juvenile' specimens sometimes blunt (Figs. 23E, H, I, M). Spines with one basal internal spinule; without external and lateral spinules and/or wings. Verticil without central tooth (Figs. 23B, K).

Collar chaetae: bayonet chaetae with two blunt-rounded to blunt-short teeth, distal blade smooth (Figs. 24A, B), exceptionally with three pointed-elongate teeth (Fig. 24C); hooded (capillary) chaetae present, sometimes with small distal denticles (Figs. 24D, E).

Thorax: THL=4.9 mm (n=11, r:(1.3)3.0-9.5, μ=4.9±2.0), THW=1.8 mm (n=11, r:(0.4)1.2-2.2, μ=1.8±0.4). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae of two sizes (Figs. 24F, H), saw-shaped uncini (Fig. 24I).

Abdomen: with 89 (n=4, r:(40)69-119, μ=89.3 ±23.2) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae. Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Figs. 24J, K), posterior uncini rasp-shaped.

HABITAT. - Depth: 0.6-28 m, on oysters (*Crassostrea* sp.), wooden pier and rocks. The salinity tolerance of this species is very wide, from 1‰ to 34‰ (Zibrowius, 1971: 708). Fouling.

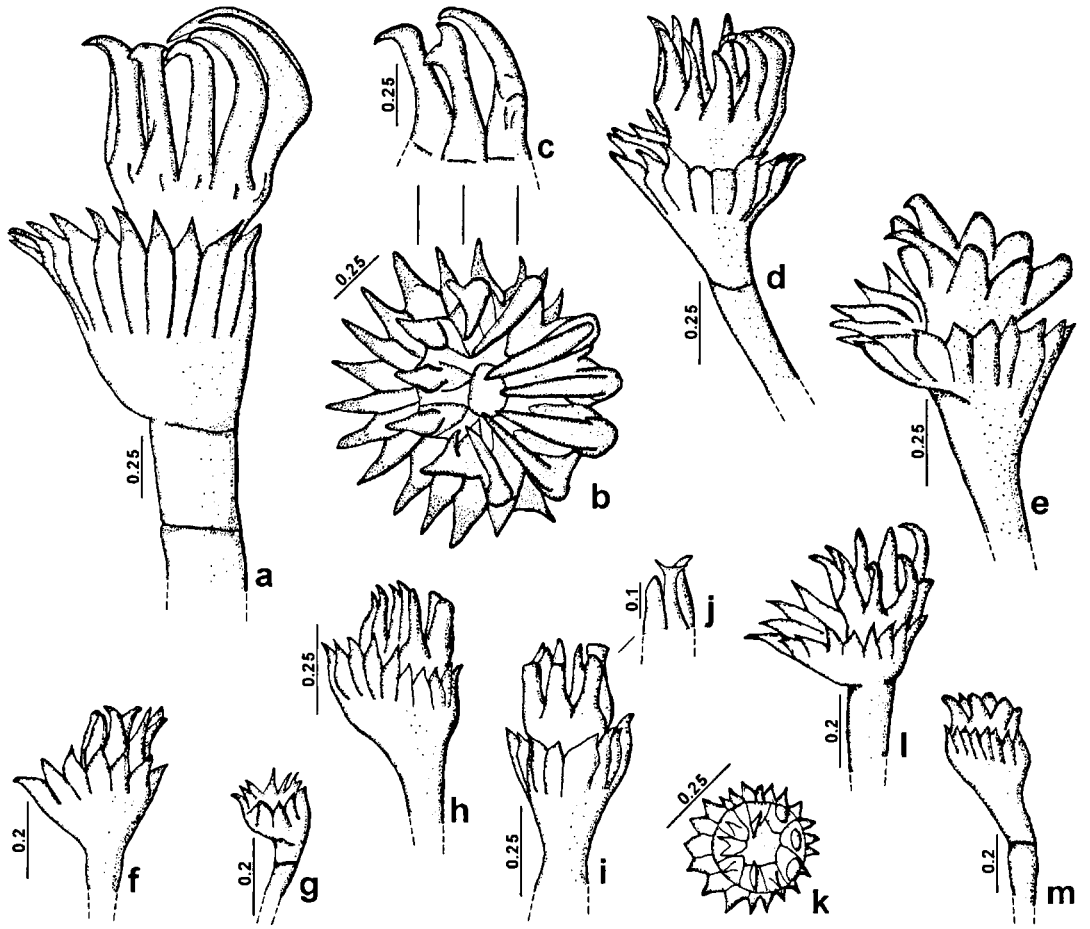

Fig. 23. *Hydroides dianthus*. From Quintana Roo, ECOSUR Serp-11b: A-B, operculum, lateral and apical view. C, three right verticil spines, detail. From Veracruz, UANL s.n.: D-E, H, L-M, opercula, lateral view. F-G, left and right operculum of single specimen. I, operculum, dorsal view. J, three right verticil spines, detail. K, operculum, apical view.

DISTRIBUTION. - Eastern U.S.A., Northern Gulf of Mexico and Curaçao (Fig. 28), Atlantic coasts of Europe and Western Africa, Mediterranean.

REMARKS. - *Hydroides dianthus* was described from the East coast of the United States, and later recorded in the Atlantic Europe, Western Africa and in the Mediterranean; presumably ship-transported (e.g. Zibrowius, 1994). The species is very commonly used for reproduction, larval development and genetic studies (cf. Kupriyanova et al., 2001).

The operculum of *H. dianthus* shows a remarkable morphological variation (Figs. 23A-M). Specimens from hypohaline lagoons have smaller bodies and poorly developed opercula: dorsal verticil spines with blunt tip (Figs. 23E, H, I, M), sometimes formed irregularly (Figs. 23B, C, I-K).

TAXONOMIC REMARKS. - *Hydroides dianthus* has been confused with *H. sanctaecrucis*. Both species share a verticil with all spines curving ventrally (Figs. 23A-D, L, 25A, C, E, F). However, *H. dianthus* lacks external spinules (Figs. 23A, D-F, H, I, L, M), which are present in *H. sanctaecrucis* (Figs. 25A, C-F). Both species were extensively revised and compared by Zibrowius (1971: 697-705).

Hydroides sanctaecrucis Krøyer [in] Mörch, 1863
Figs. 25A-R, 28

Hydroides (Eucarphus) sanctae-crucis Krøyer [in] Mörch, 1863: 378-379, Pl. 11, fig. 12 (material

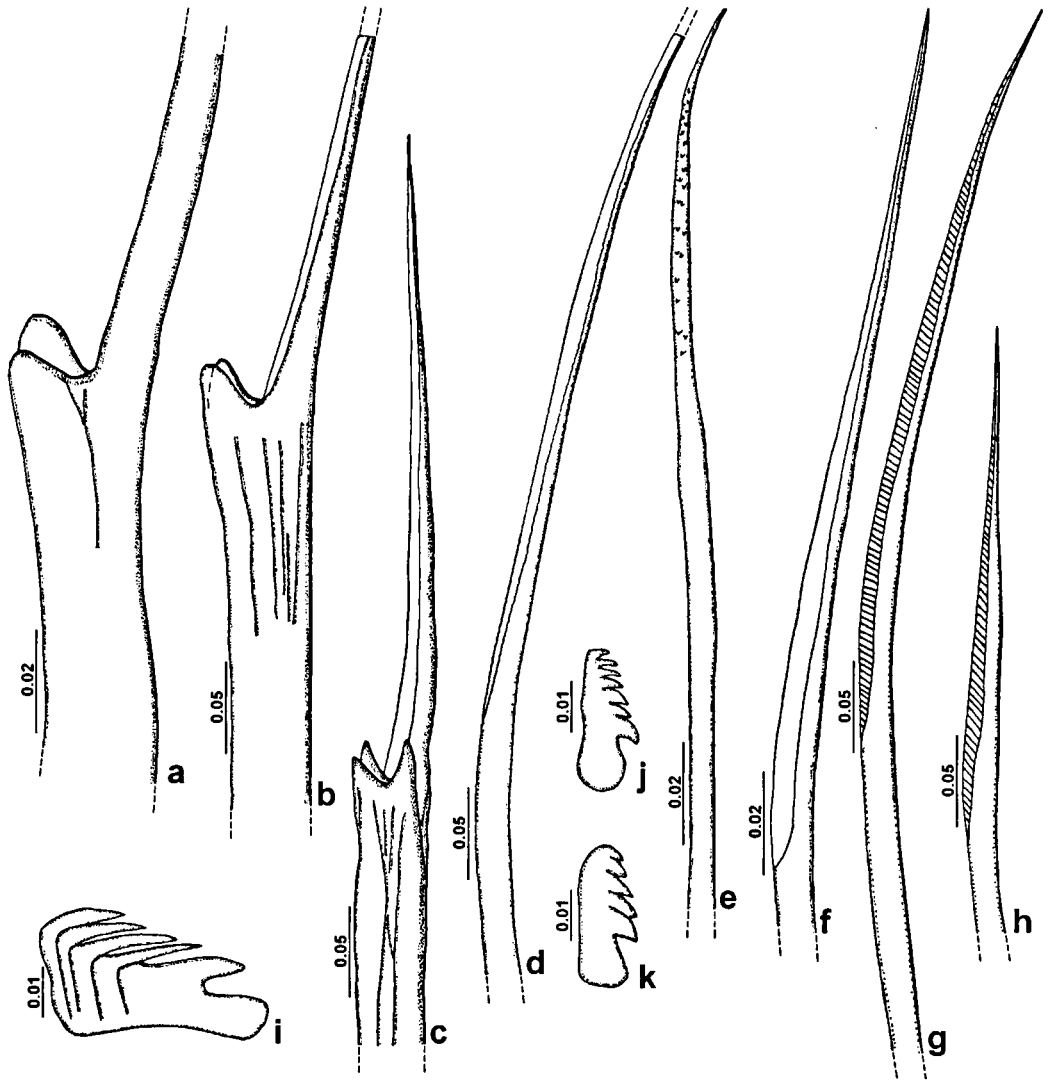

Fig. 24. *Hydroides dianthus*. From Veracruz, UANL s.n.: A, bayonet chaeta, lateral view. From Quintana Roo, ECOSUR Serp-11b: B-C, bayonet chaetae, lateral and frontal view. D, hooded (capillary) chaeta, lateral view. From Veracruz, UANL s.n.: E, hooded (capillary) chaeta, frontal view. F, thoracic hooded (limbate) chaeta. From Quintana Roo, ECOSUR Serp-11b: G-H, thoracic hooded (limbate) chaetae. I, thoracic uncinus. J, anterior abdominal uncinus. From Veracruz, UANL s.n.: K, anterior abdominal uncinus.

studied). Type locality: Saint Croix, Lesser Antilles.

Hydroides (Eupomatus) dianthoides Augener, 1922: 49-50 (partim syn., Haiti, material studied).

Eupomatus sanctae crucis; Fauvel, 1919: 478-479, 1923: 50-51 (French Guyana); Rioja, 1958: 260-262 (Veracruz).

Hydroides sanctaecrucis; Zibrowius, 1971: 699-700 (St. Croix, Puerto Rico, Jamaica, Aruba, Caribbean of Panamá, French Guyana; comparison with *H. dianthus*); Dueñas, 1999: 14 (Colombian Atlantic).

Hydroides santaecrusis; (in errore) Dueñas, 1981: 99-100, 135 (Cartagena, Colombia).

[Non: *Hydroides sanctaecrucis* sensu Díaz Díaz & Liñero Arana, 2001 (see *H. bispinosus*)].

MATERIAL. - Sixteen 'adult' specimens.

FLORIDA: ZMA V. Pol. 3540, 2 specimens (26°04'N 80°06'W, Naval Oceanographic Office, Fort Lauderdale,

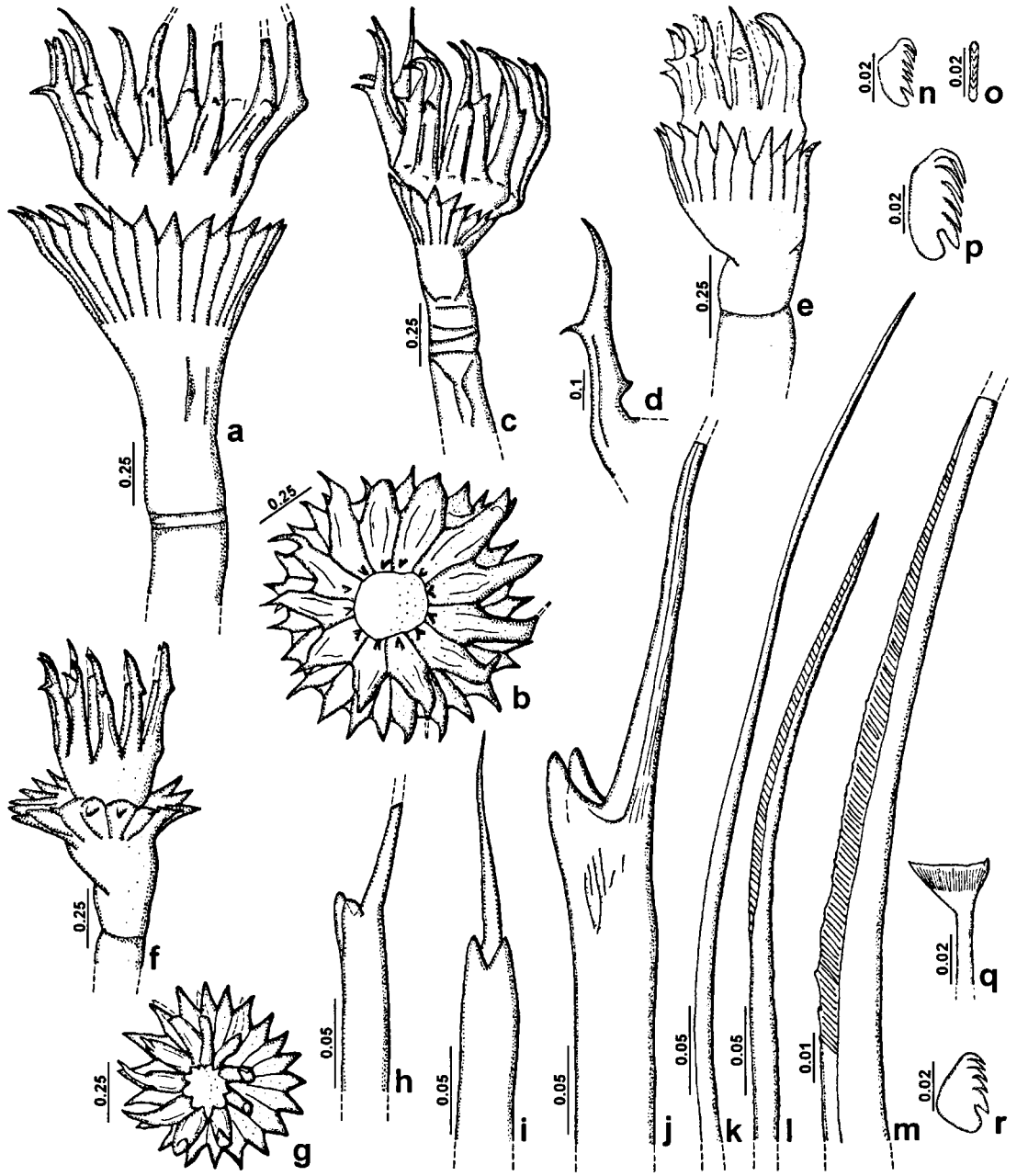

Fig. 25. *Hydroides sanctaecrucis*. From French Guyana, MNHN 3777: A-B, right operculum, lateral and apical view. C, left operculum of same specimen, lateral view. D, ventral verticil spine, detail. From Florida, ZMA V. Pol. 3540: E, operculum, lateral view. From Pacific coast of Panama, ZMA V. Pol. 3363: F-G, operculum, lateral and apical view. From French Guyana, MNHN 3777: H-I, bayonet chaetae, lateral and frontal view. From Puerto Rico, LACM-AHF s.n.: J, bayonet chaeta, lateral view. K, hooded (capillary) chaeta. L-M, thoracic hooded (limbate) chaeta with detail. N-P, thoracic uncini. Q, anterior abdominal flat-trumpet chaeta. R, anterior abdominal uncinus.

experimental fouling panels, w/o date, legit J.R. de Palma).
HAITI: ZMH V. 1878, 2 specimens not studied in detail (Port au Prince, legit Nepperschmidt)
U.S. VIRGIN ISLANDS: ZMK s.n., 5 specimens not studied in detail, probably syntypes (specimens labeled: "Kr. St. Croix, legit Oerstedt").
PUERTO RICO: LACM-AHF N1917 (Bahía de San Juan, 26/27-IX-1942).
PANAMA, ATLANTIC: ECOSUR Serp-38a and LACM-AHF s.n., 2 specimens not studied in detail (09°21.8'N

79°53.7'W, Club Naútico, salinity=31‰, 3-VI-2002, legit S.I. Salazar-Vallejo); ECOSUR Serp-38b and LACM-AHF s.n., 3 specimens not studied in detail (09°20.9'N 79°54.2'W, Panamá Canal Yacht Club, salinity=31‰, 3-VI-2002, legit S.I. Salazar-Vallejo); ECOSUR Serp-38c and LACM-AHF s.n., 35 specimens not studied in detail (Fuerte Sherman, dock and nearby tidal creek, salinity=30‰, 2-VI-2002, legit S.I. Salazar-Vallejo); ECOSUR Serp-38d and LACM-AHF s.n., 2 specimens not studied in detail (Third Bridge nearest to the Gatún Locks, salinity=18‰, 28-V-2002, legit A. Cohen).

COLOMBIA, ATLANTIC: ZMA V. Pol. 3600 (Bahía de Cartagena, 1983, legit J. Laverde-Castillo).

FRENCH GUYANA: MNHN 3777, 7 specimens (Mission T. Geay, 1902).

PANAMA, PACIFIC: ZMA V. Pol. 3363, 5 specimens (floats at pilot pier, 18-IV-1972, legit Jones et al., sta. 91).

DESCRIPTION. - Tube: white, ID=1.3 mm (n=12, r:0.8-1.7, μ=1.3±0.3), ED=1.8 mm (n=12, r:1.2-2.5, μ=1.8±0.5); one tube shows peristomes, lacking in the remaining 11; all tubes have transversal ridges; five specimens show two longitudinal ridges, seven none.

Colour and size: body yellow to brown. TL=20.8 mm (n=9, r:11.0-36.5, μ=20.8±9.0).

Branchial crown: with 16 radioles (n=16, r:10-21, μ=15.7±2.9) left, and 16 right (n=16, r:12-22, μ=15.7±2.9). RL=2.9 mm (n=16, r:2.0-4.5, μ=2.9±0.9). Terminal filament long in 11 specimens (69%) and short in five (31%).

Peduncle: POL=4.0 mm (n=16, r:2.6-5.8, μ=4.0±1.1). Insertion left (n=7; 44%), right (n=8; 50%) or at both sides (n=1; 6%); constriction ill- (Figs. 25E, F) to well-defined (Figs. 25A, C). Pseudoperculum present in 14 specimens (94%), not found in one (6%).

Operculum: OL=1.6 mm (n=16, r:1.1-2.0, μ=1.6±0.3), OD=0.9 mm (n=16, r:0.5-1.3, μ=0.9±0.2). Funnel with 24 radii (n=17, r:17-34, μ=24.3±3.9) with pointed tip (Figs. 25A-C, E-G). Interradial grooves 1/3 of funnel length in 14 opercula, 2/5 in two and 1/4 in one. Verticil with 12 spines (n=17, r:10-14, μ=11.9±1.3), all spines curving ventrally (Figs. 25A, C, E, F), with pointed tip; colour variable: pale, yellow to light brown. Dorsal spines slightly larger than ventral ones. Spines with one basal internal spinule in eight specimens (Figs. 25B, D, G), lacking in nine; spines with one external spinule, larger in ventral spines than in dorsal ones (Fig. 25D); without lateral spinules; spines with wings extending more than half of spine length (Figs. 25A, E). Verticil without central tooth (Figs. 25B, G).

Collar chaetae: bayonet chaetae with two blunt-short to pointed-elongate teeth, distal blade smooth (Figs. 25H-J); hooded (capillary) chaetae present (Fig. 25K).

Thorax: THL=3.7 mm (n=16, r:2.7-5.3, μ=3.7±0.6), THW=1.3 mm (n=16, r:0.9-1.7, μ=1.3±0.2). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae of two sizes (Figs. 25L, M), saw-shaped uncini (Figs. 25N-P).

Abdomen: with 94 (n=6, r:57-149, μ=93.5 ±34.9) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 25Q). Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Fig. 25R), posterior uncini rasp-shaped.

HABITAT. - Depth: no data in material revised, up to 5 m (HAtH, unpubl.). Salinity tolerance 18-37‰.

DISTRIBUTION. - Amphiamerican. Eastern U.S.A., Caribbean Sea, French Guyana and both sides of Panamá (Fig. 28).

REMARKS. - The faecal groove in some French Guyana specimens is filled with eggs by the hundreds, round or elongated, between 0.05 to 0.1 mm in diameter. Also, one specimen has sperm around the thoracic region.

TAXONOMIC REMARKS. - *Hydroides sanctaecrucis* was described by Krøyer [in] Mörch (1863). Rioja (1958) recorded *H. sanctaecrucis* from Veracruz, and in his description of the operculum he recorded verticil spines curving inwards and some curving outwards. This just is a different approach to "all spines curving in ventral direction", for the dorsal spines curve inwards, the ventral ones outwards. However, he mentions only two internal spinules, no external spinules. If this observation is correct, Rioja may have had an as yet undescribed taxon at hand.

This species shares with *H. dianthus* a verticil with all spines curving ventrally (Figs. 23A-D, L, 25A, C, E, F), but *H. dianthus* does not show external spinules (Figs. 23A, D-F, H, I, L, M). See also Zibrowius (1971: 697-705).

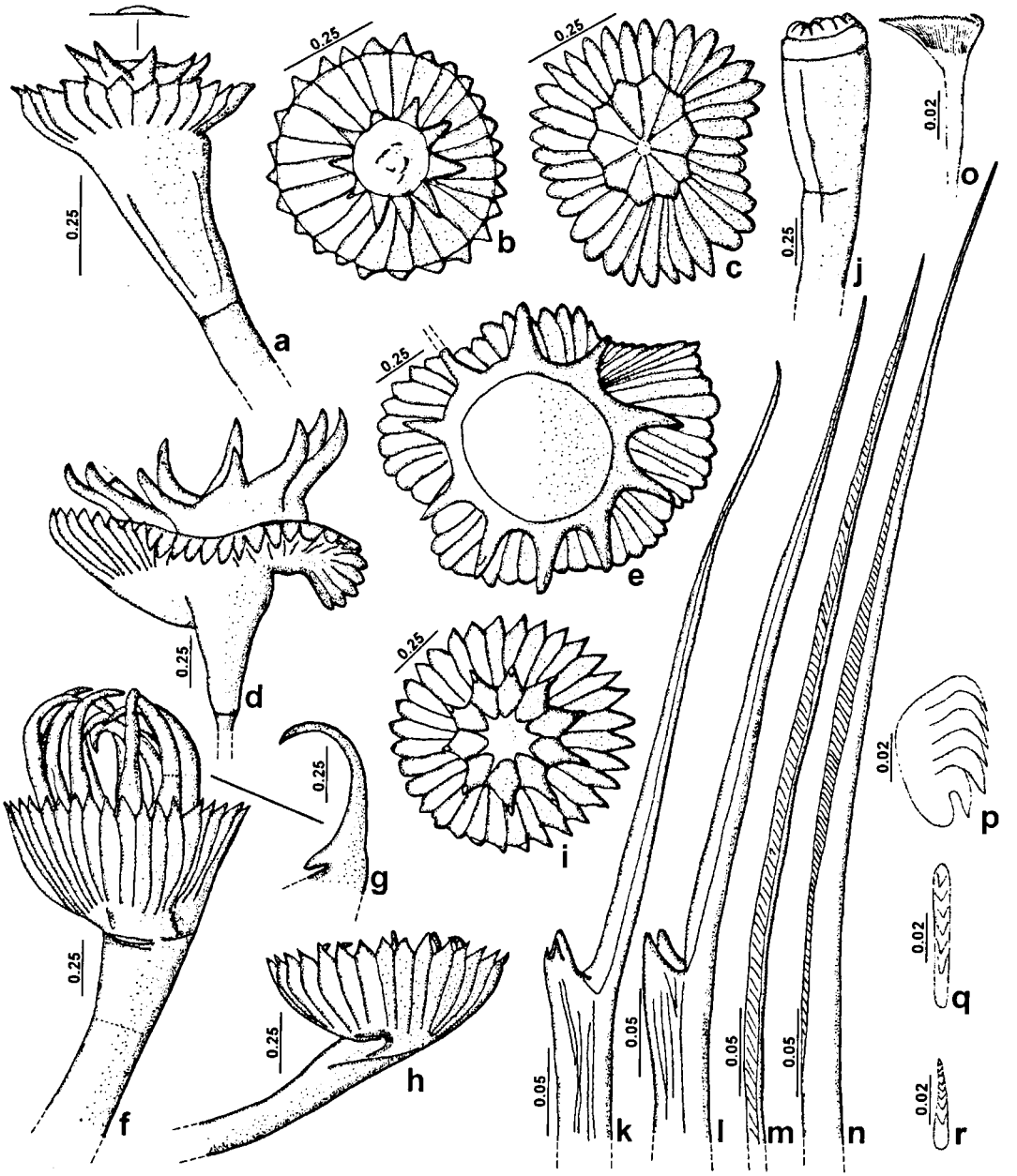

Fig. 26. *Hydroides plateni*. From Argentina, ZMA V. Pol. 3153: A-B, left operculum, lateral view and detail of central disc, respectively apical view. C, right operculum, apical view. D-E, operculum, lateral and apical view. From Uruguay, MNHN AK-240: F, left operculum, lateral view. G, dorsal verticil spine, lateral view. H-I, right operculum, lateral and apical view. J, pseudoperculum of other specimen, lateral view. K-L, bayonet chaetae, lateral view. M, hooded (capillary) chaeta. N, thoracic hooded (limbate) chaeta. O, anterior abdominal flat-trumpet chaeta. P-Q, thoracic uncini. R, anterior abdominal uncinus.

Hydroides plateni (Kinberg, 1867)
Figs. 26A-R, 28

Eupomatus plateni Kinberg, 1867: 351-352. Type locality: La Plata, Argentina.

Hydroides plateni; Zibrowius, 1971: 695, 1972a: 153-160 (27-42°S, Southern Brazil-Patagonia); Rullier & Amoureux, 1979: 194 (Brazil-Patagonia); Knight-Jones & Knight-Jones, 1991: 581, 583 (Mar del Plata and Puerto

Madryn, Argentina); de Paiva, 1993: 71, 74 (São Paulo, Brazil).

MATERIAL. - Ten 'adult' and two 'juvenile' specimens. URUGUAY: MNHN AK-240, 8 specimens (34°31'S 53°43'W, trawl, shells, 25 m, 8-I-1961, Calypso, sta. 182). ARGENTINA: ZMA V. Pol. 3153, 4 specimens (38°10.2'S 54°34.7'W, 27 m, 16-XI-1970, don. J.M. Orensanz, IV Campaña Oceanográfica al Mar del Plata, sta. 67).

DESCRIPTION. - Tube: white, ID=1.2 mm (n=2, r:(1.1)1.1-1.4, μ=1.2±0.2), ED=1.6 mm (n=2, r:(1.4)1.4-1.9, μ=1.6±0.4); most tubes missing, remaining ones fragmentary and/or covered by epibionts, two anterior ends lack peristomes; two specimens have transversal ridges; one tube shows three longitudinal ridges, one shows two.

Colour and size: body beige. TL=17.4 mm (n=5, r:(7.3)11.5-23.0, μ=17.4±5.1).

Branchial crown: with 16 radioles (n=10, r:(8)11-18, μ=15.7±2.1) left, and 17 right (n=10, r:(10)14-22, μ=16.9±2.6). RL=2.5 mm (n=10, r:(1.4)2.0-3.5, μ=2.5±0.5). Terminal filament very long in three specimens (30%), long in one (10%) and short in six (60%).

Peduncle: POL=3.4 mm (n=12, r:(1.4)1.5-5.2, μ=3.4±1.1). Insertion left (n=4; 40%), right (n=4; 40%) or at both sides (n=2; 20%); constriction ill-defined to shallow (Figs. 26A, D, F, H). Pseudoperculum present in all 'adult' specimens (Fig. 26J).

Operculum: OL=1.3 mm (n=12, r:(0.7)0.7-1.7, μ=1.3±0.3), OD=1.4 mm (n=12, r:(0.6)1.0-3.0, μ=1.4±0.5). Funnel with 41 radii (n=12, r:(26)29-51, μ=40.7±6.8) with blunt to pointed tips (Figs. 26A-F, H, I). Interradial grooves 1/3 of funnel length in 10 opercula, 2/5 in one and 1/2 in one. Verticil small, generally not or hardly surpassing the funnel perimeter (Figs. 26C, D, H), in few opercula the spines are more elongated (Fig. 26F. Verticil with 11 yellowish spines (n=12, r:(9)9-11, μ=10.5±0.7), curving inwards (Figs. 26D, F-H) or almost straight (Figs. 26A, B). In most opercula all spines are similar in shape and size (Fig. 26A), with pointed tip; however, in some specimens the dorsal spines are larger than the ventral ones (Fig. 26D). Tip of spines pointed. Spines without basal internal spinule in seven opercula (58%, Figs. 26B, C, E), with a small basal internal spinule in five (42%, Figs. 26G, I); without external and lateral spinules and/or wings. Verticil without central tooth (Figs. 26A-C, E, I).

Collar chaetae: bayonet chaetae with 2-3 pointed-elongate teeth, distal blade smooth (Figs. 26K, L); hooded (capillary) chaetae present (Fig. 26M).

Thorax: THL=3.0 mm (n=10, r:(1.6)2.5-4.0, μ=3.0±0.5), THW=1.3 mm (n=10, r:(0.6)0.9-1.8, μ=1.3±0.3). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 26N) of two sizes, saw-shaped uncini (Figs. 26P, Q).

Abdomen: with 75 (n=8, r:(45)45-107, μ=74.9 ±19.7) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 26O). Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Fig. 26R), posterior uncini rasp-shaped.

HABITAT. - Depth: 25-27 m, on shells of bivalves, in river deltas.

DISTRIBUTION. - Southern Brazil, Uruguay and Argentina (Fig. 28).

REMARKS. - The species shows a remarkable morphological variation in its opercula: radii with pointed or blunt tips, verticil spines short or large, with or without basal spinule. These contradictory characters are sometimes even shown in two opercula of a single specimen (Figs. 26A-C, F, H, I).

TAXONOMIC REMARKS. - *Hydroides plateni* shares a relatively unadorned verticil and a large funnel with short interradial grooves (1/3 or less) with *H. microtis*, *H. protulicola* and *Hydroides* sp. 2 (Figs. 14A, 26A, D, 27A, D, 37P, Q); moreover, in both *H. protulicola* and *H. plateni* the verticil is small in relation to the funnel (Figs. 26A, D, H, 27A, D). However, *H. plateni* has verticil spines with pointed tip (Figs. 26A, D, F, G), which in *H. microtis* are distally expanded (Figs. 14A-D); the bayonet chaetae of *H. plateni* have two or three teeth (Figs. 26K, L), in *H. protulicola* they show a proximal rasp (Figs. 27F-J); verticil spines are straight (Figs. 26A, B), or curving inwards (Figs. 26D, F-H) in *H. plateni*, while they always curve outwards in *H. protulicola* and *Hydroides* sp. 2 (Figs. 27B, D, E, 37P, Q). *Hydroides plateni* was extensively revised and

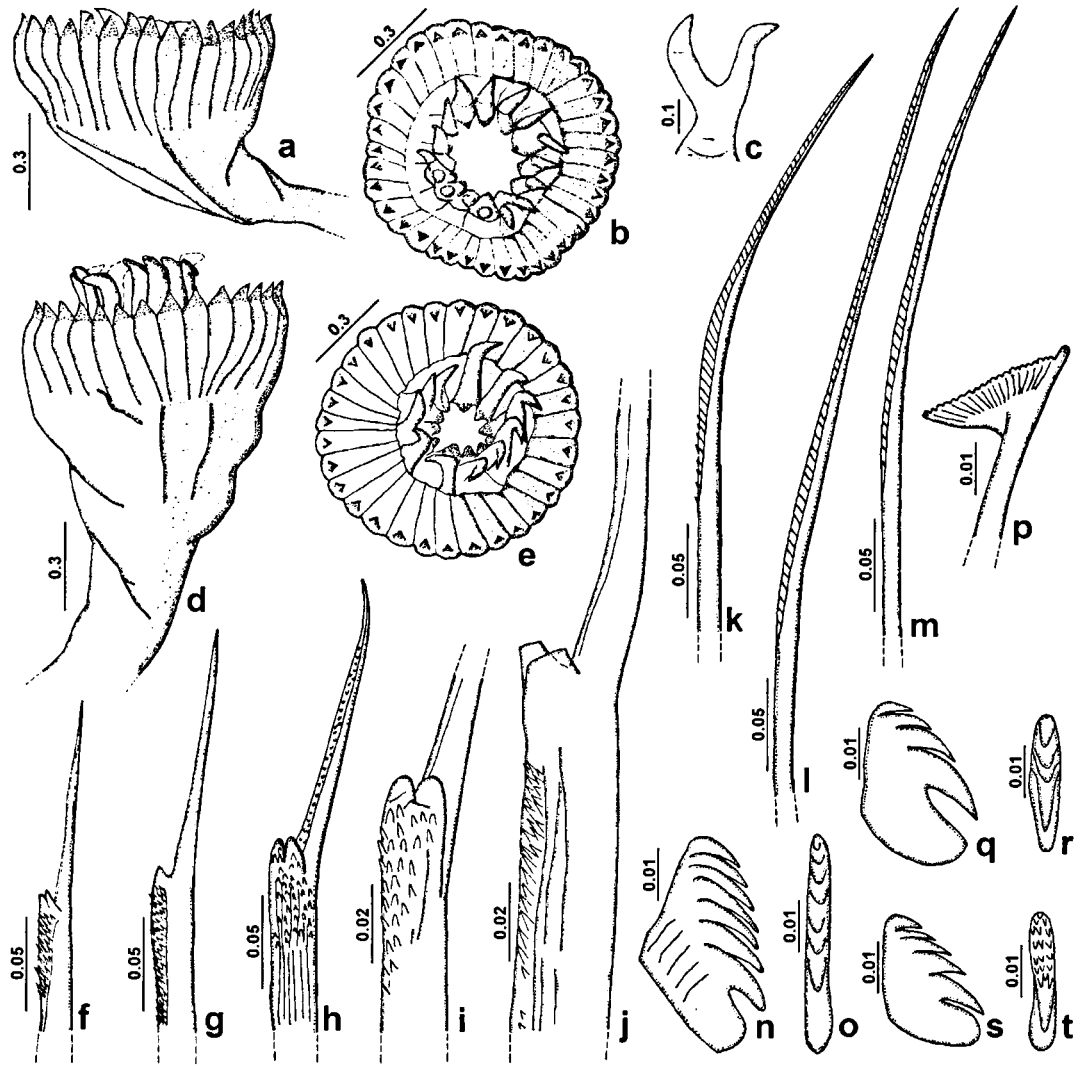

Fig. 27. *Hydroides protulicola.* From North Carolina, paratype, ZMA V. Pol. 3211: A-B, operculum, lateral and apical view. C, aberrant bifid verticil spine, internal view. D-E, operculum, lateral and apical view. F-G, bayonet chaetae, frontolateral and lateral view. From Florida, UMML 22.507: H-J, bayonet chaetae, frontolateral and lateral view with detail. K, hooded (capillary) chaeta. L-M, thoracic hooded (limbate) chaetae. N-O, thoracic uncini. P, anterior abdominal flat-trumpet chaeta. Q-R, anterior abdominal uncinus. S-T. posterior abdominal unicinus.

compared by Zibrowius (1972a: 153-160).

Hydroides protulicola Benedict, 1887
Figs. 27A-T, 28

Hydroides protulicola Benedict, 1887: 550, Pl.20, fig. 17; Pl. 21, figs. 18-23. Type locality: Cape Hatteras, North Carolina, U.S.A.

Hydroides (Eupomatus) protulicola; Augener, 1925b: 70 (Cape Hatteras).

Eupomatus protulicola; Rioja, 1946: 199-200 (Veracruz); Hartman, 1951: 119 (after Rioja); Wells & Gray, 1964: 74 (Cape Hatteras).

Hydroides protulicola; Day, 1973: 134 (Beaufort, North Carolina); Ten Hove & Wolf, 1984: 55.21-55.23 (Northern Gulf of Mexico); Bastida-Zavala & Salazar-Vallejo, 2001b: 851-852 (North Carolina).

MATERIAL. - Fourteen 'adult' and two 'juvenile' specimens.

NORTH CAROLINA: USNM 972, 9 paratypes, ZMA V. Pol. 3211, 4 paratypes (off Cape Hatteras, 86 m, 1884, R/V Albatross, sta. 2307).
FLORIDA: UMML 22.507, 2 specimens (27°18'N 80°02'W, off Palm Beach, tubes attached to fragments of bivalve shell, 48 m, 21-V-1968, R/V Gerda, cruise 6811, sta. 1003).
TEXAS: ZMA V. Pol. 3315 (28°N 95°W, off Freeport, bottom of MS Ocean Builder I, 2.5 m, 15-X-1978, legit N.J. Mobach).

DESCRIPTION. - Tube: white, ID=1.0 mm (n=2, r:(0.5)0.8-1.2, μ=1.0±0.3), ED=1.5 mm (n=2, r:(0.7)1.3-1.8, μ=1.5±0.4); most tubes missing, the rest are fragmentary and/or covered by epibionts; one anterior end has peristomes, lacking in three (including two 'juvenile' tubes); three specimens have transversal ridges, lacking in the rest of the tubes; one specimen shows three longitudinal ridges, two show two and one none.

Colour and size: body yellow to light brown. TL=16.0 mm (n=6, r:(5.2)8.7-21.0, μ=16.0 ±4.5).

Branchial crown: with 12 radioles (n=14, r:(7)9-16, μ=12.1±1.8) left, and 12 right (n=14, r:(9)9-16, μ=11.9±1.8). RL=2.9 mm (n=14, r:(0.8)1.8-4.5, μ=2.9±0.7). Terminal filament long in 12 specimens (86%) and short in two (14%).

Peduncle: POL=4.4 mm (n=14, r:(1.5)3.8-5.0, μ=4.4±0.4). Insertion left (n=8; 57%) or right (n=6; 43%); constriction ill-defined to shallow (Figs. 27A, D). Pseudoperculum present in all 'adult' specimens.

Operculum: OL=1.3 mm (n=14, r:(0.5)1.0-1.5, μ=1.3±0.2), OD=0.8 mm (n=14, r:(0.4)0.7-1.0, μ=0.8±0.1). Funnel with 31 radii (n=14, r:(16)25-37, μ=31.2±2.8) with pointed tip (Figs. 27A, D). Interradial grooves 1/4 of funnel length in seven opercula, 1/3 in 5, 2/5 in one and 1/5 in another funnel. Verticil small, occasionally the spines hardly surpass the funnel perimeter (Figs. 27A, D); with 12 yellowish spines (n=14, r:(8)10-16, μ=11.8±1.5), curving outwards, sometimes twisted laterally (Figs. 27B, C, E) or straight (Fig. 27B), all within a single verticil. All spines similar in shape and size. Sometimes a pair of spines is not completely separate, giving a bifid impression (Fig. 27C). Tip of spines pointed. Spines with one basal internal spinule (Figs. 27B, E); without external and lateral spinules and/or wings. Verticil without central tooth (Figs. 27B, E).

Collar chaetae: bayonet chaetae with two pointed-short (Figs. 27F, G) to blunt-short teeth (Figs. 27H-J) and proximal rasp, distal blade with small denticles (Fig. 27H); hooded (capillary) chaetae present (Fig. 27K).

Thorax: THL=3.3 mm (n=14, r:(1.5)2.5-4.6, μ=3.3±0.5), THW=1.0 mm (n=14, r:(0.5)0.8-1.4, μ=1.0±0.2). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae of two sizes (Figs. 27L, M), saw-shaped uncini (Figs. 27N, O).

Abdomen: with 75 (n=8, r:(45)45-107, μ=74.9 ±19.7) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 27P). Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Figs. 27Q, R), posterior uncini rasp-shaped (Figs. 27S, T).

HABITAT. - Depth: 2.5-86 m, on tubes of another serpulid (*Protula diomedeae* Benedict, 1887) and shells of *Argopecten gibbus*.

DISTRIBUTION. - Eastern U.S.A. and Northern Gulf of Mexico (Fig. 28).

REMARKS. - A single specimen, belonging to the type series (USNM 972), has four thoracic chaetigers. There is no evidence of regeneration in the branchial crown that could indicate an incomplete regeneration process of the thorax; nevertheless we hold this as the most probable explanation.

TAXONOMIC REMARKS. - *Hydroides protulicola* shares a relatively unadorned verticil and a large funnel with short interradial grooves (1/3 or less) with *H. microtis*, *H. plateni* and *Hydroides* sp. 2 (Figs. 14A, 26A, D, 27A, D, 37P). With *H. microtis* it further shares a proximal rasp in the bayonet chaetae, with *H. plateni* a small verticil in relation to the large funnel (Figs. 26A, H, 27A, D) and with *Hydroides* sp. 2 spines curving outwards (Figs. 27B, D, E, 37P, Q). However, *H. protulicola* has verticil spines with pointed tip (Figs. 27B-E), which are distally expanded in *H. microtis* (Figs. 14A-D); it can be discerned from *H. plateni* and *Hydroides* sp. 2 by the proximal rasp in the bayonet chaetae (Figs. 27F-J), absent in the latter two (Figs. 26K, L, 37S, T).

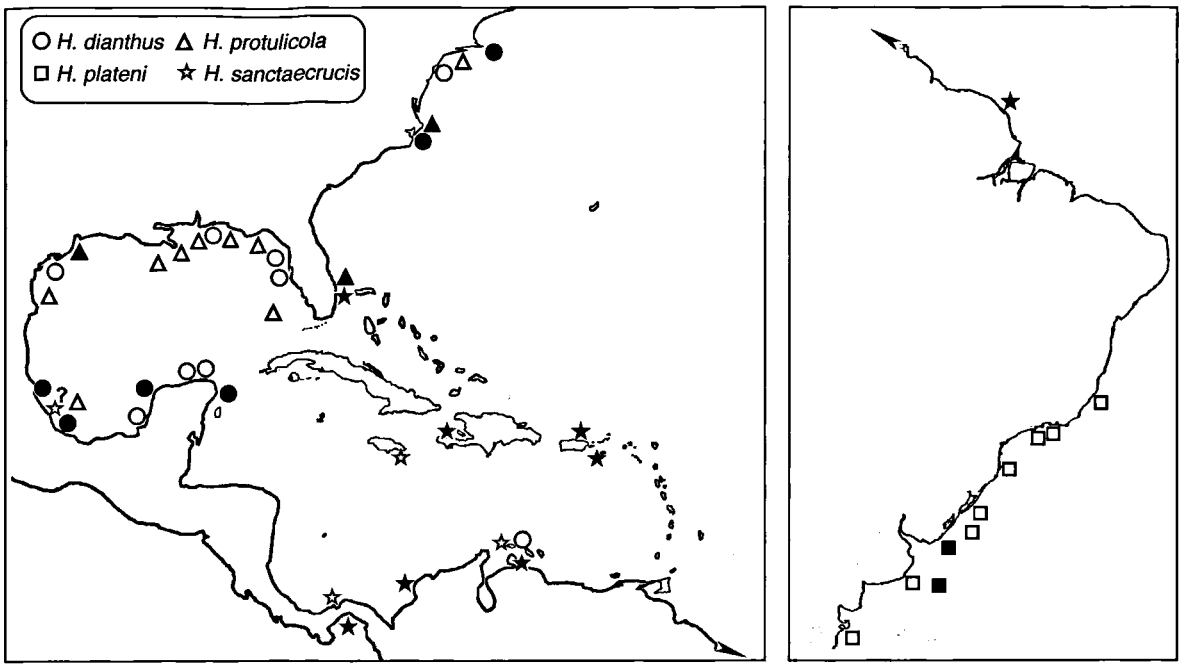

Fig. 28. Distribution of *Hydroides dianthus*, *H. sanctaecrucis*, *H. plateni* and *H. protulicola*. Closed symbols denote examined material, open symbols literature records.

Hydroides cf. **brachyacanthus** Rioja, 1941
Figs. 29A-K, 31A-D, 33, Table 4

Hydroides brachyacantha; Zibrowius, 1970: 6 (São Sebastião, Ubatuba, Brazil); Rullier & Amoureux, 1979: 193-194 (Brazil); Knight-Jones & Knight-Jones, 1991: 581 (Guanabara Bay, Brazil); Díaz Díaz & Liñero Arana, 2001: 11-12 (Venezuela).

MATERIAL. - Twelve 'adult' specimens.
CURAÇAO: ECOSUR Serp-35, ZMA V. Pol. 5008, 7 specimens and 9 not studied in detail (Venezuelan destroyer in Schottegat, serpulids and balanids on antifouling-paint of 15 months before, 0-4 m, 3-III-1955, legit P. Wagenaar Hummelinck, sta. 1218).
VENEZUELA: LACM-AHF A32-39 (3 miles N of Coche Island, 1-IV-1942).
GRENADA: ZMA V. Pol. 3919, 3 specimens (Hog Island near Pt. Salines, *Rhizophora*-mud and *Thalassia*, 0-1.5 m, 8-VII-1967, legit P. Wagenaar Hummelinck, sta. 1550, 1551).
BRAZIL: MNHN AK-536 (21°38'S 40°45'W, near São Tomé, dredge, sand, 20 m, 1-XII-1961, Calypso, sta. 99).

DESCRIPTION. - Tube: white, ID=0.6 mm (n=7, r:0.5-0.9, μ=0.6±0.1), ED=0.8 mm (n=7, r:0.6-1.2, μ=0.8±0.2); some tubes missing, the rest are fragmentary and/or covered by epibionts, six anterior ends lack peristomes; six tubes have transversal ridges (Fig. 29A); one shows two longitudinal ridges, and three none.

Colour and size: body yellow. TL=12.1 mm (n=2, r:11.3-13.0, μ=12.1±1.2; only two complete specimens).

Branchial crown: with eight radioles (n=7, r:7-10, μ=8.2±1.1) left, and eight right (n=7, r:7-10, μ=7.9±1.2). RL=2.2 mm (n=7, r:1.8-4.0, μ=2.2 ±0.8). Terminal filament long in four specimens (50%), short in other four (50%).

Peduncle: POL=2.2 mm (n=8, r:1.4-3.2, μ=2.2±0.5). Insertion left (n=3; 33%) or right (n=6; 67%); constriction ill-defined (Figs. 29B, D). Pseudoperculum present in six specimens and lacking in one.

Operculum: OL=0.7 mm (n=9, r:0.5-0.8, μ=0.7±0.1), OD=0.5 mm (n=11, r:0.3-0.7, μ=0.5±0.1). Funnel with 24 radii (n=12, r:19-30, μ=23.5±3.1) with pointed tip (Figs. 29B-F). Interradial grooves 1/3 of funnel length in three opercula, 2/5 in four and 1/2 in one. Verticil with eight spines (n=12, r:7-8, μ=7.7±0.5), strongly curving inwards (Figs. 29B, D-F), sometimes with small knob on bend; colour yellow to brown. One dorsal verticil spine larger than the others, the rest decreasing gradually in size (Figs. 29B, D-F). Tip of spines pointed. Spines with one

basal internal spinule (Figs. 29D, F); without external and lateral spinules and/or wings. Verticil without central tooth (Fig. 29F).

Collar chaetae: bayonet chaetae with two blunt-short teeth, distal blade smooth (Fig. 29G); hooded (capillary) chaetae present (Fig. 29H).

Thorax: THL=2.0 mm (n=7, r:1.6-3.3, μ=2.0 ±0.6), THW=0.6 mm (n=7, r:0.5-0.8, μ=0.6 ±0.1). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 29I) of two sizes, saw-shaped uncini (Figs. 29J, K).

Abdomen: with 66 (n=2, r:63-69, μ=65.9±4.2) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae. Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped, posterior uncini rasp-shaped.

HABITAT. - Depth: 0.8-20 m, with *Rhizophora*, *Thalassia* and sand.

DISTRIBUTION. - Lesser Antilles, Venezuela and Southern Brazil (Fig. 33).

TAXONOMIC REMARKS. - The nominal species *H. brachyacanthus* and a number of closely resembling taxa have been reported from tropical and subtropical localities all around the world, as discussed by Imajima & Ten Hove (1984). Since, it also has been reported from Israel (Ben-Eliahu & Ten Hove, 1992) and Venezuela (Díaz Díaz & Liñero Arana, 2001). Rioja described the species with one large dorsal verticil spine, almost a hook, and up to 10 additional spines clearly geniculate, with a well developed knob protruding above subapical incurving tip. Similar material from the Pacific side of America will be described by Bastida-Zavala & Ten Hove (submitted); generally, however, the dorsal hook is accompanied by a pair of larger latero-dorsal spines, the rest being subequal. *Hydroides* cf. *brachyacanthus* does not show such well developed knobs, though numbers of verticil spines (7-8 vs. 7-11) and radii (19-30 vs. 14-43) overlap widely. Nevertheless, our material falls within the variability given in the literature. Either we are dealing with a taxon with a long record of being ship-transported (with accompanying founder effect in various populations), or with a complex of species, where only a revision of all material will permit to clarify its taxonomic status. Such a revision falls outside the scope of present paper.

A comparison of *H.* cf. *brachyacanthus* with *H. similoides* n. sp., another member of the *brachyacanthus*-complex, is given in the taxonomic remarks with the latter and in Table 4.

Hydroides similoides n. sp.
Figs. 30A-O, 31A-D, 33, Table 4

Hydroides cf. *brachyacanthus* Stock, 1995: 3 (St. Thomas, parasitized).

MATERIAL. - Fourteen 'adult' and one 'juvenile' specimen. PUERTO RICO: ZMA V. Pol. 5037, 5 specimens (Joyuda, from rocks and boulders on sand, covered by a thin layer of muddy sand, 30-100 cm, 4-X-1970, legit H.A. Ten Hove, sta. 2133); ZMA V. Pol. 5038 holotype and 7 paratypes, 5039, 1 specimen (La Parguera, Isla Magueyes, W. jetty of marine institute, piers of jetty sponges, oysters, *Millepora*, 30-60 cm, 4-X-1970, legit H.A. Ten Hove, sta. 2134A).
U.S. VIRGIN ISLANDS: ZMK s.n., not studied in detail (St. Thomas, Long Bay, on corals, 27-IX-1923)
PANAMA, ATLANTIC: ZMA V. Pol. 3361, 2 specimens, not studied in detail (Limon Bay, W side in shelter cove, pilings under cement clock, 0-2 m, 09° 22' 23" N 79° 57' 2" W, legit R.B. Manning & M.L. Jones, 20-IV-1971, sta. 11); ZMA V. Pol. 3362, 3 specimens, not studied in detail (Gatún Locks, Lower West Chamber, floor of outer platform, wooden log, legit M.L. Jones, 20-III-1972, stat. 81-2); ECOSUR Serp-26a, not studied in detail (09°20.9'N 79°54.2'W, Panamá Canal Yacht Club, salinity=31‰, 3-VI-2002, legit S.I. Salazar-Vallejo); ECOSUR Serp-26b and LACM-AHF s.n., 4 specimens not studied in detail (Fuerte Sherman, dock and nearby tidal creek, salinity=30‰, 2-VI-2002, legit S.I. Salazar-Vallejo)
VENEZUELA: RMNH 18527 (Gulf of Paria, SW of Trinidad and Tobago, 8 m, 25-IV-1952).
? VERACRUZ: ECOSUR Serp-26c (Isla Sacrificios, 0.5 m, 14-VII-2000, legit J.R. Bastida-Zavala & J.A. de León-González); ECOSUR Serp-26d, 2 specimens (fouling aquarium water supply cover, 7 m, 14-VII-2000, legit J.R. Bastida-Zavala & J.A. de León-González). Altogether three questionable specimens, see 'Taxonomic remarks'.

DESCRIPTION. - Tube: white, ID=0.9 mm (n=9, r:(0.6)0.6-1.2, μ=0.9±0.2), ED=1.2 mm (n=9, r:(1.0)0.9-1.5, μ=1.2±0.2); some tubes are fragmentary and/or covered by epibionts, nine lack peristomes; one specimen with transversal ridges, lacking in the rest; eight specimens show three longitudinal ridges (Fig. 30C), one shows two. Two specimens have two lateral longitudinal ridges larger (as crest) than the central ridge.

Colour and size: body yellow. TL=12.4 mm

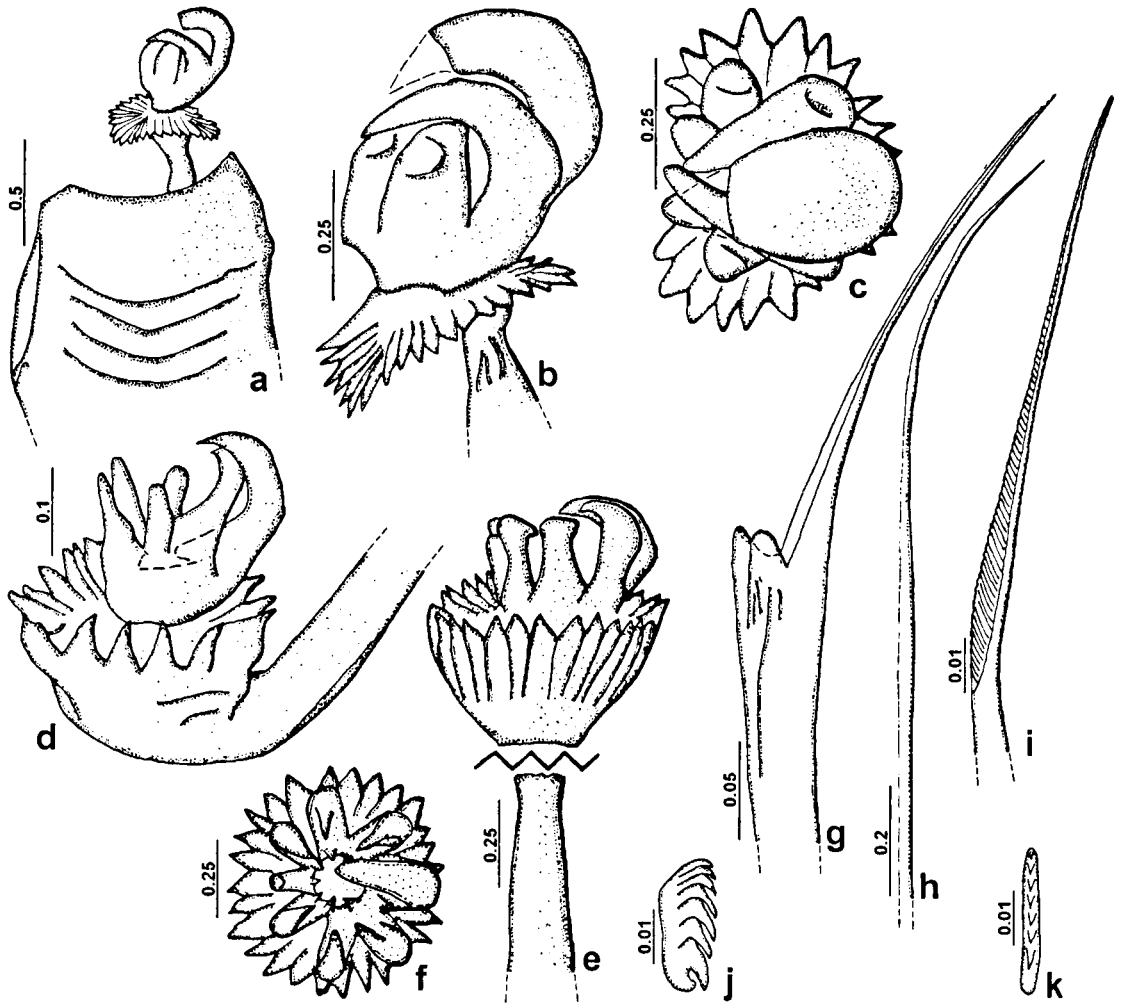

Fig. 29. *Hydroides* cf. *brachyacanthus*. From Grenada, ZMA V. Pol. 3919: A, tube and operculum, from above. B-C, operculum, lateral and apical view. From Brazil, MNHN AK-536: D, operculum, lateral view. From Venezuela, LACM-AHF A32-39: E-F, operculum, lateral and apical view. G, bayonet chaeta, lateral view. H, hooded (capillary) chaeta. From Brazil, MNHN AK-536: I, thoracic hooded (limbate) chaeta. J-K, thoracic uncini.

(n=5, r:(9.5)9.5-16.0, μ=12.4±2.4).

Branchial crown: with eight radioles (n=14, r:(6)5-11, μ=8.1±2.1) left, and eight right (n=14, r:(6)5-12, μ=8.0±2.2). RL=1.6 mm (n=14, r:(1.0)1.0-2.5, μ=1.6±0.5). Terminal filament very long in one specimen (7%), long in 13 specimens (93%).

Peduncle: POL=2.5 mm (n=15, r:(1.3)1.3-3.6, μ=2.5±0.7). Insertion left (n=13; 87%) or right (n=2; 13%); constriction ill- (Fig. 30G) to well-defined (Fig. 30A). Pseudoperculum present in 14 'adult' specimens, lacking in one.

Operculum: OL=1.0 mm (n=16, r:(0.5)0.5-1.4, μ=1.0±0.3), OD=0.5 mm (n=17, r:(0.3)0.3-0.8, μ=0.5±0.2). Funnel with 17 radii (n=17, r:(12)12-22, μ=17.5±2.8) with blunt tip (Figs. 30A, D, F, G). Interradial grooves 2/5 of funnel length in 13 opercula, 1/3 in two and 1/2 in one. Verticil with 11 spines (n=17, r:(8)8-13, μ=11.4±1.6), strongly curving inwards (Figs. 30A, B, D-G), colour dark brown to yellow. Two or three dorsal spines larger than the others and curving smoothly; the rest curving abruptly, geniculate, their bends accentuated by a prominent knob, similar in shape but decreasing in size ventrally (Figs. 30A, D-G), all with pointed tip. Spines with one basal internal

Table 4. Main differences between *Hydroides* cf. *brachyacanthus* and *H. similoides* n. sp.

Character	*H.* cf. *brachyacanthus*	*H. similoides* n. sp.
Longitudinal ridges of tube	0 (-2)	(2-) 3
Number of radii	19-30	12-22
Radius tip	pointed	blunt
Number of verticil spines	7-8	8-13
Dorsal verticil spines larger than the ventral	1	2-3
Peduncle length (mm)	1.4-3.2	1.3-3.6

spinule (Figs. 30B, E); without external and lateral spinules and/or wings. Verticil without central tooth.

Collar chaetae: bayonet chaetae with pointed elongate teeth, distal blade smooth (Fig. 30H); hooded (capillary) chaetae present (Fig. 30I).

Thorax: THL=1.9 mm (n=11, r:(2.1)1.4-2.5, μ=1.9±0.3), THW=0.7 mm (n=12, r:(0.3)0.5-0.8, μ=0.7±0.1). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 30J) of two sizes, saw-shaped uncini.

Abdomen: With 58 (n=4, r:(48)48-64, μ=57.7 ±7.0) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 30K). Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Figs. 30L, M), posterior uncini rasp-shaped (Figs. 30N, O).

HABITAT. - Depth: 0.5-8 m, on rocks, fouling. Salinity tolerance 30-37‰.

DISTRIBUTION. - Gulf of Mexico and Caribbean Sea (Fig. 33).

ETYMOLOGY. - Named for its resemblance to *H. similis*, a species from the Pacific side of America.

TAXONOMIC REMARKS. - The operculum of this taxon is reminiscent of that of *H. similis* (Treadwell, 1929), an Eastern Pacific species, because of its 2-3 dorsal verticil spines larger than the others. It differs from *H. similis* s.str. in its lower number of radii (12-22 vs. 26-39), moreover with blunt (Figs. 29A, D, F, G) instead of pointed tips. It also resembles *H. brachyacanthus* s.str. in its bilateral symmetry and geniculate ventral verticil spines. However, *H. brachyacanthus* has a single dorsal hook and pointed radii, while there are 2 or 3 hooks and rounded radii in *H. similoides* n.sp.

The three specimens from Veracruz (Figs. 30P-S) have been included in the list of material with a '?' since the verticil spines do not show the knob above subapical incurving tip.

A comparison with *H.* cf. *brachyacanthus* is given in Table 4.

Hydroides salazarvallejoi n. sp.

Figs. 32A-P, 33, Table 5

MATERIAL. - Seven 'adult' and two 'juvenile' specimens.
PUERTO RICO: ZMA V. Pol. 5072, 3 specimens, not studied in detail (La Parguera, Isla Magueyes, E, 1-X-1970,Glade in mangroves, *Thalassia*-bed, muddy sand; 20-30 cm, between boulders, legit H.A. ten Hove, Sta. 2135).
GUADELOUPE: MNHN s.n. (Président Théodore Tissier, sta. 155, "à l'entrée du Cohé de Lamentin, plongé", 2-3 m, 13-III-1951).
MARTINIQUE: ZMA V. Pol. 5073 (Martinique, Anse de l'Âne, near Trois Îslets, 10-II-1964. Sand beach, andesetic rock debris, floating algae, some *Thalassia*, 0-1 m, legit P. Wagenaar Hummelinck, Sta. 1439).
COLOMBIA, ATLANTIC: ZMA V. Pol. 3776, holotype and paratype (Santa Marta Area, Cabo de la Aguja, 8 m, 1986, legit J.W. Dulfer and M.J.C. Rozenmeijer, sta. C).
PANAMA, ATLANTIC: ZMA V. Pol. 3360 (Limon Bay, W side in shelter cove, pilings under cement clock, 0-2 m, 09°22'23"N 79°57'2"W, legit R.B. Manning & M.L. Jones, 20-IV-1971, sta. 11).
PANAMA, PACIFIC: ZMA V. Pol. 3359 (Perlas Isl., Isla Mina, off N.E. Point, 8°29'17"N 79°00'02"W, 2-V-1971, 5-8 m, sta. 45, legit Glynn, Child, Dahl & Sundval); BMNH ZB. 1933.7.10.446 (Coiba Island, dredge, 5 fathoms, legit C. Crossland, 'St.George' Panamá & Galapagos Cruise, 1924); BMNH ZB. 1933.7.10.443 (Taboga Island, dredge, 1-2 fathoms on dead broken coral, legit C. Crossland, 'St.George' Panamá & Galapagos Cruise, 1924).
COSTA RICA, PACIFIC: LACM-AHF (and ZMA 3858) s.n., 2 specimens (Dominical, rocks, 0.3 m, 11-XII-1968, legit D. Straughan).
ECUADOR: ZMA V. Pol. 3506, 2 specimens (2°11'28"S

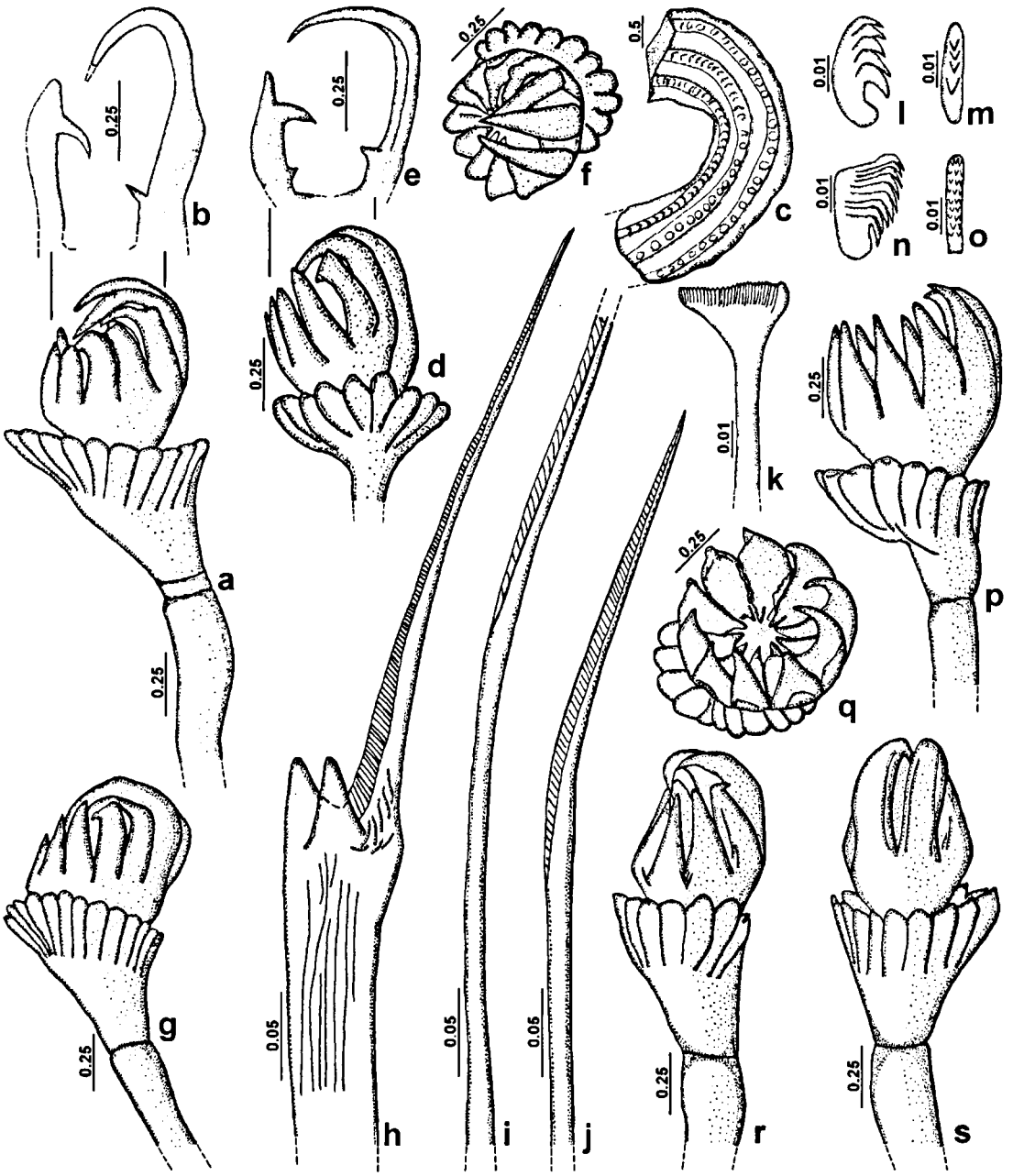

Fig. 30. *Hydroides similoides* n. sp. From Puerto Rico, ZMA V. Pol. 5038, holotype: A-B, operculum and scheme of most dorsal and ventral verticil spine, lateral view. C, tube, from above. ZMA V. Pol. 5037: D-E, other operculum and scheme of most dorsal and ventral verticil spine, lateral view. F, operculum, apical view. From Trinidad and Tobago, RMNH 18527: G, operculum, lateral view. From Puerto Rico, ZMA V. Pol. 5038: H, bayonet chaeta, lateral view. I, hooded (capillary) chaeta. J, thoracic hooded (limbate) chaeta. K, anterior abdominal flat-trumpet chaeta. L-M, anterior abdominal uncini. N-O, posterior abdominal uncini. *H. ?similoides*. From Veracruz, ECOSUR Serp-26: P-Q, operculum, lateral and apical view. R-S, other operculum, lateral and dorsal view.

80°56'31"W, N of Guayaquil, 8-9 m, 8-V-1966, R/V Anton Bruun, cruise 16, sta. 6670).

DESCRIPTION. - Tube: white, ID=0.7 mm (n=4, r:(0.4)0.6-0.8, μ=0.7±0.1), ED=1.1 mm (n=4, r:(0.5)0.9-1.4, μ=1.1±0.1); some specimens missing tube, one tube with peristomes and lacking in the rest; all tubes with transversal ridges and two longitudinal ridges.

Colour and size: body yellow. TL=9.4 mm

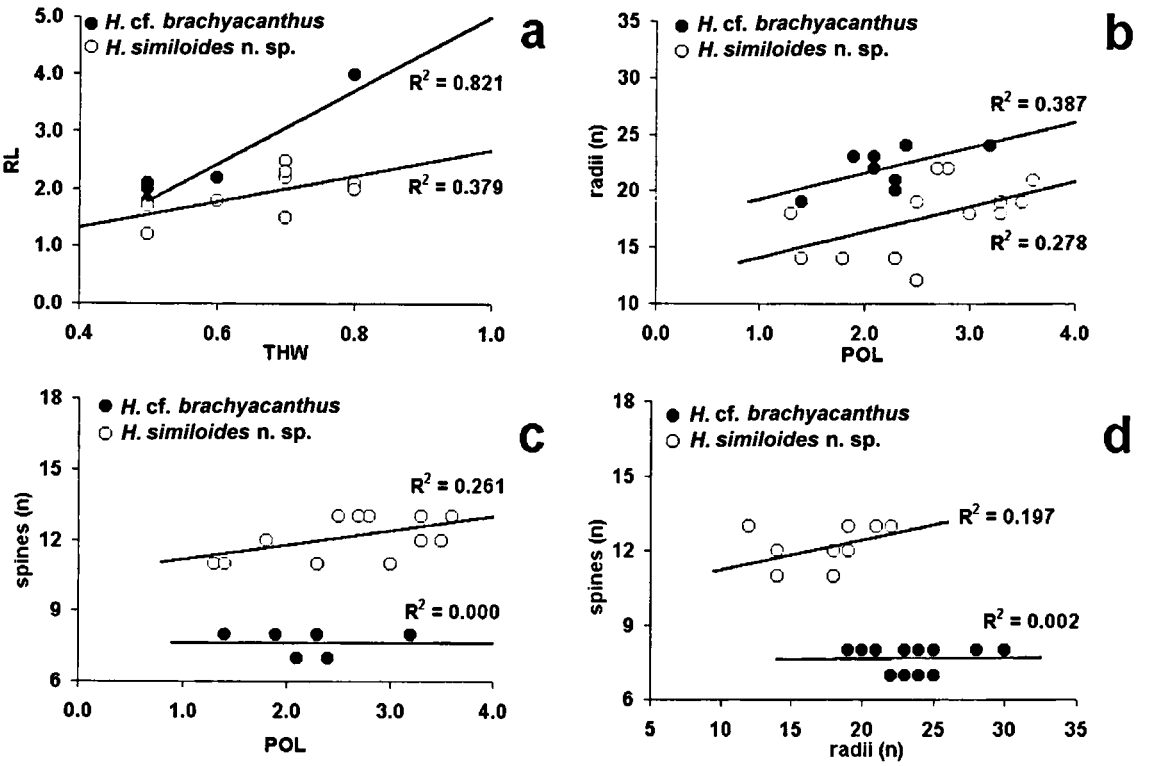

Fig. 31. Morphometric comparisons between *Hydroides* cf. *brachyacanthus* and *H. similoides* n. sp.

(n=3, r:(5.0)5.0-13.5, μ=9.4±4.6).

Branchial crown: with eight radioles (n=7, r:(6)6-11, μ=8.3±1.7) left, and eight right (n=7, r:(4)6-10, μ=8.1±1.2). RL=2.1 mm (n=7, r:(0.9)1.5-3.0, μ=2.1±0.5). Terminal filament very long in four specimens (57%) and long in three (43%).

Peduncle: POL=2.3 mm (n=7, r:(1.2)2.0-3.2, μ=2.3±0.4). Insertion left (n=2; 22%) or right (n=7; 78%); constriction well-defined (Figs. 32A, D, F, G, J). Pseudoperculum present in six specimens (Fig. 32I), lacking in one.

Operculum: OL=0.9 mm (n=7, r:(0.4)0.7-1.2, μ=0.9±0.2), OD=0.3 mm (n=7, r:(0.2)μ=0.3 ±0.1). Funnel with 18 radii (n=7, r:(12)14-24, μ=17.8±4.0) with pointed tip (Figs. 32A, B, D-G, J). Interradial grooves 1/3 of funnel length in four opercula and 1/4 in two. Verticil with six spines (n=7, r:(5)5-8, μ=6.2±1.3), straight (Figs. 32A, F, G, J) or outward (Fig. 32D), colour yellow, light brown or dark brown. The dorsal spine much larger than the others, with the tip curving strongly inwards (tip almost in position of an internal spinule), almost like a strongly bent pick-axe (Figs. 32A-H, J); with a distal knob (Figs. 32A, C). Remaining 4-7 verticil spines with blunt tip to club-shaped (Figs. 32A, D-G, J), with a basal internal spinule; without external and lateral spinules and/or wings. Verticil without central tooth.

Collar chaetae: bayonet chaetae with two pointed-elongate teeth, distal blade smooth (Fig. 32K); hooded (capillary) chaetae present.

Thorax: THL=2 mm (n=7, r:(1.2)1.6-2.3, μ=2.0±0.2), THW=0.6 mm (n=7, r:(0.3)0.5-0.8, μ=0.6±0.1). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 32L) of two sizes, saw-shaped uncini (Figs. 32M, N).

Abdomen: with 57 chaetigers (n=3, r:(18)18-130, μ=56.7±56.0). Anterior and middle abdominal chaetigers with flat-trumpet chaetae. Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Figs. 32O, P), poste-

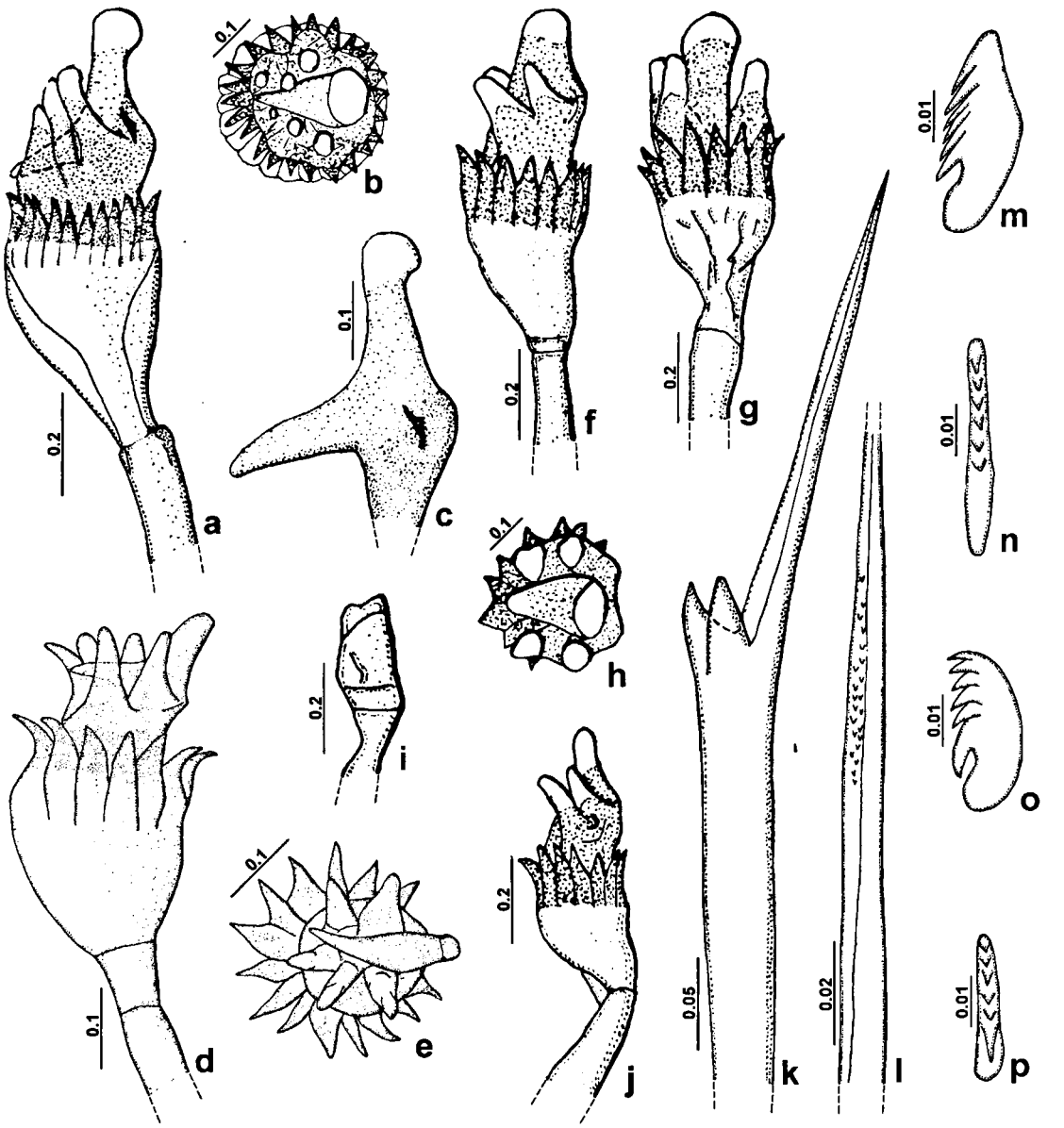

Fig. 32. *Hydroides salazarvallejoi* n. sp. From Guadaloupe, MNHN s.n.: A-B, operculum, lateral and apical view. C, most dorsal verticil spine, lateral view. From Atlantic of Panama, ZMA 3360: D-E, operculum, lateral and apical view. From Costa Rica, LACM-AHF s.n.: F-H, operculum, lateral, dorsal and apical view. I, pseudoperculum, lateral view. J, other operculum, lateral view. K, bayonet chaeta, lateral view. L, thoracic hooded (limbate) chaeta. M-N, thoracic uncini. O-P, anterior abdominal uncini.

rior uncini rasp-shaped.

HABITAT. - Depth: 0.3-2.5 m, on rocks, with sponges and oysters.

DISTRIBUTION. - Amphiamerican. Caribbean Sea, Pacific of Costa Rica, Panamá and Ecuador (Fig. 33).

ETYMOLOGY. - Named after Sergio I. Salazar-Vallejo, for his many years of dedication to polychaete taxonomy, especially in syntheses, checklists and the taxonomy of pilargids.

TAXONOMIC REMARKS. - This form resembles *H. glandifer*, described by Rioja (1941a) from the Mexican Pacific, of which the type material is

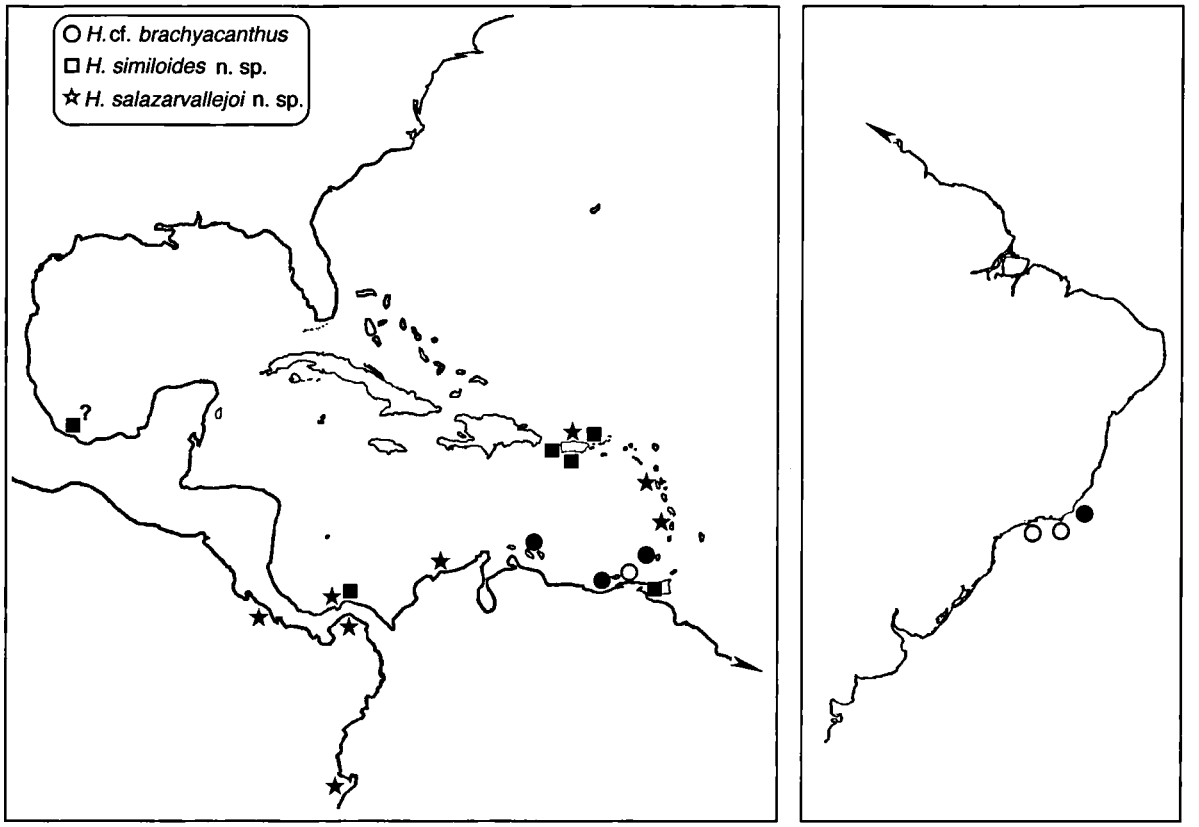

Fig. 33. Distribution of *Hydroides* cf. *brachyacanthus*, *H. similoides* n. sp. and *H. salazarvallejoi* n. sp. Closed symbols denote examined material, open symbols literature records.

regarded to be lost. Both forms are similar in the presence of a large dorsal verticil spine, with a few smaller attached laterally to this hook (Figs. 32A-H, J). *Hydroides salazarvallejoi* n. sp. differs from *H. glandifer* s.str. by a higher number of radii (Table 5). Rioja did not mention an incurving tip (beak) on the ventral side of the 'bulbous' spine in his description. Upon first sight, we too missed the closely appressed beak in new material from the Pacific side of Mexico (Bastida-Zavala & Ten Hove, submitted). However, there is a sharply pointed tip coinciding with the medio-ventral V-shaped cleft between the two ventralmost spines. Sometimes it is necessary to squeeze the base of the verticil with a pair of tweezers to open up the beak and verticil spines making them visible. We assume that Rioja overlooked this beak, but that it was present in his material. The present taxon, however, differs from what we perceive to be *H. glandifer* s.str. in three aspects: 1) The apex of the dorsal hook is absolutely rounded, convex in *H. glandifer* s.str., concave with distal knob in *H. salazarvallejoi* n. sp.; 2) The remaining verticil spines have a pointed tip in the first taxon, are blunt in the second; and 3) Although the verticil spines are fused to the dorsal hook in *H. salazarvallejoi* n. sp., they still resemble a funnel and have a basal internal spinule; in *H. glandifer* s.str. they are more fused, almost forming part of the hook, and internal spinules are lacking.

Hydroides diramphus Mörch, 1863
Figs. 34A-P, 36

Hydroides (Eucarphus) dirampha Mörch, 1863: 379, Pl. 11, fig. 10. Type locality: St. Thomas, Lesser Antilles.

Hydroides (Eucarphus) benzoni Mörch, 1863: 380 (Brazil, material studied).

Hydroides (Eucarphus) dirhampha; [sic] Grube, 1872: 52 (Desterro, Brazil).

Eucarphus serratus Bush, 1910: 495-496 (Bermuda, material studied).

Hydroides lunulifer sensu Monro, 1933: 1082

Table 5. Main differences between *Hydroides salazarvallejoi* n. sp., the description by Rioja and new specimens of *H. glandifer* s.str. from the Mexican Pacific.

Character	*H. salazarvallejoi* n. sp.	*H. glandifer* Rioja, 1941	*H. glandifer* new specimens
Number of radii	14-24	10	12-17
Number of verticil spines	5-8	5	5
Tip of lateral spines	blunt	pointed	pointed
Internal spinule in lateral spines	present	absent	absent
Curve of dorsal hook	concave	convex	convex
Colour of verticil	yellow to brown	almost black	yellow (juvenile) to almost black

(Colon, Caribbean of Panamá), Liñero Arana, 1999: 39 (Venezuela).

Hydroides dirampha; Zibrowius, 1970: 5-6 (Santa Catarina, Brazil; Antigua, Grenadines; very extensive synonymy), 1971: 705-707 (extensive synonymy; widely recorded in temperate and tropical seas of the World), 1973a: 31-32 (Senegal); Rullier & Amoureux, 1979: 194 (Brazil); Dueñas, 1981: 100, 136 (Cartagena, Colombia), 1999: 14 (Atlantic of Colombia); Knight-Jones & Knight-Jones, 1991: 581 (Guanabara Bay, Brazil); Díaz Díaz & Liñero Arana, 2001: 12-13 (Venezuela).

Hydroides diramphus; Bastida-Zavala & Salazar-Vallejo, 2001b: 845-846 (Veracruz).

MATERIAL. - Sixteen 'adult' and two 'juvenile' specimens.
BERMUDA: YPM 1330, not studied in detail (A.E. Verrill & party 1901, type of *Eucarphus serratus*).
VERACRUZ: ECOSUR Serp-27a, 4 specimens (San Juan de Ulúa, fouling, rock pier, together with vermetids, oysters and ascidians, 1-1.5 m, 11-VIII-1996, legit M.A. Muro).
CURAÇAO: ZMA V. Pol. 2665 (Piscadera Baai, Binnenbaai, N part, SW, Martin Stredu, *Rhizophora*, 0-1 m, 26-VII-1967, legit P. Wagenaar Hummelinck, sta. 1479a).
PANAMA, ATLANTIC: ECOSUR Serp-27b and LACM-AHF s.n., 2 specimens not studied in detail (09°21.8'N 79°53.7'W, Club Naútico, salinity=31‰, 3-VI-2002, legit S.I. Salazar-Vallejo); ECOSUR Serp-27c and LACM-AHF s.n., 5 specimens not studied in detail (09°20.9'N 79°54.2'W, Panamá Canal Yacht Club, salinity=31‰, 3-VI-2002, legit S.I. Salazar-Vallejo).
VENEZUELA: LACM-AHF A32-39, 8 specimens (3 miles N of Coche Island, 1-IV-1942).
BRAZIL: ZMK s.n., not studied in detail (Brasilien, legit Hygom, type of *H. (E.) benzoni*); MNHN AS-182, 4 specimens (SW Sitio Forte, sand, 0-5 m, 9-XII-1961, Calypso, sta. 118); MNHN AS-184 (23°05'S 44°17'W, near Rio de Janeiro, trawl, mud, 23 m, 8-XII-1961, Calypso, sta. 115).

DESCRIPTION. - Tube: white, ID=1.3 mm (n=13, r:(1.0)1.0-1.7, μ=1.3±0.2), ED=1.8 mm (n=13, r:(1.4)1.4-2.8, μ=1.8±0.4); some tubes fragmentary and/or covered by epibionts, two anterior ends showed peristomes, lacking in seven tubes; all tubes (n=12) have transversal ridges; four specimens show three longitudinal ridges, seven show two and one none. Most tubes from Venezuela (LACM-AHF A32-39) are coiled.

Colour and size: yellow to light brown. TL= 19.8 mm (n=4, r:(5.8)17.0-24.0, μ=19.8±3.2).

Branchial crown: with 15 radioles (n=16, r:(6)7-21, μ=14.7±3.3) left, and 15 right (n=16, r:(6)10-21, μ=15.0±2.5). RL=3.0 mm (n=16, r:(1.0)1.7-5.0, μ=3.0±0.9). Terminal filament very long in one (6%), long in 14 specimens (88%), and short in one (6%).

Peduncle: POL=3.8 mm (n=18, r:1.2)2.5-5.5, μ=3.8±0.8). Insertion left (n=5; 31%) or right (n=9; 56%), or at both sides (n=2; 13%); constriction ill- (Fig. 34C) to well-defined (Fig. 34A). Pseudoperculum present in all 'adult' specimens (n=14), but not observed in two juveniles.

Operculum: OL=1.6 mm (n=18, r:(0.5)1.2-2.1, μ=1.6±0.3), OD=1.0 mm (n=18, r:(0.2)0.6-1.3, μ=1.0±0.2). Funnel with 29 radii (n=17, r:(16)25-39, μ=29.2±3.3) with pointed tip (Figs. 34A-D), colour pale to dark gray. Interradial grooves 1/3 of funnel length in 14 opercula, 2/5 in two, 1/2 in one, 1/4 in one. Verticil with 14 yellowish spines (n=17, r:(9)11-16, μ=13.7±1.8), straight (Figs. 34A-D). All spines similar in shape and size. Tip of spines T-shaped and flattened (Figs. 34A-D). Spines with one basal internal spinule (Figs. 34B, D); without external and lateral spinules and/or wings. Verticil without central tooth (Figs. 34B, D).

Collar chaetae: bayonet chaetae with two

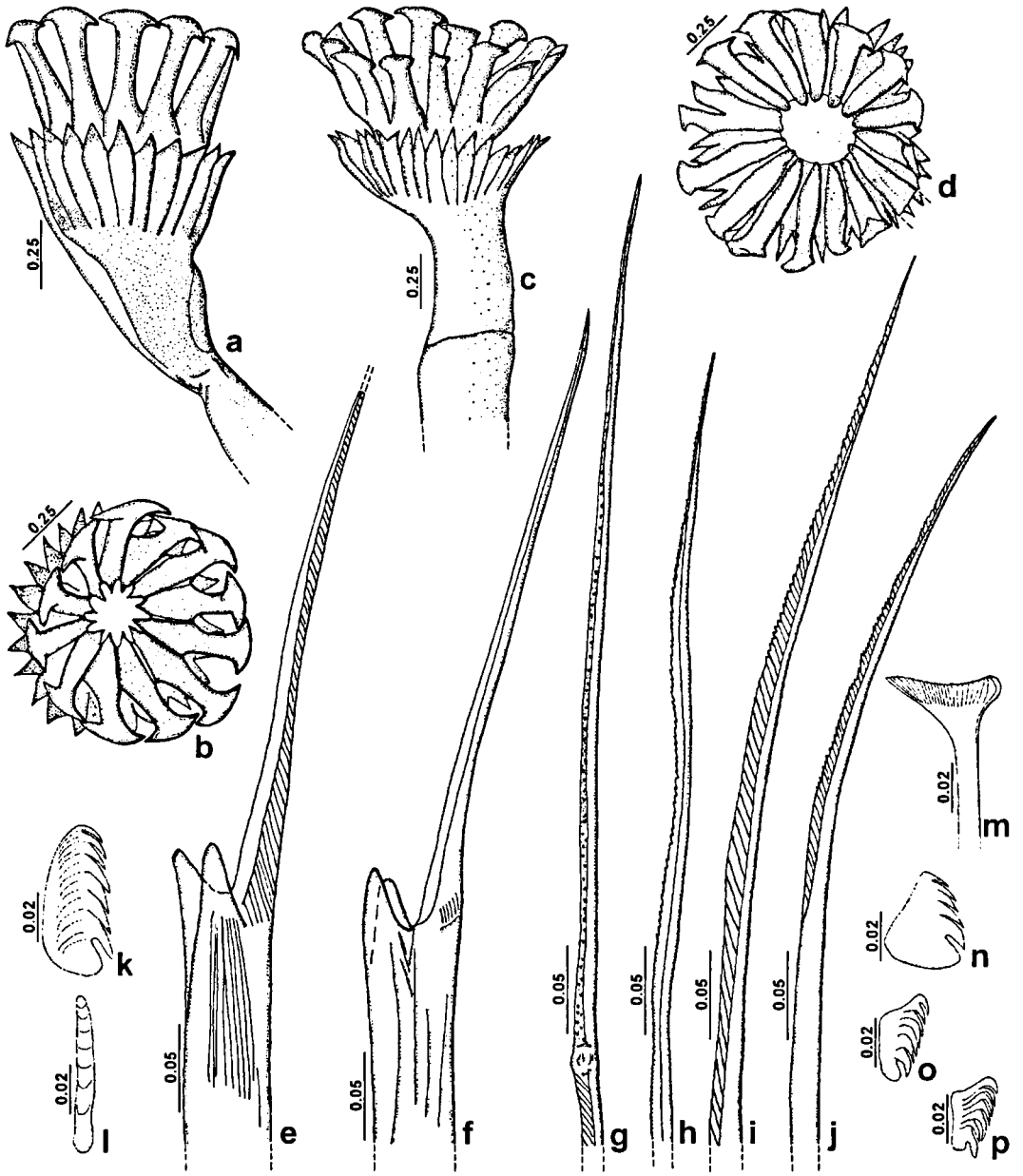

Fig. 34. *Hydroides diramphus*. From Veracruz, ECOSUR Serp-27: A-B, operculum, lateral and apical view. From Venezuela, LACM-AHF A32-39: C-D, operculum, lateral and apical view. From Veracruz, ECOSUR Serp-27: E, bayonet chaeta, lateral view. From Brazil, MNHN AS-182: F, bayonet chaeta, lateral view. G, hooded (capillary) chaeta. From Veracruz, ECOSUR Serp-27: H, hooded (capillary) chaeta. From Brazil, MNHN AS-182: I-J, thoracic hooded (limbate) chaetae. K-L, thoracic uncini. M, anterior abdominal flat-trumpet chaeta. N, anterior abdominal uncinus. O-P, posterior abdominal uncini.

pointed-elongate teeth, distal blade smooth (Figs. 34E, F); hooded (capillary) chaetae present with minute denticles distally (Fig. 34H).

Thorax: THL=4.2 mm (n=14, r:(1.3)2.5-6.5, μ=4.2±1.1), THW=1.3 mm (n=14, r:(0.3)1.0-1.7, μ=1.3±0.2). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae of two sizes (Figs. 34I, J), saw-shaped uncini (Figs. 34K, L).

Abdomen: with 72 (n=5, r:(33)43-97, μ=72.1

±19.7) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 34M). Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Fig. 34N), posterior uncini rasp-shaped (Figs. 34O, P).

HABITAT. - Depth: 1-54 m, on coral reef, rock piers; fouling. Salinity tolerance 31-37‰.

DISTRIBUTION. - Circum(sub)tropical (Fig. 36).

REMARKS. - One specimen showed a hooded (capillary) chaeta with a small middle knob (Fig. 34G), no doubt a teratological aberration.

TAXONOMIC REMARKS. - *Hydroides diramphus* and *H. microtis* show a distal expansion of the verticil spines, but it is T-shaped with flattened tip in *H. diramphus* (Figs. 34A-D), while it is globular in *H. microtis* (Figs. 14A-D). In addition, the bayonet chaetae of *H. microtis* show a proximal rasp, absent in *H. diramphus* (Figs. 14F, G, 34E, F).

According to Zibrowius (1971, 1994) the circum(sub)tropical distribution of *H. diramphus* is due to a long history of being ship-transported.

Hydroides elegans (Haswell, 1883)
Figs. 35A-J, 36

Eupomatus elegans Haswell, 1883: 633, Pl. 12, fig. 1; 1885: 660-662, Pl. 31, figs. 1-4, Pl. 32, figs. 11-12, Pl. 33, figs. 1-6. Type locality: Port Jackson, Australia.

Hydroides abbreviata Krøyer [in] Mörch, 1863: 377, Pl. 11, figs. 6-7 (St. Croix); Augener, 1925a: 46 (name in list only); Zibrowius, 1971: 721; 1973b: 685 (mentioned as possible synonym of *H. elegans*); Perkins & Savage, 1975: 59 (name in list).

Vermilia abbreviata; De Quatrefages, 1866: 535 (abstract of Mörch).

Hydroides norvegica; Hartman, 1952: 63-64 (Texas, Gulf of Mexico); Renaud, 1956: 35 (Florida); Rioja, 1960: 311 (Veracruz). [Non: Gunnerus, 1768].

Mercierella enigmatica sensu Foster, 1972: 5-8 (partim, figs. 3a-b). [Non: Fauvel, 1922].

Hydroides elegans; Zibrowius, 1971: 721-725 (Florida; extensive discussion), 1972a: 158, 1972c: 433-434, 437, 442-444 (discussion), 1973a: 42-44 (West Africa); Ten Hove, 1974: 45-48 (introduction into the Netherlands; England, France, Italy, Malta, Tunisia, Ghana, Mozambique, Sri Lanka, Argentina, Curaçao); Dueñas, 1981: 100-101, 137 (Cartagena, Colombia), 1999: 14 (Atlantic of Colombia); Johnson & Vittor, 1982: 137 (Caribbean and Florida); Knight-Jones & Knight-Jones, 1991: 581 (Guanabara Bay, Brazil; Mar del Plata); Liñero Arana, 1999: 38 (Venezuela); Bastida-Zavala & Salazar-Vallejo, 2001b: 845-848 (Gulf of Mexico); Díaz Díaz & Liñero Arana, 2001: 12 (Venezuela); Kupriyanova et al., 2001: 8, 10 (reproduction and development synthesis).

MATERIAL. - Eight 'adult' and six 'juvenile' specimens.
FLORIDA: UMML 22-80, 2 specimens (bottom of the vessel Physalia, Florida, 10-IX-1953, legit W. Hess).
TEXAS: LACM-AHF N5370 (Rockport, Texas, ship fouling, 28-IX-1951).
VERACRUZ: ECOSUR Serp-28c (fouling aquarium water supply cover, 7 m, 14-VII-2000, legit J.R. Bastida-Zavala & J.A. de León-González); ECOSUR Serp-28e, 2 specimens (San Juan de Ulúa, rock pier, together with vermetids, oysters and ascidians, 1-1.5 m, 11-VIII-1996, legit M.A. Muro).
CAMPECHE: ECOSUR Serp-28d, 2 specimens (Beach 20 km SW Champotón, sea grass (*Syringodium*) and algae (*Udotea flabellum, Penicillus dumetosus* and *Halimeda incrassata*), 1 m, 14-II-1999, legit J.R. Bastida-Zavala & S. Salazar-Vallejo).
QUINTANA ROO: ECOSUR Serp-28b, 2 specimens (Isla Contoy, fouling wooden pier, 21-II-1999, legit J.R. Bastida-Zavala & S. Salazar-Vallejo).
PUERTO RICO: LACM-AHF N1917 (Bahía de San Juan, 26/27-IX-1942).
PANAMA, ATLANTIC: ECOSUR Serp-28e, not studied in detail (09°21.8'N 79°53.7'W, Club Naútico, salinity= 31‰, 3-VI-2002, legit S.I. Salazar-Vallejo); ECOSUR Serp-28f and LACM-AHF s.n., 10 specimens not studied in detail (09°20.9'N 79°54.2'W, Panamá Canal Yacht Club, salinity= 31‰, 3-VI-2002, legit S.I. Salazar-Vallejo).
ARUBA: ECOSUR Serp-28a (Bucuti, N lagoon side, entrance of harbour, coarse coral-debris, sand, 1 m, 26-VIII-1970, from coral cobbles, legit H.A. Ten Hove, sta. 2010B).
CURAÇAO: ZMA V. Pol. 3761, 2 specimens (Schottegat, near Amstel brewery, coral rubble on muddy sand, 0.2-0.5 m, 4-XII-1989, legit P. Bouma & U. Frank).

DESCRIPTION. - Tube: white, ID=1.1 mm (n=3, r:(0.5)1.0-1.3, μ=1.1±0.2), ED=1.4 mm (n=2, r:(0.7)1.3-1.5, μ=1.4±0.1); tubes fragmentary and/or covered by epibionts; the single complete anterior end lacks peristomes; two specimens

have transversal ridges and show two and none longitudinal ridges, respectively.

Colour and size: body yellow to light brown. TL=8.5 mm (n=5, r:(4.5)4.5-13.3, μ=8.5±3.2).

Branchial crown: with 10 radioles (n=5, r:(6)9-12, μ=10.5±1.1) left, and 10 right (n=5, r:(6)9-10, μ=10.2±0.8). RL=2.3 mm (n=5, r:(0.6)1.9-2.7, μ=2.3±0.4). Terminal filament long in four specimens (80%) and short in one (20%).

Peduncle: POL=2.8 mm (n=5, r:(1.5)1.5-4.3, μ=2.8±1.0). Insertion left (n=2; 40%) or right (n=3; 60%); constriction ill-defined (Figs. 35A, C, D). Pseudoperculum present in five 'adult' specimens.

Operculum: OL=0.9 mm (n=7, r:(0.5)0.5-1.3, μ=0.9±0.3), OD=0.6 mm (n=8, r:(0.3)0.4-0.8, μ=0.6±0.1). Funnel with 24 radii (n=9, r:(15)15-31, μ=23.9±5.5) with blunt tip (Figs. 35A, C). Interradial grooves 1/4 of funnel length in one operculum, 1/3 in four opercula, 2/5 in one and 1/2 in one. Verticil with 14 spines (n=7, r:(13)13-17, μ=14.2±1.5), straight (Figs. 35A-E), colour yellowish to hyaline. All spines similar in shape and size, with pointed tip, often broken (Fig. 35A). Spines with 0-4 internal spinules, from basal to middle section of the spine (Figs. 35B, E); with 2-3 pairs of lateral spinules (exceptionally 4), without external spinules and/or wings. Verticil without (Fig. 35B) or with central tooth (Figs. 35D, E).

Collar chaetae: bayonet chaetae with two pointed-elongate teeth and a proximal rasp, distal blade with many denticles and a conspicuous notch (Figs. 35F, G); hooded (capillary) chaetae with denticles distally (Fig. 35H).

Thorax: THL=1.7 mm (n=5, r:(1.0)1.0-2.5, μ=1.7±0.5), THW=0.7 mm (n=5, r:(0.5)0.6-1.0, μ=0.7±0.2). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae of two sizes, saw-shaped uncini (Fig. 35I).

Abdomen: with 41 (n=4, r:(35)35-57, μ=41.5 ±10.0) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae. Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Fig. 35J), posterior uncini rasp-shaped.

HABITAT. - Depth: 0.4-7 m, on rocky and wooden piers and ships' bottoms, in lagoons; fouling. Salinity tolerance 30-37‰.

DISTRIBUTION. - Circum(sub)tropical (Fig. 36).

REMARKS. - One specimen, from Texas, has a double funnel (Fig. 34C), just like the one figured by Hartman (1952, Fig. 1). It may be the same specimen, but we found it loose in a lot (LACM-AHF N5370) of hundreds of *H. elegans* collected from a ships' bottom in Rockport, Texas. The taxon is very commonly used for studies in reproduction, larval development and genetics (cf. Kupriyanova et al., 2001). It is regarded to be an invasive, ship-transported species (e.g. Zibrowius, 1994), in its 'new' localities, however, its distribution is generally limited to polluted harbours and lagoons (Ten Hove, 1974).

TAXONOMIC REMARKS. - In 1971 Zibrowius reinstated *Hydroides elegans* Haswell, 1883. The name has been used extensively afterwards, we know of about 200 references. He mentioned *Hydroides abbreviatus* Mörch, 1863 as an uncertain synonym of *H. elegans* (attribution uncertaine); the type is not in Copenhagen, presumably lost. Mörch's description is extremely short, but accompanied by a characteristic figure. In the meantime we have seen thousands of specimens, among which quite a few from the Caribbean (*H. abbreviatus* was described from Saint Croix), and hardly have doubt that both taxa are synonymous.

The conditions of Art.23.9.1. of the ICZN (1999) regarding the retention of prevailing usage are both met, since the references of *H. abbreviata* (a complete list is given above) should not be taken into account as use of valid names under Art. 23.9.6. Therefore, the name *Hydroides abbreviata* has not been used as a valid name after 1899, and should be regarded as a nomen oblitum.

The junior synonym *H. elegans* has been used very extensively (about 200 times) since 1971, the species being a main fouling organism, as well as frequently being used for experiments. It should be regarded as nomen protectum.

The existing confusion between *H. elegans* and the temperate European *H. norvegicus* was solved by Zibrowius (1971) and Ten Hove (1974), who found the collar chaetae to give the best distinction: with proximal rasp in *H. elegans*, lacking in *H. norvegicus*. The differences with the similar Indo-Pacific taxa *H. multispinosus* Marenzeller, 1885 and *H. longispinosus* Imajima, 1976b have

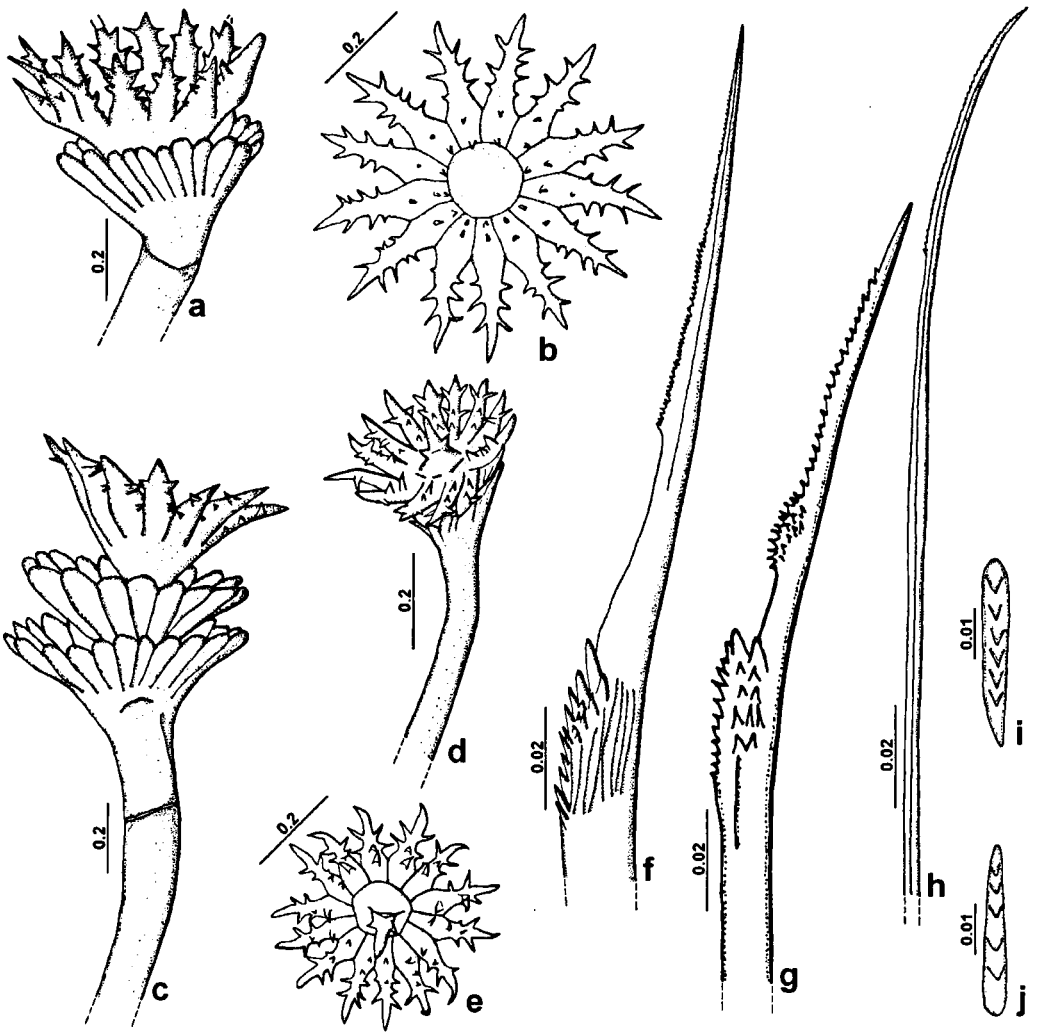

Fig. 35. *Hydroides elegans*. From Quintana Roo, ECOSUR Serp-28b: A, operculum, lateral view. From Florida, UMML 22-80: B, operculum, apical view. From Texas, LACM-AHF N5370: C, aberrant operculum, lateral view. From Campeche, ECOSUR Serp-28d: D-E, operculum, lateral and apical view. From Quintana Roo, ECOSUR Serp-28b: F-G, bayonet chaetae, lateral and frontolateral view. H, hooded (capillary) chaeta. I, thoracic uncinus. J, anterior abdominal uncinus.

been discussed in Imajima (1976b: 240, 245). Fiege & Sun (1999) synonymized *H. centrospina* Wu & Chen, 1981 with *H. longispinosus*.

Hydroides sp. 1
Figs. 37A-O, 40

Hydroides sp. A Ten Hove & Wolf, 1984: 55.16-55.19 (Northern Gulf of Mexico); Ten Hove & San Martín, 1995: 16 (Cuba).

MATERIAL. - Seven 'adult' specimens.

FLORIDA: UMML 22-279 (24°31'N 81°09'W, off Florida Keys, 141 m, 17-IX-1964, R/V Gerda, cruise 6433, sta. 376); ZMA V. Pol. 3689, 2 specimens (27°37'N 84°13'W, bryozoans and sponges, 73 m, 3-III-1967, R/V Hourglass, sta. E(EJ-67-80)).
MEXICO: ECOSUR Serp-34, 3 specimens (Quintana Roo, off Punta Herradura, on black coral, 80 m, 30-XI-2000, legit S. Salazar-Vallejo & L. Carrera-Parra).
CUBA: ZMA V. Pol. 3847 (Punta Pedernales, Isla de la Juventud, on gorgonid coral, 50 m, 26-IV-1984, I Expedición Cubano-Española, sta. 45).

DESCRIPTION. - Tube: white to light pink, ID= 0.8

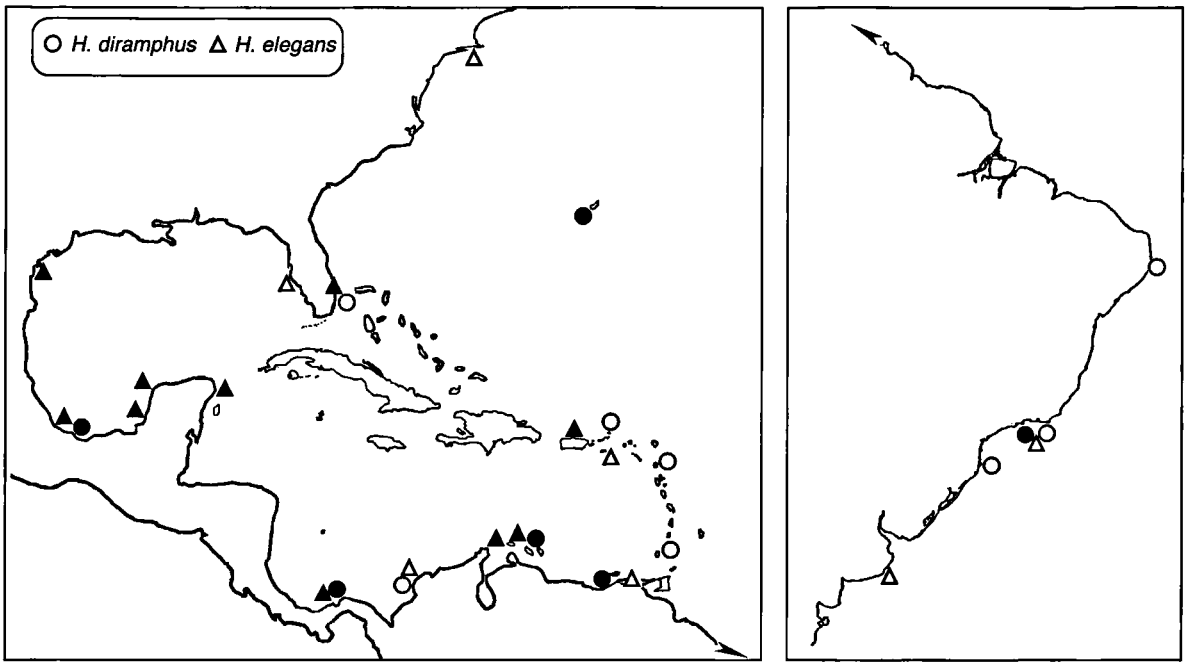

Fig. 36. Distribution of *Hydroides diramphus* and *H. elegans*. Closed symbols denote examined material, open symbols literature records.

mm (n=7, r:0.6-1.1, μ=0.8±0.2), ED=1.1 mm (n=7, r:0.7-1.5, μ=1.1±0.3); six tubes lack peristomes; five specimens have transversal ridges, three show two longitudinal ridges, three others none.

Colour and size: body beige. TL=11.1 mm (n=6, r:7.8-25.0, μ=11.1±6.5).

Branchial crown: with 10 radioles (n=7, r:7-16, μ=10.4±3.4) left, and 10 right (n=7, r:7-16, μ=10.2±3.3). RL=3.1 mm (n=7, r:2.0-6.0, μ=3.1±1.5). Terminal filament very long in three specimens (43%), long in three more (43%) and short in two (14%).

Peduncle: POL=4.3 mm (n=7, r:2.8-7.5, μ=4.3 ±1.7). Insertion left (n=3; 43%) or right (n=4; 57%); constriction ill- (Fig. 37C) to well-defined (Figs. 37A, D). Pseudoperculum present in all 'adult' specimens.

Operculum: OL=1.3 mm (n=7, r:1.0-2.0, μ=1.3±0.3), OD=0.7 mm (n=7, r:0.4-1.0, μ=0.7 ±0.2). Funnel with 19 radii (n=7, r:15-25, μ=18.8 ±3.3) with blunt tip (Figs. 37A-D). Interradial grooves 1/3 of funnel length in four opercula, 2/5 in two and 1/2 in one. Verticil with seven spines (n=7, r:7-9, μ=7.4±0.8), curving inwards (Figs. 37A-D), colour pale yellow to light brown. All spines similar in shape and size, with pointed tip. Spines with one basal internal spinule; with two to three pairs (in one specimen four) of lateral spinules, without external spinules and/or wings (Figs. 37A-D). Verticil without central tooth (Fig. 37B).

Collar chaetae: bayonet chaetae with two or three blunt-elongate to blunt-short teeth, distal blade smooth (Figs. 37E-G); hooded (capillary) chaetae present (Figs. 37H, I).

Thorax: THL=1.9 mm (n=7, r:1.5-2.7, μ=1.9 ±0.5), THW=0.7 mm (n=7, r:0.5-1.0, μ=0.7 ±0.2). Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 37J) of two sizes, saw-shaped uncini (Figs. 37K, L).

Abdomen: with 43 (n=6, r:36-50, μ=43.4±5.4) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 37M). Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Figs. 37N, O), posterior uncini rasp-shaped.

HABITAT. - Depth: 50-141 m, on black coral, bryozoans and sponges.

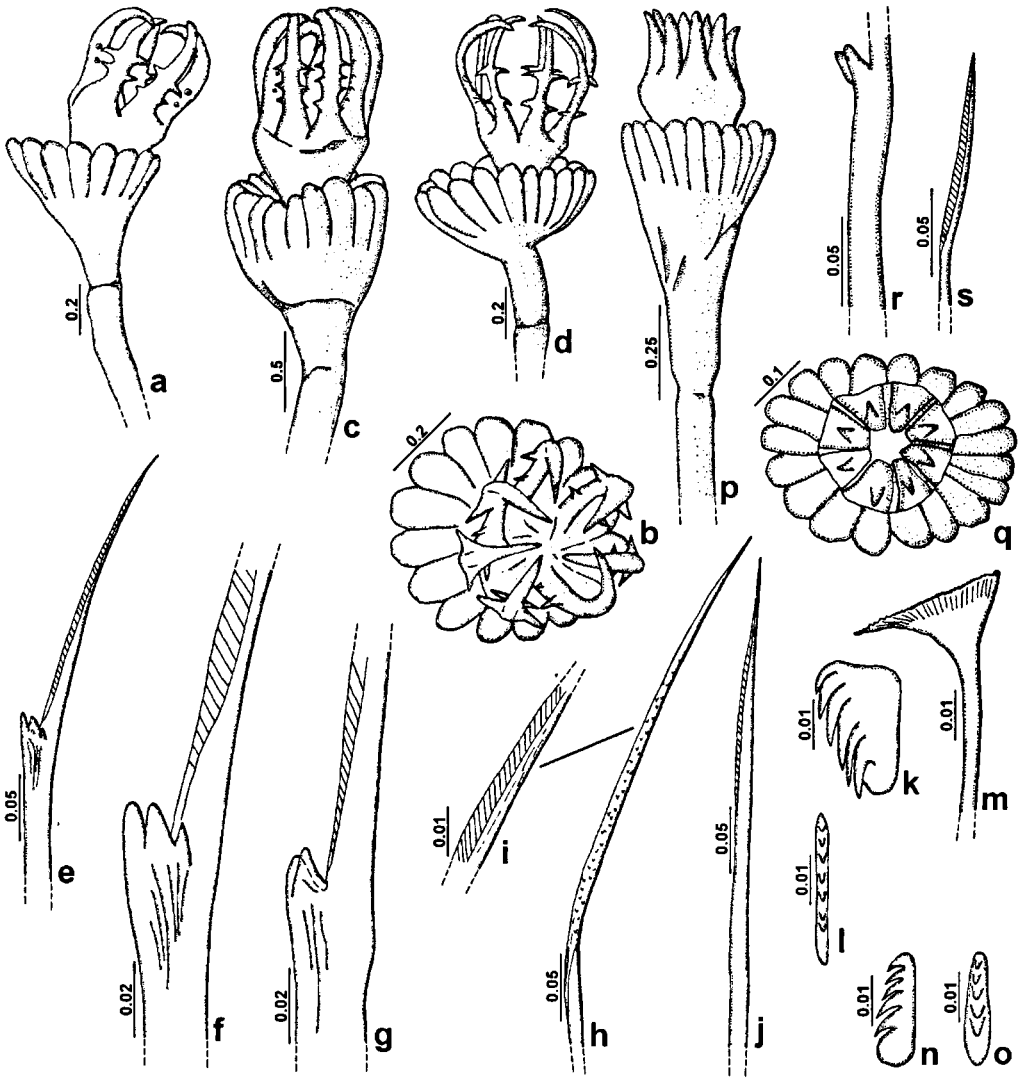

Fig. 37. *Hydroides* sp. 1. From Florida, ZMA V. Pol. 3689: A-B, operculum, lateral view and apical view. UMML 22.279: C, other operculum, lateral view. From Quintana Roo, ECOSUR Serp-34: D, operculum, lateral view. E-G, bayonet chaetae, frontolateral and lateral view. H-I, hooded (capillary) chaeta, with detail. J, thoracic hooded (limbate) chaeta. K-L, thoracic uncini. M, anterior abdominal flat-trumpet chaeta. N-O, anterior abdominal uncinus. *Hydroides* sp. 2. From Bonaire, ZMA V. Pol. 3914: P-Q, operculum, lateral and apical view. R, bayonet chaeta, lateral view. S, thoracic hooded (limbate) chaeta.

DISTRIBUTION. - Northern Gulf of Mexico, Mexican Caribbean and Cuba (Fig. 40).

TAXONOMIC REMARKS. - The species is currently under description by Ten Hove & Perkins (in prep.). *Hydroides* sp. 1 resembles *H. bispinosus*, both species share blunt radii and have lateral spinules (Figs. 11A-D, 37A-D). It should be noted that the proximal lateral spinules in *Hydroides* sp. 1 are small and may easily be overlooked. However, the tips of the verticil spines in *Hydroides* sp. 1 curve inwards smoothly (Figs. 37A, C, D), while the curve is more abrupt to geniculate and at about half their length in *H. bispinosus* (Figs. 11A-D).

Hydroides sp. 1 resembles *H. capensis* Zibrowius, 1972b from tropical West Africa in the incurving verticil spines with up to three pairs of lateral spinules. However, a medial internal spinule and

central tooth are present in *H. capensis*, missing in *Hydroides* sp. 1.

Hydroides sp. 2
Figs. 37P-S, 40

MATERIAL. - BONAIRE: ZMA V. Pol. 3914 (Klein Bonaire, 900 m E of Westpunt, sand flat below reef, 49 m, 1-VII-1970, legit H.A. Ten Hove, sta. 2105C).

DESCRIPTION. - Tube: only one, white, ID=0.4 mm, ED=0.5 mm; lacking peristomes and transversal and/or longitudinal ridges.

Colour and size: body yellow. TL=13.0 mm (incomplete).

Branchial crown: with seven pairs of radioles. RL=3.3 mm. Terminal filament long.

Peduncle: POL=3.9 mm (n=2, r:3.3-4.5, μ=3.9±0.8). Insertion at both sides; constriction ill-defined to shallow (Fig. 37P).

Operculum: OL=0.9 mm (n=2, r:0.9-1.0, μ=0.95±0.1), OD=0.3 mm (n=2, r:0.3-0.4, μ=0.35±0.1). Funnel with 19 radii (n=2, r:18-19, μ=18.5±0.7) with blunt tip (Figs. 37P, Q). Interradial grooves 1/3 of funnel length in both opercula. Verticil with eight yellowish spines, curving outwards (Figs. 37P, Q). All spines similar in shape and size, with pointed tip. Spines without internal (Fig. 37Q), external and/or lateral spinules and/or wings (Fig. 37P). Verticil without central tooth (Fig. 37Q).

Collar chaetae: bayonet chaetae with two blunt-elongate teeth, curving away from the shaft, distal blade smooth (Fig. 37R); hooded (capillary) chaetae present.

Thorax: THL=1.7 mm, THW=0.3 mm. Thoracic membranes well developed. Eight chaetigers with hooded (limbate) chaetae (Fig. 37S) of two sizes, saw-shaped uncini.

Abdomen: with 35 chaetigers (incomplete specimen, some abdominal segments lost). Anterior and middle abdominal chaetigers with flat-trumpet chaetae. Anterior uncini saw-shaped, posterior uncini rasp-shaped.

HABITAT. - Depth 49 m, sand flat below reef.

DISTRIBUTION. - Netherlands Antilles (Fig. 40).

TAXONOMIC REMARKS. - The species is currently under description by Ten Hove & Perkins (in prep.). *Hydroides* sp. 2 might be confused with small specimens of *H. protulicola* and *H. microtis*. The last ones, however, have bayonet chaetae with proximal rasp (Figs. 14F, G, 27F-J), absent in the otherwise very typical bayonet chaetae of *Hydroides* sp. 2 (Fig. 37R). It also is somewhat similar to *H. plateni* in the fact that all verticil spines are simple and unadorned. However, all spines are curving inwards or straight (Figs. 26A, D, F, H), while they curve outwards in *Hydroides* sp. 2 (Figs. 37P, Q).

Hydroides sp. 3
Figs. 38A-J, 40

Hydroides sp. Bastida-Zavala & Salazar-Vallejo, 2001b: 852, fig. 4a (Cuba).

MATERIAL. - CUBA: IOC 5 (Cayo Diego Pérez, Golfo de Batabanó, 15 m, 20-VII-1988).

DESCRIPTION. - Tube: missing.

Colour and size: body beige. Specimen incomplete.

Branchial crown: with seven pairs of radioles. RL=1.7 mm. Terminal filament short.

Peduncle: POL=2.8 mm. Insertion left; constriction ill-defined (Fig. 38a). Pseudoperculum present.

Operculum: OL=1.1 mm, OD=0.4 mm. Funnel with 13 radii with blunt tip (Fig. 38A). Interradial grooves 1/3 of funnel length. Verticil with five dark brown spines, distally curving inwards (Figs. 38A, B). The most dorsal spine bigger than the others with tip curving strongly inwards. The rest of spines almost conical, similar in shape and size, with pointed tip. Spines with basal internal spinule (Fig. 38C); with 2-3 pairs of lateral spinules (Figs. 38A, B); without external spinules and/or wings. Verticil without central tooth (Fig. 38C).

Collar chaetae: bayonet chaetae with two pointed-elongate teeth, distal blade smooth (Figs. 38D-F); hooded (capillary) chaetae present (Fig. 38G).

Thorax: THL=1.0 mm, THW=0.3 mm. Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae (Fig. 38H) of two sizes, saw-shaped uncini (Fig. 38I).

Abdomen: most abdominal chaetigers lost.

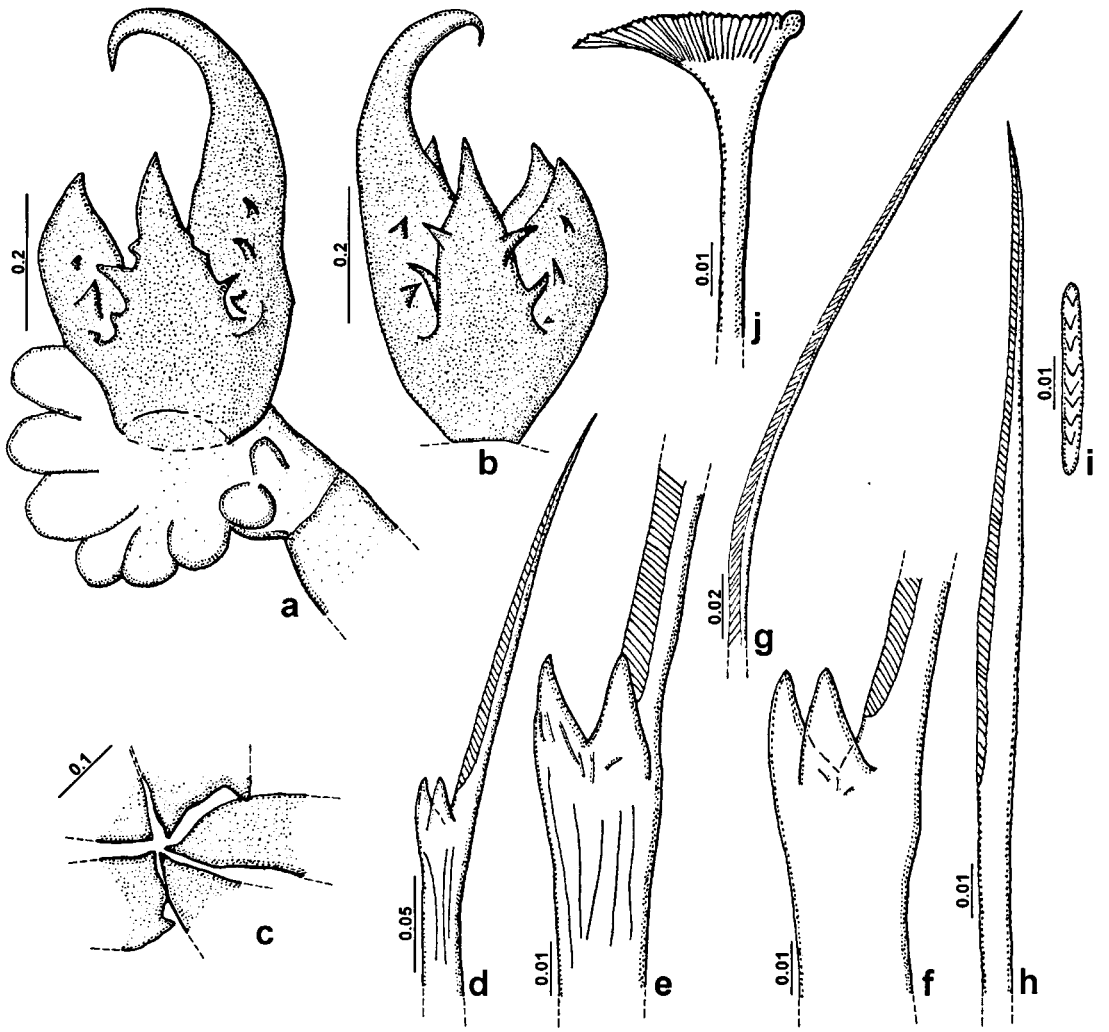

Fig. 38. *Hydroides* sp. 3. From Cuba, IOC 5: A-B, operculum, left and right lateral view. C, basal internal spinules, detail. D-F, bayonet chaetae, lateral and frontal views. G, hooded (capillary) chaeta. H, thoracic hooded (limbate) chaeta. I, thoracic uncinus. J, anterior abdominal flat-trumpet chaeta.

Anterior abdominal chaetigers with flat-trumpet chaetae (Fig. 38J). Anterior uncini saw-shaped.

HABITAT. - Depth 15 m.

DISTRIBUTION. - Known only from Cuba (Fig. 40).

TAXONOMIC REMARKS. - The only specimen of *Hydroides* sp. 3 was originally labeled *H. parvus* in the collections of the Instituto de Oceanología de Cuba. However, it is very different from that species; it has radii with blunt tip, verticil spines smoothly curving inwards distally and with 2-3 pairs of lateral spinules (Figs. 38A, B), while *H. parvus* has radii with pointed tip, verticil spines strongly curving inwards, with knob and with only one pair of lateral spinules (Figs. 12A-C).

Hydroides sp. 3 resembles *Hydroides* sp. 1 in having two or three pairs of lateral spinules. However, the former has a larger dorsal verticil spine (Figs. 38A, B), the latter has all verticil spines of the same shape and size (Figs. 37A-D).

Hydroides sp. 3 is different from all known

Hydroides species, it most probably is a new species. However, in our opinion variability in some taxa of the genus is so extreme, that we prefer not to describe a new species on a single specimen.

Hydroides sp. 4
Figs. 39A-C, 40

MATERIAL. - Three 'adult' specimens.
CURAÇAO: ZMA V. Pol. 5003 (Playa Kalki, reef with small sandy areas, 13-17 m, 28-V-1970, legit H.A. Ten Hove, sta. 2037B).
BONAIRE: ZMA V. Pol. 5004, 2 specimens (Flamingo Beach Hotel, Kralendijk, sloping reef, sand flats, 33 m, 27-VII-1970, legit H.A. Ten Hove, sta. 2115B).

DESCRIPTION. - Tube: white, ID=0.8 mm (n=3, r:0.7-0.9, μ=0.8±0.1), ED=1.1 mm (n=3, r:0.9-1.2, μ=1.1±0.2); two tubes lack peristomes and transversal ridges; one specimen shows two longitudinal ridges, the other three.

Colour and size: body yellow. TL=20.0 mm (only one specimen).

Branchial crown: with eight radioles (n=3, r:7-9, μ=7.6±1.6) left, and seven right (n=3, r:6-8, μ=7.0±1.0). RL=4.9 mm (n=3, r:4.5-5.5, μ=4.9 ±0.5). Terminal filament very long in all specimens.

Peduncle: POL=7.5 mm (n=2). Insertion left (n=1; 33%) or right (n=2; 67%); constriction ill-defined (Fig. 39A). Pseudoperculum present in all specimens.

Operculum: OL=1.4 mm (n=3, r:1.1-1.5, μ=1.4±0.2), OD=0.7 mm (n=3, r:0.6-0.8, μ=0.7 ±0.1). Funnel with 29 radii (n=3, r:26-31, μ=28.6 ±2.5) with blunt tip (Figs. 39A, B). Interradial grooves 1/2 of funnel length (n=3). Verticil with eight spines (n=3, r:7-8, μ=7.7±0.6), curving inwards strongly and abruptly (Figs. 39A, C), colour yellow to light brown. All spines similar in shape and size (Figs. 39A, B), with pointed tip. Spines with one basal internal spinule (split in one; Fig. 39C); without external and lateral spinules and/or wings. Verticil without central tooth.

Collar chaetae: bayonet chaetae with two blunt-elongate teeth, distal blade smooth; hooded (capillary) chaetae present.

Thorax: THL=1.8 mm (n=2, r:1.5-2.2, μ=1.8 ±0.5), THW=0.8 mm (n=3, r:0.7-0.9, μ=0.1 ±0.2). Development of thoracic membranes unknown, specimens were dried out. Six chaetigers with hooded (limbate) chaetae of two sizes, saw-shaped uncini.

Abdomen: with 80 (n=2, r:66-97, μ=80.0 ±21.9) chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae. Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped, posterior uncini rasp-shaped.

HABITAT. - Depth: 15-33 m, on sand flats of sloping reef.

DISTRIBUTION. - Netherlands Antilles (Fig. 40).

TAXONOMIC REMARKS. - The material does not resemble any of the known species. Superficially it might be mistaken for *H. bispinosus*, in overall compactness of the operculum; it differs, however, in its long radii and absence of side-spinules. In view of the small sample and its poor state, we decided to treat it as a full taxon without naming it.

Hydroides cf. **operculatus** (Treadwell, 1929)
Figs. 39D-O, 40

MATERIAL. - CAMPECHE: ECOSUR Serp-25 (Beach 20 km SW Champotón, sea grass (*Syringodium*) and algae (*Udotea flabellum, Penicillus dumetosus* and *Halimeda incrassata*), 1 m, 14-II-1999, legit J.R. Bastida-Zavala & S. Salazar-Vallejo).

DESCRIPTION. - Tube: white, ID=0.3 mm, ED= 1.0 mm; without peristomes; with transversal ridges; without longitudinal ridges.

Colour and size: body beige. TL=7.0 mm.

Branchial crown: with six pairs of radioles. RL= 1.5 mm. Terminal filament long.

Peduncle: POL=1.4 mm. Insertion right; constriction ill-defined (Fig. 39D). Pseudoperculum present.

Operculum: consistence soft, hardly chitinized. OL=0.6 mm, OD=0.3 mm. Funnel with 17 radii with pointed tip (Figs. 39D, E). Interradial grooves 1/3 of funnel length. Verticil with seven yellow spines, distally curving inwards (Figs. 39D, E). All spines similar in shape and size, with pointed and strongly incurving tips (Fig. 39D). Spines with basal internal spinule (Fig. 39E); without external or lateral spinules and/or wings.

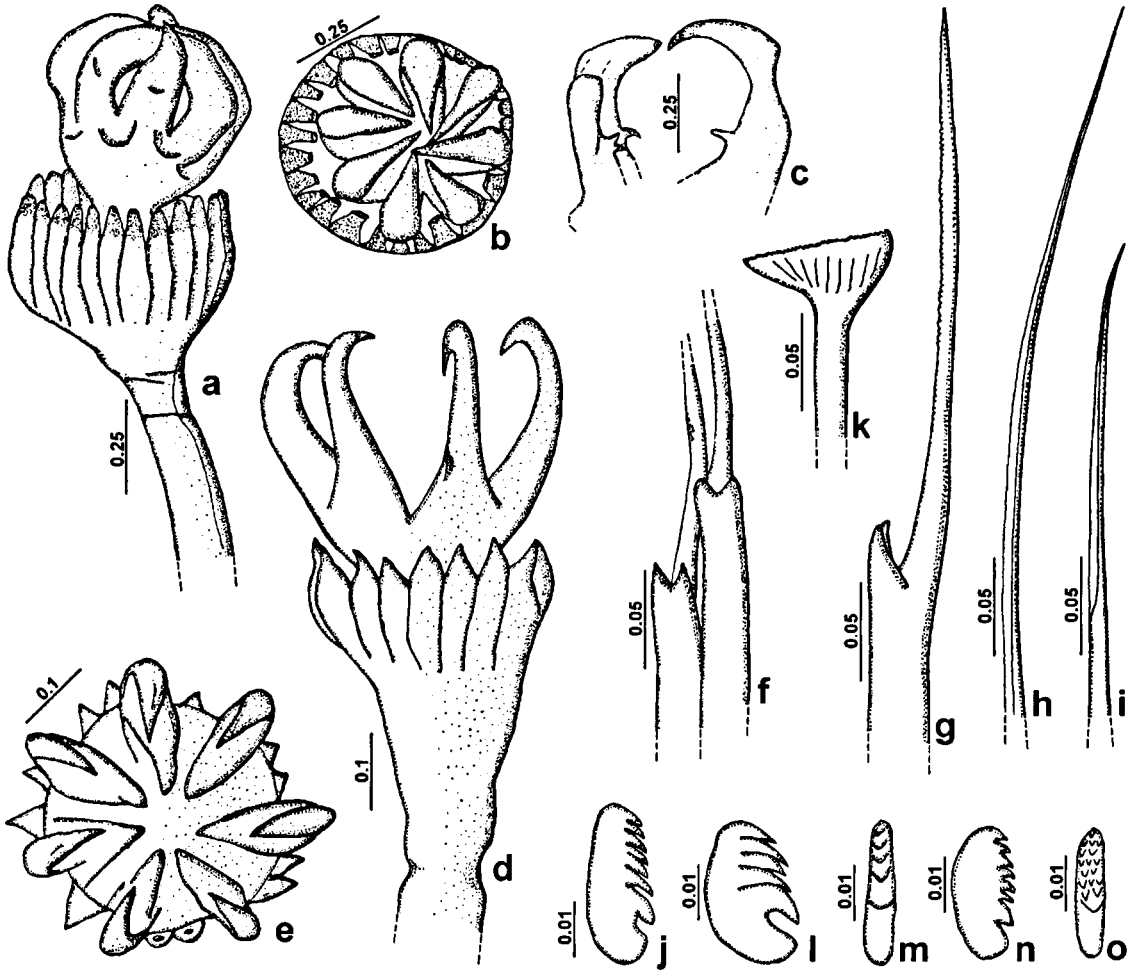

Fig. 39. *Hydroides* sp. 4. From Bonaire: A, operculum, lateral view. B,. most ventral and dorsal verticil spines, lateral view. C, operculum, apical view. *H.* cf. *operculatus*. From Campeche ECOSUR Serp-25: D-E, operculum, lateral and apical view. F-G, bayonet chaetae, frontal and lateral view. H, hooded (capillary) chaeta. I, thoracic hooded (limbate) chaeta. J, thoracic uncinus. K, anterior abdominal flat-trumpet chaeta. L-M, anterior abdominal uncini. N-O, posterior abdominal uncini.

Verticil without central tooth (Fig. 39E).

Collar chaetae: bayonet chaetae with two pointed-elongate to blunt-short teeth, distal blade with minute denticles (Figs. 39F, G); hooded (capillary) chaetae present (Fig. 39H).

Thorax: THL=1.7 mm, THW=0.5 mm. Thoracic membranes well developed. Six chaetigers with hooded (limbate) chaetae of one size (Fig. 39I), saw-shaped uncini (Fig. 39J).

Abdomen: with 56 chaetigers. Anterior and middle abdominal chaetigers with flat-trumpet chaetae (Fig. 39K). Posterior chaetigers with 'capillary' chaetae. Anterior uncini saw-shaped (Figs. 39L, M), posterior uncini rasp-shaped (Figs. 39N, O).

HABITAT. - Depth 1 m, in sea grass-bed (*Syringodium*) with algae (*Udotea flabellum, Penicillus dumetosus* and *Halimeda incrassata*).

DISTRIBUTION. - Champotón, Gulf of Mexico (Fig. 40).

REMARKS. - With the similarly small specimen of *Hydroides mucronatus*, this is the only material in which we were not able to find two sizes in the

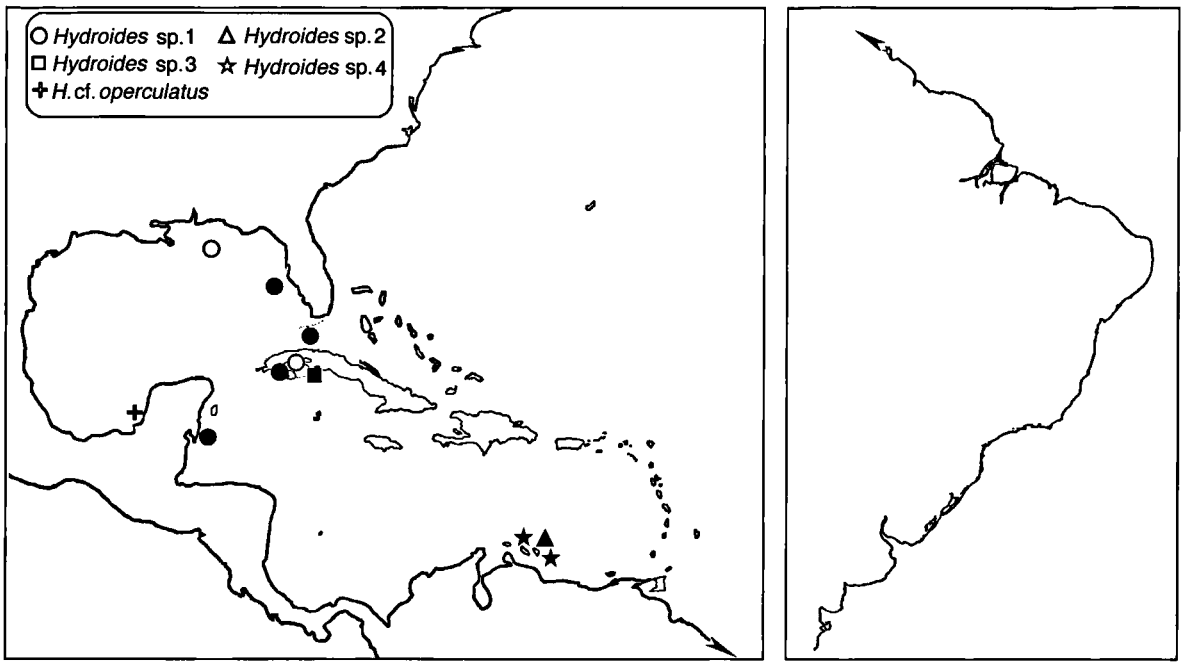

Fig. 40. Distribution of *Hydroides* sp. 1, *Hydroides* sp. 2, *Hydroides* sp. 3, *Hydroides* sp. 4 and *H.* cf. *operculatus*. Closed symbols denote examined material, open symbols literature records.

thoracic (hooded) limbate chaetae. Whether this is a real difference, or due to insufficient (and too small) material remains to be decided from more specimens.

TAXONOMIC REMARKS. - *Hydroides* cf. *operculatus* resembles *H. operculatus* (Treadwell, 1929) from the Indo-Pacific, in the shape of the operculum, number of verticil spines (7, Bastida-Zavala & Ten Hove, unpubl.), with basal internal spinule (Figs. 39A, B). However, the latter has more radii (28-33, Bastida-Zavala & Ten Hove, unpubl.) than *H.* cf. *operculatus* (17).

Hydroides cf. *operculatus* also is similar to *H. gracilis* (Bush, 1905) from the Eastern Pacific, in the shape of the operculum. However, the former has verticil spines with a basal internal spinule (Fig. 38B), absent in the latter. In addition, *H. gracilis* has more radii (16-42) and verticil spines ((8)10-12), Bastida-Zavala & Ten Hove, submitted) than *H.* cf. *operculatus*

The operculum has a soft consistence, maybe it is regenerating and not fully grown. It is not impossible that *H. operculatus* has been spread by ship-transport, Zibrowius (1979) found this essentially Indo-Pacific species on a ships' bottom in Toulon (France). For these reasons, more material is necessary for a more definite identification.

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