1. Family Syllidae Grube, 1850

by

Jerry D. Kudenov[1] and Leslie H. Harris[2]

Introduction

The Syllidae represent one of the most diverse and systematically challenging families of Polychaeta, with about 70 genera and over 600 species (Hartman, 1959, 1965; Fauchald, 1977; Pettibone, 1982). Syllids tend to be small, usually less than 10 mm long and 1 mm wide, and are especially well represented as epibiota on hard surfaces or on metazoans in intertidal, subtidal and shelf habitats. Other members of this family are also abundant or widely distributed in shallow soft-bottom environments. The Syllidae is represented by only a few genera in deeper waters, such as *Sphaerosyllis* and *Braniella* in slope and rise habitats.

Morphology

The body is usually small, short and slender or threadlike, nearly cylindrical to dorsoventrally flattened in cross section, and tapering anteriorly and posteriorly. The integument is generally smooth, but papillae of various shapes and distributions are sometimes present.

The prostomium tends to be wider than long. Eyes number two to three pairs; the posterior two pairs are arranged trapezoidally, and the anterior pair tends to be eyespots associated with the anteriormost region of prostomium. Antennae generally number three, including unpaired median and paired lateral antennae, which may be strongly articulated, wrinkled or smooth; they are absent in *Exogonella*. Nuchal organs may be present as epaulettes or lobes extending from the posterior prostomial margin, or as continuous transverse or paired postectal lobes. Palps are paired, usually large, roughly triangular in shape, range from being completely fused to free from one another, and project anteroventrally. However, the palps of *Autolytus* are greatly reduced, not visible dorsally, and project ventrally from the prostomium.

The pharynx is an eversible tube with a cuticular lining, and generally with a dorsomedian tooth that tends to be marginal or subdistal when the pharynx is everted, although it may be present in the middle or posterior half of the pharynx. Additionally, a distal circlet or arc of marginal pharyngeal teeth may accompany the dorsomedian tooth, all of which may become so well developed that together they appear to form a crown or trepan (as in *Trypanosyllis*). Sometimes the pharynx is described as being unarmed, i.e., pharyngeal teeth are absent, as in *Syllides*. A distal circlet of 10 soft papillae is usually also present, although these may be fewer in number or absent in some taxa. The proventriculus is conspicuous, with transversely striated muscles arranged in rows, and connects the anterior pharynx to the posterior intestine.

[1]Department of Biological Sciences, University of Alaska Anchorage, 3211 Providence Drive, Anchorage, Alaska 99508
[2]Invertebrate Zoology Section, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, California 90007

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The tentacular segment is achaetous, and generally forms a complete ring, although sometimes it is dorsally reduced or variously developed into an occipital flap that extends anteriorly over the prostomium, covering one or both pairs of posterior eyes. Ventrally the tentacular segment forms the lips of the mouth. Tentacular cirri generally number two pairs, although only one pair may be present in *Exogone*; *Exogonella* lacks cirri altogether.

Parapodia are uniramous and similar all along the body in nonreproductive individuals; they may be biramous in reproductive individuals. Setae are generally compound falcigers (as in *Typosyllis*), or sometimes compound spinigers (as in some species of *Exogone* and *Pionosyllis*), or are entirely simple (as in *Haplosyllis*). In some taxa, the articulation between the blade and the shaft is fused. A dorsal and ventral simple seta may also be present in each fascicle for a varying number of segments. Aciculae are present in all parapodia, varying both in number and shape.

Dorsal cirri vary in shape and length, sometimes alternating between long and short, and generally present on all parapodia, although they may be absent from an anterior segment in some taxa. Dorsal cirri may be articulated or moniliform (as in *Syllis*, *Typosyllis* or *Trypanosyllis*); smooth (as in *Exogone*, *Odontosyllis* or *Pionosyllis*); or irregularly wrinkled (as in *Eusyllis* or *Streptosyllis*). Ventral cirri are mostly digitiform, and usually do not extend beyond the parapodial lobes; they are entirely absent from the subfamily Autolytinae.

The pygidium has a pair of anal cirri, and sometimes also a ventromedian cirrus. The cirri are usually slender, ranging from articulated to smooth.

Systematic History

Grube (1850) was the first to recognize syllids as a separate family, followed by Williams (1851) who also considered the Syllidae as a separate family. Other important early works on syllids include Quatrefages (1865), Malaquin (1893), Gravier (1900), Haswell (1920a, b; 1921), Fauvel (1923, 1934a, b) and Rioja (1925). Rioja (1925) divided the Syllidae into four subfamilies: Autolytinae, Exogoninae, Eusyllinae and Syllinae, each of which are defined and accompanied by a key below, and have been recognized by subsequent investigators (Fauchald, 1977; Pettibone, 1982).

Recent literature of importance includes the studies by Berkeley and Berkeley (1938, 1945), Rioja (1941, 1943), Uschakov (1955), Gidholm (1962, 1965, 1967a,b), Pettibone (1954, 1963, 1982), Imajima (1966a-e, 1967), Day (1967), Hartman (1961, 1968), Hartmann-Schröder (1971), Fauchald (1977), Uebelacker (1984), Russell (1987, 1989a-b, 1991) and San Martín (1990, 1991a,b). The excellent series of papers by Imajima (1966a-e, 1967) are undoubtedly the most important works that have consistently clarified important traits for the entire family. In this context, Imajima largely stabilized syllid systematics.

Principal Diagnostic Traits

The four subfamilies defined by Rioja (1925), and recognized by Imajima (1966a), Day (1967) and Uebelacker (1984) are characterized as follows:

Subfamily Autolytinae

Diagnosis. Body threadlike, 4-20 mm long, 0.5-1 mm wide. Palps partially to completely fused to one another, directed ventrally. Nuchal organs present either as conspicuous epaulettes or lobes. Tentacular cirri numbering 2 pairs. Antennae, tentacular cirri and dorsal cirri smooth. Ventral cirri absent. Pharynx long, coiled or sinuous, with a distal circlet of teeth (=trepan).

Subfamily Exogoninae

Diagnosis. Body rather compact, less than 8 mm long, 0.8 mm wide. Palps fused dorsally for at least one-half to all their length. Nuchal organs usually inconspicuous. Tentacular cirri usually numbering 1-2 pairs; may be absent. Antennae, tentacular cirri and dorsal cirri smooth. Ventral cirri present. Pharynx usually straight, with a middorsal tooth or unarmed.

Subfamily Eusyllinae

Diagnosis. Body usually at least 10 mm long. Palps only fused basally, free from one another distally. Nuchal organs large and conspicuous. Tentacular cirri numbering 1-2 pairs. Dorsal cirri smooth to wrinkled. Ventral cirri present. Pharynx usually straight, with a middorsal tooth with or without a marginal series of teeth, or unarmed.

Subfamily Syllinae

Diagnosis. Body usually at least 10 mm long, sometimes over 50 mm. Palps usually free basally. Nuchal organs usually small and inconspicuous. Tentacular cirri numbering 2 pairs. Dorsal cirri strongly articulated or moniliform. Ventral cirri present. Pharynx straight, with a middorsal tooth, with or without distal circlet of teeth (=trepan).

It is relatively easy to distinguish autolytins and exogonins from one another and from each of the other two subfamilies. Unfortunately, it is often difficult to identify both eusyllins and syllins to a subfamily because key characters sometimes overlap. For example, some eusyllins may have distinctly articulated dorsal cirri or basally fused palps and some syllins may have smooth dorsal cirri or basally separated palps (Day, 1967; Uebelacker, 1984). Fusion of palps in the Eusyllinae and Syllinae may be partly controlled by physical factors such as temperature (Piltz, 1980), suggesting that this particular character is not informative. Although distinctions between smooth to wrinkled versus articulated dorsal cirri of eusyllins and syllins are not always reliable, this trait is still the most practical one to use when placing these taxa into subfamilies.

A synopsis of the majority of syllid genera is presented by Fauchald (1977). Important generic traits include: body shape, epidermal papillae, prostomial antennae, occipital flap, tentacular cirri, nuchal organs, nature of dorsal and ventral cirri, nature and distribution of setae, aciculae, and nature and armature of the

pharynx. Perhaps knowledge of the pharynx is the most critical of these traits. The pharynx may be unarmed, lacking any sort of dentition, or may have an internal valve. An armed pharynx can show a variety of dentition patterns: (a) a single middorsal tooth with a smooth or minutely dentate anterior rim or margin; (b) a continuous distal circlet of teeth (trepan) which may have an enlarged median tooth; (c) a discontinuous ventral arc or an incomplete circlet of teeth. The position of the middorsal tooth is also important because it can range from distal, subdistal, or proximal in the pharynx. Pharyngeal dentition is often the only way to separate such genera as *Eusyllis* and *Pionosyllis*.

Important species traits include: pigmentation patterns; shape and distribution of such structures as antennae and eyes, palps, nuchal organs, pharynx, proventriculus, peristomial cirri, occipital flap, parapodia, dorsal and ventral cirri, setae and aciculae. Among the more important traits noted above are the setae, aciculae, and pharynx. Both setae and aciculae must be examined and illustrated from superior and inferior regions of fascicles of anterior, middle and posterior parapodia using a compound microscope. It is also important to scan the entire specimen for the distribution and morphological changes in setae and aciculae along the body (Fauchald, 1977), especially in such genera as *Exogone*, *Syllides* and *Streptosyllis*. Typically, blades of compound falcigers tend to vary in length, decreasing both inferiorly within fascicles, and posteriorly along the body; aciculae generally decrease in both size and number per parapodium posteriorly along the body. Setae and aciculae must also be examined and illustrated using oil-immersion, particularly the ends of shafts and blade tips of compound setae, and the tips of both aciculae and simple setae. The pharynx is critical to species identifications, and it is usually not protracted in preserved specimens. Sometimes it can be readily observed through the body wall of small translucent specimens. Otherwise the pharynx must be removed if possible (Day, 1967; Fauchald, 1977; Uebelacker, 1984) and illustrated.

One must take care when identifying or describing syllids. Often, it is necessary to examine individual specimens one at a time. This does not mean that the taxon is so fraught with taxonomic difficulties that it should remain the purview of a few specialists. However, it is clear that much of the present confusion surrounding syllid systematics is due to at least three obvious factors. First, many workers have described new species, often in complicated genera, without having examined relevant type materials. Similarly, there is a tendency for some workers to apply names of species described from such areas as Europe (especially by Fauvel, 1923) to species that have similar suites of characters from the western coast of North America (Berkeley and Berkeley, 1948; Hartman, 1968). Such undue reliance on literature descriptions, instead of types, has cumulatively destabilized species concepts. For example, earlier records of *Exogone gemmifera* represent at least one undescribed species (Banse and Hobson, 1974; this study). Some of these species may truly be "cosmopolitan" in distribution, but until the types are critically examined, there is simply no way of knowing the number of "hidden" species involved. Secondly, well-known species that may have limited dispersal abilities have been identified far from their type localities. Again, many such identifications are seldom compared to types, which adds greater uncertainty to syllid systematics and further complicates efforts to identify species. A third factor is that a number of species are either too poorly known, original type specimens are no longer available, or lectotypes have not been redescribed.

Prospects for stabilizing syllid systematics will be attainable only in the long term. Systematic practice on and descriptions of syllids needs to be standardized. The best way to set this process in motion is for workers to compare their identifications to existing type material during revisionary studies of genera. Where type material is not available, one must obtain and describe specimens from type localities and not rely solely on published descriptions. Other systematic techniques should also be pursued in the study of syllids. For example, an intriguing karyological study (Curini-Galletti *et al*, 1991) summarized chromosomal data for syllids, and suggested that: (a) congeneric species usually have similar karyotypes; and (b) one likely mechanism of karyological evolution involves chromosomal fission or fusion, while polyploidy is speculated to be another mechanism that may have led to high numbers of chromosomes in both the Eusyllinae and Syllinae. Syllids are an ecologically important group of infauna and epibiota, and efforts to render them more understandable should be made by all interested polychaetologists.

Biology

Syllids are usually small, cryptic, highly motile polychaetes that dominate hard substrata. They are often associated with sponges, hydroids, corals, bryozoans, ascidians, algae and seagrasses. Syllids of the subfamily Exogoninae are well represented in soft sediments where they inhabit superficial layers, while others are common in algal mats and coral rubble. The entire family is best represented in shallow seas, being less diverse in deep water, although certain genera such as *Sphaerosyllis*, *Braniella* and *Syllis* are present.

Most syllids are considered to be carnivorous, piercing the body wall of prey with their armored pharynges, and ingesting body fluids through the pumping action of the highly muscular proventriculus. Other taxa, such as the Exogoninae may generally be selective deposit feeders or consume diatoms (Day, 1967; Fauchald and Jumars, 1979; Pettibone, 1982).

Syllid reproductive biology is both interesting and complex (Heacox, 1980; Heacox and Schroeder, 1981a,b). Sexes are separate, but species can generally reproduce both asexually and sexually. Asexual reproduction occurs through the formation of stolons which are posterior body segments of sexually derived adults (or parental atoke) that become transformed solely for the purpose of carrying gametes. Stolons are transient structures, with prostomia bearing appendages and 2 pairs of conspicuous eyes, long tentacular and dorsal cirri, and biramous parapodia with notopodial fascicles of long natatory or swimming capillary setae. Each stolon can either be produced singly, in long serial chains, or in dense clusters, detaching periodically to spawn (Dales, 1967; Schroeder and Hermans, 1975). Stolons of the Exogoninae, Eusyllinae and Syllinae tend to be morphologically similar: male and female stolons are called a chaetosyllis stage; those of *Trypanosyllis* and *Eurysyllis* are called a tetraglene stage. Stolons of the Autolytinae are dimorphic: male stolons are called polybostrichus stages and have long divergent palps; female stolons are called sacconereis stages with ventral pouches or marsupia containing large yolky ova (Gidholm, 1962).

Sexually reproducing syllids may spawn their gametes directly into seawater after they have become modified into swimming stages called epitokes. Epitokes generally have large eyes, and biramous parapodia with notopodial fascicles of long natatory setae in certain segments. Epitokes eventually swarm to surface waters in response to various environmental cues where gametes are released en masse, producing free-swimming larvae. Another mode of sexual reproduction is brooding by females in which developing embryos are attached directly in sacs to the dorsum, ventrum or parapodia. The embryos usually number two per segment, and develop directly into individuals with 4-6 segments that resemble small adults.

Key to the Subfamilies and Genera of the Syllidae (After Imajima, 1966a; Fauchald, 1977)

1A. Ventral cirri absent; dorsal cirri smooth ..... **Autolytinae**[3]

1B. Ventral cirri present; dorsal cirri smooth to articulated 2

2A. Body small, usually less than 8 mm long; dorsal cirri smooth; palps fused for at least half their lengths (Figs. 1.1A, 1.7B, 1.10A) ..... **Exogoninae** 4

2B. Body larger, usually more than 10 mm long; dorsal cirri smooth to articulated; palps not fused or fused only basally (Figs. 1.15A, 1.19A) 3

[3] No species of the Autolytinae were encountered in the collections examined as part of this study. The Autolytinae are, however, well represented in California waters (Hartman, 1968; L. Harris, personal observation, 1995).

3A. Palps fused basally (Figs. 1.19A, 1.20A); dorsal cirri smooth to wrinkled (Figs. 1.18A, 1.19A) ..... **Eusyllinae** 7

3B. Palps not fused basally (Figs. 1.27A, 1.28A); dorsal cirri articulated (Figs. 1.26C, 1.28A) ..... **Syllinae** 12

4A. Two pairs of tentacular cirri (Figs. 1.1A, 1.2A, 1.25B) 5

4B. One pair of tentacular cirri (Figs. 1.5A, 1.6A, 1.8A, 1.10A) 6

5A. Dorsal cirri long and filiform (Figs. 1.1A, 1.2A) ..... *Brania*

5B. Dorsal cirri globular or spherical (Fig. 1.25E-G) ..... *Eurysyllis*

6A. Dorsal cirri papilliform or ovoid (Figs. 1.4C, 1.7D-F) ..... *Exogone*

6B. Dorsal cirri pyriform or flask-shaped (Figs, 1.8C-E, 1.9A, 1.10D-E) ..... *Sphaerosyllis*

7A. Eversible pharynx unarmed (Figs. 1.21B, 1.22B-C) ..... *Syllides*

7B. Eversible pharynx armed (Figs. 1.12A, 1.18A) 8

8A. Pharynx with a single middorsal tooth (Figs. 1.20B, 1.26B, 1.30C,D, 1.32A) 9

8B. Pharynx with a distal circlet of smaller curved teeth (Figs. 1.16B, 1.17E) ..... *Odontosyllis*

9A. Middorsal tooth located in posterior region of eversible pharynx (Fig. 1.18A) ..... *Opisthodonta*

9B. Middorsal tooth located in anterior region of eversible pharynx (Figs. 1.12A, 1.14B, 1.15B, 1.20B) 10

10A. Anterior margin or rim of eversible pharynx denticulated (Figs. 1.14B, 1.15B) ..... *Eusyllis*

10B. Anterior margin or rim of eversible pharynx smooth 11

11A. Parapodia long; palps 2 times longer than prostomium (Figs. 1.11C, 1.12A) ..... *Dioplosyllis*

11B. Parapodia short and conical; palps maximally same length as prostomium (Fig. 1.20B) ..... *Pionosyllis*

12A. Pharynx with middorsal tooth (Figs. 1.23B, 1.25A, 1.26B, 1.32A) 13

12B. Pharynx with middorsal tooth and trepan (Fig. 1.30C-D) 15

13A. Setae include compound falcigers (Fig. 1.27C), dorsal and ventral simple setae, and pseudocompound setae (Fig. 1.27D-E) ..... *Syllis*

13B. Setae include compound falcigers, some with extremely long spiniger-like blades, and dorsal and ventral simple setae 14

14A. Compound falcigers and spiniger-like falcigers with extremely long bidentate blades at least 4 times longer than inferiormost blades within fascicles of midbody segments (Figs. 1.23G, 1.24G,I) ..... *Ehlersia*

14B. Only compound falcigers present (Figs. 1.32F-I, 1.33D-E, 1.34D-J) ..... *Typosyllis*

15A. Palps same length as prostomium (Fig. 1.26A); body cylindrical; setae simple (Fig. 1.26D-E) ..... *Geminosyllis*

15B. Palps shorter than prostomium (Figs. 1.29A, 1.30A-B); body flattened; setae compound (Figs. 29D-G, 30B-F) ..... *Trypanosyllis*

List of Syllid Species

In all, 16 genera and 34 species of syllids have been identified in MMS samples from the Santa Maria Basin and western Santa Barbara Channel. One species is a new combination, and 14 other species in 11 genera are new to science. The following species list is organized by subfamily. Type specimens are deposited in the National Museum of Natural History, Smithsonian Institution (NMNH), Natural History Museum of Los Angeles County (LACM-AHF), Santa Barbara Museum of Natural History (SBMNH) and the Australian Museum, Sydney (AM W); all non-type specimens of new taxa listed below are deposited at the LACM-AHF. As noted above, the Autolytinae are not represented in voucher collections, and were infrequently encountered in MMS samples. Excellent papers on the Autolytinae by Gidholm (1962, 1965, 1967a,b) and Imajima (1966b) should be consulted.

Subfamily Exogoninae

Brania brevipharyngea Banse, 1972
Brania californiensis Kudenov and Harris, new species
Exogone (Exogone) lourei Berkeley and Berkeley, 1938
***Exogone (Exogone) dwisula* Kudenov and Harris, new species**
Exogone (Parexogone) molesta Banse, 1972
***Exogone (Parexogone) acutipalpa* Kudenov and Harris, new species**
***Exogone (Parexogone) breviseta* Kudenov and Harris, new species**
Sphaerosyllis californiensis Hartman, 1966
***Sphaerosyllis bilineata* Kudenov and Harris, new species**
***Sphaerosyllis ranunculus* Kudenov and Harris, new species**

Subfamily Eusyllinae

Dioplosyllis lagunae (Hartman, 1961), **new combination**
***Dioplosyllis tridentata* Kudenov and Harris, new species**
Eusyllis blomstrandi Malmgren, 1867
Eusyllis habei Imajima, 1966c
Eusyllis longocirrata Imajima, 1966c
Odontosyllis phosphorea Moore, 1909
***Odontosyllis fragilis* Kudenov and Harris, new species**
***Opisthodonta mitchelli* Kudenov and Harris, new species**
Pionosyllis magnifica Moore, 1906
***Pionosyllis articulata* Kudenov and Harris, new species**
Syllides reishi Dorsey, 1978
***Syllides mikeli* Kudenov and Harris, new species**

Subfamily Syllinae

Ehlersia heterochaeta (Moore, 1909)
Ehlersia hyperioni Dorsey and Phillips, 1987
***Eurysyllis spicum* Kudenov and Harris, new species**
Geminosyllis ohma Imajima, 1966d
Syllis spongiphila Verrill, 1885
Trypanosyllis (Trypanedenta) sp. A
Trypanosyllis (Trypanosyllis) coeliaca nipponica Imajima and Hartman, 1964
Trypanosyllis (Trypanosyllis) sp. A
Trypanosyllis (Trypanosyllis) sp. B
Typosyllis alternata (Moore, 1908)
Typosyllis bella (Chamberlin, 1919)
Typosyllis hyalina (Grube, 1863)

Description of Species

Subfamily Exogoninae

Genus *Brania* Quatrefages, 1866

Grubea Quatrefages, 1865:35 (in part).
Protogrubea Czerniavsky, 1881:414 (in part).
Pseudobrania San Martin in Sardá, 1984:7-13.
Pseudobrania: San Martín, 1984a:150-151.
Grubeosyllis Verrill, 1900, *sensu* San Martín, 1991b:716-717.

Type species: *Exogone pusilla* Dujardin, 1851

Diagnosis. Prostomium with 3 antennae. Palps well developed, fused at least basally, as long as prostomium. Two pairs of tentacular cirri. Small nuchal organs present between prostomium and tentacular segment. Pharynx with single middorsal anterior tooth. Dorsal cirri longer than setal lobes. Ventral cirri as long as setal lobes. Embryos carried on dorsum of females. Aciculae acuminate with sharp filiform tips, or distally notched or excavate, with blunt tip.

Remarks. San Martín (1984a) proposed the genus *Pseudobrania* to include previously described *Brania* species that have (a) prostomial antennae, tentacular and dorsal cirri long and fusiform; (b) acuminate acicula with distally sharp tips; and (c) palps completely united by a dorsal membrane, and not separated by a distal cleft or notch. This genus was prematurely described by Sardá (1984) but because it was based upon San Martín's unpublished dissertation, the authorship San Martín in Sarda must be applied. However, *Pseudobrania* is actually preoccupied in the Platyhelminthes, and San Martín (1991b:716-717) instead proposed using the previously named genus, *Grubeosyllis* Verrill, 1900. According to the scheme proposed by San Martín, *Brania sensu stricto* differs from *Grubeosyllis* in having, (a) prostomial antennae, tentacular and dorsal cirri clavate or truncate; (b) aciculae distally excavate with tooth or blunt tips; and (c) palps united basally by dorsal membrane, distally separated by a small notch or cleft. There are apparently other differences pertaining to morphology of the compound setae.

The necessity of San Martín's (1984a, 1991b) approach is highly questionable. *Brania sensu lato* includes 21 species (Fauchald, 1977), and is a relatively compact genus. The division of this genus tends to obscure similarities previously recognized among congeneric species. San Martín (1991b) also suggests a closer relationship between members of his newly redefined *Grubeosyllis* and *Parapionosyllis* Fauvel, 1923, than between *Grubeosyllis* and *Brania sensu stricto*. This statement is difficult to comprehend. For example, *Parapionosyllis* differs from *Grubeosyllis* in having one, instead of two pairs of tentacular cirri, and in having compound spinigers rather than compound falcigers. Finally, examinations of both *B. brevipharyngea* and a new *Brania* species described below from MMS materials suggests considerable overlap in the characters used by San Martín (1984a, 1991b) and Sardá (1984). For example, the palps of the new MMS *Brania* species are distally notched and separated from one another, the aciculae are distally blunt and excavate, and some of the dorsal cirri are filiform, while others may be clavate. Similarly, the aciculae of *B. brevipharyngea* are also excavate and distally blunt, although the palps appear to be fused by a dorsal membrane for their entire length. Perhaps the criteria used for these generic distinctions rely too heavily on soft anatomical features that not only change allometrically over life cycles, but also are easily influenced by collecting efforts and preservation. The above features for the two MMS *Brania* species significantly overlap the two separate sets of criteria defined by San Martín (1984a, 1991b) for both *Grubeosyllis* (=*Pseudobrania*) and *Brania*, call into serious question the usefulness of dividing such a relatively compact genus (*Brania sensu lato*) and shed considerable doubt on the validity of *Grubeosyllis*. Therefore, the traditional generic definition of *Brania* is followed here, and *Grubeosyllis* is considered to be a junior synonym of *Brania*.

Although Rioja (1941) described *Brania heterocirra* from Mexico, Westheide (1974) reported *B. heterocirra* from the Galapagos, Japan (where Imajima (1966a) recorded it as *B. clavata)*, and Washington (where Banse (1972) in part identified it as *B. brevipharyngea*). *Brania heterocirra* is included in the key below since it seems likely to be encountered in the syllid fauna of southern California. There are several additional undescribed species of *Brania* in California (L. Harris, unpublished).

Key to Species of *Brania* From the Santa Maria Basin

1A. Dorsal cirri varying in length along body; pharynx and proventriculus in same number of segments; cutting surfaces of superior dorsal simple seta smooth to minutely serrated ..... *Brania heterocirra*

1B. Dorsal cirri subequal in length along body; pharynx and proventriculus in different number of segments; cutting surfaces of superior dorsal simple seta strongly serrated 2

2A. Pharynx in 2 segments (Fig. 1.1A); proventriculus in 4 segments ..... *Brania brevipharyngea*

2B. Pharynx in 4 segments (Fig. 1.2A); proventriculus in 2 segments (Fig. 1.2B) ..... *Brania californiensis*

Brania brevipharyngea Banse, 1972

Figure 1.1

Brania brevipharyngea Banse, 1972:198-200, fig. 4.—Banse and Hobson, 1974:55.
Pseudobrania brevipharyngea: San Martín, 1984a:172, 174.—Sardá, 1984:12.
Grubeosyllis brevipharyngea: San Martín, 1991b:716-717.

Material Examined. California: Santa Maria Basin, off Purisima Point, Sta. BRA-20 (1, SBMNH 142697). —Washington: False Bay, San Juan Island, holotype (USNM 40711), paratypes (5, USNM 40712).

Description. Total body length about 3 mm, 0.4 mm wide without parapodia, 0.6 mm with parapodia, for 30-31 setigers (Banse, 1972); MMS specimen an anterior fragment 1.5 mm long, 0.4 mm wide, with about 20 setigers. Body of preserved specimens generally colorless except for slight pigmentation on tentacular segment. Setigers 7-15 ovigerous, each with 12 ova per segment in 1 specimen (Banse, 1972:199).

Prostomium wider than long (Fig. 1.1A); 2 pairs of eyes, anterior pair largest, lenticulate, in trapezoidal arrangement; additional pair of eyespots present on anterior prostomium medial to lateral antennae (Fig. 1.1A). Antennae longer than prostomium, bottle-shaped; median antenna arising between 2 pairs of large eyes; lateral antennae arising from anterior part of prostomium (Fig. 1.1A). Palps about as long as prostomium, fused completely (Fig. 1.1A). Pharynx extending through setiger 2 (2.5 setigers in MMS specimen); middorsal tooth subdistal, lacking distal circlet of soft papillae when everted. Proventriculus extending from setigers 3-6, with 20-25 rows of muscle cells (17-18 in MMS specimen). Tentacular segment distinct dorsally (Fig. 1.1A), with 2 pairs of bottle-shaped tentacular cirri; dorsal pair longest, each about as long as median prostomial antenna; ventral pair each about one-half length of dorsal ones (Fig. 1.1A).

Parapodia of median segments truncate, with small, distally rounded presetal lobes (Fig. 1.1B). Compound falcigers distally bidentate (Fig. 1.1C), 7 to 9 per parapodium. Blades decreasing in length inferiorly within fascicles, superior blades twice length of inferior blades; all with serrated cutting edges. Shafts of compound falcigers enlarged distally; superior distal surfaces serrated (Fig. 1.1C). Superior dorsal simple seta distally bidentate with serrated cutting surface (Fig. 1.1D), present in all setigers from setiger 1 or 4. Ventral inferior simple seta present from setigers 20-21 to end of body. One acicula per parapodium, distally blunt, beak-shaped (Fig. 1.1E). Dorsal cirri long, bottle-shaped, present on all segments (Fig. 1.1A,B). Ventral cirri digitiform, extending beyond parapodial lobes (Fig. 1.1B).

Pygidium with paired anal cirri, each bottle-shaped, 2-3 times length of anterior dorsal cirri.

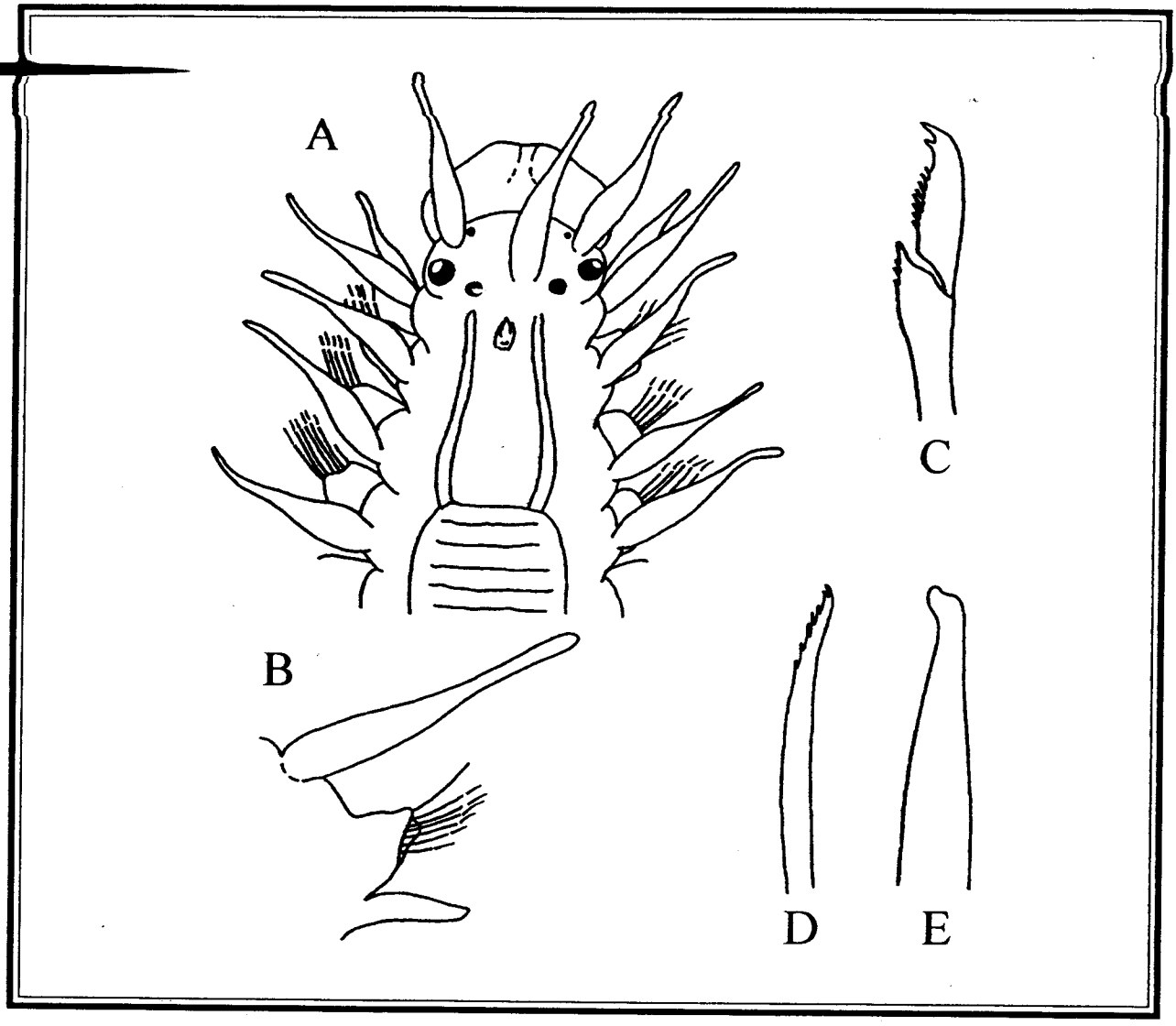

Figure 1.1. *Brania brevipharyngea*: A, anterior end, dorsal view, setae schematic; B, parapodium 16, posterior view; C, inferiormost compound falciger; D, superior dorsal simple seta; E, acicula. (A-E, redrawn from Banse, 1972)

Remarks. *Brania brevipharyngea* is characterized by the combination of a short pharynx about two segments long, and a relatively long proventricle about 4 segments in length (Banse, 1972:199-200). Westheide (1974) reassigned one paratype originally described by Banse as *B. brevipharyngea* to *B. heterocirra* Rioja, 1941.

Distribution. California; Washington; British Columbia.

Brania californiensis Kudenov and Harris, new species

Figure 1.2

Material Examined. California: off Point Arguello, Sta. BRA-6, holotype (USNM 170899).

Description. Holotype incomplete. Originally with 22 setigers; 16 setigers present at time of description. Length 1.4 mm, width 0.12 mm at setiger 6, without parapodia. Specimen colorless except for golden pigment just below constriction on antennae and tentacular cirri. Specimen originally carrying embryos dorsally on setiger 12 through 15 on the right side and setigers 12 and 13 on the left side; embryos 70 μm in length.

Prostomium wider than long; eyes numbering 2 pairs, located posteriorly on the prostomium; anterior pair largest, both sets lenticulate; additional pair of eyespots present on anterior prostomium medial to lateral antennae (Fig. 1.2A). Antennae longer than prostomium, bottle-shaped; median antenna located just anterior to posterior pair of eyes (Fig. 1.2A). Palps barely longer than prostomium, fused completely, pointed distally. Pharynx extending through setiger 4, bright reddish-brown; middorsal tooth subdistal; distal end appearing smooth (pharynx inverted in specimen) (Fig. 1.2A). Proventriculus extending from midpoint of setiger 4 to midpoint of setiger 6, with approximately 19 rows of muscle cells (Fig. 1.2A). Tentacular segment indistinct, with 2 pairs of bottle-shaped tentacular cirri; dorsal pair longest, each about two-thirds as long as median prostomial antenna; ventral pair each about two-thirds length of dorsal pair (Fig. 1.2A).

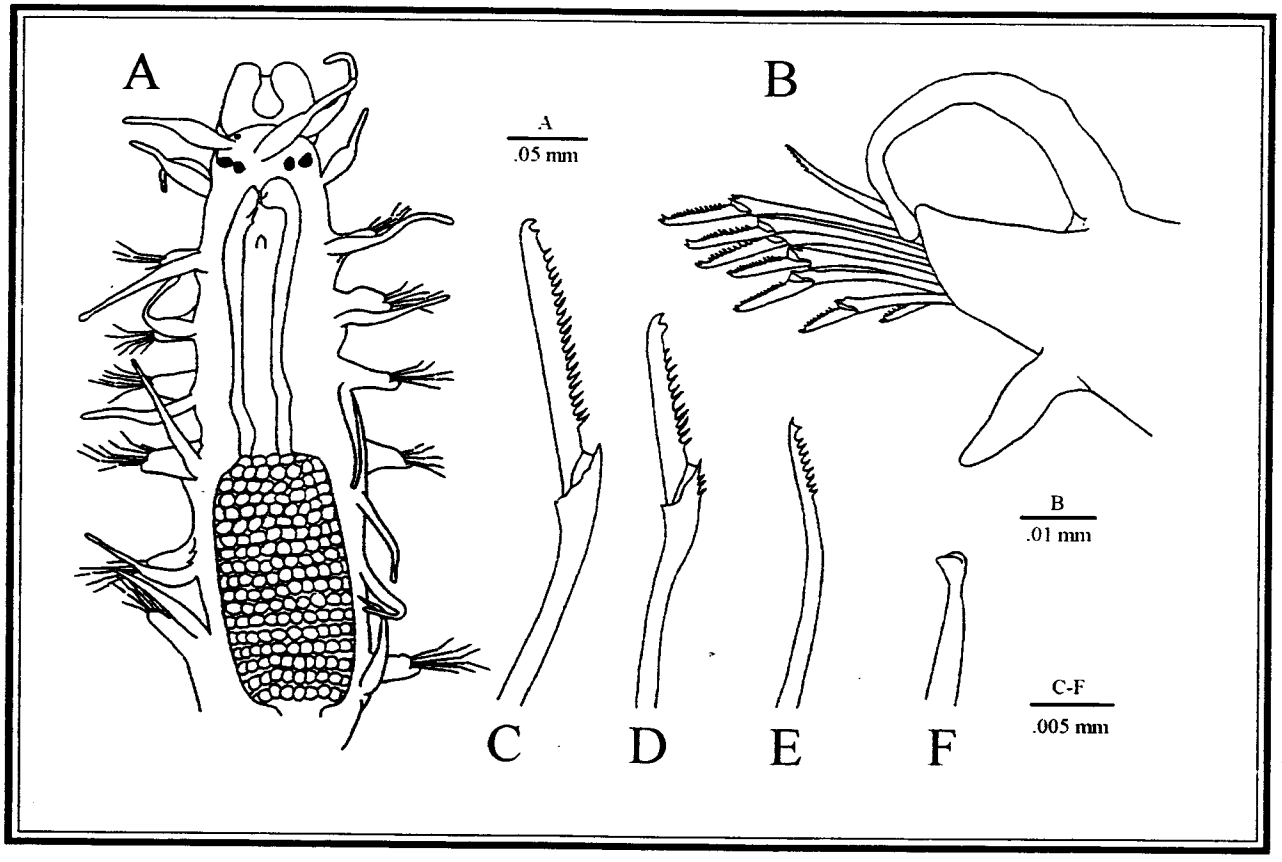

Figure 1.2. ***Brania californiensis*** **Kudenov and Harris,** ***new species*** : A, anterior end, dorsal view; B, parapodium 6; C, superior compound falciger, setiger 6; D, median compound falciger, setiger 6; E, dorsal simple seta, setiger 6; F, acicula, setiger 6. (A-F, originals by JDK)

Parapodia of median segments truncate, presetal and postsetal lobes equal in length; slight prolongation of superior lips around bases of superior simple setae (Fig. 1.2B). Compound falcigers distally bidentate (Fig. 1.2C,D), approximately 7 per parapodium. Blades decreasing in length inferiorly within fascicles (Fig. 1.2C,D), superior blades (Fig. 1.2C) twice length of inferior blades; all with serrated cutting edges (Fig. 1.2C,D). Superior blades decreasing gradually in length posteriorly. Shafts of compound falcigers enlarged distally; superior distal surfaces serrated (Fig. 1.2C,D). Superior dorsal simple seta distally bidentate with serrated cutting surface, present in all setigers beginning on setiger 1 (Fig. 1.2E). Ventral inferior simple seta present from setiger 18, continuing to at least setiger 22. One acicula per parapodium, distally blunt, beak-shaped (Fig. 1.2F).

Dorsal cirri long, weakly bottle-shaped, present on all segments. Ventral cirri digitiform, subequal to or shorter than parapodial lobes.

Pygidium unknown.

Remarks. *Brania californiensis* and *B. brevipharyngea* Banse 1972, are similar in setal morphology, setal distribution, and form of the dorsal cirri. *Brania californiensis* differs from *B. brevipharyngea* in having the pharynx present in four segments, instead of two, and the proventriculus in two segments instead of four. In addition, ventral cirri do not extend beyond the parapodial lobes of *B. californiensis*, in contrast to those of *B. brevipharyngea*.

Etymology. The species name, *californiensis*, refers to the state where the specimens were collected.

Distribution. Southern California.

Genus *Exogone* Örsted, 1845

Type species: *Exogone naidina* Örsted, 1845

Diagnosis. Prostomium with 3 antennae. Palps fused dorsally throughout most or all of length. One pair of tentacular cirri. Nuchal organs inconspicuous. Pharynx armed with single anterior middorsal tooth. Tentacular cirri, dorsal and ventral cirri ovoid to papilliform. Dorsal and ventral cirri shorter than setal lobes. Developing embryos attached ventrally to posterior margins of median segments of female (Imajima, 1966a; Fauchald, 1977; Uebelacker, 1984).

Remarks. San Martín (1991b) recognized three subgenera of the genus *Exogone*: (1) species of *Exogone (Parexogone)* Mesnil and Caullery, 1916, have unmodified compound "spinigers" and falcigers all with unmodified heterogomph hinges and shaft tips; (2) species of *Exogone (Exogone)* Örsted, 1845, all have modified compound "spinigers" and falcigers, all with modified heterogomph hinges and shaft tips; and (3) species of *Exogone (Sylline)* Claparède, 1864, all have compound setae strongly modified, with blades and shafts partially fused, or lacking blades. Unfortunately, San Martín (1991b) uses the term "spiniger" for any compound seta with a long blade. Many of the compound "spinigers" noted by San Martín are actually compound falcigers with long, tapering, distally bidentate blades, and explains the use of quotation marks in his definition of the above subgenera. The term spiniger is or should be used only to denote a "seta that tapers to a fine point" (Fauchald, 1977), and is used to describe the fine tapering blades of compound setae. San Martín (1991a) presents a useful key to the known species of each subgenus of *Exogone*, and a key to these subgenera is presented below.

Although the genus *Exogone* is well understood, several species from the Pacific coast of the United States and Canada have been erroneously identified as European species. For example, records of both *Exogone gemmifera* Pagenstecher, 1862, and *E. verugera* (Claparède, 1868) from southern and central California apparently cannot be verified, contrary to statements by Hartman (1968). Moreover, Westheide (1974) found that some materials previously identified as *E. gemmifera* both by Pettibone (1954) and Imajima

(1966a) represent a new species, *E. naidinoides*, later emended by Russell, 1991, which he also encountered in the Galapagos Islands and from Pt. Barrow, Alaska. Given these findings, the identity of two specimens reported as *E. gemmifera* by Lee and Rho (1992) from the Yellow Sea of Korea needs to be verified. Similarly, Westheide (1974) found that previous records of *E. verugera* from Japan (Imajima, 1966a) represent another species (*E. occidentalis*), also emended by Russell, 1991, that occurs in the Galapagos Islands; San Martín (1991b) considers *E. occidentalis* to be the junior synonym of *Exogone breviantennata* Hartmann-Schröder (1959); SCAMIT materials of *Exogone* sp. A from southern California may be identical to *E. breviantennata*. Finally, Westheide (1974) discovered some materials identified and described as *E. molesta* by Banse (1972) and *E. multisetosa* by Friedrich (1956) represented still another new species, *Exogone longicornis*. It is also likely that the specimens described by Banse and Hobson (1974) as *E. gemmifera* represent an undescribed species that is closely related, if not identical, to the MMS specimens identified as *Exogone dwisula*, new species, below. It seems likely that some of the species described by Hartmann-Schröder (1959) and Westheide (1974) will eventually be encountered in the syllid fauna of southern California: *Exogone breviantennata*, *E. longicornis* and *E. naidinoides* are included in the appropriate subfamily-level keys that follow.

Key to the Subgenera of *Exogone* (after San Martín, 1991b)

1A. Antennae closely set, often in middle of prostomium, between eyes (Fig. 1.3A); compound setae with highly modified blades, shafts and heterogomph joints (Figs. 1.3C-E, 1.4D-F); dorsal simple setae similar in all segments (Fig. 1.3B), or differing in form between anterior and posterior segments (Fig. 1.4G-I) 2

1B. Antennae widely spaced, with median antenna in middle of prostomium and lateral antennae in front of eyes; compound setae with unmodified blades, shafts and heterogomph joints (Fig. 1.6F-P); dorsal simple setae similar in all segments (Fig. 1.7S-U) ..... *Exogone (Parexogone)*

2A. Compound setae with blades as long falcigers [=spinigers of San Martín] narrow, terminating in minutely bidentate tips (Fig. 1.3C), and blades of short falcigers with subdistal tooth larger than distal tooth (Fig. 1.3E); shaft tips and heterogomph hinges especially of anterior setae strongly modified (Fig. 1.3E); posterior dorsal simple setae thicker, differing in form to anterior simple setae (Fig. 4G-I) ..... *Exogone (Exogone)*

2B. Compound setae all strongly modified, with blades partially fused to shafts and bayonet-shaped blades lacking; shaft tips distally truncate; dorsal simple setae generally similar throughout body, distally truncate with serrated cutting surfaces ..... *Exogone (Sylline)*

Subgenus *Exogone (Exogone)* Örsted, 1845

Type species: *Exogone naidina* Örsted, 1845

Diagnosis. Antennae closely set together, usually arising between eyes; compound falcigers with modified blades, shaft tips and heterogomph joints; blades including long, narrow forms with minute, distally bidentate tips, and shorter forms with subdistal teeth larger than distal teeth; dorsal simple setae of 2 forms, differing between anterior and posterior body segments.

Key to Known Species of the Subgenus *Exogone (Exogone)* from the Northeast Pacific

1A. Dorsal cirri present on setiger 2 (Fig. 1.3A); shaft tips of compound spinigers of setiger 2 (sometimes also setiger 1) massively enlarged compared to those of adjacent setigers, distally falciform (Fig. 1.3C-D) 2

1B. Dorsal cirri absent on setiger 2 (Fig. 1.4A); shaft tips of compound spinigers and falcigers of setiger 2 enlarged compared to those of medial and posterior segments, not distally falciform (Fig. 1.4E) 3

2A. Antennae long, extending to or beyond anterior prostomial margin (Fig. 1.3A), median antenna 2-3 times longer than lateral antennae; proventriculus extending through 4-5 segments, with 18-24 rows of muscle cells; superior dorsal simple setae first present from setiger 1 .... *Exogone (Exogone) lourei*

2B. Antennae short, not extending to anterior prostomial margin, median antenna about as long as lateral antennae; proventriculus extending through 7-8 segments, with 25 or more rows of muscle cells; superior dorsal simple setae first present from setigers 10-14 ..... *Exogone (Exogone) uniformis*

3A. Blades of compound setae in setigers 1-3 uniformly short, deeply bifid (Fig. 1.4D-E) .... *Exogone (Exogone) dwisula*

3B. Blades of compound setae in setigers 1-3 may include short and awl- or needle-like spinigers, or falcigers of various lengths 4

4A. Compound falcigers with blades long and tapering all along body; antennae short, subequal in length, much less than one-half length of prostomium; proventriculus extending through 2.5-3 segments with approximately 20 rows of muscle cells ..... *Exogone (Exogone) breviantennata*

4B. Compound spinigers with awl-like blades; antennae long, with median at least 4 times longer than lateral antennae, and usually longer than combined length of prostomium and palps; proventriculus extending through 2 segments with 31 rows of muscle cells; 2 aciculae in anterior parapodia .... *Exogone (Exogone) longicornis*

Exogone (Exogone) lourei Berkeley and Berkeley, 1938

Figure 1.3

Exogone lourei Berkeley and Berkeley, 1938:44, figs. 6-12; 1948:79, fig. 117.—Rioja 1941: 703-4, pl. 3, fig. 10-13.—Berkeley, 1967:1055.—Pettibone, 1967:5. Hartman, 1968:425-426, figs. 1-5.—Banse 1972: 200-202, figs. 5a-d.—Banse and Hobson 1968:16, fig. 4d-e; 1974:58, figs. 14h-j.—Perkins 1981:1092.—Uebelacker, 1984:30-39 to 30-41, fig. 30-34 a-f.—Russell, 1991:55-57, fig. 2.

Exogone uniformis Hartman 1961:73-74 (in part, including pl. 6, fig. 1, pl. 7, fig. 1); Hartman 1968: 427-428 (in part, including figs. 1, 2).

Exogone dispar Pettibone, 1954:259 (in part).

Exogone (Exogone) lourei: San Martín, 1991a: 728, 735.

Sphaerosyllis californiensis Hartman, 1966: 196-197, pl. 3 (in part).

Material Examined. California: Santa Maria Basin, Stas. BRA-16 (3); 65 (1); off Point Sal, Sta. R-8 (33: USNM 170915); off Point Sal, Stas. PJ-1 (21); PJ-2 (75); PJ-3 (21); PJ-4 (2); PJ-5 (10); PJ-6 (50); PJ-7 (50); PJ-8 (10); PJ-9 (1); PJ-10 (65); PJ-11 (5); PH-F (?1, regenerating head); off Point Arguello, Stas. PH-I (3); PH-R (1); PH-U (2).—Western Santa Barbara Channel, BRC-1 (6, USNM 170914), (20, SBMNH 142698), (?1, regenerating head).—R/V *Velero IV* Sta. 5028-57, 1 paratype (removed from paratype lot of *Sphaerosyllis californiensis*, LACM-AHF Poly 1707).—R/V *Velero IV* Sta. 5102-57 (37: holotype and paratypes of *E. uniformis*, LACM-AHF Poly 170, 171, 521). British Columbia: False Narrows, holotype (USNM 32895).

Description. Up to 10 mm long, 0.2 mm wide, for 50 segments. Prostomium wider than long, pentagonal; eyes numbering 2 pairs; anterior pair largest, lenticulate, widest apart; posterior pair not lenticulate; all arranged trapezoidally (Fig. 1.3A). Antennae arising together from anterior part of prostomium; median antenna fusiform, about as long as palps, 2-3 times length of paired lateral antennae; latter small, digitiform (Fig. 1.3A). Palps long, completely fused (Fig. 1.3A). Nuchal organs small, paired, at postectal corners of prostomium. Pharynx usually extending to setiger 3 (Fig. 1.3A); anterior middorsal tooth subdistal, surrounded by distal circlet of 10 soft papillae when everted. Proventriculus usually extending through 4-5 segments, with 18-24 rows of muscle cells (Fig. 1.3A). Tentacular segment fused to prostomium; tentacular cirri numbering 1 pair, each small, papilliform (Fig. 1.3A).

Parapodia each with 5-9 setae per fascicle, including compound spinigers and falcigers plus simple setae (Fig. 1.3B-F). One or 2 compound spinigers occupying superior positions of fascicles; blades long, narrow; shafts of those in setiger 2, sometimes also setiger 1, greatly enlarged, thick, falciform (Fig. 1.3C,D). Compound falcigers with blades of similar lengths, all distally bidentate with primary tooth terminal, minute (Fig. 1.3E). Dorsal superior simple seta unidentate, slender, distally curved, minutely serrated from setiger 1; becoming thicker, sharply bent in posterior segments (Fig. 1.3B). Ventral seta curved, distally bidentate with bent tips in median and posterior segments (Fig. 1.3F). Dorsal and ventral cirri digitiform, present on all setigerous segments.

Pygidium with pair of long, cirriform anal cirri.

Remarks. *Exogone lourei* is characterized by long compound spinigers with greatly enlarged shafts on setiger 2, that may also occur on setiger 1; a long median and short paired lateral antennae; the proventriculus extending through 4 to 5 segments with around 16 to 30 (usually 18 to 24) rows of muscle cells. *E. lourei* was originally described from Vancouver, and has subsequently been reported from various localities along the Pacific coast of North America (Banse and Hobson, 1968; Hartman, 1968; Rioja, 1941), the Gulf of Mexico (Perkins, 1981; Uebelacker, 1984), Cuba and the Gulf of Mexico region (San Martín, 1991b), and Belize by Russell (1991) who confirmed both Perkins' and Uebelacker's records, and also emended the species description.

Various morphological characters were measured (by L. Harris) on 100 specimens of *Exogone lourei*; individuals ranging from 16 to 49 setigers. For example, the proventriculus extends through a range of 2-7 segments, is present in 4 to 5 segments in 70 specimens, and usually occurs from setigers 3-4 to 7-8 in individuals with non-everted pharynges. Rows of proventricular muscle cells range from 16-30, and usually number 18-24 in 94 specimens. Superior dorsal simple setae begin anywhere in setigers 1-19, and usually are found in setigers 1-9. Natatory setae are first present from setigers 13-15, and usually begin after setiger 15. Gametes are detectable in setigers 8-28, and usually seen in setigers 10-14. These and other data need to be further analyzed for size-related relationships. As one would anticipate, specimens with fewer than 27 setigers have smaller pharynges (2-3 segments) and proventricules (3-4 segments), dorsal simple setae from setiger 1, and proventricules with the same number of muscle rows as adults.

Exogone lourei is similar only to *E. uniformis* Hartman, 1961 in that both have compound spinigers with long blades and thick shafts in setiger 2. There tends to be considerable overlap in individual key characters between these species. *Exogone lourei* can be distinguished from *E. uniformis* by the combined presence of a median antenna much longer than the paired lateral antennae, 18-24 rows of proventricular muscle cells and a proventriculus in 4-5 segments, instead of short, subequal antennae, with 25 or more rows of proventricular muscle cells, and a proventriculus in 7-8 segments. Most of the paratypes of *E. uniformis* are actually specimens of *E. lourei*.

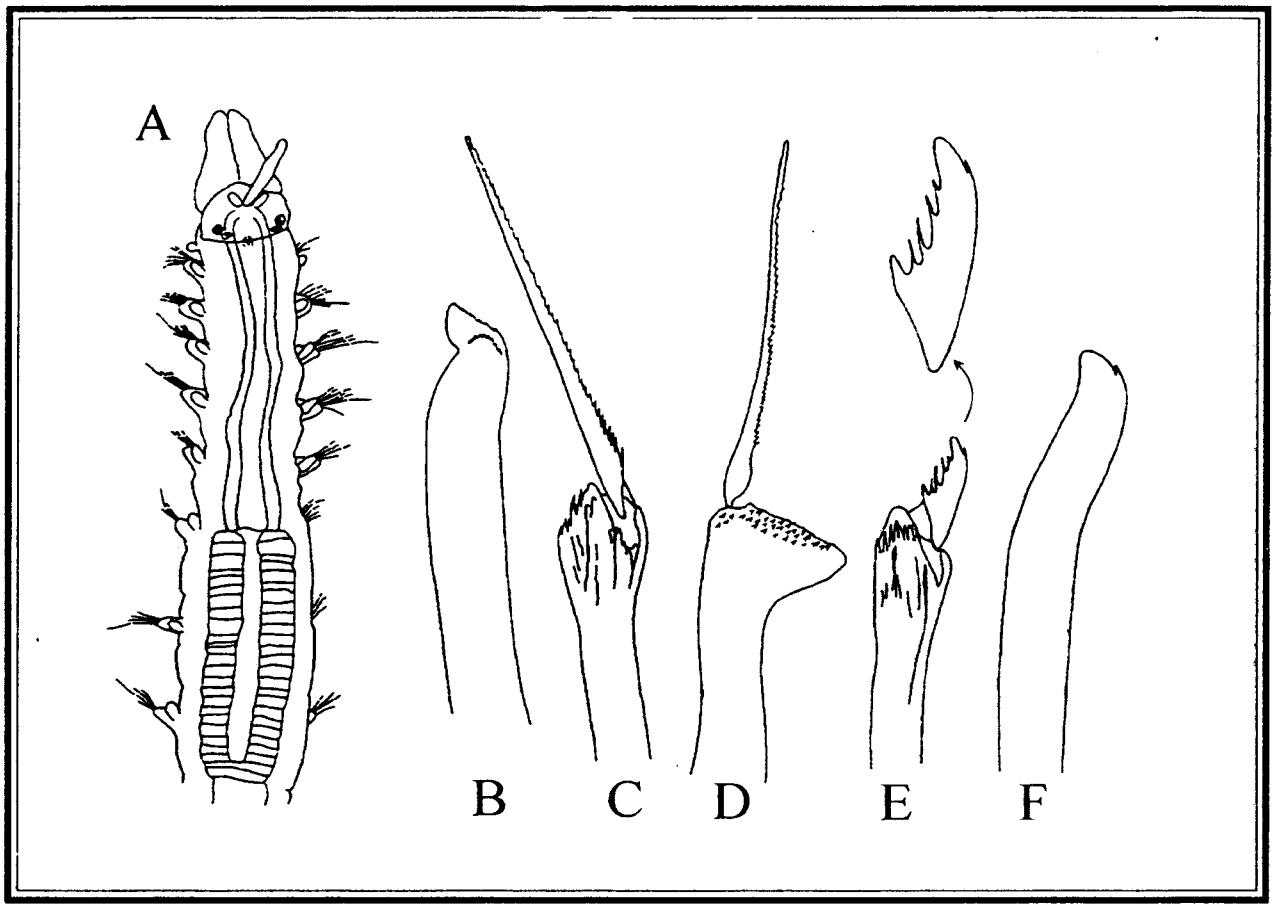

Figure 1.3. *Exogone (Exogone) lourei*: A, anterior end, dorsal view; B, dorsal simple seta from midbody region; C, superior spiniger from midbody region; D, compound spiniger, setiger 2; E, inferior compound falciger, with detail of blade, setiger 2; F, ventral simple seta. (A-F, after Uebelacker, 1984)

Distribution. British Columbia; Washington; Oregon; California; ?Mexico; Gulf of Mexico: Texas, Louisiana, Mississippi, Alabama, Florida; Cuba; Spain.

Exogone (Exogone) dwisula Kudenov and Harris, new species

Figure 1.4

Exogone uniformis Hartman 1961: 73-74 (in part); Hartman 1968: 427-428 (in part)
?*Exogone gemmifera*: Banse and Hobson 1974:56.
Sphaerosyllis californiensis Hartman, 1966:196-197, pl. 3 (in part).

Material Examined. California: Santa Maria Basin, BRA-6 rock (1); BRA-13 rock, 2 paratypes (AM W. 22190); BRC-13 rock, 1 paratype (SBMNH 142658), (1); BRC-14 rock (4); BRA-16 rock, 4 paratypes (LACM-AHF Poly 1662), (2); BRA-20 rock (3); BRA-25 rock, 3 paratypes (LACM-AHF Poly 1663) + (2).—Western Santa Barbara Channel, Stas. BRC-1 rock, 7 paratypes (USNM 170913); BRA-1 rock (3); BRA-2 rock (1).—La Jolla, off South Casas Reef, rocky intertidal (from *Phyllospadix* wash), 11

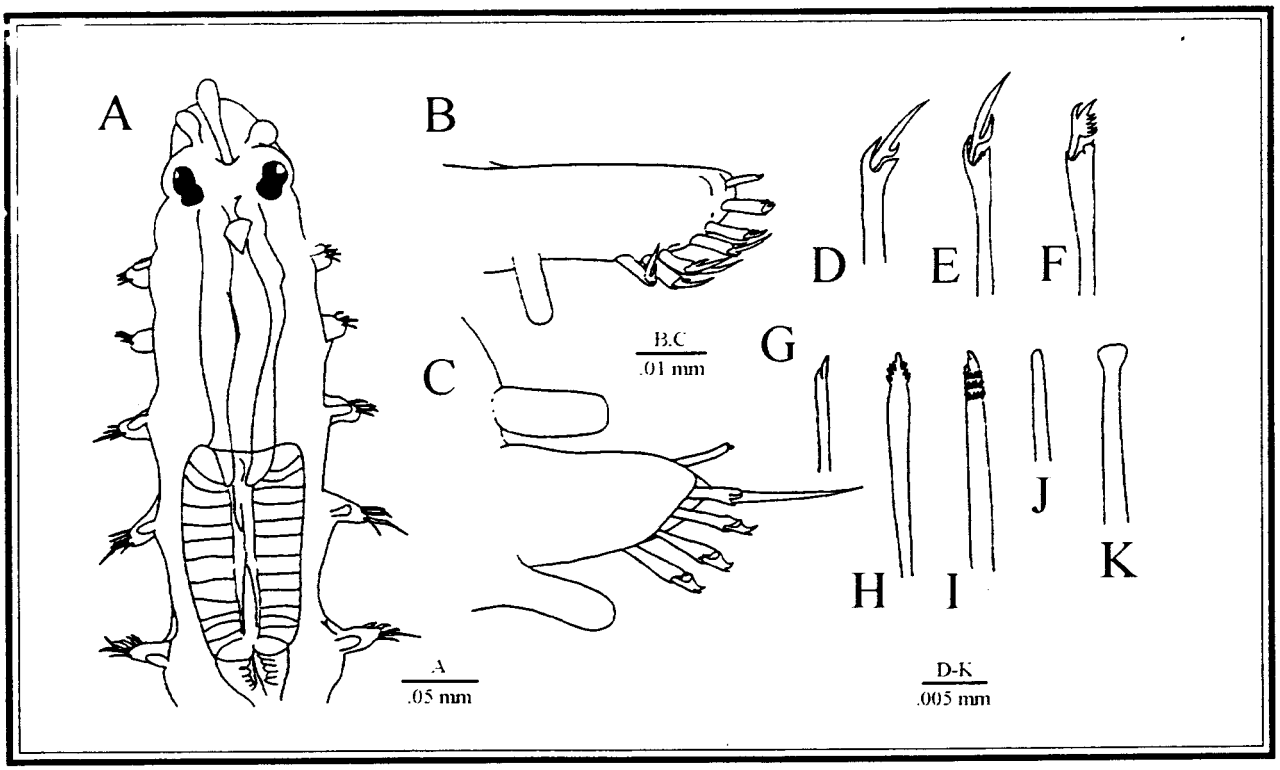

Figure 1.4. ***Exogone (Exogone) dwisula*** **Kudenov and Harris, new species**: A, anterior segments, dorsal view; B, right parapodium, setiger 2, ventral view; C, right parapodium, setiger 9, posterior view; D, compound falciger with can opener-like blades, setiger 1; E, superior compound falciger with can opener-like blades, setiger 2; F, compound falciger, setiger 5; G, dorsal simple seta, setiger 1; H-I, dorsal simple setae: H, setiger 6, ventral view; I, setiger 17, lateral view; J, acicula, setiger 1; K, acicula, setiger 17. (A-K, originals by JDK)

June 1979, coll. D.B. Cadien, holotype (LACM-AHF Poly 1661).—R/V *Velero IV* Sta. 5028-57, 3 paratypes (removed from paratype lot of *Sphaerosyllis californiensis*; LACM-AHF Poly 1659).—R/V *Velero IV* Sta. 5102-57, 2 paratypes (removed from paratype lot of *Exogone uniformis*; LACM-AHF Poly 171).

Description. Holotype 3.9 mm long, 0.2 mm wide without parapodia at setiger 6, for 34 setigers. Body fragile, semicircular in cross section, arched dorsally. Natatory setae and gametes first present from setigers 8-9. Brooding females with a single pair of embryos on ventrum of each segment from setigers 8-9.

Prostomium rectangular; 2 pairs of eyes, lenticulate, anterior and posterior eyes on each side connate, anterior pair largest; posterior pair sometimes covered by fold of tentacular segment (Fig. 1.4A). Antennae long, club-shaped to fusiform; median antenna about twice length of prostomium, arising from a point in front of anterior pair of eyes; lateral antennae one-half to three-fourths length of median antenna, arising slightly anterior to median antenna (Fig. 1.4A). All antennae arise at same level with median antenna when prostomium contracted. Palps wider than long, completely fused, usually arched, projecting ventrally (Fig. 1.4A). Nuchal organs inconspicuous, ciliated, arising from anterolateral margin of tentacular segment, continuing as bilobed nuchal glands internally. Pharynx usually extending through setiger 2(3), with large, anterior middorsal tooth, surrounded by distal circlet of 10 soft papillae when everted (Fig. 1.4A). Proventriculus present in 2.5 setigers, usually from setiger 3 through middle of setiger 5, with 14-16 rows of large muscle cells (Fig. 1.4A). Intestine with muscular valve-like structure at junction with proventriculus (Fig. 1.4A). Tentacular segment longer than prostomium and shorter than segments following, with 1 pair of small, ovoid tentacular cirri anterolaterally (not visible as illustrated).

Parapodial lobes stout, conical (Fig. 1.4B,C). Three types of compound setae present: (a) falcigers with long, deeply bifid blades (resembling a metal can opener in side view) numbering 7-10 per fascicle in setigers 1-3, all blades smooth, subequal within each of these first 3 fascicles, decreasing in length from setigers 1 to 3, with shafts terminating in strongly serrated edges, sometimes obscured by blades (Fig. 1.4D,E); (b) spinigers with long blades usually numbering 1, occasionally 2, as superiormost seta in fascicles from setiger 4 to end of body, increasing to maximal lengths in middle segments, decreasing posteriorly where blades are shortest (Fig. 1.4C); and (c) falcigers with short comblike bidentate blades numbering 3 in most fascicles from setiger 4, decreasing to 2 in far posterior fascicles, blades decreasing in length along body (Fig. 1.4F); cutting edges all coarsely dentate from setiger 4 becoming smooth in posterior segments, with shafts terminally serrated. Superior dorsal simple seta present from setiger 1 to end of body, terminating in abruptly tapered tips with close-set transverse rows of spines (Fig. 1.4G-I). Inferior ventral simple seta present from midbody setigers to end of body; bifid, with subdistal serrations. Aciculae usually 1 per parapodium in all setigers, occasionally 2 in anteriormost setigers; all terminating in distally enlarged blunt heads (Fig. 1.4J-K).

Dorsal cirri digitiform, present on all setigers except setiger 2, arising from body wall just above parapodial lobes (Fig. 1.4A-C). Ventral cirri digitiform, at least as large as dorsal cirri, not projecting beyond parapodial lobes (Fig. 1.4B,C).

Pygidium with 2 long, cirriform anal cirri, about as long as last 3 setigers.

Remarks. *Exogone dwisula* is characterized by the presence of two pairs of lenticulate eyes, pharynx in two segments, proventriculus in 2.5 segments with 14-16 well-defined rows of muscle cells, lacking dorsal cirri on setiger 2; with three kinds of compound setae including (a) compound falcigers with smooth deeply bifid blades distally in setigers 1-3, (b) usually a single compound spiniger with an awl-shaped blade next to the dorsal superior simple seta from setiger 4 to end of body, and (c) several compound falcigers with short distally bidentate blades with subdistal tooth much larger than distal tooth. The bifurcate nature of the awl-like blades is difficult to discern, even under oil immersion at the optimum viewing angle. *E. dwisula* inhabits snug, branching tubes composed of fine silt.

Exogone dwisula can easily be misidentified as *E. gemmifera* (Pagenstecher, 1862). Although we have not examined all of the materials identified by Hartman as *E. gemmifera*, a preliminary re-examination of some of her materials confirms the ease with which these two species can be confused. A primary point of confusion is the difference in proventricle length between European and eastern north Pacific specimens. Banse and Hobson (1974:56) suggest that the Pacific forms of *E. gemmifera* "...probably should be assigned to a new species."

Exogone dwisula and *E. gemmifera* are similar species having peculiar can opener-like blades on all falcigers of the first two or three setigers. *Exogone dwisula* always seems to have these setae in the first three setigers, whereas *E. gemmifera* specimens from Scandinavia have them in setigers 1-2 (L. Harris, pers. obs), while other European and Israeli specimens have them in setigers 1-3 (Ben-Eliahu, 1977). *Exogone dwisula* differs from *E. gemmifera* in having a proventriculus of 2.5 segments rather than 1.5-2 segments in length; 7-10 compound falcigers per fascicle in the first 2-3 setigers instead of 4 for specimens of similar sizes; and in having the cutting surfaces of dorsal superior simple setae heavily serrated rather than smooth. Indications are that San Martín (1991b) has identified another species (*Exogone* sp. A) that may also be a member of this species complex. Two specimens of *E. dwisula* were found in a paratype lot of *E. uniformis* Hartman.

Etymology. The term, *dwisula*, is the Indonesian name for a 2-pronged lance head, and here refers to the deeply bifid or can opener-like blades of compound falcigers.

Distribution. Southern California; possibly also Washington and British Columbia.

Type species: *Paedophylax hebes* Webster and Benedict, 1884

Diagnosis. Prostomial antennae not all arising between eyes; compound setae all with similar unmodified blades of varying lengths, shaft tips and heterogomph joints; dorsal simple setae of one form, distally unidentate or bidentate.

Key to the Known Species of the Subgenus *Exogone (Parexogone)* from the Pacific Coast

1A. Transition between long and short blades of compound falcigers in all setigers gradual, with superior blades 1.5 to 3 times longer than inferior blades within fascicles (Fig. 1.5C-E, K) 2

1B. Transition between long and short blades of compound falcigers in setigers 1-4 abrupt, with superior blades 3 to 4 times longer than inferior blades within fascicles (Fig. 1.6E, H, 1.7K,P) .... *Exogone (Parexogone) molesta*

2A. Superior blades of compound falcigers 3 times longer than inferior blades (Fig. 1.6E, H); pharynx in 6-8 segments; all dorsal simple setae distally unidentate (Fig. 1.6Q, R) .... *Exogone (Parexogone) acutipalpa*

2B. Superior blades of compound falcigers 1.5 times longer than inferior blades (Fig. 1.7K, P); pharynx in 4 segments; all dorsal simple setae distally bidentate (Fig. 1.7S-U) .... *Exogone (Parexogone) breviseta*

Exogone (Parexogone) molesta (Banse, 1972)

Figure 1.5

Exogone molesta Banse, 1972:203-205, fig. 6.—Banse and Hobson, 1968:15-16, fig. 4 a-c; 1974:58, fig. 14k,l.
Exogone (Parexogone) molesta: San Martín, 1991a:725.

Material Examined. California: Santa Maria Basin, off Point Estero, Sta. 3 (3); off Point Sal, Sta. 36 (1); off Purisima Point, Sta. 42(1); east of Point Conception, Sta. 85 (1); off Point Sal, Sta. R-8 (2, USNM 170917); off Point Sal, Stas. PJ-1 (22); PJ-2 (7); PJ-3 (4); PJ-4 (3); PJ-5 (2); PJ-6 (3); PJ-7 (64); PJ-8 (24); PJ-9 (2); PJ-10 (21); PJ-11 (24); off Point Arguello, Sta. PH-R (1).—Western Santa Barbara Channel, Sta. BRC-1 rock (2, USNM 170916).

Description. Specimens about 3 mm long, 0.2 mm wide excluding parapodia, 0.3 mm wide including parapodia, for up to 40 segments (Banse, 1972). Sexually mature individuals with both natatory setae and gametes first present from setiger 11.

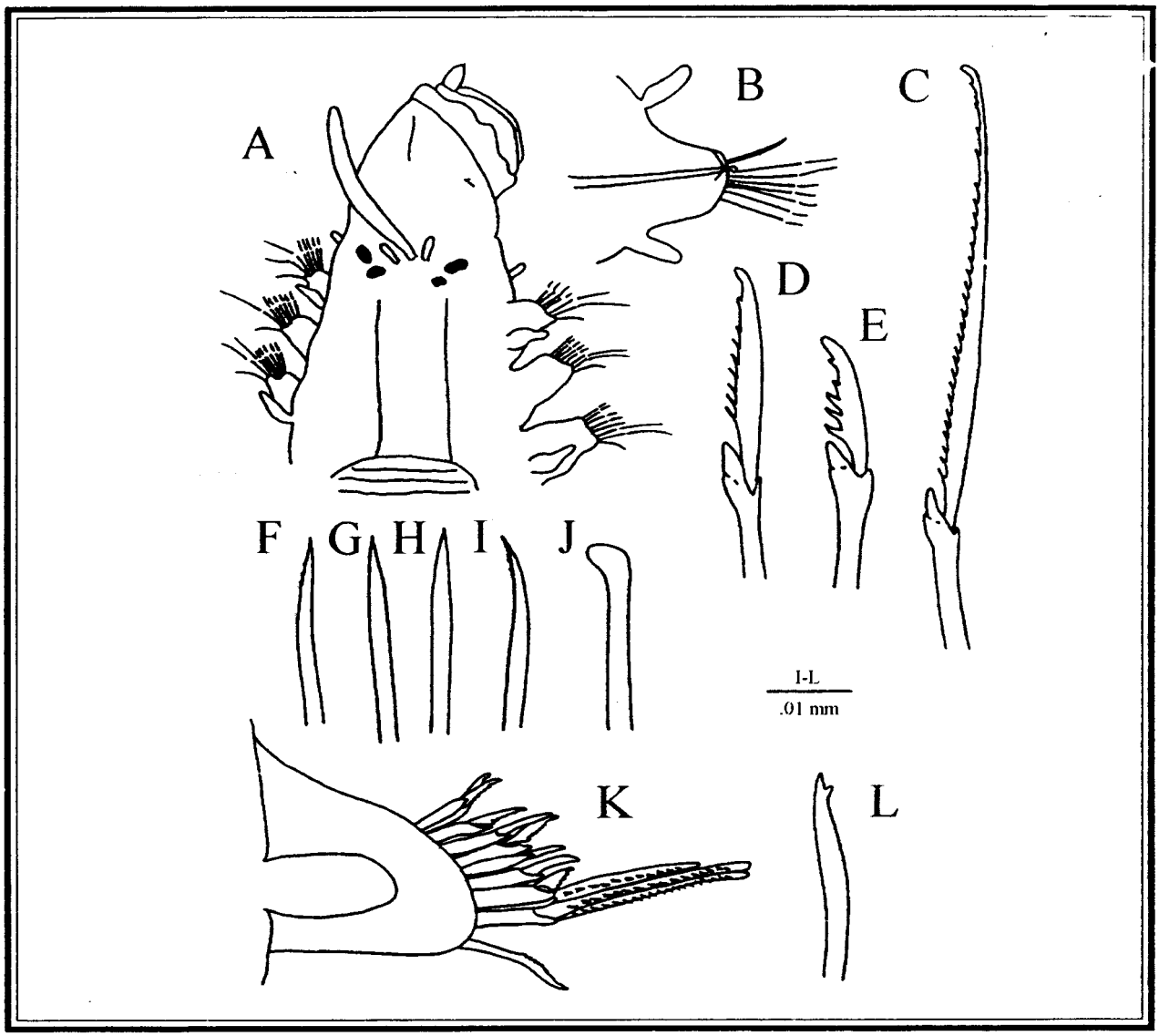

Figure 1.5. *Exogone (Parexogone) molesta*: A, anterior end, dorsal view slightly from the right side; B, parapodium 12; C, falciger with long blade from setiger 4; D, falciger with medium long blade from setiger 16; E, falciger with short blade from setiger 4; F-G, dorsal simple seta from two positions from setiger 8; H, same, far posterior segment; I, ventral simple seta from posterior setiger; J, acicula from setiger 16; K, parapodium 1, dorsal view; L, ventral simple seta, far posterior setiger. (A-H, redrawn from Banse, 1972; I-L, originals by JDK)

Prostomium wider than long; eyes oblong, numbering 2 pairs, anterior pair largest, arranged trapezoidally; eyespots absent (Fig. 1.5A). Antennae digitiform; median antenna longer than prostomium, 7-10 times length of lateral antennae; lateral antennae not extending beyond eyes; all arising between anterior pair of eyes (Fig. 1.5A). Palps long, distally pointed, fused completely, poorly defined from prostomium, depending on state of contraction (Fig. 1.5A). Pharynx extending to setigers 3-4, with distal anterior middorsal tooth (Fig. 1.5A). Proventriculus extending from setigers 4-5 through 4-4.5 segments, with about 20 rows of large muscle cells. Intestine with valve-like structure at junction with proventriculus. Tentacular segment fused with prostomium; 1 pair of tentacular cirri, each about size of lateral antennae.

Parapodia short, distally rounded, with small superior preseta lobe (Fig. 1.5B). Setae consisting of up to 4 superior compound falcigers with long unidentate blades each in setigers 1-15 (25) (Fig. 1.5C,K); and compound falcigers with blades short, distally bidentate, with secondary teeth strongly reduced (Fig. 1.5D,E); all together numbering about 12 per anterior parapodia, decreasing to 6 in median, and 4 in posterior parapodia. Blades all increasing in length from anterior to median body region, decreasing thereafter to end of body, and decreasing in length inferiorly within fascicles; long superior blades of anterior fascicles 3-4 times length of inferior blades, 4-5 times in median segments, and 1.25 times length in posterior segments. Long superior blades of median segments twice the length of anterior blades, 4 times length of blades in posterior segments with transition between long medial and short posterior blades sometimes abrupt; terminating in blunt, curved, unidentate tips in setiger 1 to around setiger 20, and either short and abruptly bidentate thereafter, or gradually decreasing in length and forming a slight subdistal tooth along setigers 20-25, and then becoming short and conspicuously bidentate at around setiger 25. Short blades in first few anterior setigers fairly uniform in length. Cutting edges of long superior falcigerous blades finely serrated; shorter falcigerous blades much more coarsely serrated, particularly inferior ones. Dorsal simple setae present in all setigers, distally pointed, unidentate, usually with slightly serrated cutting surface (Fig. 1.5F-H). Ventral inferior simple seta distally pointed, curved, usually unidentate, with slightly serrated cutting surface, from around setiger 25 to end of body (Fig. 1.5I), sometimes bidentate (Fig. 1.5L). One acicula per parapodium, distally blunt, knob-shaped (Fig. 1.5J).

Dorsal cirri digitiform, present on all setigers except setiger 2 (Fig. 1.5A). Ventral cirri digitiform, not extending beyond parapodial lobes (Fig. 1.5B).

Pygidium with paired, digitiform anal cirri, each about as long as last 1-3 setigers.

Remarks. Although Banse (1972) originally described the superior compound setae as being spinigerous, they lack tapering capillary tips so characteristic of spinigerous blades. In fact, the blade tips of these setae are all distally blunt and curved, and a secondary tooth is evident in posterior fascicles. Additionally, all other compound falcigers are more appropriately described as being distally bidentate rather than either unidentate or subbidentate.

Exogone molesta and *E. sexoculata* Hartmann-Schröder (1979) are similar in having a long median antenna and short lateral antennae, long pointed palps, superior compound falcigers with long blades three times the length of inferior blades within fascicles, two distinctly different populations of blades having abruptly different lengths within the same fascicle, and all blades coarsely serrated. *Exogone molesta* differs from *E. sexoculata* in having two pairs of eyes instead of eyes plus an additional pair of eyespots, all simple setae distally unidentate rather than bidentate, and apparently lacks a distal nipple-shaped parapodia lobe present in *E. sexoculata*.

Distribution. Southern California; Washington.

Exogone (Parexogone) acutipalpa Kudenov and Harris, new species

Figure 1.6

Materials examined. California: Santa Maria Basin, off Purisima Point, Sta. BRA-16 rock (1); Sta. R-5, 2 paratypes, (USNM 170910); off Point Sal, Stas. PJ-1, 1 paratype (SBMNH 142656) + (1); PJ-2, 1 paratype (AM W. 22188); PJ-6 (1); PJ-7, holotype (USNM 170908), 1 paratype (LACM-AHF Poly 1681) + (5); PJ-10, 2 paratypes (USNM 170909), 5 paratypes (LACM-AHF Poly 1682-1683).

Description. Holotype 2.6 mm long, 0.2 mm wide without parapodia at setiger 6; 0.25-0.3 mm wide with parapodia at setiger 6, for up to 40 setigers.

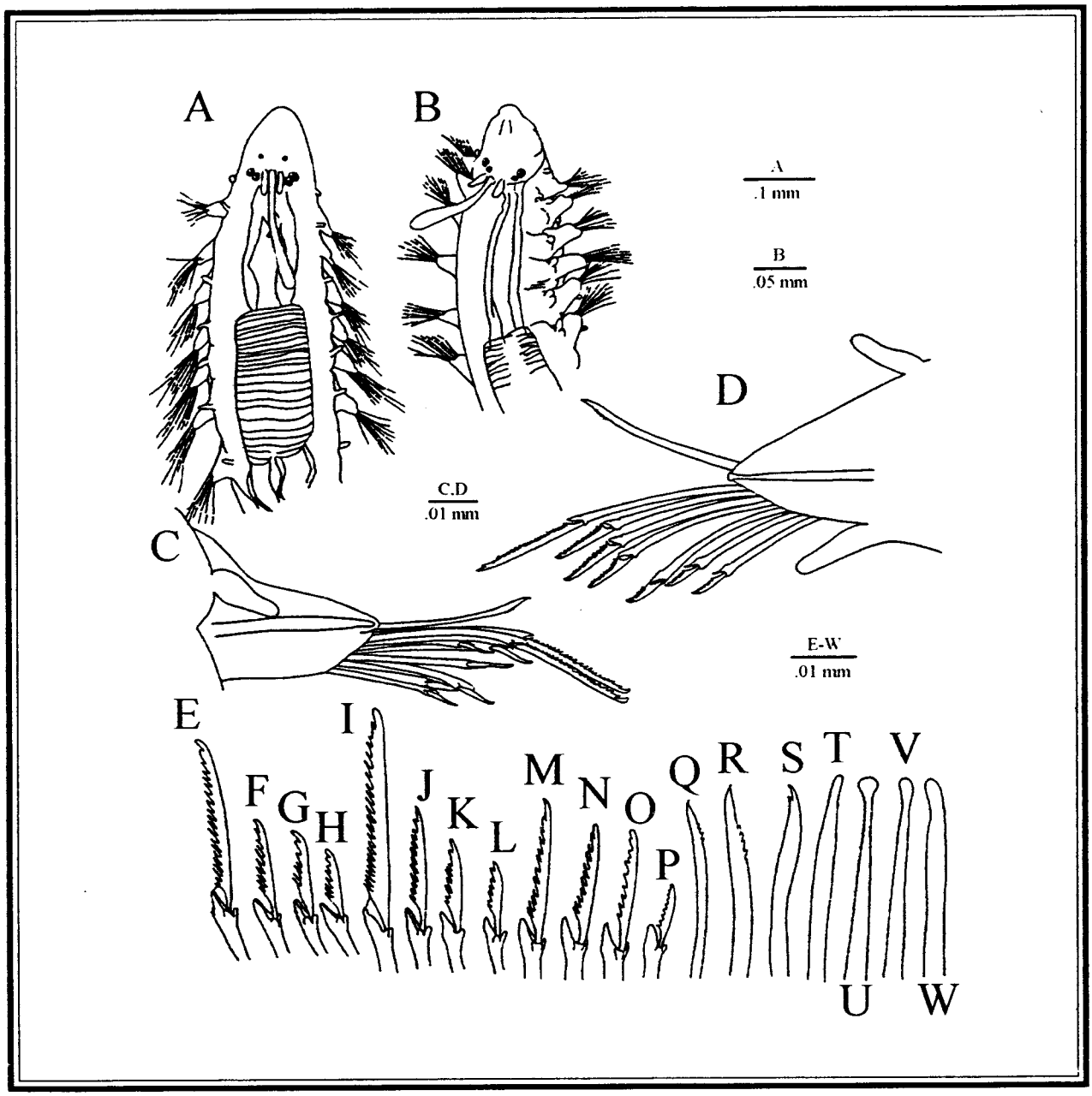

Figure 1.6. ***Exogone (Parexogone) acutipalpa*** **Kudenov and Harris, new species**: A, anterior end, dorsal view; B, same, dorsal view; C, right parapodium 1, dorsal view; D, left parapodium 16, posterior view; E-H, compound falcigers from setiger 2: E, superior seta with long blade; F, same, with shorter blade; G, lower intermediate seta; H, inferior seta; I-L, compound falcigers from setiger 12: I, superior seta with long blade; J, intermediate seta; K, low intermediate seta; L, inferior seta; M-P, compound falcigers from setiger 23: M, superior seta; N, upper intermediate seta; O, lower intermediate seta; P, inferior seta; Q-R, dorsal simple setae: Q, setiger 1; R, setiger 23; S, ventral simple seta from setiger 35; T-W, aciculae: T, setiger 1; U, setiger 12; V, setiger 9; W, setiger 30. (A-W, originals by JDK)

Prostomium wider than long; with 2 pairs of eyes, lenticulate, arranged in trapezoid, anterior pair larger; posterior pair often hidden by overlapping tentacular segment; eyes fragment easily, multiple eyes common; 1 pair of eyespots, situated just below junction of prostomium and palps (Fig. 1.6A,B). Three prostomial antennae, median one commonly 4 times longer than laterals but may be up to 10 times longer; all fusiform (Fig. 1.6A,B). Palps long and pointed, length greater than prostomial length (Fig. 1.6A,B). Pharynx in setigers 1-4, with distal anterior middorsal tooth (Fig. 1.6A). Proventricle in setigers 5-7, with about 20-23 rows of large muscle cells (Fig. 1.6A). One pair of tentacular cirri, smaller than lateral antennae, digitiform in shape (Fig. 1.6A,B).

Parapodia stout, conical, with small lobe where aciculae emerge through body wall (Fig. 1.6C,D). Setae are compound bidentate falcigers (Fig. 1.6E-P), 12-15 in anterior fascicles, 6-8 in median fascicles, and 4-6 in posterior fascicles. Blades with subdistal tooth reduced, forming a highly acute angle to long axis of blade; cutting edges with conspicuously variable teeth of different shape and size, usually slender, spine-like proximally, becoming saw toothlike distally (Fig. 1.6E-P); decreasing inferiorly within fascicles, with superior blades 3 times length of inferior blades (Fig. 1.6C-E,H,I,L); along body axis, blade lengths gradually increasing to medial segments, decreasing thereafter posteriorly. Dorsal superior simple seta first present from setiger 1, distally pointed, unidentate (Fig. 1.6Q,R), becoming slightly notched subdistally in posteriormost setigers (Fig. 1.6S); all with cutting surface slightly serrated. Ventral inferior simple seta present in posteriormost setigers, resembling dorsal simple setae, except for subdistal notch (Fig. 1.6T). Aciculae with curved tips, numbering 1 per parapodium (Fig. 1.6U-X). Dorsal cirri short, digitiform, present on all setigers except setiger 2, shorter than length of parapodial lobes (Fig. 1.6C,D). Ventral cirri short, digitiform, similar in size to dorsal cirri (Fig. 1.6C).

Pygidium with paired digitiform anal cirri of variable lengths, each about as long as last 1-3 setigers, plus smaller ventromedian cirrus.

Remarks. *Exogone acutipalpa* is most easily confused with *E. molesta* Banse in the northeastern Pacific since both species have a long median antenna, long pointed palps, and superior falcigers with conspicuously long blades. *Exogone acutipalpa* differs from *E. molesta* in having a pair of eyespots in addition to two pairs of eyes instead of lacking the paired eyespots, and in having blades of all compound falcigers gradually decreasing in length within all fascicles rather than having two groups of blades having abruptly different lengths in anterior and median fascicles.

Habitat. Soft, fine sediments in depths of 91.5-154 m.

Etymology. The specific epithet, *acutipalpa*, refers to the extremely pointed palps.

Distribution. Southern California.

Exogone (Parexogone) breviseta Kudenov and Harris, new species

Figure 1.7

Exogone sp. C SCAMIT Harris, 1987:1-8.

Material Examined. California: Santa Maria Basin, off Point Sal, Sta. PJ-7 (1).—Western Santa Barbara Channel, Goleta, 301(h) Sta. 2, 24-25 m, 14 April 1985, 1986, coll. MBC, 3 paratypes (LACM-AHF Poly 1678); Sta. 3, 25 m, 14 April 1986, coll. MBC, 2 paratypes (USNM 170911); Sta. 4, 29 m, 29 October 1985, coll. MBC, 1 paratype (USNM 170912); Sta. 6, 22-23.5 m, 14-15 April 1986, 1 paratype (SBNMH 142657), 4 paratypes (LACM-AHF Poly 1679-1680); Sta. 7, 23 m, 14 April 1986, coll. MBC, 1 paratype (AM W. 22189); Goleta, NPDES, Sta. 4, 29 m, 29 October 1985, coll. MBC (1).—Santa Catalina Island, Catalina Outfall, Sta. 1, 38 m, 2 November 1986, coll. B. Given (4); Sta. 3, 38 m, 2 November 1986, coll. B. Given, holotype (LACM-AHF Poly 1666).

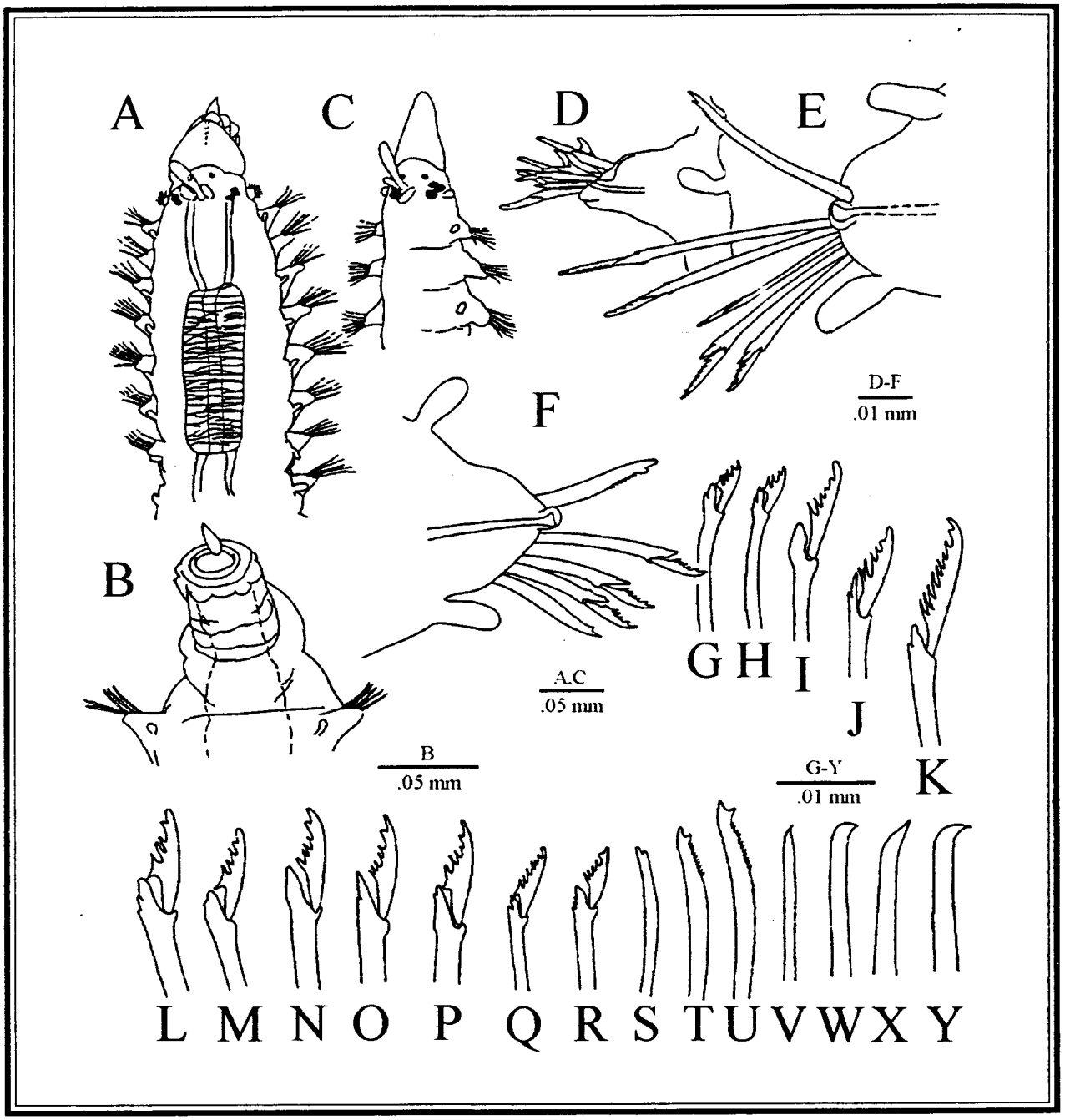

Figure 1.7. ***Exogone (Parexogone) breviseta*** **Kudenov and Harris, new species**: A, anterior end, dorsal view; B, pharynx and setiger 1, ventral view; C, anterior end, dorsolateral view; D, left parapodium 1, dorsal view; E, left parapodium 12, posterior view; F, right parapodium 25, anterior view; G-I, superior compound falcigers from setiger 2; J, same from setiger 3; K-M, compound falcigers from setiger 4: K, superior seta; L-M, upper intermediate setae; N-P, compound falcigers from setiger 25: N, superior seta; O, intermediate seta; P, inferior seta; Q, superior seta from midbody segment; R, same from far posterior segment; S-T, dorsal simple setae: S, from setiger 2; T, from midbody; U, from far posterior segment; V-Y, aciculae: V, from setiger 1; W, from midbody segment; X, from setiger 25; Y, from far posterior segment. (A-Y, originals by JDK)

Description. Holotype 1.8 mm long, 0.1 mm wide without parapodia at level of setiger 6, 0.2 mm wide with parapodia at level of setiger 6, for 33 setigers. Specimens up to 3.8 mm long. Surface pigmentation patterns absent; pharynx sometimes golden in color. Eggs first occur in setigers 9-10 and continue towards end of body; one complete mature specimen of 28 setigers with natatory setae in setigers 11-27.

Prostomium wider than long; eyes small, lenticulate, numbering at least 2 pairs, each pair frequently divided, forming separate multiple pairs, all arranged trapezoidally on posterior part of prostomium; with an additional pair of eyespots on anterior surface of prostomium (Fig. 1.7A,C). Antennae fusiform, close-set, as transverse group between posterior pair of eyes (Fig. 1.7A,C). Median antenna about twice length of prostomium; lateral antennae ranging from one-fifth to one-half length of median antenna (Fig. 1.7A,C). Palps pointed, longer than prostomium (Fig. 1.7A,C). Nuchal organs ciliated, located laterally at junction of prostomium and tentacular segment, continuing internally as bilobed glands. Pharynx extending through setiger 6, sometimes to setiger 8, with anterior middorsal tooth (Fig. 1.7A,B). Proventriculus present in setigers 7-8, sometimes setigers 8-9, with 20-23 rows of large muscle cells (Fig. 1.7A). One pair of tentacular cirri, similar in shape to lateral antennae, smaller (Fig. 1.7A,C).

Parapodia stout, conical, with small postsetal lobe (Fig. 1.7D-F). All setae compound falcigers with short, strongly serrated, distally bidentate blades (Fig. 1.7G-R). Blades decreasing in length within fascicles, superior blades less than twice length of inferior blades; all increasing in overall length from anterior to median setigers, decreasing thereafter posteriorly (Fig. 1.7C-E). Superior dorsal simple seta present in all setigers, inconspicuously bifid in anterior setigers (Fig. 1.7S), becoming thick and strongly bifid with serrated cutting surfaces in posterior setigers (Fig. 1.7T,U). Inferior ventral simple seta present in median and posterior setigers, distally bifid, particularly in posterior setigers. Acicula with distally bent tip, 1 per parapodium (Fig. 1.7V-Y).

Dorsal cirri digitiform, shorter than parapodial lobes, present on all setigers except setiger 2 (Fig. 1.7A,E,F). Ventral cirri similar to dorsal cirri in shape, slightly smaller (Fig. 1.7E,F).

Pygidium with paired digitiform anal cirri of variable lengths, each about as long as last 1-3 setigers, plus smaller ventromedian cirrus.

Remarks. *Exogone breviseta* has been misidentified as *E. molesta* Banse by having long pointed palps, a long median antenna, and short lateral antennae. *Exogone breviseta* differs from *E. molesta* in lacking superior falcigers with long blades, and in having compound falcigers all subequal in length throughout the body, an anterior pair of prostomial eyespots, and a longer pharynx and a shorter proventriculus. *Exogone breviseta* has also been confused with *Exogone acutipalpa*, described above, in that both have a long median antenna, long distally pointed palps, two pairs of eyes plus anterior paired eyespots and blades of compound falcigers coarsely serrated. *Exogone breviseta* differs from *E. acutipalpa* in having the posterior two pairs of eyes small and divided into smaller separate structures, in having superior falcigers all with short rather than long blades, and in having a considerably shorter pharynx.

Exogone breviseta co-occurs with *E. lourei*, *E. molesta* and *E. uniformis*.

Habitat. Coarse, mixed and soft sediments in depths of 20-200 m.

Etymology. The species name, *breviseta*, refers to the short blades on all compound falcigers.

Distribution. Southern California.

Subgenus *Exogone (Sylline)* Claparède, 1864

Type species: *Sylline brevipes* Claparède, 1864

Diagnosis. Antennae closely set together, usually arising between eyes; compound falcigers with strongly modified bayonet-shaped blades partially fused to heterogomph joints; shaft tips usually truncate; dorsal simple setae of one form, generally distally truncate with serrated cutting surfaces.

Remarks. Both species in the key below lack dorsal cirri on setiger 2, and appear to have prostomia generally fused to the tentacular segment. *Exogone (Sylline) naidinoides* is not represented in MMS materials, although it is reported from the northeast Pacific; *E. (Sylline) fustifera* Haswell is reported from Australia.

Key to Selected Species of the Subgenus *Exogone (Sylline)* (after San Martín, 1991b)

1A. Bayonet-shaped compound falcigers from median segments including long and short blades ..... *Exogone (Sylline) naidinoides*

1B. Bayonet-shaped compound falcigers from midbody segments thin with blades of uniform length .... *Exogone (Sylline) fustifera*

Genus *Sphaerosyllis* Claparède, 1863

Type species: *Sphaerosyllis hystrix* Claparède, 1863

Diagnosis. Prostomium with 3 antennae. Palps fused dorsally for most or entire length. One pair of tentacular cirri. Nuchal organs inconspicuous. Pharynx with single anterior middorsal tooth. Antennae, tentacular cirri and dorsal cirri usually flask-shaped (pyriform). Integument usually with glandular adhesive papillae.

Remarks. The majority of *Sphaerosyllis* species lack dorsal cirri on setiger 2 (San Martín, 1984a-b, 1991a; Riser, 1991). San Martín (1984b) relied on this and other features to define subgenera: *Prosphaerosyllis* San Martín, 1984b, for species with dorsal cirri on setiger 2; and *Sphaerosyllis* Claparède, 1863, for species lacking dorsal cirri on setiger 2. The subgenus *S. (Sphaerosyllis)* is further subdivided into the "*erinaceus*" and "*pirifera*" groups. The "*erinaceus*" group is partly characterized by having aciculae with tips flared and mucronate, the posterior eyes supposedly arranged in a straight transverse row, and have not been reported from the eastern Pacific; the "*pirifera*" group has aciculae with tips shaped like golf clubs, and eyes arranged polygonally. Riser (1991) suggests that the above subgenus concept may be inadequate in view of additional species described since San Martín first proposed this scheme. Russell (1989a) does not recognize San Martín's (1984b) subgenera since they are "...based more on artificial than on important phylogenetic characters." We concur with both Russell (1989a) and Riser (1991), and find the usefulness of San Martín's sphaerosyllid subgenera limited.

Riser (1991) also provides an important critique of systematic characters for *Sphaerosyllis*. Perhaps one of his most illuminating statements is that exogonine syllids (including *Sphaerosyllis* species that have dorsal cirri on setiger 2 as adults) usually lack dorsal cirri on setiger 2 prior to developmental differentiation of fore-gut elements. Identification of juvenile specimens will be difficult if one relies primarily on dorsal cirri. Care must therefore be taken to consider the age of one's specimens, especially since *Sphaerosyllis* that lack dorsal cirri on setiger 2 as adults have a pair of non-deciduous papillae that are larger than general body papillae.

Three species of *Sphaerosyllis* have been encountered in the MMS collection: *S. californiensis* Hartman, 1966; *S. bilineata*, new species; and *S. ranunculus*, new species. *Sphaerosyllis brandhorsti* Hartmann-Schröder, 1965, is included in the key below, although it was originally described from Chile, and later reported from Washington (Banse, 1972). Banse's record is based on an incomplete specimen which differs

from Hartmann-Schröder's original account in potentially significant ways; it seems unlikely that *S. (S.) brandhorsti* occurs in the northeast Pacific. Unfortunately, we have not examined Banse's specimen. Records of *S. hystrix* from the northeast Pacific are probably based on Berkeley and Berkeley (1938), who distinguished this species by the presence of glandular pits containing bundles of minute rods in each segment. In contrast, *S. californiensis* was traditionally characterized by lacking these parapodial glands. However, subsequent examinations of *S. californiensis* type specimens confirms their presence (see below), and worms previously identified as *S. hystrix* from southern California are all *S. californiensis*. Moreover, Riser (1991) records *S. californiensis* from British Columbia, and it therefore seems likely that all records of *S. hystrix* in the northeast Pacific are either misidentified specimens of *S. californiensis*, or represent at least one undescribed species of *Sphaerosyllis*. In view of these findings, *S. hystrix* is excluded from the following key.

Key to Species of *Sphaerosyllis* from the Northeast Pacific

1A. Dorsal cirri similar to one another 2

1B. Dorsal cirri of two forms, not similar to one another 3

2A. Proventriculus usually present through 1.5-2 segments (Fig. 1.8A); dorsum with dense fields of filiform and elliptical papillae (Fig. 1.8C-D); ventrum lacking papillae; laterally with 2 pairs of conspicuous papillae per segment, each pair associated with basal anterior and posterior facies of parapodial lobes ..... *Sphaerosyllis californiensis*

2B. Proventriculus present in 4 segments; dorsum with scattered, sparse fields of filiform papillae; ventrum with papillae; papillae inconspicuous on parapodia ..... *Sphaerosyllis brandhorsti*

3A. Dorsum with 2 conspicuous dorsomedial longitudinal rows of distally knobbed macropapillae, 2 pairs per segment from setiger 4 or 5, alternating between a large anterior and smaller posterior pair per segment (Fig. 1.9A); ventrum with 12 digitiform papillae in 4 longitudinal rows of 3 papillae plus 2 additional longitudinal rows of 4 small, round papillae per segment, these altogether forming 6 longitudinal rows (Fig. 1.9C); dorsal cirri flask-shaped anteriorly, becoming cirriform posteriorly . ..... *Sphaerosyllis bilineata*

3B. Dorsum without obvious dorsomedial longitudinal rows of papillae; ventrum with 2 pairs of papillae per segment, all arranged in 2 longitudinal rows; dorsal cirri mammiform in setigers 1-7 or 9 (Fig. 1.10D) and far posterior segments, digitiform in medial segments from setigers 8 to 10, or all digitiform from setigers 8-10 (Fig. 1.10E) ..... *Sphaerosyllis ranunculus*

Sphaerosyllis californiensis Hartman, 1966

Figure 1.8

Sphaerosyllis californiensis Hartman, 1966:196-197, pl. 3; 1968:453-454, figs. 1-7.

Material Examined. California: R/V *Velero* Sta. 5028-57, holotype (LACM-AHF Poly 863) and 47 paratypes (LACM-AHF Poly 864).—Southeast of Point Conception, Sta. 86 (1, USNM 170926).—Santa Barbara, Camby's Reef, rock scraping, 16 m, 15 April 1983, coll. D. B. Cadien (2).—Gulf of the Farallones, Cordell Bank, Sta. 831033, coll. B. Schmieder (1).

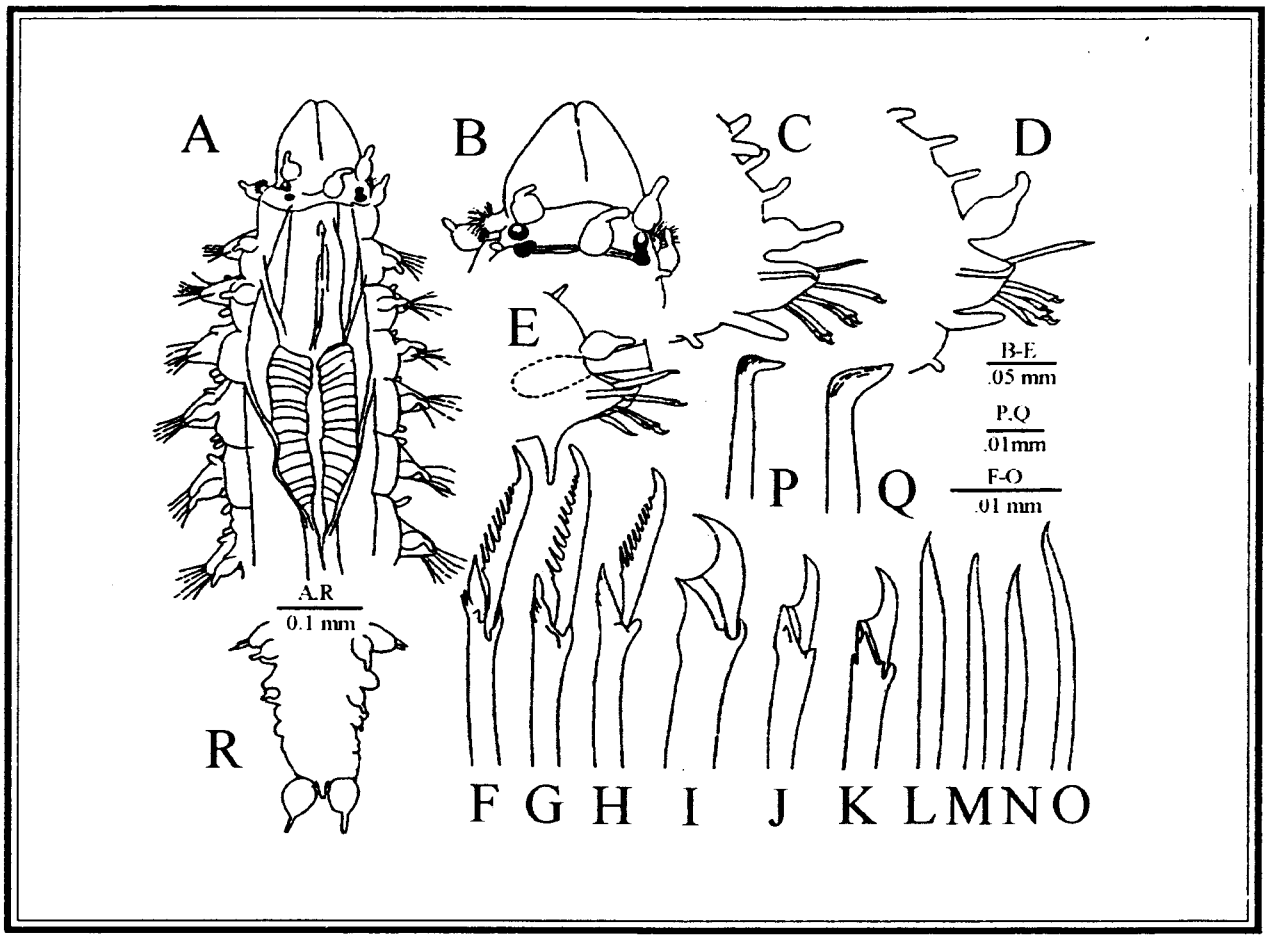

Figure 1.8. *Sphaerosyllis californiensis*: A, anterior segments, dorsal view (Goleta 6/III); B, prostomium, dorsal view; C, left parapodium, setiger 7, anterior view; D, left parapodium, setiger 30, anterior view; E, right parapodium, setiger 22, posterior view (LBGS B8/III); F-G, superior compound falcigers, setiger 2; H, inferior compound falciger, setiger 2; I-K, compound falcigers from setiger 31: I, superior seta; J, intermediate seta; K, inferior seta; L-N, dorsal simple setae: L, setiger 28; M, setiger 32; N, setiger 33; O, ventral simple seta, setiger 31; P-Q, aciculae: P, setiger 2; Q, setiger 31; R, Posterior end, dorsal view. (A-R, originals by JDK)

Description. Largest complete MMS specimen 3.7 mm long, 0.9 mm wide excluding parapodia and setae, for 40 setigers. Preserved specimens lack pigmentation. Integument covered with fine sediment (Hartman, 1966). Dorsum usually densely papillate, including conspicuous filiform papillae, up to 22 μm long, and short elliptical papillae (up to 8 μm long); all papillae gradually increasing in length posteriorly along body. Ventrum smooth, lacking papillae. Lateral margins of setigers with long papillae, 2 pairs per segment, each pair associated with anterior and posterior faces of basal parapodial lobes. Epitokous segments from setiger 10 to setiger 22 or sometimes almost to end of body.

Prostomium oval in outline, 3 times longer than wide, broadly fused dorsally with tentacular segment; eyes numbering 2 pairs, lenticulate, in trapezoidal to rectangular arrangement on posterior half of prostomium, anterior eyes largest; eyes connate (Fig. 1.8A,B). Median antenna slightly longer than lateral antennae, similar in shape, arising from anterior emargination of tentacular fold; lateral antennae arising anterolaterally from prostomium, with bulbous bases and cylindrical tips, extending to edge of palps (Fig. 1.8A,B). Palps

short, dorsally fused; distal median notch as a wide furrow (Fig. 1.8B); palps covered dorsally with short papillae. Pharynx usually present in setiger 1 to middle of setigers 3-4 (in setigers 1-3.5 in holotype), with large anterior middorsal tooth (Fig. 1.8A). Everted pharynx surrounded by 10 widely spaced papillae. Proventriculus barrel-shaped, with 13-14 transverse rows of muscle cells, usually present in setigers 5-6 (in setigers 3.5-5 in holotype) (Fig. 1.8A), sometimes in setigers 3-5 or 4-6, or in setigers 4-8 in highly contracted specimens.

Tentacular segment visible dorsally as fold covering posterior half of prostomium, including posterior pair of eyes and sometimes anterior pair of eyes. Tentacular cirri similar to lateral antennae, arising ventrolaterally in relation to anterior pair of eyes (Fig. 1.8A,B). Small papillae present on anterior margin of tentacular fold.

Parapodial lobes conical, distally blunt (Fig. 1.8C-E), each with 3 conspicuous distal papillae as follows: longest papilla on posterior basal surface of parapodium; shortest papilla on anterior distal surface; intermediate papilla on posterior distal surface. Parapodial glands present from setiger 5, conspicuous from setigers 7-8, medial to dorsal cirri, containing spherical yellow granules which can fade and be undetectable in some preserved specimens.

Compound setae numbering 5-7 per fascicle in anterior segments, 3-5 in posterior segments; blades unidentate, longer in anterior segments, becoming stouter, more triangular posteriorly. Superior blades of anterior segments coarsely (sometimes finely) serrated, 2-3 times longer than smooth inferior blades (Fig. 1.8F-H); those of posterior segments subequal, superior blades finely serrated to smooth, inferior ones smooth (Fig. 1.8I-K). Ends of shafts with 2-3 denticles on cutting surface plus additional hair like processes (Fig. 1.8F,G). Dorsal simple seta present in all setigers, slightly curved subdistally; anterior simple setae smooth, appearing finely hirsute when highly worn; posterior setae shorter with serrated cutting surfaces (Fig. 1.8L,M). Inferior simple seta small, smooth, present in last 2-19 setigers (Fig. 1.8N,O). Aciculae normally numbering one per parapodium, thick, tapering abruptly to tip bent distally at a right angle (Fig. 1.8P), gradually becoming more stout posteriorly (Fig. 1.8Q). Additional acicula sometimes present in setigers 1-7, slender, distally pointed. Natatory capillary setae long, smooth, in setal sac located between neuropodia and dorsal cirri (Fig. 1.8E). Notoaciculae absent.

Dorsal cirri similar to antennae in shape, slightly thinner basally, absent from setiger 2 (Fig. 1.8A); longer than anterior parapodial lobes, equal to or somewhat shorter than median and posterior parapodial lobes. Ventral cirri short, cylindrical, sometimes extending beyond parapodial lobes (Fig. 1.8C-E).

Pygidium hemispherical, subdistally encircled by about 10 long papillae, with 2 long clavate anal cirri, these slightly larger than nearest dorsal cirri, plus an additional cluster of smaller papillae surrounding anal opening, sometimes obscured by circlet of longer papillae or anal cirri.

Remarks. Re-examination of type materials revealed the presence of 2 specimens of an undescribed *Sphaerosyllis* species (described below), a specimen of *Exogone lourei*, and 3 specimens of *E. dwisula*, as noted above. While this finding does not alter the species concept of *S. californiensis*, Hartman's original description appears to be based on one or two type specimens; new illustrations are here provided for additional information.

Riser (1991) examined west coast specimens of *Sphaerosyllis pirifera* Claparède, 1868, and found that nearly all were *S. californiensis*. *Sphaerosyllis pirifera* appears not to be represented along the western coast of North America (Riser, 1991:216) as first reported by Berkeley and Berkeley (1948). In addition, examination (by LHH) of specimens identified and archived by O. Hartman both as *S. hystrix* Claparède, 1863 and *S. pirifera* were also found to be *S. californiensis*. It is likely that *S. hystrix* is not represented in the polychaete fauna of southern California. Additional specimens previously identified as *S. hystrix* from other localities along the western coast of North America need to be re-examined to determine whether it is represented in our fauna as also indicated by Berkeley and Berkeley (1948).

Habitat. Silt, mixed soft sediments and rocky subtidal habitats.

Distribution. Southern California.

Sphaerosyllis bilineata Kudenov and Harris, new species

Figure 1.9

Sphaerosyllis californiensis Hartman, 1966:196-197, pl. 3; 1968:453-454, figs. 1-7 (in part).

Material Examined. California: Santa Maria Basin, off Purisima Point, Stas. BRA-13 rock, paratype (USNM 170924); BRC-13 rock (1); BRC-14 rock, paratype (AM W. 22193); BRA-16 rock, 11 paratypes (LACM-AHF Poly 1664, 1665); BRA-27 (SBMNH 142699)..—Western Santa Barbara Channel, south of Point Conception, Sta. 84, paratype (USNM 170925); off Point Conception, Sta. BRC-2 rock (1); San Francisco Bay, off Hunters Point, ESA Homeporting, Sta. HP1B, 37°43'30.8"N, 122°21'25.8"W, 9 m, 8 September 1986, coll. Kinnetic Laboratories, Inc., holotype (LACM-AHF Poly 1673).—R/V *Velero IV* Sta 5028-57, 2 paratypes (removed from paratype lot of *Sphaerosyllis californiensis*; LACM-AHF Poly 1675).

Description. Holotype complete with 31 setigers, 3 mm long, 0.3 mm wide without parapodia, 0.4 mm wide with parapodia. Body slender, dorsum convex, lacking pigmentation patterns; dorsum appears light yellow due to encrusted silt. One female with dorsally attached embryos on setigers 11-17. Two sexually mature males with sperm in setigers 8-24 or 26.

Prostomium wider than long, with small conical papillae dorsally and laterally; 2 pairs of eyes, large, lenticulate, 2 eyes on each side set close together; posterior pair usually covered by dorsal fold of tentacular segment (Fig. 1.9A); additional pair of anterior eyespots present adjacent to lateral antennae (not illustrated). Median antenna arising from posterior margin of prostomium, on border of dorsal fold; lateral antennae smaller than median, cylindrical with bulbous bases (Fig. 1.9B). Palps longer than wide, anterior margins blunt, directed ventrally. Small, conical papillae present on dorsal and lateral margins of palps, and anterior margin of tentacular fold. Ciliated nuchal organs present between prostomium and tentacular segment (Fig. 1.9A). Pharynx long, narrow, thick-walled, extending to setiger 3-4, or setigers 2-6 in contracted specimens, often appearing sinuous in preserved specimens; middorsal tooth large, positioned one-quarter length of pharynx behind anterior pharyngeal margin when everted (Fig. 1.9A). Proventriculus normally extending through 3-4 segments, barrel-shaped with 20-23 rows of muscle cells (Fig. 1.9A). Tentacular segment and prostomium fused dorsally. Tentacular cirri similar to prostomial antennae, but smaller (Fig. 1.9B).

Parapodial lobes triangular, each with 2 digitiform papillae, on anterior face and distally on posterior face (Fig. 1.9C). Setae generally compound falcigers, numbering 6-7 per fascicle anteriorly, decreasing to 5 posteriorly. Blades unidentate, longest anteriorly, gradually decreasing in length posteriorly (Fig. 1.9D); superiormost blade (sometimes 2 superiormost blades) in each fascicle with finely serrated cutting margins, others smooth. Superior dorsal simple seta distally unidentate, with smooth cutting surface, in all setigers. Inferior simple seta unidentate, slightly serrated to smooth, in last 2-8 setigers. One acicula per parapodium, slender, subdistally enlarged, bent.

Dorsal cirri flask-shaped on setiger 1, about equal to or slightly larger than prostomial antennae; larger, longer from setiger 2, becoming cirriform posteriorly, extending beyond parapodial lobes (Fig. 1.9A-B). Ventral cirri digitiform, not extending beyond parapodial lobes (Fig. 1.9C).

Each segment with 1 or 2 transverse rows of papillae, with 4 papillae per row (Fig. 1.9A). Dorsum of setigers 1-3 or 4 each with 4 filiform papillae in single transverse row per segment; setigers 4-5 to end of body each with 8 filiform papillae in an anterior-posterior transverse row. Middle 2 papillae of all segments distally knobbed, together forming two dorsomedian longitudinal rows along body; those of anterior segmental rows from setiger 4 largest, alternating with shorter papillae in posterior rows to end of body. Smaller outer papillae of anterior segmental rows arising from body wall superior to parapodial lobes and anterior to dorsal cirri; those of posterior segmental rows located just anterior to intersegmental annuli. All papillae gradually increasing in length posteriorly.

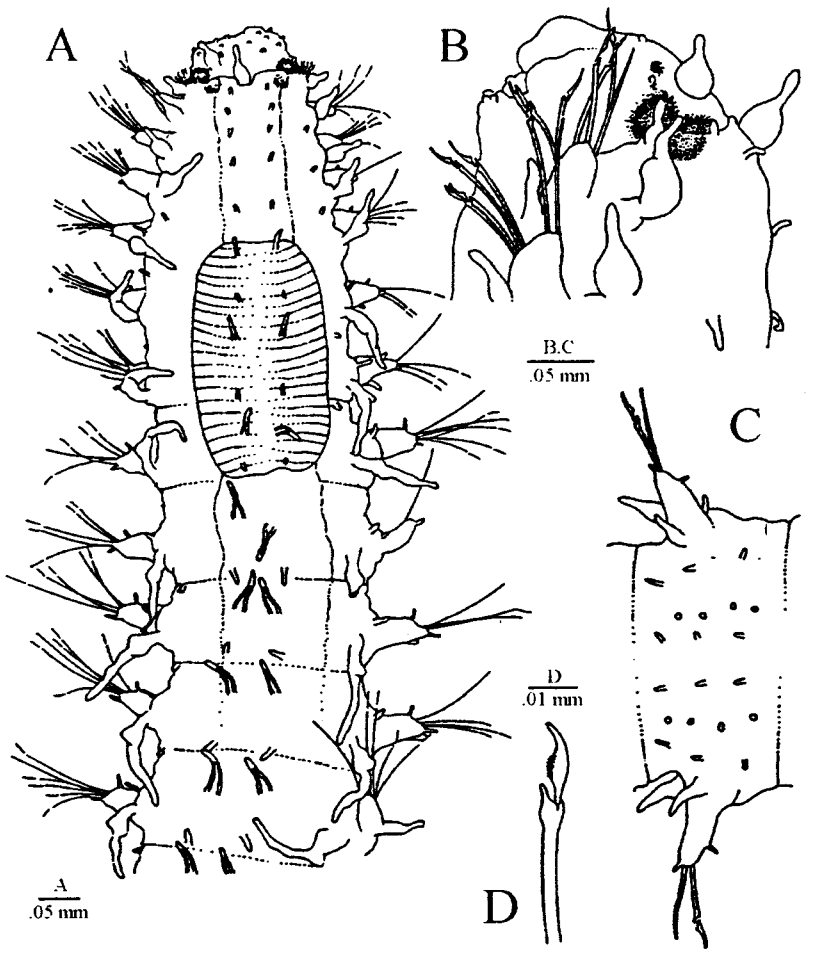

Figure 1.9. ***Sphaerosyllis bilineata*** **Kudenov and Harris, new species**: A, anterior segments, dorsal view; B, prostomium and setigers 1-2, lateral view; C, ventrum, median setiger; D, superior compound falciger, setiger 8. (A-D, originals by J. Dorsey)

Ventrum with 20 papillae per segment in 6 longitudinal rows, including 12 digitiform papillae in 4 longitudinal rows of 3 papillae, and 2 longitudinal rows of 4 short round papillae (Fig. 1.9C).

Pygidium with paired anal cirri, these 2-3 times longer, and 3-4 times wider than dorsal cirri of last setiger; circlet of 8-10 small, digitiform papillae present above anal cirri.

Remarks. *Sphaerosyllis bilineata*, *S. longipapillata* Hartmann-Schröder, 1979, *S. riseri* Perkins 1981, and *S. tetalix* Eliason, 1920 are similar in having four papillae per segment, all arranged in two longitudinal rows along the dorsum. All species also have an additional pair of papillae per segment, each in front of the dorsal cirri on the body wall superior to the parapodia. *Sphaerosyllis bilineata* differs from the other listed

taxa in having one pair of small papillae per segment in setigers 1-3 or 4, and two pairs of different sized papillae that alternate regularly from setigers 4-5 to the end of the body; papillae are the same size in all segments for the other three species except *S. longipapillata* which lacks papillae from the two dorsal rows in setigers 1-6. *Sphaerosyllis bilineata* further differs from the above listed species in having an additional pair of small papillae dorsolaterally along the posterior margin of each segment. The alternating rows of long and short papillae are the most conspicuous feature of *S. bilineata*.

The compound falcigers of both *S. bilineata* and *S. riseri* differ from those of *S. longipapillata* and *S. tetralix* in having superior blades all serrated instead of all smooth. *Sphaerosyllis bilineata* differs from *S. riseri* in having slightly longer blades, and 20-23 rows of proventricular muscle cells rather than 17-18.

Habitat. Rocky substrates in depths of 89-126 m.

Etymology. The species name, *bilineata*, refers to the paired dorsomedial rows of conspicuous papillae.

Distribution. California.

Sphaerosyllis ranunculus Kudenov and Harris, new species

Figure 1.10

Material Examined. California: off Point San Luis, Sta. R-2 (14, USNM 170930); off Point Sal, Stas. PJ 1 (46); PJ-2 (27, including 1 brooding 2 setiger larvae); PJ-3, 3 paratypes (AM W. 22194) + (11); PJ-4, 5 paratypes (SBMNH 142661) + (3); PJ-5 (9); PJ-6 (42); PJ-7 (47); PJ-8, 15 paratypes (USNM 170929) + (36); PJ-9 (31); PJ-10 (67); PJ-11, 35 paratypes (LACM-AHF Poly 1668) + (21).—U.S. Army Corps of Engineers, dump site LA-5, Sta. BD 5-4(3), 32°32'20"N, 117°20'35"W, 188 m, 12 Dec. 1983, coll. MBC Applied Environmental Sciences, holotype (USNM 170927).—Between Point San Pedro and Pescadero Point, FTSP-Corps of Engineers, Stas. B5-W(3), 37°29'21"N, 122°55'32"W, 128 m, 10 October 1986, coll. Kinnetic Laboratories, Inc. (KLI), (1); B5-W(4), 5 paratypes (USNM 170928); B2-W(5), 37°22'10"N, 122°49'27"W, 128 m, 11 October 1986, coll. KLI (1); B2-N(1) 37°23'09"N, 122°49'34"W, 126 m, 2-3 April 1986, coll. KLI, 5 paratypes, (LACM-AHF Poly 1667).—Mexico: Tijuana, Tijuana Oceanographic Engineering Study, Sta. B10(3), 32°35.74'N, 117°10.34'W, 18 m, 18 July 1986, coll. MBC Applied Environmental Sciences, (1).

Description. Holotype incomplete, 1.3 mm long, 0.15 mm wide including parapodia, for 23 setigers. Body slender, circular in cross section in atokous specimens; oval to dorsoventrally flattened in epitokous specimen. Dorsum with micropapillae (best observed in lateral view). Ventrum with 2 longitudinal rows of papillae, usually two pairs per segment; each lower papilla on ventrolateral margin loosely associated with parapodia (Fig. 1.10D). Color in alcohol light yellow; pigmentation absent.

Prostomium small, micropapillate; 3 pairs of eyes, all lenticulate; posterior 2 pairs largest, nearly equal in size, arranged trapezoidally; anterior pair in front of lateral antennae (Fig. 1.10A-C). Antennae small, inconspicuous, mammiform (basally spherical, abruptly becoming distally papilliform); median antenna arising between or slightly behind posterior eyes; lateral antennae arising between anterior and middle pair of eyes; each about one-half size of median antenna (Fig. 1.10A-C). Palps small, fused completely (Fig. 1.10A-C), directed ventrally, micropapillate. Pharynx extending to middle of setiger 3, with middorsal tooth in anterior quarter when inverted (Fig. 1.10A). Proventriculus in 3.5 segments, extending from middle of setiger 3 to end of setiger 6 when pharynx inverted; in 4 segments when pharynx everted; with about 20 (19-22) rows of muscle cells (Fig. 1.10A). Retractor muscle visible through body wall, especially along right side of body in PJ1/3; running from body wall around level of setiger 2 to intestinal region posterior to proventriculus (Fig. 1.10A).

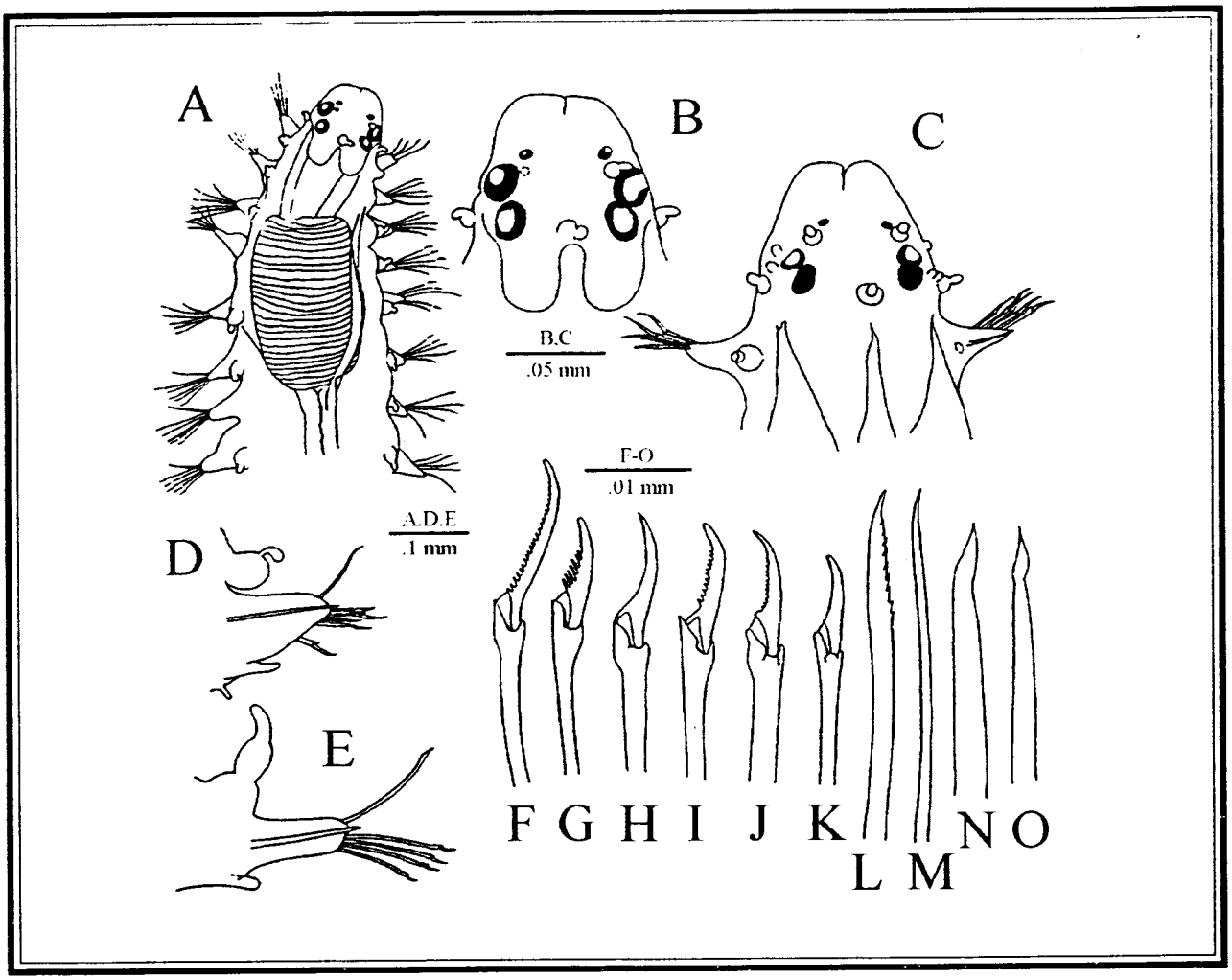

Figure 1.10. ***Sphaerosyllis ranunculus*** **Kudenov and Harris, new species**: A, anterior end, dorsal view; B, prostomium, dorsal view; C, prostomium, ovigerous female, dorsal view; D, right parapodium, setiger 7, anterior view; E, right parapodium. setiger 16, anterior view; F-G, compound falcigers from setiger 4: F, superior seta; G, inferior seta; H-I, compound falcigers from setiger 5: H, inferior seta; I, superior seta; J, compound falciger, setiger 20; K, compound falciger, setiger 22; L, dorsal simple seta, setiger 18; M, ventral simple seta, setiger 23; N, acicula, setiger 15; O, acicula, setiger 19. (A-O, originals by JDK)

Tentacular segment fused to prostomium, not visible dorsally (Fig. 1.10A,C); 1 pair of tentacular cirri, similar in form and size to antennae (Fig. 1.10B,C). Parapodia uniramous, triangular, distally pointed in atokous specimens; stout, thick in anterior segments (Fig. 1.10D), becoming longer, narrower in middle and posterior segments (Fig. 1.10E). Compound falcigers present in all setigers, all unidentate (Fig. 1.10F-K); numbering around 7-8 per anterior fascicle, around 3-5 in posterior fascicles. Blades of setigers 1-3 decreasing in length inferiorly within fascicles, cutting edges all finely serrated; blade lengths of following setigers more variable, with tendency for superiormost to have somewhat more coarsely serrated cutting margins, and inferiormost blades to be smooth (Fig. 1.10F-I). Blades of posterior setigers usually smooth, slightly shorter than those in anterior segments (Fig. 1.10J,K). Superior dorsal simple seta first present from setiger 1 to end

of body, distally unidentate, with serrated cutting surfaces (Fig. 1.10L). Ventral inferior simple seta first present in last 8 or fewer posterior segments, distally unidentate, smaller than dorsal simple seta, generally smooth (Fig. 1.10M). One acicula per parapodium, distally pointed, projecting through parapodium, although tip tightly covered and readily visible through cuticle; distally flexed, with "flat" surface representing dorsal surface (Fig. 1.10N,O).

Dorsal cirri on all setigers, small, apparently contractile; those of setigers 1-7 or 9 mammiform (Fig. 1.10D), commonly becoming digitiform from setiger 8-10 to end of body (Fig. 1.10E); sometimes remaining mammiform on all setigers or having mammiform cirri on anterior and posterior segments, digitiform cirri medially. Ventral cirri small, digitiform, arising basally from and not extending beyond parapodial lobes (Fig. 1.10D,E).

Pygidium micropapillate, with paired anal cirri, surrounded by circlet of small digitiform papillae.

Length of other specimens at least 2.5 mm, 0.15 mm wide excluding setae, for 24 setigers (PJ-2(3)); all incomplete. Epitokous specimen (PJ-1(3)) with biramous parapodia beginning in setiger 8 and continuing through last setiger, each with a dense fascicle of long, fine capillary setae emerging from notosetal sacs located between dorsal cirri and parapodia. Gametes first visible from setiger 8; 4 external eggs carried dorsally per segment, with dorsomedial rows easily detached, rarely present on preserved specimens.

Remarks. Most Phase II MMS specimens here identified as *Sphaerosyllis ranunculus* were originally identified as *S. brandhorsti* Hartmann-Schröder, 1965. Based on the present samples, *S. brandhorsti* is probably not present along southern California. *Sphaerosyllis ranunculus* differs from *S. brandhorsti* in having minute prostomial antennae and tentacular cirri compared to relatively large, conspicuous appendages, in having clavate dorsal cirri of similar size through setiger 7 generally becoming digitiform thereafter instead of being clavate in all body segments, and in having blades of inferior compound falcigers smooth rather than serrated. *Sphaerosyllis brandhorsti* was originally described from Chile, and was subsequently reported from Orcas Island, Washington, on the basis of a single specimen by Banse (1972:209). Although Riser (1991) suggests that the degree of fusion between the prostomium and tentacular segment is an unreliable character in the systematics of *Sphaerosyllis*, Banse notes that his specimen differs from the types of *S. brandhorsti* by the fusion of these two areas. Banse further notes the absence of epidermal papillae in his specimen. These same differences exist in the present materials compared to the original description of *S. brandhorsti*, and lead us to doubt Banse's identification.

Habitat. Soft sediments, including isolated rocks in soft sediments, in depths of 18-128 m.

Etymology. The term, *ranunculus*, is *Latin* for tadpole, and refers to the body shape of these specimens.

Distribution. Southern California, San Diego to San Francisco; central Oregon; Puget Sound Washington.

Subfamily Eusyllinae

Genus *Dioplosyllis* Gidholm, 1962

Type Species: *Dioplosyllis cirrosa* Gidholm, 1962

Diagnosis. Prostomium with 3 antennae. Palps large, lingulate, fused basally. Nuchal organs as transverse ridges when present. Two pairs of tentacular cirri. Parapodia long. Pharynx with a middorsal anterior tooth and additional smaller teeth, with a smooth rim, or with a few teeth.

Remarks. Although *Dioplosyllis octodentata* Perkins, 1981 is included in the key below, it was originally described from the east coast of Florida, and may occur at other localities in the Gulf of Mexico (Uebelacker, 1984).

Key to the Species of *Dioplosyllis* from California

1A. Compound falcigers with distally bidentate blades with minutely serrated cutting edges (Fig. 1.11E); pharynx in 2 segments; proventriculus in 3-4 segments, with about 90 rows of muscle cells ..... *Dioplosyllis lagunae*

1B. Compound falcigers include distally tridentate blades with conspicuously serrated cutting edges (Fig. 1.12D); pharynx in 7-8 segments (Fig. 1.12A); proventriculus in 5-7 segments with 30-33 rows of muscle cells (Fig. 1.12A) 2

2A. Compound falcigers tridentate blades enshrouded by distal hoods (Fig. 1.12D); distal teeth of blades aligned parallel to long axis of blade; shaft tips of compound falcigers distally pointed, entire ..... *Dioplosyllis tridentata*

2B. Compound falcigers include bi-, tri- and multidentate blades, distal hoods absent; distal teeth of blades paired to unpaired, depending on state of wear; shaft tips of compound falcigers deeply notched and distally bifid ..... *Dioplosyllis octodentata*

Dioplosyllis lagunae (Hartman, 1961), new combination

Figure 1.11

Orseis lagunae Hartman, 1961:64-65; 1968:371-372, figs. 1-2.
Dioplosyllis broadi Mueller and Fauchald, 1976:19-22, figs. 1-6.

Material Examined. California: Santa Catalina Island, Big Fishermans Cove Pier, holotype of *Dioplosyllis broadi* (LACM-AHF Poly 1141).—Laguna Beach, intertidal, holotype of *Orseis lagunae* (LACM-AFH Poly 135).

Description of Atokous Form. Length at least 15 mm, 2.5 mm wide excluding parapodia, 5.2 mm wide including parapodia; an anterior fragment with 10 segments. Body short, inflated (Hartman, 1961).

Prostomium wider than long; 2 pairs of eyes, large, conspicuous; anterior pair set farthest apart, posterior pair near postectal margins, all trapezoidally arranged. Antennae long, slender, cirriform. Median antenna arising just anterior to anterior eyes. Lateral antennae anterior to anterior eyes. Palps long, distally inflated, projecting ventrally.

Parapodia thick, triangular. Setae compound falcigers with distally bidentate blades. Blades decreasing in length inferiorly in fascicles, superior blades twice the length of inferior blades; angle between two distal teeth large, with subdistal tooth projecting outward obliquely.

Dorsal cirri long, slender, cirriform. Ventral cirri similar in form to dorsal cirri, extending beyond parapodial lobes.

Description of Epitoke Form. Length up to 24 mm, 2.1 mm wide excluding parapodia, 6.1 mm wide with parapodia, for 13 setigers (Mueller and Fauchald, 1976). Body widest medially, tapering anteriorly and posteriorly; dorsum strongly arched; ventrum flat. In live specimens, pigmentation on dorsum generally brownish purple, ventrum lighter; segments with paired series of transverse ridges, each purple ridge separated from neighboring ridges by cream colored grooves, 2 per tentacular segment, increasing to 12 on setiger 4, 17-18 on setiger 8 (Fig. 1.11A). Parapodia with ridges running parallel to body axis, each ridge purple with white spots (Fig. 1.11A). Dorsal and ventral cirri each with 10 longitudinal stripes, consisting of series of small purple spots.

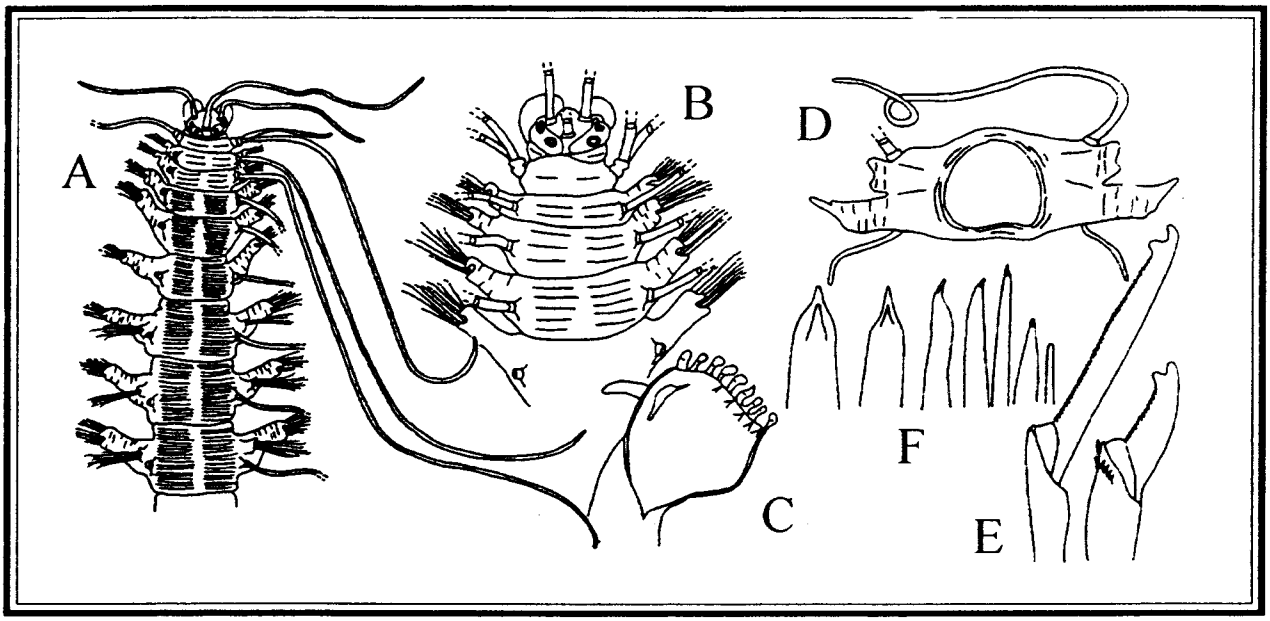

Figure 1.11. *Dioplosyllis lagunae*: A, anterior end, dorsal view; B, prostomium and anterior segments, dorsal view; C, pharynx; D, setiger 7, anterior view; E, compound falcigers, setiger 7; F, neuroaciculae, setiger 7. (A-F, redrawn from Mueller and Fauchald, 1976)

Prostomium wider than long; 2 pairs of eyes, subequal, posterior pair lenticulate, anterior pair set farthest apart, all arranged trapezoidally (Fig. 1.11A,B). Antennae long, wrinkled to smooth with short ceratophores; median antenna arising between anterior and posterior eyes, extending posteriorly to setiger 6; lateral antennae arising from anterior margin of prostomium, extending posteriorly to setiger 5 (Fig. 1.11A). Paired nuchal organs at postectal corners of prostomium (Fig. 1.11A,B). Palps thick, rounded, more than twice length of prostomium, fused basally (Fig. 1.11A,B); palpostyles present. Pharynx to setiger 2, with subdistal anterior tooth plus 5 evenly spaced curved teeth, surrounded by distal circlet of 10 soft papillae when everted (Fig. 1.11C). Proventriculus present in setigers 3-6, with about 90 rows of muscle cells.

Tentacular segment conspicuous dorsally (Fig. 1.11A,B). Two pairs of tentacular cirri, wrinkled to smooth, similar in form to prostomial antennae; dorsal pair longest, each extending posteriorly to setiger 8; ventral pair about half as long as dorsal ones; all with cirriphores.

Parapodia long, triangular (Fig. 1.11D). Compound setae bidentate falcigers numbering 25-30 per fascicle (Fig. 1.11E). Blades longest superiorly, decreasing in length inferiorly within fascicles, with minutely serrated cutting edges (Fig. 1.11E). Shaft tips distally bifid, with denticles on subdistal superior surfaces (Fig. 1.11E). Neuroacicula varying in thickness, tapering abruptly, 6-7 per parapodium from setiger 6 (Fig. 1.11F). Capillary setae long, from setiger 6. Notoacicular lobe inferior to fascicles of capillary setae, numbering 6-7 per fascicle from setiger 6.

Dorsal cirri long, cirriform, smooth to wrinkled, those of setigers 1-2 extending to setiger 11-12; all with short, conspicuous ceratophores (Fig. 1.11A). Ventral cirri long, cirriform, extending to middle of adjacent setigers (Fig. 1.11D).

Pygidium with paired anal cirri, long and cirriform.

Remarks. The single type specimen described as *Orseis lagunae* Hartman, 1961 from Laguna Beach is not a hesionid and is here referred to *Dioplosyllis*. Hartman's (1961) original description lacks illustrations; Hartman (1968) depicted two compound falcigers that looked similar to those of *D. broadi* presented by Mueller and Fauchald (1976). Comparisons of the types of both *O. lagunae* and *D. broadi* by one of us (L. Harris) confirms their synonymy.

Habitat. Intertidal and shallow subtidal rocky substrata.

Distribution. Southern California.

Dioplosyllis tridentata Kudenov and Harris, new species

Figure 1.12

Material Examined. California: off Purisima Point, Sta. BRC-13 rock, holotype (USNM 170900).

Description. Holotype 5 mm, 0.5 mm wide without parapodia, 1 mm wide with parapodia. Body broken into anterior piece with 21 setigers; posterior piece with 12 setigers of which latter 4 or 5 regenerating. Pigmentation patterns absent.

Prostomium wider than long, pentagonal, with deep median cleft (Fig. 1.12A); 2 pairs of eyes, lenticulate, anterior pair largest, in trapezoidal arrangement (Fig. 1.12A); a minute pair of eyespots present on anterior prostomium margin, medial to lateral antennae. Antennae smooth, cirriform, longer than prostomium; median antenna about 5 times longer than prostomium, arising between anterior and posterior pairs of eyes; lateral antennae about twice length of prostomium, arising medial to each anterior eye. Palps long, flat, thick, about 1.5 times longer than prostomium, basally fused, projecting ventrally, lacking palpostyles (Fig. 1.12A). Nuchal organs paired transverse ridges along postectal border of prostomium (Fig. 1.12A). Pharynx tubular, extending through setiger 8 when inverted, middorsal tooth subdistal (dissected) (Fig. 1.12A); distal circlet of soft papillae not observed. Proventriculus extending through setigers 9-15, with about 30 rows of large muscle cells.

Tentacular segment narrow, with 2 pairs of long, cirriform tentacular cirri, each with short cirrophores; dorsal pair probably longest, each at least as long as median antenna (remaining right tentacular cirrus distally broken); paired ventral cirri broken off.

Parapodia long, slender, distally conical to triangular, gradually increasing in length to middle segments, decreasing in length thereafter (Fig. 1.12C). About 15-18 compound setae per anterior fascicle (ca. setiger 5), increasing to 20-25 per medial fascicle (ca. setiger 15), decreasing to around 17-19 per posterior fascicle (ca. setiger 29). Blades distally bidentate, largest denticle strongly curved, enshrouded by distal hood; blades longest superiorly, just over twice length of inferior blades within same fascicle, all decreasing in length inferiorly within fascicles; all with minutely serrated cutting edges. Shaft tips distally entire, with denticles scattered on subdistal superior surfaces. Neuroaciculae taper to knobbed tips, not projecting through parapodial lobes, numbering 1 per parapodium.

Dorsal cirri long, smooth, cirriform (mostly broken), all with short cirrophores, arising from body wall; right dorsal cirrus of setiger 1 present, extending posteriorly to around setigers 13-14. Ventral cirri glandular, basally inflated, tapering distally; not extending beyond parapodial lobes, short in anterior segments, becoming longer, better developed in middle segments, decreasing in length posteriorly.

Pygidium with paired anal cirri, all regenerating.

Remarks. *Dioplosyllis tridentata* and *D. octodentata* Perkins, 1981, are similar in having tridentate compound falcigers, in contrast to the four other described *Dioplosyllis* species summarized by Mueller and Fauchald (1976), which have bidentate compound falcigers. *Dioplosyllis tridentata* differs from *D. octodentata* in having distal hoods on blade tips; in having minute rather than coarse serratia on the cutting edges of

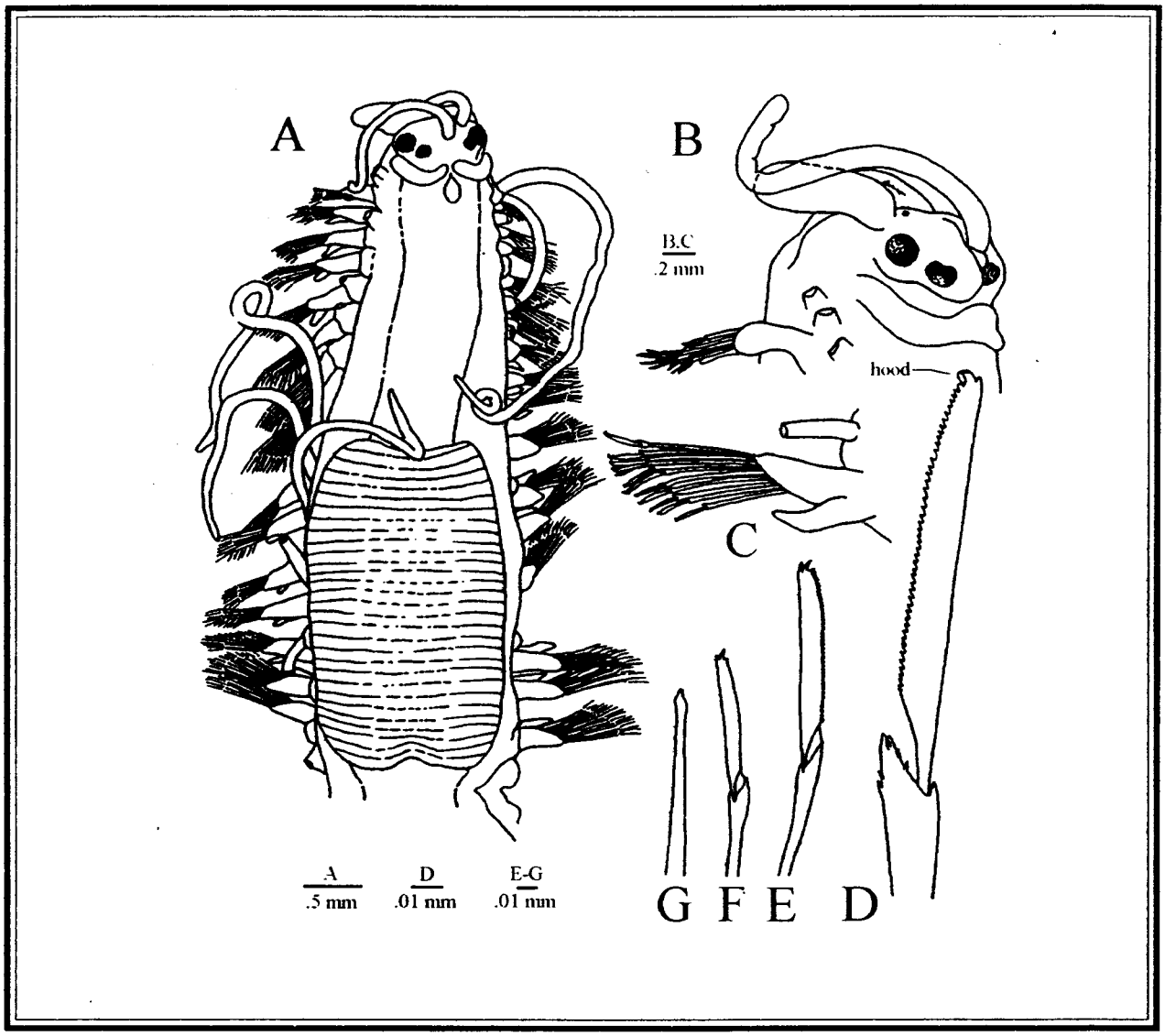

Figure 1.12. ***Dioplosyllis tridentata*** **Kudenov and Harris, new species**: A, anterior segments, dorsal view; B, prostomium and setiger 1, lateral view; C, left parapodium, median segment, posterior view; D-E, superior compound falcigers; F, inferior compound falciger; G, acicula. (A-C, E, F, redrawn from originals by J. Dorsey; D, original by JDK)

blades; in having shaft tips of compound falcigers distally entire instead of bifid and deeply notched; in having the pharynx extend through eight rather than seven segments; in having the proventriculus extend through seven segments with around 30 rows of muscle segments, instead of five or seven segments with about 33 rows. The pharyngeal armature of these two species may also differ, although it is difficult to clearly examine the pharynx of *D. tridentata* without damaging the single specimen. For example, *D. tridentata* seems to have a single large subdistal tooth while *D. octodentata* has a single large tooth plus seven smaller ones. The margin of the pharynx in *D. tridentata* appears to be smooth.

Dioplosyllis tridentata is readily distinguished from *D. lagunae* from southern California, besides the differences in compound falcigers noted above, in lacking palpostyles; the pharynx extending through 8 instead of 3-4 segments and the proventriculus through 6-7 rather than 3 segments; with around 30 instead of around 90 rows of muscle cells in the proventriculus; and in having shaft ends of compound falcigers distally entire instead of deeply notched or bifid.

Habitat. Rocky substrata.

Etymology. The name, *tridentata*, refers to the presence of 3 teeth on blades of compound falcigers.

Distribution. Southern California.

Genus *Eusyllis* Malmgren, 1867

Type species: *Eusyllis blomstrandi* Malmgren, 1867

Diagnosis. Prostomium with 3 antennae. Palps fused basally. Nuchal organs usually as ciliated ridges between prostomium and tentacular segment. Occipital flap sometimes present. Antennae, tentacular and dorsal cirri smooth to indistinctly articulate. Pharynx with middorsal tooth and denticulate rim. Setae compound falcigers.

Remarks. The presence of a denticulate pharyngeal margin or rim is critical to the systematics of *Eusyllis*, and must be determined before specimens can be correctly identified to this genus. Specimens with retracted pharynges must therefore be dissected to avoid confusion with the closely similar *Pionosyllis*.

Key to Species of *Eusyllis* from California (after Imajima, 1966c)

1A. Ventral cirri of setiger 1 foliaceous, much larger than those following (Fig. 1.14K); marginal rim of pharynx smooth dorsally, denticulate ventrally (Fig. 1.14B) ..... *Eusyllis habei*

1B. Ventral cirri of setiger 1 similar in form and size to those following; marginal rim of pharynx uniformly denticulate 2

2A. Dorsal cirri of middle body segments 2-3 times longer than body width (Fig. 1.15C); blades of compound falcigers long and narrow (Fig. 1.15E,F) ..... *Eusyllis longicirrata*

2B. Dorsal cirri of middle body segments two-thirds length of body width (Fig. 1.13A,B); blades of compound falcigers short and stout (Fig. 1.13E-G) ..... *Eusyllis blomstrandi*

Eusyllis blomstrandi Malmgren, 1867

Figure 1.13

Eusyllis blomstrandi Malmgren, 1867:159.—Augener, 1928: 721.—Annenkova, 1938: 153, fig. 6.—Fauvel, 1923:293-294, fig 112 h-m.—Wesenberg-Lund, 1947:11-13, fig. 3; 1950a:16; 1950b:48; 1951: 37.—Berkeley and Berkeley, 1948:84-85, fig. 126.—Pettibone, 1954:260-261, fig. 28 g-i.—1963:119-120, fig. 31 n-p; Imajima, 1966c:92-94, text-fig. 29, a-h.—Banse and Hobson, 1968:15-16, figs. 4 a-c; 1974:56, figs. 14 b-c.—Hartmann-Schröder, 1971:158, fig. 52.
Eusyllis bloemstrandi Friedrich 1938:122 (misspelling of *E. blomstrandi*).
Typosyllis collaris Hartman 1948:23, fig. 6 a-c.

Materials examined. California: Santa Maria Basin, Sta. R-1 (1, USNM 170903).

Description. Specimens 10-12 mm long, 0.8-1.2 mm wide, with 50 segments; single MMS specimen an anterior fragment 3.5 mm long, 0.5 mm wide excluding parapodia, with 28 setigers. Body slender, pale brown in alcohol; each segment with single, dorsal transverse ciliary band (Imajima, 1966c; Banse and Hobson, 1968).

Prostomium wider than long, anterior margin somewhat rounded; 2 pairs of eyes, red, in trapezoidal arrangement, anterior pair largest; additional pair of red eyespots usually present on anterior prostomium margin (Fig. 1.13A). Antennae smooth to wrinkled proximally, distinctly articulated distally; median antenna arising between largest pair of eyes, around 5 times longer than prostomium; lateral antennae, arising from anterior edge of prostomium, each about one-half length of median antenna (Fig. 1.13A). Palps broad, flat, triangular, slightly fused basally (Fig. 1.13A). Pharynx thick, about as wide as proventriculus; anterior rim finely denticulate, with anterior middorsal tooth, surrounded by distal circlet of 10 soft papillae when everted. Proventriculus extending from setigers 7-8 to 13-16.

Tentacular segment reduced dorsally, forming low occipital flap covering posterior prostomium margin. Two pairs of tentacular cirri, proximally smooth, weakly articulated distally; dorsal pair longest, each about as long as median antenna; ventral pair about half as long as dorsal ones (Fig. 1.13A).

Parapodia bluntly conical (Fig. 1.13B-D). Setae generally compound falcigers (Fig. 1.13E-G); blades short, distally bidentate with cutting edges serrated. Blades decreasing in length inferiorly within fascicles; those of anterior segments slender (Fig. 1.13E), becoming more stout posteriorly (Fig. 1.13F,G), especially in inferior part of fascicles. Superior distal ends of shafts minutely serrated (Fig. 1.13E-G). Dorsal superior and ventral inferior seta present in fascicles of posterior segments. Two to 3 aciculae per anterior parapodium, decreasing to 1 per posterior parapodium; distally curved, pointed, mallet-shaped (Fig. 1.13H).

Dorsal cirri basally smooth to wrinkled, weakly to distinctly articulated distally (Fig. 1.13A-D). Dorsal cirri of setiger 1 longest, longer than median antenna, with 40-50 articles (Fig. 1.13B); setiger 2 dorsal cirri short, about one-half length of first pair; cirri on setigers 3 and 4 long; on setiger 5 short; on setiger 6 long; on setiger 7 to end of body about two-thirds body width. Ventral cirri thick, foliaceous, extending beyond parapodial lobes (Fig. 1.13B-D).

Remarks. The present record of *Eusyllis blomstrandi* is based on a single anterior fragment from Phase II. Although this species is widely reported from the west coast of North America (Berkeley and Berkeley, 1945; Banse and Hobson, 1968, 1974; Hartman, 1968), Banse and Hobson (1968) noted different pharyngeal morphology compared to that described by both Malmgren (1867) and Imajima (1966c). We suspect that specimens identified as *E. blomstrandi* at least from southern California represent an undescribed species. Efforts to address this issue must await additional, well-preserved specimens and re-examination of Malmgren's specimens.

Distribution. California to Alaska; Japan; Labrador Sea to Massachusetts; Spitsbergen; Iceland; Ireland; Mediterranean Sea.

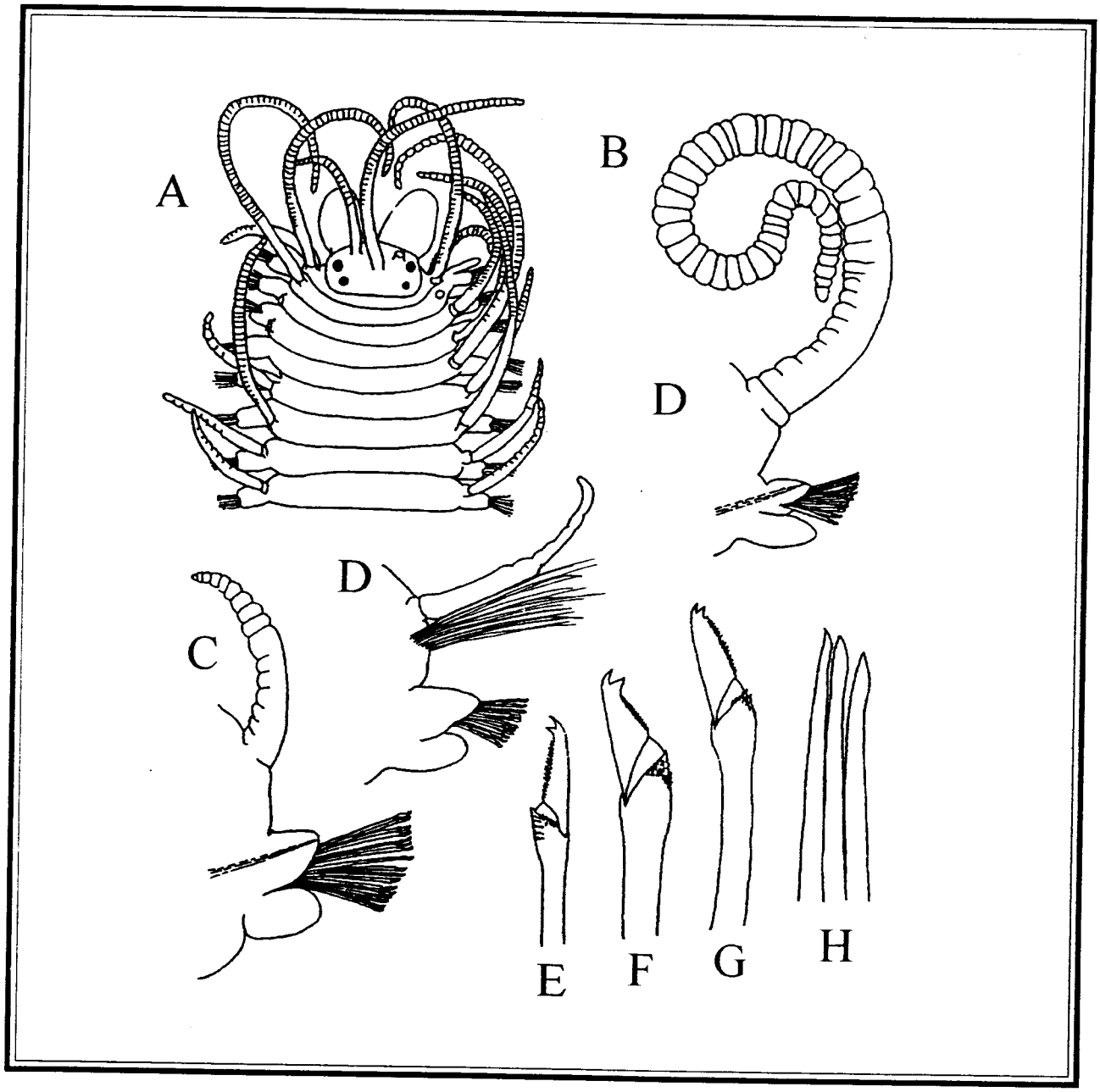

Figure 1.13. *Eusyllis bloomstrandi*: A, anterior end, dorsal view; B, parapodium 1; C, parapodium 15; D, parapodium 17 from epitokous specimen; E, inferior compound falciger, parapodium 1; F, inferior compound falciger, middle body segment; G, superior compound falciger, middle body segment; H, aciculae, parapodium 1. (A-H, modified and redrawn from Hartmann-Schröder, 1971)

Eusyllis habei Imajima, 1966

Figure 1.14

Eusyllis habei Imajima, 1966c:97-99, text-fig. 31, a-k.

Material Examined. California: between Point San Luis and Point Sal, Sta. BRA-25 rock (5, USNM 170904) + (2); off El Morro, Sta. BRA-27 (5, SBMNH 142700); east of Point Conception, Sta. BRC-01 rock (1); off Point Conception, Sta. BRA-02 rock (2); off point San Luis, Stas. R-1 (2, USNM 170905); R-8 (2, USNM 170906); off Point Arguello, Stas. PH-F (5); PH-I (1); PH-U (1); PH-W (4).

Description. Length up to 5 mm, 0.9 mm wide, for 43 setigers (Imajima, 1966c); MMS specimens all incomplete, 2.1 mm long, 0.2 mm wide excluding setae, for 24 setigers. Body pale yellow white in alcohol. Some Japanese specimens with 2 dorsal transverse color bands per segment (Imajima, 1966c); most MMS specimens with 1 black transverse band on anterior edge of each segment, bands sometimes incomplete middorsally. Body fragile.

Prostomium wider than long; 2 pairs of eyes, each circular in outline, arranged trapezoidally, anterior pair set farthest apart (Imajima, 1966c); MMS specimens with conspicuous reddish-brown eyes (Fig. 1.14A). Antennae weakly annulated; median antenna arising between anterior pair of eyes, 4-5 times longer than prostomium; lateral antennae arising from anterior prostomium margin, each about one-half length of median antenna (Fig. 1.14A). Nuchal ridges paired, extending broadly along posterior prostomial border. Palps about as long as prostomium, distally rounded, basally fused (Fig. 1.14A,K). Pharynx extending through setiger 6 when inverted, setiger 3 when everted; ventral rim of everted pharynx with 20-26 denticles, dorsal rim smooth with large, distal, spindle-shaped middorsal tooth, all surrounded by distal circlet of 10 soft papillae (Fig. 1.14B). Proventriculus present in setigers 6 to 9-10, with 23-24 rows of muscle cells, anterior 20 of these large, conspicuous.

Tentacular segment reduced dorsally. Two pairs of tentacular cirri; dorsal pair each about as long as median antenna; ventral pair each about one-third length of dorsal pair (Fig. 1.14A).

Parapodia short, thick, conical (Fig. 1.14C). Compound setae bidentate falcigers with minutely serrated cutting edges (Fig. 1.14D-G). Blades decreasing in length inferiorly within fascicles, posteriorly along body axis. Superior blades of anterior, middle segments oar-shaped, 2-2.5 times longer than inferior blades (Figs. D,E); those of posterior segments shorter, just slightly longer than inferior blades (Figs. F,G). Anterior setigers each with 10-15 superior falcigers with long blades and 20-30 inferior falcigers with short blades; median setigers each with 10 falcigers. Dorsal superior and ventral inferior simple seta present in posterior setigers; dorsal seta capillariform with cutting surface minutely serrated (Fig. H), ventral seta stout, distally bidentate (Fig. I). One to 2 aciculae in anterior parapodia and 1 acicula in median parapodia; distally blunt (Fig. J).

Dorsal cirri of setiger 1 longest, 2 times longer than median antenna, alternating long and short thereafter; long cirri equal to and short ones one-half body width (including parapodia). Ventral cirri of setiger 1 foliaceous, flattened; digitiform from setiger 2 to end of body; all shorter than parapodial lobes.

Remarks. This is the first record of *Eusyllis habei* from the western coast of North America. The MMS specimens generally conform to features previously described, although they are smaller.

Distribution. Southern California; Japan.

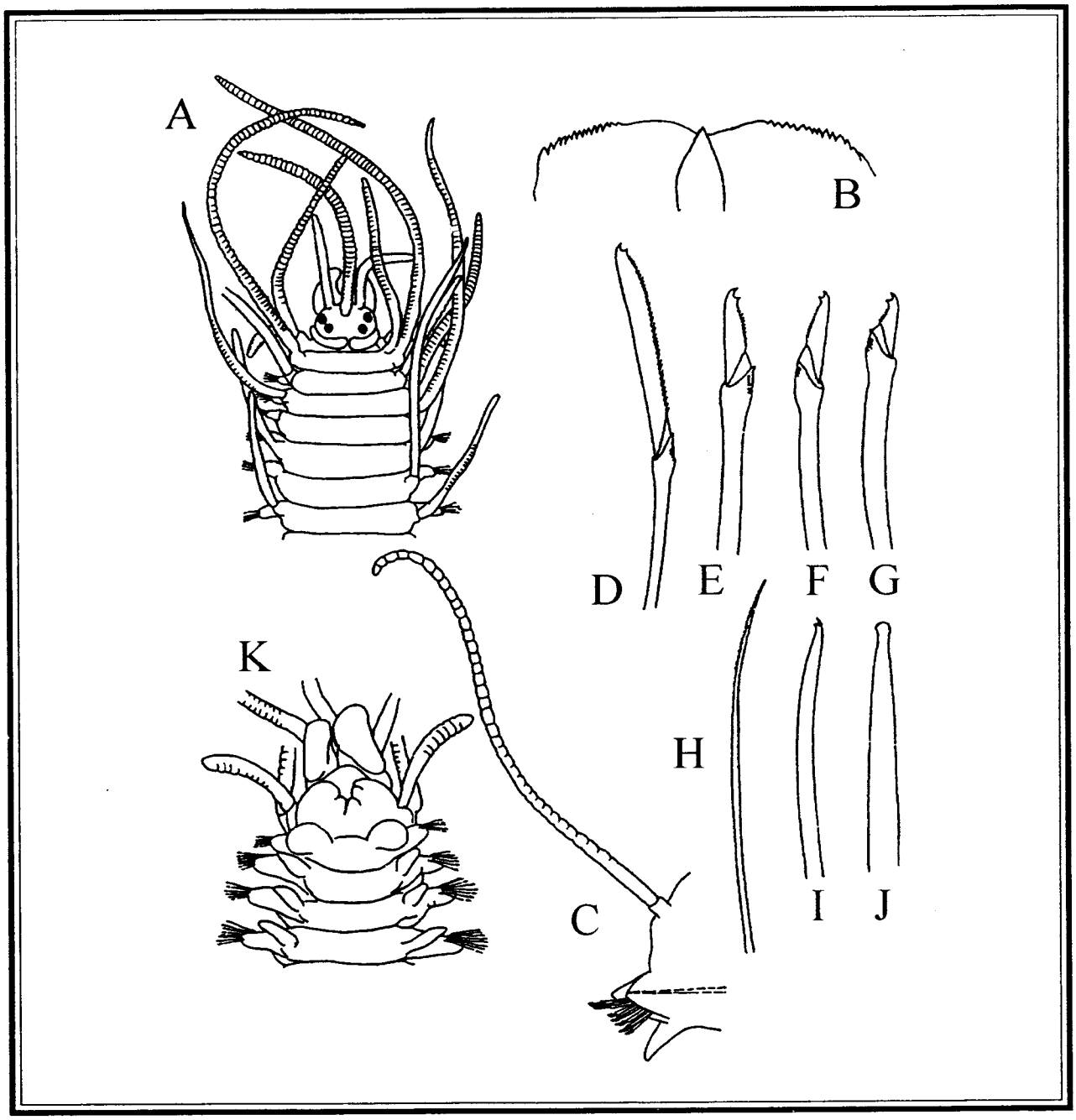

Figure 1.14. *Eusyllis habei*: A, anterior end, dorsal view; B, pharynx, dissected; C, parapodium 18; D, superior compound falciger, middle segment; E, inferior compound falciger, middle segment; F, superior compound falciger, posterior segment; G, inferior compound falciger, posterior segment; H, dorsal simple seta, posterior segment; I, ventral simple seta, same posterior segment as H; J, acicula, median parapodium; K, anterior end, ventral view. (A-K, redrawn from Imajima, 1966c)

Eusyllis longicirrata Imajima, 1966

Figure 1.15

Eusyllis longicirrata Imajima, 1966c:94-97, text-fig. 30, a-f.

Material Examined. California: between Point San Luis and Point Sal, Sta. BRA-25 rock (3, USNM 170907).

Description. Length up to 18 mm, 1.2 mm wide for 87 setigers (Imajima, 1966c); all MMS specimens anterior fragments up to 2 mm long, 0.5 mm wide excluding parapodia for 21 setigers.

Prostomium wider than long, anterior margin slightly rounded, posterior middorsal cleft deep, extending to center of prostomium (Fig. 1.15A); 2 pairs of eyes, red, anterior pair largest, farthest apart. Antennae long, smooth, slender. Median antenna arising from middle of prostomium, 4 times longer than prostomium; lateral antennae arising from anterior prostomial margin, each one-half length of median antenna. Nuchal organs paired, extending along posterior margin of prostomium (Fig. 1.15A). Palps longer than prostomium, narrow, distally rounded, not fused basally (Fig. 1.15A). Everted pharynx extending through 5 or 8 segments in two MMS specimens, with anterior rim minutely denticulate, with middorsal subdistal tooth, surrounded by distal circlet of 10 soft papillae. Proventriculus in setigers 13-21 (Imajima, 1966c; Fig. 1.15B); MMS specimens with proventriculus in setigers 9-17 or 6-14 (8 segments) with 32-34 rows of muscle cells.

Tentacular segment reduced dorsally. Two pairs of tentacular cirri; dorsal pair as long as median antenna; ventral pair each one-half length of dorsal tentacular cirri.

Parapodia elliptical in outline, distally rounded (Fig. 1.15C). Setae compound falcigers (Figs. D,E). Blades distally bidentate with cutting edges minutely serrated; decreasing in length inferiorly within fascicles, superior blades two times longer than inferior blades. Two to 3 aciculae per parapodium, distally pointed, slightly curved (Fig. 1.15F).

Dorsal cirri with long cirriphore, smooth, considerably more slender, longer than both antennae, tentacular cirri (Fig. 1.15A,C); alternating long and short along body. Long dorsal cirri of anterior segments up to 4 times longer than body width, decreasing to 3 times in middle body segments; short dorsal cirri 2 times body width throughout, gradually decreasing in overall length posteriorly. Ventral cirri digitiform, extending beyond parapodial lobes.

Remarks. This is the first record of *Eusyllis longicirrata* from the eastern Pacific. The MMS specimens generally conform to features previously described, although they are smaller.

Distribution. Southern California; Japan.

Genus *Odontosyllis* Claparède, 1863

Type species: *Syllis fulgurans* Audouin and Milne-Edwards, 1833

Diagnosis. Prostomium with 3 antennae. Palps either fused basally or separate. Nuchal organs large, curved ciliated ridges along posterior margin of prostomium. Two pairs of tentacular cirri. Occipital flap usually present. Antennae, tentacular cirri and dorsal cirri smooth. Pharynx with fewer than 20 curved teeth.

Remarks. The key presented below includes all known species, and one new species, from the Pacific coast of North America from California to Alaska. Only *Odontosyllis phosphorea* and *O. fragilis* were encountered in MMS materials.

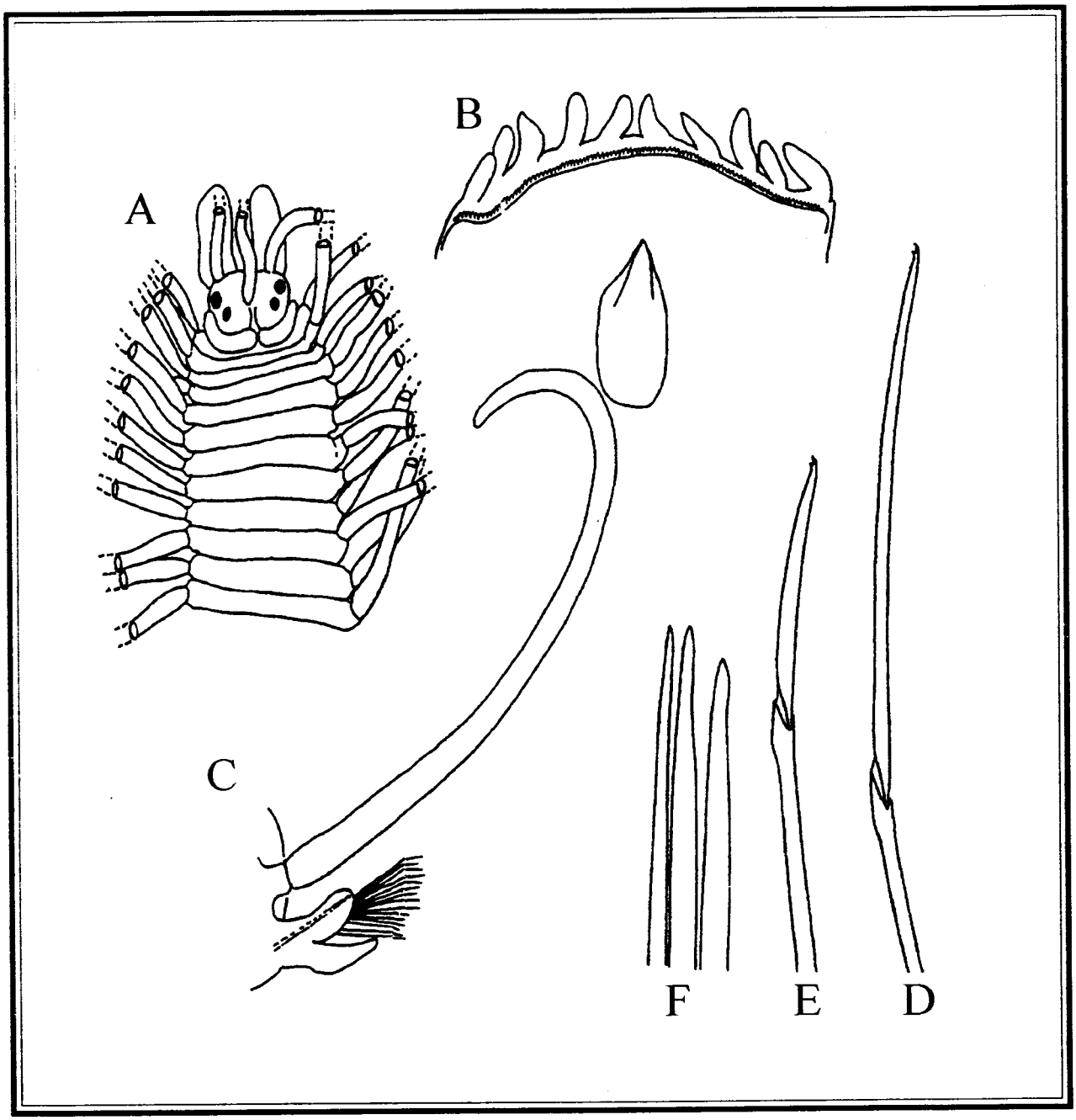

Figure 1.15. *Eusyllis longicirrata*: A, anterior end, dorsal view, distal parts of antennae, tentacular and dorsal cirri omitted; B, pharynx dissected; C, parapodium 11; D, superior compound falciger, parapodium 11; E, inferior compound falciger, parapodium 11; F, aciculae, parapodium 11. (A-F, redrawn from Imajima, 1966c)

Key to Known Species of *Odontosyllis* from the Northeast Pacific (after Banse and Hobson, 1974)

1A. Median antenna arising from anterior prostomium margin; palps small, projecting ventrally, not visible in dorsal view ..... *Odontosyllis parva*

1B. Median antenna arising from dorsal surface of prostomium near anterior pair of eyes (Figs. 1.16A, 1.17A); palps large, projecting anteroventrally, visible in dorsal view (Figs. 1.16A, 1.17A) 2

2A. Proventriculus extending through about 20 segments; blades of bidentate compound falcigers short, cutting edges minutely serrated in anterior fascicles and smooth in posterior fascicles; preserved specimens lack color patterns ..... *Odontosyllis fulgurans japonica*

2B. Proventriculus extending through 10 or fewer segments; blades of bidentate compound falcigers long and short, with cutting edges all serrated or all smooth; preserved specimens usually with dorsal pigmentation 3

3A. Proventriculus extending through 9-10 segments with 60-67 rows of muscle cells; blades of compound falcigers with serrated cutting edges (Fig. 1.16E,G); dorsum with dark pigment spot every third to fourth intersegmental groove or with black transverse line on each of the first 20 segments (Fig. 1.16A); occipital flap with or without black pigment; pharynx with 6 distal teeth (Fig. 1.16B) ..... *Odontosyllis phosphorea*

3B. Proventriculus extending through 12 segments with approximately 300 rows of small, dense muscle cells; blades of compound falcigers with smooth cutting edges (Fig. 1.17F,G); middorsum with a dark pigment spot in middle of every segment including tentacular segment (Fig. 1.17A); occipital flap without black pigment (Fig. 1.17A); pharynx with 5 distal teeth (Fig. 1.17E) ..... *Odontosyllis fragilis*

Odontosyllis phosphorea Moore, 1909

Figure 1.16

Odontosyllis phosphorea Moore, 1909:327.—Berkeley and Berkeley, 1948:82.—Hartman, 1961:76-7; 1968:441-442, figs. 1-3.—Banse, 1972:207-209, fig. 7G-N.—Banse and Hobson, 1974:58, fig. 15c-d.—Blake, 1975:189, pl. 35, fig. 133.

Odontosyllis phosphorea nanaimoensis E. Berkeley, 1923:207; 1961:1321.—Berkeley and Berkeley, 1948:82.—Pettibone, 1967:5.

Hesperalia nans Chamberlin, 1919:9.

Not *Hesperalia californiensis* Chamberlin, 1919:9. *Fide* Hartman, 1961:9.

Not *Odontosyllis phosphorea* Berkeley and Berkeley, 1938:42. *Fide* Banse, 1972:207.

Material Examined. California: Santa Maria Basin, Sta. BRA-16 rock (1); between Point Estero and Point Buchon, Sta. 6, rock (4, SBMNH 142701).—Laguna Beach, holotype of *Hesperalia californiensis* Chamberline, 1919, ovigerous (MCZ 2149); holotype of *Hesperalia nans* Chamberlin, 1919, ovigerous, dried (MCZ 2150).—Santa Catalina Island, type of *Odontosyllis phosphorea* (USNM 17214).—British Columbia: Nanaimo, syntypes of *O. phosphorea nanaimoensis* (15, USNM 32858).

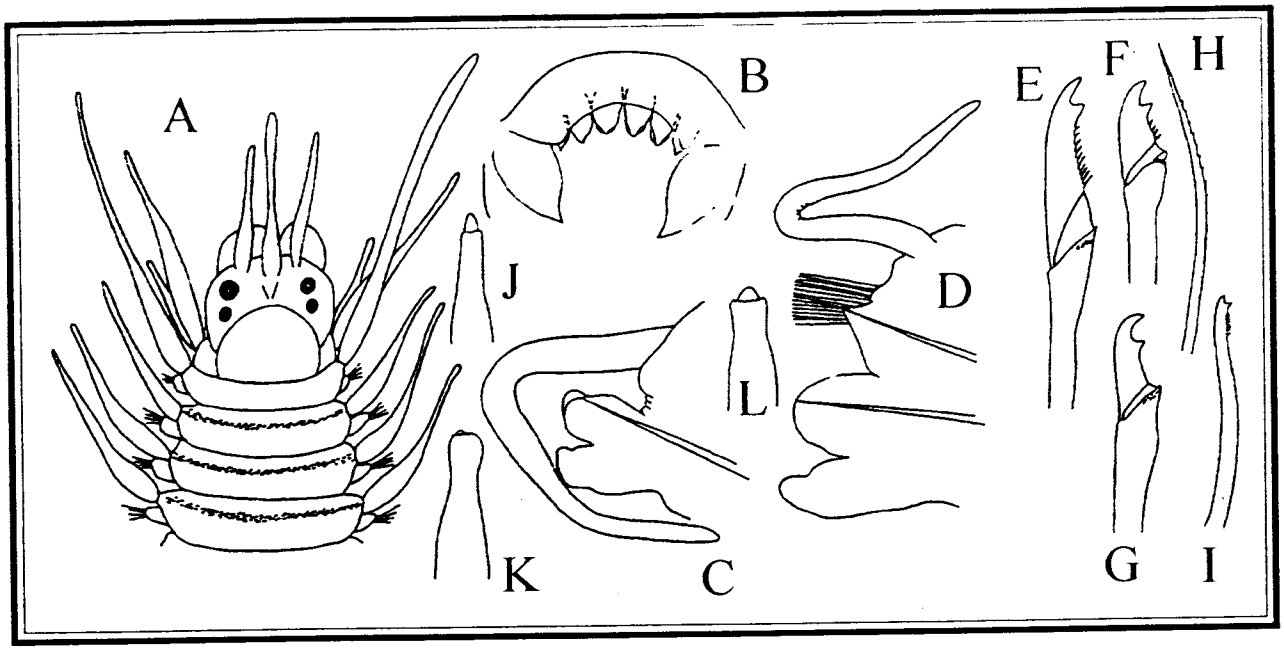

Figure 1.16. *Odontosyllis phosphorea*: A, anterior end, dorsal view; B, teeth and lateral chitinized regions of pharynx, frontal view; C, anterior parapodium; D, medial biramous parapodium from epitokous specimen; E, compound falciger, setiger 10; F, same, setiger 70; G, same, from inferior fascicle; H, dorsal simple seta, posterior segment; I, ventral simple seta, posterior segment; J, acicula, setiger 1; K, same, posterior segment; L, same, setiger 70. (A, modified from Blake, 1975; B, E-F, H-L, redrawn from Banse, 1972; C-D, G, redrawn from Moore, 1909)

Description of Epitokous Form. Length 20 to 30 mm, 2.5 mm wide, for about 90 segments (Moore, 1909; Hartman, 1968); MMS specimens up to 9.5 mm long, 0.7 mm wide excluding parapodia, for 69 setigers. Dorsum arched, ventrum flattened. Color in life variable: pale yellow to ivory with dark or black middorsal spot every third or fourth intersegmental groove or as a black transverse line on each of first 20 setigers followed by faint middorsal pigment spot in each successive medial segment; occipital flap darkly pigmented.

Prostomium small, wider than long; 2 pairs of eyes, black; anterior pair widest apart; posterior pair lying in crescent-shaped patch of dark pigment; all arranged trapezoidally (Fig. 1.16A). Median antenna small, smooth, arising between anterior pair of eyes; lateral antennae smooth, subequal in length and arising slightly anterior to median antenna (Fig. 1.16A). Palps thick, fleshy, projecting ventrally, fused basally. Everted pharynx extending to setiger 6-8, with circlet of 6 distal teeth (Fig. 1.16B). Proventriculus from setigers 7-9 to 17-19; muscle rows ranging from 60-67, depending on body size.

Tentacular segment reduced dorsally, obscured by prostomium, with semicircular occipital flap extending forward to cover anterior pair of eyes (Fig. 1.16A). Two pairs of tentacular cirri, smooth to wrinkled; dorsal pair longest, about 3 times longer than prostomium; ventral pair about one-half length of dorsal pair (Fig. 1.16A).

Parapodia short; uniramous, distally rounded in anterior segments (Fig. 1.16C); biramous in median segments with notopodial lobes triangular, neuropodial lobes rounded (Fig. 1.16D) Setae including compound falcigers with distally bidentate blades with serrated cutting margins, about 30 per anterior fascicle at setiger 10 (Fig. 1.16E), decreasing thereafter to about 24 per median fascicle, and 18 per posterior fascicle (Fig. 1.16F,G). Blade lengths subequal within anterior medial and posterior fascicles; decreasing slightly in overall length from anterior to posterior setigers. Dorsal simple seta distally unidentate, wide, present in last 2-4 setigers of complete specimens (Fig. 1.16H). Ventral simple seta distally bidentate, present in last few posterior

setigers (Fig. 1.16I). Capillary swimming setae long, from setigers 21-22. Neuroaciculae 4 per anterior parapodia (Fig. 1.16J), decreasing to 2 in median and posterior parapodia (Fig. 1.16K,L). Notoacicula thin, tapering distally, deeply embedded, 1 per notopodium of median segments.

Dorsal cirri smooth with short cirriphores; alternating long and short. Ventral cirri thick, distally blunt, projecting slightly beyond parapodial lobes in median segments.

Remarks. *Odontosyllis phosphorea* is a well-defined species commonly associated with rocky habitats from western Canada to southern California that is readily collected using night lights. Banse (1972) reported the cutting edges of compound falcigers in specimens he examined to be serrated, in contrast to Moore's (1909) originally observations and illustration, which is included in this study (Fig. 1.16G); Banse's data are used in the above key.

Hartman (1961) proposed that *Hesperalia californiensis* Chamberlin, 1919, is a junior synonym of *O. phosphorea*. Re-examination of the types of both species by one of us (L. Harris) revealed that *H. californiensis* is a species of *Odontosyllis*, but not *O. phosphorea*. *Odontosyllis phosphorea* differs from *O. californiensis* in having blades of compound setae with secondary teeth located subdistally, rather than at the midpoint of the cutting edge. However, *H. nans* Chamberlin, 1919, has the identical pigmentation pattern and setae that are characteristic of *O. phosphorea*. We suggest that the latter two species are synonyms, although the type of *H. nans* has dried out, and precise comparisons are not presently feasible.

Distribution. Pacific coast, Mexico to British Columbia.

Odontosyllis fragilis Kudenov and Harris, new species

Figure 1.17

Material Examined. California: Western Santa Barbara Channel, east of Point Conception, Sta. BRA-1 rock, holotype (USNM 170918).

Description. Holotype complete specimen 5.4 mm long, 0.3 mm wide excluding setae, with 65 segments in 3 parts: anterior part with 19 setigers; middle part with 15; posterior with 30. Color in alcohol generally white, except for middorsal pigment patch on each segment, including patch under occipital flap on tentacular segment.

Prostomium wider than long, with deep medial cleft along posterior margin; 2 pairs of eyes, lenticulate, connate, arranged trapezoidally; anterior pair largest (Fig. 1.17A). Antennae smooth; median antenna inserted on anterior prostomium margin, longer than prostomium, just anterior to anterior pair of eyes; lateral antennae inserted near anterior edge of prostomium, slightly shorter than median antenna (Fig. 1.17A). Palps large, globular, directed ventrally, basally free, visible in dorsal view (Fig. 1.17A). Pharynx extending to setiger 4 when inverted; with at least 5 curved, subequal chitinous teeth (dissected), 1 middorsal, 2 dorsolateral and 2 ventrolateral in position (Fig. 1.17E). Proventriculus in setigers 5-16, with approximately 300 rows of minute, densely packed muscle cells (dissected) barely visible using 250× magnification.

Tentacular segment dorsally distinct from prostomium and setiger 1, with tongue-shaped occipital flap extending over prostomium, not covering eyes (Fig. 1.17A). Two pairs of tentacular cirri, subequal, smooth and longer than prostomial antennae; dorsal pair longest, each nearly 2 times longer than median antenna (Fig. 1.17A).

Parapodia tapering, with distally truncate presetal lobe extending beyond parapodial lobe in anterior segments (Fig. 1.17B); gradually becoming smaller, distally incised into 2 unequal lobes, superior lobe smallest, associated with acicula in medial and posterior segments (Fig. 1.17C,D,I). All setae compound falcigers (Fig. 1.17F,G), around 10-15 anteriorly, decreasing to about 7-12 posteriorly. Blades similar in size, distally bidentate, increasing slightly in length inferiorly within fascicles (Fig. 1.17F,G). Superior blades with distal tooth smaller than subdistal tooth, becoming larger in inferior blades; smooth cutting edges, although 2 additional,

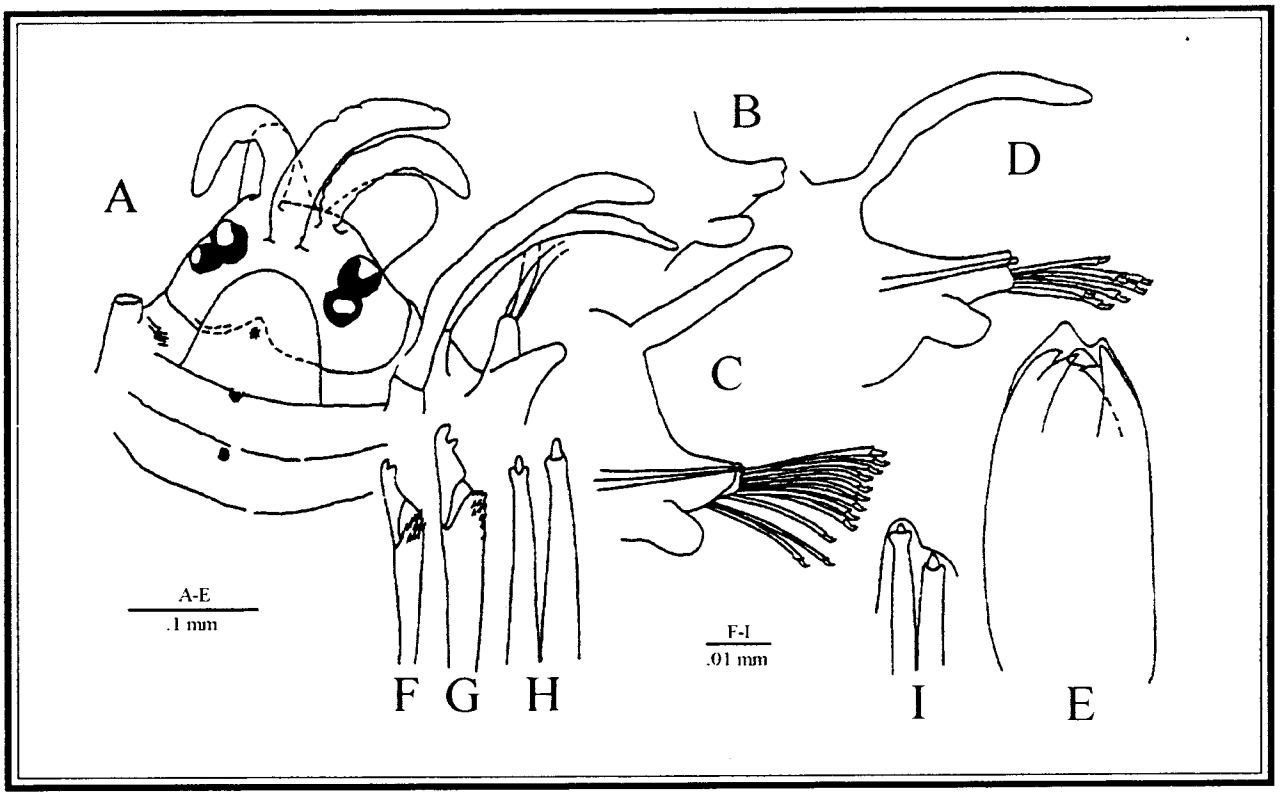

Figure 1.17. ***Odontosyllis fragilis*** **Kudenov and Harris, new species**: A, anterior segments, dorsal view; B, left parapodium, setiger 11, setae omitted, anterior view; C, left parapodium, setiger 11, including dorsal cirrus and setae, anterior view; D, left parapodium, setiger 36, anterior view; E, pharynx, dissected, dorsolateral view; F, superior compound falciger, setiger 11; G, inferior compound falciger, setiger 11; H, paired aciculae, setiger 11; I, paired aciculae embedded in acicular lobe, setiger 11. (A-I, originals by JDK)

small denticles sometimes present on largest inferior blades. Shafts distally inflated, with subdistal spines on superior surfaces, these best developed on superior setae (Fig. 1.17F,G). Two aciculae per parapodium, not projecting through parapodial lobes or cuticle; distally pointed, tip circumscribed by flange or collar (Fig. 1.17H,I).

Dorsal cirri smooth, cirriform, arising from body wall. Ventral cirri thickly digitiform, inflated, not extending beyond parapodium.

Pygidium unknown.

Remarks. *Odontosyllis fragilis* is characterized by the presence of a dorsomedian row of pigment spots from the tentacular segment to the end of the body, 5 subequal chitinous teeth in the pharynx of which one is middorsal, pharynx in setigers 1-4, proventriculus in setigers 5-16 with perhaps 300 rows of small, tightly packed muscle cells that are poorly discernable using 250 × magnification; blades of compound falcigers all distally bidentate with smooth cutting edges, and two acicula per parapodium. The proventriculus is particularly unusual, and is not like those described for known *Odontosyllis* species.

Etymology. The name, *fragilis*, alludes to the fact that specimens are extremely delicate, and seldom remain intact.

Distribution. Southern California.

Type species: *Opisthodonta morena* Langerhans, 1879

Diagnosis. Prostomium with 3 antennae. Palps fused basally. Nuchal organs large, ciliated ridges between prostomium and tentacular segment. Two pairs of tentacular cirri. Antennae, tentacular cirri and dorsal cirri smooth, slender. Pharynx armed with a large middorsal posterior tooth. Some anterior parapodia with thick aciculae.

Remarks. Hartmann-Schröder (1971) reviewed the genus *Opisthodonta* which includes the type species *O. morena* (Langerhans, 1879) and *O. pterochaeta* (Southern, 1914). *Opisthodonta* is polytypic as presently defined: *O. pterochaeta* is more closely allied to the *Streptosyllis*-complex in having huge aciculae terminating in flat, enlarged ends plus thick compound falcigers with short blades confined to anterior segments, and will be assigned to a new genus elsewhere (Dorsey and Kudenov, in preparation); it will not be included in this analysis.

Opisthodonta mitchelli Kudenov and Harris, new species

Figure 1.18

Material Examined. California: Santa Maria Basin, off Point Arguello, Sta. BRA-6, rock, holotype (USNM 170919) + 2 paratypes (LACM-AHF Poly 1674); Stas. BRA-13, rock, paratype (AM W. 22191); BRC-13, rock (1); BRC-14, rock (1); BRA-16 rock, paratype (USNM 170920); BRA-21 rock (1); between Point San Luis and Point Sal, Sta. BRA-25 (2); off El Morro, Sta. BRA-27 (1); off Point Estero, Sta. 1, 2 paratypes (LACM-AHF Poly 1669); off El Morro, Sta. 6, 6 paratypes (LACM-AHF Poly 1670); off Point Arguello, Sta. PH-N (1).—Western Santa Barbara Channel, east of Point Conception, Stas. BRA-1 rock (1); BRC-1 rock, paratype (SBMNH 142659); south of Point Conception, Stas. BRA-2, rock (1); BRC-2, rock (1).

Description. Holotype 9.5 mm long, 0.5 mm wide without parapodia at setiger 7, with 60 setigers. Body coiled, strongly arched dorsally, flattened ventrally; fragile. Body wall pigmentation absent in preserved specimens; pharynx dark reddish brown.

Prostomium subrectangular to pentagonal; 2 pairs of eyes, anterior pair largest, lenticulate, widely separated, in trapezoidal arrangement; additional pair generally present medial to and near bases of lateral antennae, minute, lenticulate, absent in holotype (Fig. 1.18A). Antennae long, smooth; median antenna arising from posterior margin of prostomium, just anterior to nuchal organs, extending posteriorly to setiger 10-11, 2.5-3 times longer than lateral antennae; lateral antennae arising from anterior margin of prostomium, anterior to largest pair of eyes; each 2.5 times longer than prostomium (Fig. 1.18A). Nuchal ridge continuous, conspicuously ciliated, present on posterior prostomial margin (Fig. 1.18A). Palps square, extremely well developed, fused basally; shorter, wider than prostomium (Fig. 1.18A). Pharynx wide, thick-walled, with middorsal tooth in posterior half; extending to setiger 12 when retracted (Fig. 1.18A); when everted, extending to setigers 10-11 with distal circlet of 10 soft papillae (Fig. 1.18B). Proventriculus long, barrel-shaped, in setigers 13-20 (extending to setigers 16-20), with approximately 23-27 rows of muscle cells.

Tentacular segment dorsally distinct from prostomium, not as wide as following segments (Fig. 1.18A). Dorsal tentacular cirri three-fourths length of median antenna; ventral tentacular cirri one-third length of dorsal cirri (Fig. 1.18A).

Parapodia with single anteriorly placed node, usually located over tips of aciculae (not illustrated). Parapodial lobes of setigers 1-12 thick, fleshy, broadly truncate with pronounced ventral lip, appearing crowded and together conveying impression of a modified anterior region (Fig. 1.18A,B); parapodia of median and posterior setigers longer, thinner. Setae generally compound falcigers (Fig. 1.18D,E); blades all bifid, each

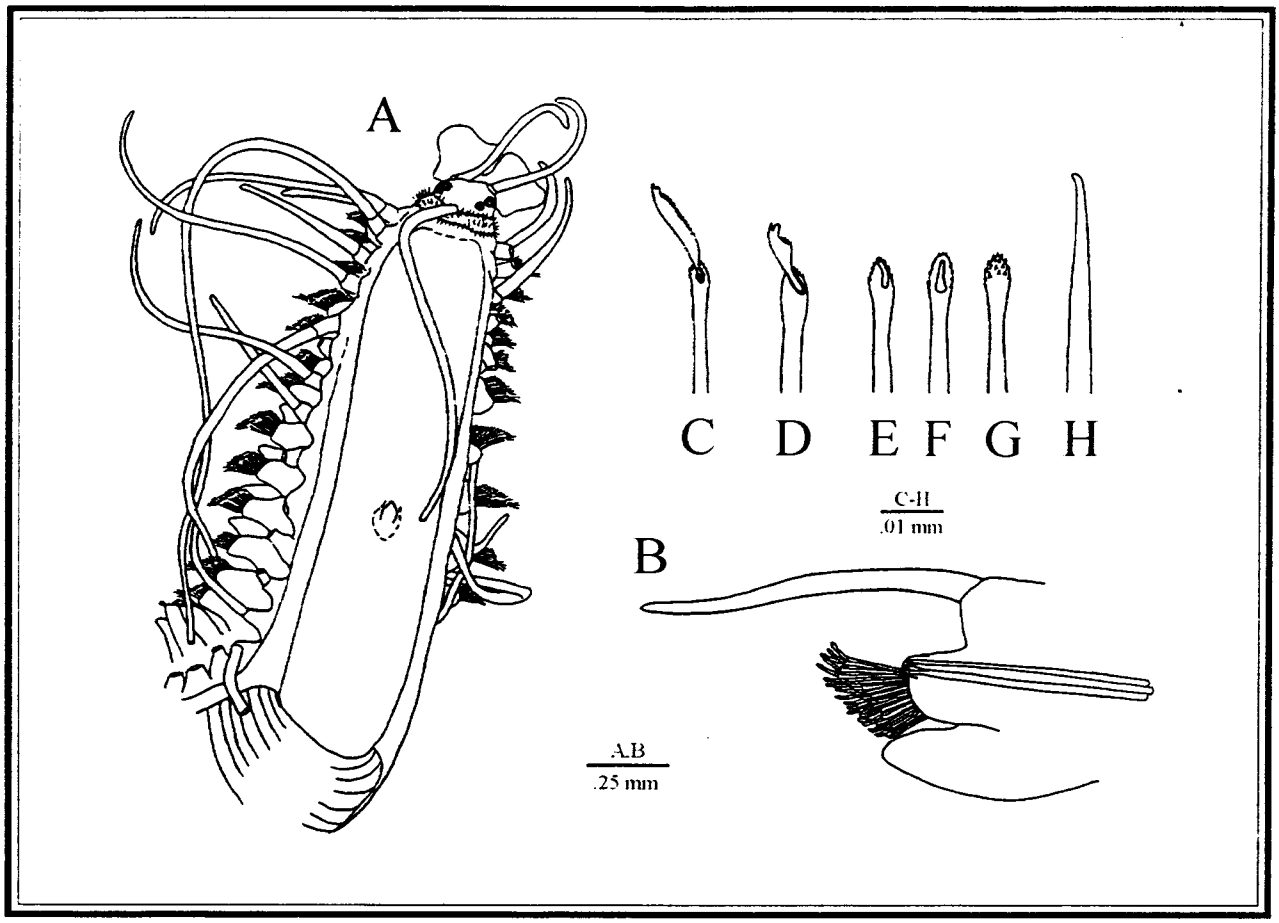

Figure 1.18. ***Opisthodonta mitchelli*** **Kudenov and Harris, new species**: A, Anterior end, dorsal view; B, right parapodium, setiger 4, anterior view; C, superior compound falciger, setiger 4; D, inferior compound falciger, setiger 4; E, shaft tip of compound falciger, posteroventral view; F, shaft tip of compound falciger, ventral view; G, shaft tip of compound falciger, dorsal view; H, Acicula. (A-G, redrawn from originals by J. Dorsey)

with fine, long serrations on cutting edges, suggesting presence of sheath at low magnification. Setigers 1-12 with 3-5 superior falcigers with blades (Fig. 1.18C) 2 times longer than middle and inferior blades (Fig. 1.18D) within fascicles, latter short and numerous, arranged in close-set dorso-ventral rows. Setae of median, posterior setigers consisting of 1-2 superior falcigers with blades slightly longer than others within fascicles, all gradually decreasing inferiorly; median setigers with 7-9 compound setae per fascicle, decreasing to 4-5 posteriorly. Shaft endings all strongly serrated, distally excavate (Fig. 1.18E-F). Dorsal simple seta present in median setigers to end of body, long, slender, tips appearing flattened, distally bifid, gently curved; cutting surface serrated. Ventral inferior seta present in last 10-13 setigers, stout, distally bifid with small superior tooth; cutting surface serrated. Three aciculae per anterior parapodia, of these 2 slightly enlarged, all with bent tips, decreasing to 1 per parapodium in posterior segments (Fig. 1.18H).

Dorsal cirri inserted on small elevations above parapodia, cirrophores conspicuous; alternating in length along body, longest anteriorly, decreasing in overall length posteriorly (Fig. 1.18A). Cirri of setiger 1 largest, extending posteriorly over 17 segments, those of setiger 2 over 6-7 segments (Fig. 1.18A). Longer dorsal cirri of median and posterior setigers extending over 2-3 segments; shorter cirri over 1-2 segments. Ventral cirri large, foliaceous in anterior segments, extending beyond tip of parapodial lobes (Fig. 1.18B), gradually become smaller, digitiform, not extending beyond parapodia in median and posterior segments.

Pygidium semicircular, with 2 long, smooth anal cirri.

Additional details are here provided for small specimens measuring 1.8 mm long, with 22 setigers: pharynx extending to setiger 6; proventriculus present in setigers 12-19; broadly truncate parapodia confined to setigers 1-6. A complete juvenile measures 1 mm long, 12.5 µm wide excluding parapodia, with 13 setigers. Six eyes present. Pharynx inverted, extending to setiger 4. Proventriculus in setigers 5 to anterior setiger 7, with around 25 rows of muscle cells. Truncate parapodia in setigers 1-4 enlarged. Compound falcigers numbering 10 per fascicle in setigers 1-4, blades longest in superiormost 2 to 3 setae; numbering 6-7 per fascicle in median parapodia; and 3 in posterior parapodia. Dorsal superior simple seta beginning in setigers 9-13. Ventral inferior simple seta beginning in setigers 11-13. Dorsal cirri proportionately smaller compared to adults; anterior ones as long as body width; posterior ones 2 times length of the body. Ventral cirri foliaceous in setigers 1-6, transitional in form in setigers 7-8, becoming digitiform in setigers 9-13.

Remarks. *Opisthodonta mitchelli* differs from *Opisthodonta* sp. B (Uebelacker, 1984) in lacking long spiniger-like falcigers, and instead having short-bladed falcigers enclosed by a sheath; continuous instead of paired nuchal organs; aciculae tapering and slightly bent distally instead of being straight and terminating in a distal knob and subdistal flange that is marginally dentate; and foliaceous and digitiform ventral cirri rather than auricular ventral cirri.

Opisthodonta mitchelli also differs from *Opisthodonta* sp. A (Uebelacker, 1984) in lacking aciculae with distally rounded ends and characteristic subdistal clefts, in having the proventriculus longer, extending through 6-7 segments with 23-27 rows of muscle cells, instead of 2-4 segments with 19-23 rows; and in having ventral cirri both foliaceous and digitiform rather than auricular.

Opisthodonta mitchelli differs from *O. morena* in lacking enlarged aciculae in anterior segments; superior compound blades of anterior setigers two times instead of four times longer than middle and inferior blades within fascicles; 23-27 instead of 18-24 rows proventricular muscle cells; and simple setae in median and posterior segments.

One female specimen of *O. mitchelli* (Sta. PH-N) has gametes beginning in setiger 20; all others non-reproductive.

Habitat. Soft bottoms and rocky substrata, in depths of 72-111 m.

Etymology. This species is named in fond memory and honor of Charles "Mitch" Mitchell, Sr., who was a special person to both L. Harris and John H. Dorsey, and whose absence is deeply regretted.

Distribution. Southern California.

Genus *Pionosyllis* Malmgren, 1867

Type species: *Pionosyllis compacta* Malmgren, 1867

Diagnosis. Prostomium with 3 antennae. Palps fused basally or separate. Nuchal organs usually as ciliated ridges along postectal margins of prostomium. Two pairs of tentacular cirri. Antennae, tentacular cirri and dorsal cirri smooth to weakly articulated. Pharynx with a single middorsal tooth; rim smooth.

Remarks. The presence of a smooth, edentate pharyngeal margin or rim is critical to the systematics of *Pionosyllis* species. This character must be determined before specimens can be correctly assigned to this genus. Specimens with retracted pharynges must therefore be dissected to avoid confusion with *Eusyllis*.

Although *Pionosyllis gigantea* Moore, 1908, was not encountered in MMS materials examined, it is widely distributed both latitudinally and bathymetrically from Alaska to southern California (Hartman, 1968), and is included in the key below. *Pionosyllis uraga* Imajima, 1966, has also been found in southern California (L. Harris, personal observation).

Key to the Species of *Pionosyllis* from California

1A. Blades of compound setae at least 3 times longer than basal width (Fig. 1.120C-E) 2

1B. Blades of compound setae short, less than 3 times longer than wide (Fig. 1.19C); antennae arise from anterior prostomium margin (Fig. 1.19A) ..... *Pionosyllis magnifica*

2A. Superior compound falcigers with extremely long, spiniger-like bidentate blades in all segments, 6-10 times longer than inferior blades in fascicles (Fig. 1.20C-E); antennae distally articulated (Fig. 1.20A,B); dorsal cirri irregularly alternating in length along body (Fig. 1.20A) ..... *Pionosyllis articulata*

2B. Superior compound falcigers with blades of uniform length within fascicles; antennae distally smooth; dorsal cirri usually long, not alternating in length along body ..... *Pionosyllis gigantea*

Pionosyllis magnifica Moore, 1906

Figure 1.19

Pionosyllis magnifica Moore, 1906:223-225, pl. 10, figs. 9-11; 1908:325.—Annenkova, 1938:152.—Hartman, 1968:447-448, figs. 1-3.

Eusyllis magnifica Pettibone, 1954:261-262.—Banse and Hobson, 1974:56, fig. 14f.

Material Examined. California: Santa Maria Basin, between Point Estero and Point Buchon, Sta. 6 rock (1, USNM 170923).—Washington: Puget Sound, holotype (USNM 5533).

Description. Length 48 mm, 2 mm wide excluding dorsal cirri and setae, 150 segments (Moore, 1906; Hartman, 1968); MMS specimen 2.5 mm long, 0.3 mm wide for 17 setigers. Body widest in middle body segments, flattened, tapering markedly both anteriorly and posteriorly. Pigmentation absent in preserved specimens.

Prostomium small, depressed, wider than long, subrectangular; 2 pairs of black eyes, anterior pair largest, arranged trapezoidally (Fig 1.19A). Antennae slender, long, arising near anterior prostomium margin; median antenna 3-3.5 times longer than prostomium (lost in MMS specimen); paired lateral antennae each 2-3 times longer than prostomium (Fig. 1.19A). Palps large, projecting anteroventrally, basally fused (Fig. 1.19A). Everted pharynx with subdistal, middorsal tooth plus distal circlet of 10 soft papillae. Proventriculus of MMS specimen present in 4.5 segments.

Tentacular segment distinct, reduced dorsally (Fig. 1.19A), well-developed ventrally as lips. Two pairs of tentacular cirri, long, slender, smooth; dorsal pair 4 times and ventral pair 2.5 times longer than prostomium (Fig. 1.19A).

Parapodia stout, fleshy, distally rounded (Fig. 1.19B), becoming more elongate, conspicuous posteriorly. Setae compound falcigers with bidentate blades (Fig. 1.19C), about 40 per fascicle in median segments where best developed. Blade lengths decreasing inferiorly within fascicles; all with serrated cutting edges. Notoaciculae slender, curved, acutely pointed, 1 per parapodium in median segments, ventral to dorsal cirriphores (Fig. 1.19B); neuroaciculae stout, distally knobbed, 3-4 per parapodium.

Dorsal cirri cirriform, smooth to wrinkled (not annulated), resembling one another throughout; longest in anterior segments, decreasing to about one-half body width in median segments; all with long, pronounced dorsal cirrophores. Ventral cirri short, stout and enlarged, distally blunt, not extending beyond parapodial.

Pygidium small, with paired anal cirri, each the length of the last 12 segments.

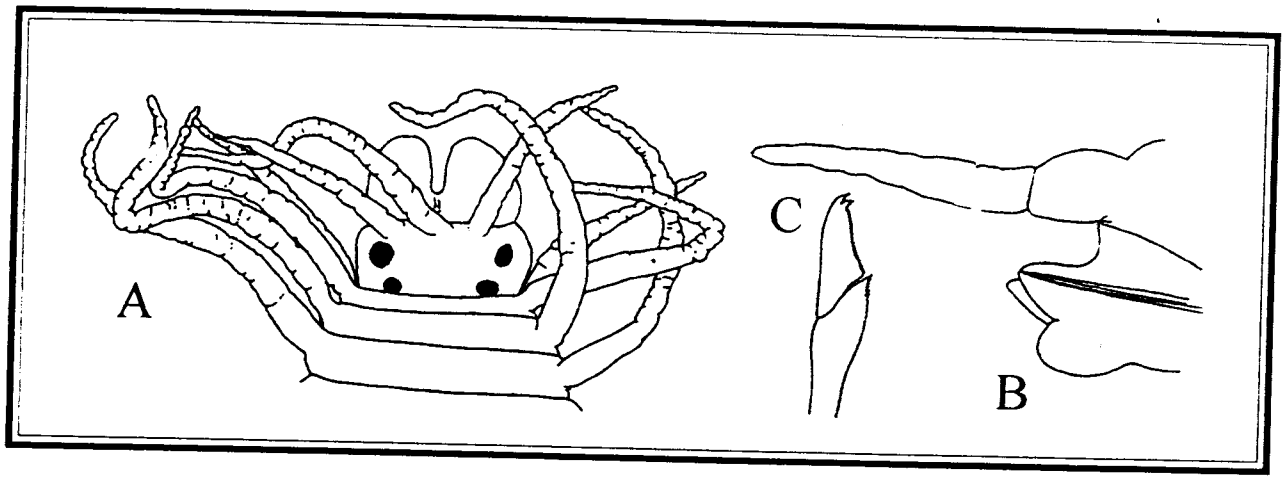

Figure 1.19. *Pionosyllis magnifica*: A, anterior end, dorsal view; B, parapodium; C, compound falciger. (A-C, redrawn from Moore, 1906)

Remarks. *Pionosyllis magnifica* is a long established species normally associated with muddy, sandy and shelly sediments in shallow habitats of Alaska, British Columbia and Washington (Pettibone, 1954; Hartman, 1968; Banse and Hobson, 1974). The single MMS specimen is poorly preserved. Pettibone (1954) referred Moore's species to *Eusyllis* on the basis of its denticulate pharyngeal margin. Examination of Moore's type by one of us (L. Harris) confirmed the presence of a smooth pharyngeal margin, and supports the original placement of this species in *Pionosyllis*.

Habitat. Mud, sand and shelly bottoms, to a depth of 109 m.

Distribution. California; Washington; Alaska.

Pionosyllis articulata Kudenov and Harris, new species

Figure 1.20

Material Examined. California: Santa Maria Basin, off Point Estero, Sta. 2, 3 paratypes (SBMNH 142660) + (4); off Purisima Point, Sta. 42, 1 paratype (USNM 170922) + (9); off Point Buchon, Sta. 12 (6); off Point San Luis, Sta. 22 (1); off Point Sal, Sta. 30, 4 paratypes (AM W. 22192); Sta. 43 (1); off Point Arguello, Sta. 64 (2); off Point Buchon, Sta. BRC-26 Extra, rock, holotype (USNM 170921); off El Morro, Sta. BRA-28 Extra, rock, 6 paratypes (LACM-AHF Poly 1671); off Point Sal, Stas. PJ-1 (3); PJ-2 (4); PJ-5 (1); PJ 6 (5); PJ-7, 13 paratypes (LACM-AHF Poly 1672) + (24); PJ-8 (2); PJ-10 (22); PJ-16 (1).—Western Santa Barbara Channel, off Point Conception, Sta. BRA-2 (1).—Point Loma, head of Coronado Canyon, Army Corp of Engineers, Stas. BD5-2 (3).

Description. Holotype measures 6 mm long, 0.3 mm wide excluding parapodia, 0.5 mm wide with parapodia (at setiger 7); 68 setigers. Body coiled, threadlike; setigers 1-9 each short, usually contracted, parapodia closely spaced, setigers becoming longer from setiger 10 (Fig. 1.20A); dorsum with paired transverse bands of cilia on each segment, conspicuous in reproductive individuals. Pigment absent in preserved specimens; pharynx reddish-brown. Sexually mature specimens with swimming setae beginning on setiger 21, continuing to near end of body; with 2-4 eggs per segment in setigers to far posterior.

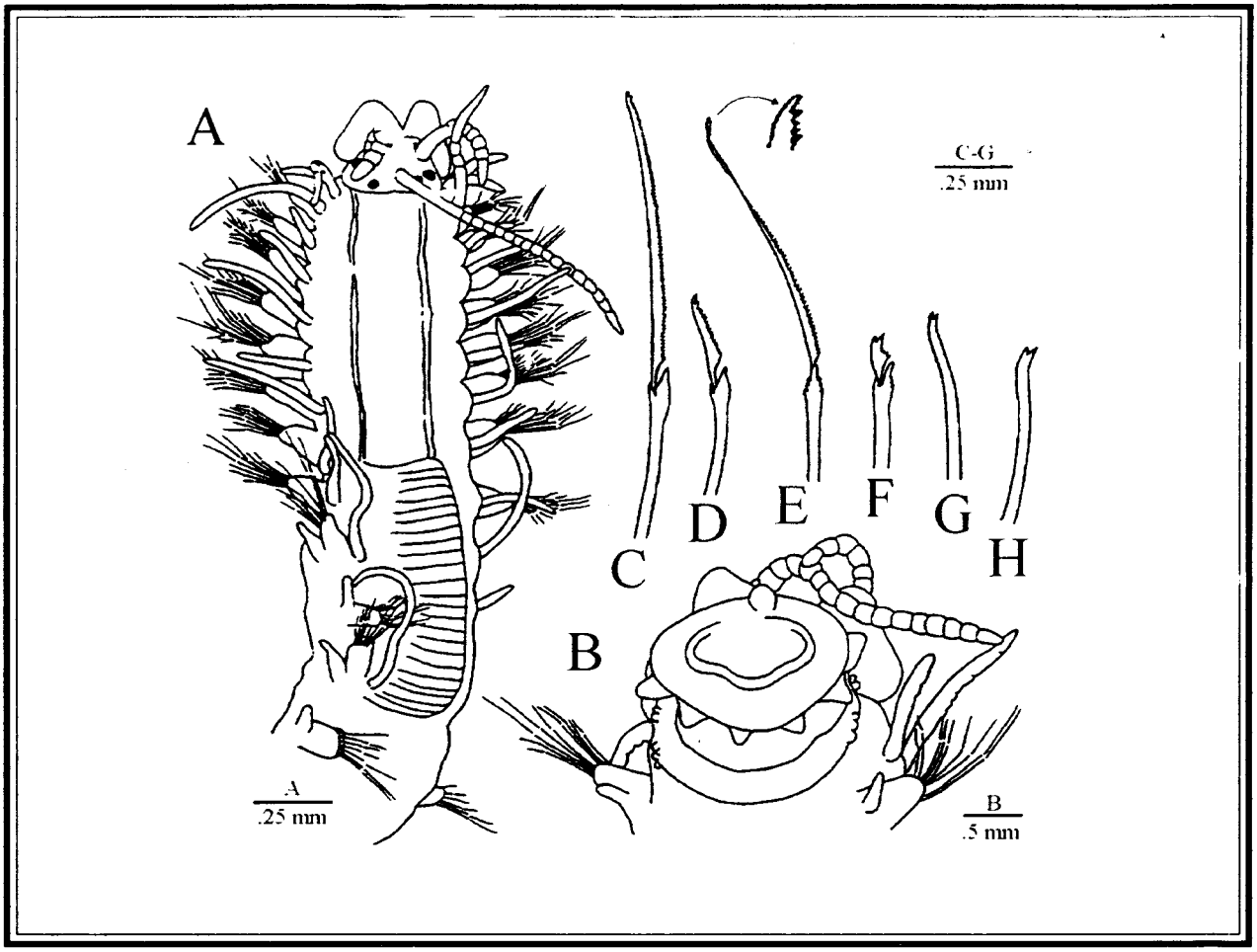

Figure 1.20. ***Pionosyllis articulata*** **Kudenov and Harris, new species**: A, anterior end, dorsal view; B, pharynx and setiger 1, ventral view; C, superior compound falciger, setiger 6; D, inferior compound falciger, setiger 6; E, superior compound falciger, with detail of tip, setiger 40; F, inferior compound falciger, setiger 40; G, dorsal simple seta, setiger 40; H, ventral simple seta, setiger 40. (A-H, redrawn from originals by J. Dorsey)

Prostomium wider than long (Fig. 1.20A); 2 pairs of eyes, in trapezoidal arrangement, anterior pair largest, lenticulate; additional pair of eyespots sometimes present, usually on anterior prostomium margin, anterior and medial to lateral antennae (Fig. 1.20A). Antennae slender, basally smooth (Fig. 1.20A); median antenna long, about 5 times width of prostomium, with about 16 distal articles; arising just posterior to midpoint of prostomium; lateral antennae about one-half length of median antenna, each with 6 distal articles, arising near anterior border of prostomium. Palps large, flattened, rounded anteriorly, slightly fused basally (Fig. 1.20A); distal one-third to one-half usually projecting ventrally. Nuchal organs not observed. Pharynx extending to setigers 6-7, with anterior middorsal tooth; chitinized margin smooth, surrounded by circlet of 10 soft distal papillae, with small papillae-like thickenings on proximal circumoral ring (Fig. 1.20B). Proventriculus extending from setigers 7-8 to 10-12, usually 5 segments in length, with 22-24 rows of muscle cells (Fig. 1.20A).

Tentacular segment as long as setiger 1, usually contracted, with 2 pairs of tentacular cirri, similar in form to prostomial antennae, distal articles sometimes present; dorsal pair longest, each about same length as lateral antennae; ventral pair each about one-third to one-half length of dorsal pair (Fig. 1.20A,B).

Parapodia conical, distally rounded, with small round pre-, and post-setal lobes. Compound setae bidentate falcigers. Blades decreasing in length posteriorly along body and inferiorly within fascicles; blades in setigers 1-19 thin, becoming more stout from setiger 20 to end of body. Distal denticle of short blades in setigers 1-19 somewhat larger than subdistal denticle (Fig. 1.20E); from setiger 20 becoming smaller than subdistal denticle, sharply bidentate (Fig. 1.20F). Cutting edges finely serrated in blades of anterior fascicles, becoming coarser, less numerous in blades of posterior fascicles. Superiormost falcigers with extremely long blades in all setigers, numbering 4-5 in anterior segments, decreasing to 1 posteriorly (Figs. C,D); blades of superior 4-5 compound falcigers within fascicles of setigers 1-19 six times length of those inferiormost (Figs. C,E), increasing after setiger 20 up to 10 times length (Figs. D,F). Dorsal simple seta from setigers 21-22 to end of body, initially unidentate, becoming bidentate posteriorly, with smooth cutting surfaces (Fig. 1.20G). Ventral simple seta from about setiger 36 to end of body, bifid, with smooth cutting surfaces (Fig. 1.20H). Aciculae numbering 2 per anterior parapodia, increasing to 3-4 in posterior segments; anterior ones terminating in diamond-shaped tips, generally becoming distally blunt posteriorly except for one enlarged geniculate form.

Dorsal cirri present on all segments, smooth except for those of setiger 1, which are slightly articulate distally (Fig. 1.20A); irregularly alternating in length all along body (short-long, two short-one long). Those of setiger 1 1.3-1.5 times longer than dorsal tentacular cirri; all generally increasing in length to middle body where longest up to 2.5 times the width of median segments, shortest one-half this width (both estimates excluding parapodia). Ventral cirri of anterior segments digitiform (Fig. 1.20B), not extending beyond parapodial lobes, decreasing to about one-half the length of median, posterior parapodia.

Pygidium with 1 pair of anal cirri, each long, smooth; median digitiform cirrus short.

Remarks. *Pionosyllis articulata* is characterized by the presence of superior compound falcigers with extremely long spiniger-like blades in all setigers; change in shape of falcigers after setiger 19; prostomial antennae distally articulated; dorsal cirri that alternate long and short; acicula increasing in numbers in posterior parapodia; presence of simple superior and inferior setae; and setigers 1-9 apparently shorter than those following. Although the small paired eyespots are usually present on the anterior prostomium, they apparently can occur nearly anywhere on the prostomium or be absent. For example, they may either be located next to the median antenna, or along the posterior prostomium, in addition to the usual location noted above.

Superior compound falcigers with extremely long blades are present in fascicles of *P. articulata*, *P. ehlersiaeformis* Augener, 1913, *P. weismannioides* Augener, 1913, *P. augeneri* Hartmann-Schröder, 1979, *P. longisetosa* Hartmann-Schröder, 1965, and *P. uraga* Imajima, 1966c. *Pionosyllis articulata* differs from these species in having antennae distinctly articulated distally rather than smooth or indistinctly wrinkled. *Pionosyllis articulata*, *P. longisetosa* and *P. uraga* differ from species listed above in having compound setae with long blades in all setigers; these setae are first present in median setigers of *P. ehlersiaeformis*, *P. weismannioides*, *P. augeneri*. Both *P. articulata* and *P. longisetosa* differ from *P. uraga* in that the long blades of compound setae are falcigerous and distally bidentate rather than spinigerous and distally tapered to fine points. *Pionosyllis articulata* differs from *P. longisetosa* in having long, thin, whip-like blades each 6-10 times longer than inferior setae in the same fascicles, rather than wide blades each around 3 times longer than inferior setae; spiniger-like blades with finely serrated cutting edges in contrast to ones with coarsely serrated cutting edges; blades with subdistal tooth well defined instead of being weakly defined; falcigers becoming stout in medial segments rather that being of uniform throughout; simple setae distally bidentate with serrated cutting surfaces instead of distally rounded and unidentate with smooth cutting surfaces; and having dorsal cirri alternating irregularly in length, rather than regularly. *Pionosyllis articulata* further differs from *P. uraga* in having blades of compound falcigers from median segments short, sharply bidentate, rather than butter knife-like and weakly bidentate; and having digitiform ventral cirri instead of foliaceous ones that are broadly attached to parapodial lobes.

The tips of long spiniger-like blades from compound falcigers must be examined using oil immersion. It may be possible to subdivide *Pionosyllis* into a subgenus of species all having long spiniger-like compound setae similar to the way *Ehlersia* has functionally been separated from *Typosyllis* (Uschakov, 1955; Day, 1967; Banse and Hobson, 1974; Uebelacker, 1984; Dorsey and Phillips, 1987). Although such an investigation falls well outside the scope of the present study, it is likely to be both interesting and productive.

Habitat. Soft bottoms and rocky substrata, in depths of 60-205 m.

Etymology. The species name, *articulata*, refers to the characteristic distal articulations of the prostomial antennae, and dorsal cirri of setiger 1.

Distribution. Southern to central California.

Genus *Syllides* Örsted, 1845

Type species: *Syllides longocirrata* Örsted, 1845

Diagnosis. Prostomium with 3 antennae. Tentacular segment frequently collar like and ciliated. Two pairs of tentacular cirri. Some dorsal cirri usually articulated. Setae and aciculae of anterior segments not enlarged. Pharynx usually unarmed, with smooth anterior marginal rim.

Remarks. Banse (1971) reviewed the genus, and provided descriptions, illustrations and a key. The key below includes both *Syllides japonica* Imajima, 1966c, and *S. longocirrata*, which have been reported from Washington and British Columbia (Banse and Hobson, 1974).

Key to Known Species of *Syllides* from the Northeast Pacific

1A. Two kinds of dorsal simple setae present: thick with bent tips in setigers 1-5; thin and distally tapering from setiger 6 to end of body ..... *Syllides longocirrata*

1B. One kind of dorsal simple seta present in all segments (Figs. 1.21D, 1.22R,S) 2

2A. Dorsal cirri with bright, reflective golden yellow pigment in most articles; 20 or fewer articles per dorsal cirrus (Figs. 1.21C, 1.22D-G) 3

2B. Dorsal cirri lack reflective pigment; 20-30 articles per dorsal cirrus ..... *Syllides japonica*

3A. Dorsal cirri with 15-20 spherical articles (Fig. 1.21A,C); median antenna shorter than lateral antennae (Fig. 1.21A); integument with epidermal papillae (Fig. 1.21A); compound and dorsal simple setae lack distal hoods; dorsal simple setae capillary tipped (Fig. 1.21D) ..... *Syllides reishi*

3B. Dorsal cirri with 5-8 tear drop-shaped articles (Fig. 1.22D-G); median antenna longer than lateral antennae (Fig. 1.22A); integument lacking papillae; compound and dorsal simple setae enshrouded by distal hoods (Fig. 1.22R-T); dorsal simple setae distally blunt (Fig. 1.22R-T) .... *Syllides mikeli*

Syllides reishi Dorsey, 1978

Figure 1.21

Syllides reishi Dorsey, 1978:24-26, figs. 1d, 2 a-f.

Material Examined. California: Santa Maria Basin, Sta. BRA-13 rock (1, USNM 170934); off El Morro, Sta. 6 rocks (1).—San Clemente Island, holotype (LACM-AHF Poly 1255) and paratypes (9, LACM-AHF Poly 1256).

Description. Length 2 mm, 0.4 mm wide excluding parapodia, for 30 setigers (Dorsey, 1978). Body golden brown in life, epidermal papillae dark brown. Epidermal papillae small, irregularly shaped, multilobate, abundant on dorsum, becoming numerous on ventrum, infrequent on prostomium, palps, parapodia; absent from intersegmental regions. Articles of dorsal cirri contain golden yellow pigment (Fig. 1.21C).

Prostomium wider than long with pharynx inverted (Fig. 1.21A), pentagonal when everted (Fig. 1.21B); 2 pairs of eyes, lenticulate, subequal in size, anterior pair set farthest apart, all arranged trapezoidally; additional pair of eyespots present on anterior prostomium margin (Fig. 1.21A,B). Antennae smooth to wrinkled; median antenna arising between posterior pair of eyes, up to 1.5 times longer than prostomium; lateral antennae arising in front of and medial to anterior pair of eyes, each 3 times longer than prostomium, two times longer than median antenna (Fig. 1.21A,B). Pharynx extending to setiger 3, unarmed; lacking distal circlet of soft terminal papillae when everted. Proventriculus extending through setigers 4-7 when pharynx inverted.

Tentacular segment distinct dorsally (Fig. 1.21A). Tentacular cirri cirriform, wrinkled, 2 pairs; dorsal pair 1.2 times longer than lateral antennae, nearly 3 times longer than prostomium; ventral pair about as long as dorsal pair.

Parapodia short, conical (Fig. 1.21C). Compound setae bidentate falcigers (Fig. 1.21D,E), 8-9 in anterior fascicles, decreasing to 2-5 in posterior fascicles. Blades longest superiorly, 2 times longer than inferior blades within fascicles, gradually decreasing posteriorly along body; all with minutely serrated cutting edges (Fig. 1.21D). Dorsal simple seta with capillary tip, present from setiger 1, with serrated cutting surface (Fig. 1.21F). Aciculae with distally enlarged tips, 1 per parapodium (Fig. 1.21G).

Dorsal cirri of setiger 1 inflated, wrinkled; strongly articulated from setiger 2 to end of body, with 15-20 articles anteriorly, decreasing to about 10 articles posteriorly. Articles each with 1-2 vesicles, variably present, containing golden-yellow granules (Fig. 1.21C). Ventral cirri digitiform, as long as or longer than parapodial lobes, also containing golden-yellow granules.

Pygidium with paired anal cirri plus median unpaired ventral cirrus; all spherical, equal in size.

Remarks. *Syllides reishi* is a well defined species originally described from San Clemente Island, that seems to be present only in rocky habitats along southern California. Refer to the discussion of *S. mikeli* below for additional comments concerning *S. reishi*.

Distribution. Southern and central California.

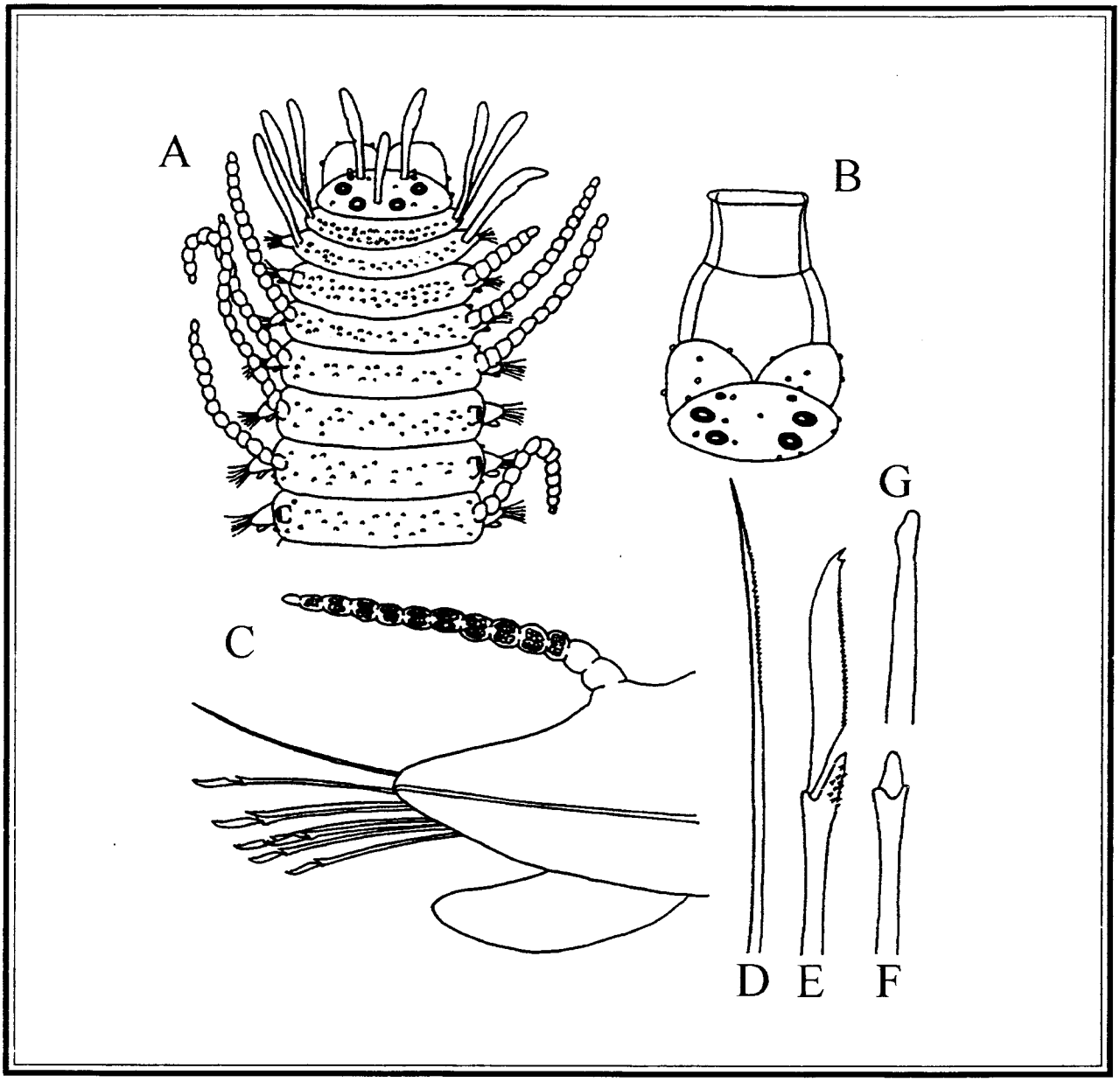

Figure 1.21. *Syllides reishi*: A, anterior end, dorsal view; B, prostomium and everted pharynx, dorsal view; C, parapodium 16, posterior view; D, dorsal simple seta, parapodium 10; E, compound falciger, parapodium 10; F, shaft end of compound falciger, ventral view; G, acicula, parapodium 10. (A-G, redrawn from J. Dorsey, 1978)

Syllides mikeli Kudenov and Harris, new species

Figure 1.22

Material Examined. California: Santa Maria Basin, off Point Sal, Stas. PJ-1, 1 paratype (SBMNH 142662) + (1); PJ-2 (1); PJ-3 (1); PJ-7, holotype (USNM 170931), 1 paratype (USNM 170932), 4 paratypes (LACM-AHF Poly 1676); PJ-8, 1 paratype (LACM-AHF Poly 1677); PJ-10, 1 paratype (AM W. 22195) + (2); PJ-16, 3 paratypes (USNM 170933).

Description. Holotype complete, 1.4 mm long, 0.2 mm wide excluding parapodia, 0.3 mm wide with parapodia, for 26 setigers. Body excluding dorsal cirri white in preserved specimens; articles of dorsal cirri with golden-brown pigment granules in transmitted light, yellow-brown in reflected light. Epidermal papillae absent. Each segment with a dorsal transverse row of cilia.

Prostomium wider than long with pharynx inverted; pentagonal when everted; 3 pairs of eyes, lenticulate, middle pair largest and set farthest apart, posterior 2 pairs arranged trapezoidally; anterior pair associated with lateral antennae (Fig. 1.22A,B). Antennae smooth to wrinkled; median antenna arising between posterior pair of eyes, up to 2 times longer than prostomium; lateral antennae arising in front of and medial to anteriormost pair of lenticulate eyes, each 1.5 times longer than prostomium, two-thirds length of median antenna (Fig. 1.22A). Pharynx extending to junction of setigers 3-4 or through setiger 4, unarmed (Fig. 1.22A); subdistal circlet of 10 soft terminal papillae (Fig. 1.22C), uni- to trilobed when pharynx everted, shape apparently associated with extent of pharyngeal eversion. Proventriculus extending through setigers 4 to 7-8 when pharynx inverted (Fig. 1.22A), from junction of setigers 1-2 through setiger 6 when pharynx everted, with about 46 rows of small muscle cells.

Tentacular segment distinct dorsally, glandular, with anterior margin conspicuously ciliated (Fig. 1.22A,B). Tentacular cirri cirriform, wrinkled to smooth, 2 pairs; dorsal pair about as long as lateral antennae; ventral pair about one-half length of dorsal cirri (Fig. 1.22A,B).

Parapodia narrow, conical (Fig. 1.22D-G). Compound setae bidentate falcigers with minutely serrated cutting edges and hoods covering both cutting edges and distal tips (Fig. 1.22H-Q); hoods well-developed in setae of anterior fascicles. Setae number 10 per fascicle each in setigers 1-2, increasing to 12-14 each in setigers 5-6, decreasing to 8-9 to end of body. Superior blades of anterior setigers narrow, longest, distally twisted (Fig. 1.22H,I,K), 2 times longer than inferior blades within anterior fascicles (Fig. 1.22J,L), gradually decreasing posteriorly along body (Fig. 1.22P,Q); 1-2 per fascicle in setiger 1; 2-3 in setiger 2; 3 in setigers 5-6; 2 from setiger 7 to end of body. Dorsal superior simple seta slender, capillary, present from setiger 1 with minute denticles of long serrated cutting surface covered by long hood (Fig. 1.22R,S), terminating in bubble-shaped capsule around unidentate tip posteriorly (Fig. 1.22T). Ventral inferior simple seta long, capillary, lacking distal hood, present in last few posterior parapodia (Fig. 1.22U). Aciculae distally blunt anteriorly (Fig. 1.22V), with distal knobs posteriorly (Fig. 1.22W), 1 per parapodium.

Dorsal cirri of setigers 1-2 cirriform (Fig. 1.22A), wrinkled to smooth, strongly articulated thereafter to end of body, articles tear drop-shaped, increasing in length to setigers 3-6 (Fig. 1.22D), decreasing gradually thereafter to end of body. Dorsal articles of setiger 3 (= 5); setiger 4 (= 5-6); setiger 5 (= 5-8); setiger 7 (= 4-6); setiger 9 (= 5-6); setiger 19 (= 4-5); each with 1-2 vesicles containing reflective golden-yellow pigment. Ventral cirri digitiform, extending almost to but not beyond end of parapodial lobes (Fig. 1.22D-G).

Pygidium with paired anal cirri plus median unpaired ventral cirrus.

Remarks. *Syllides mikeli*, *S. reishi*, *S. japonica* Imajima, 1966c, and *S. longocirrata* Örsted, 1845 *sensu* Banse (1971) are reported from the western coast of North America. *Syllides mikeli* is superficially similar to *S. reishi* in that both have golden-yellow pigment granules in the articles of the dorsal cirri. *Syllides mikeli* differs from *S. reishi* in having a long median and short lateral antennae rather than a short median antenna and longer laterals; lacking epidermal papillae; having both compound falcigers and dorsal simple

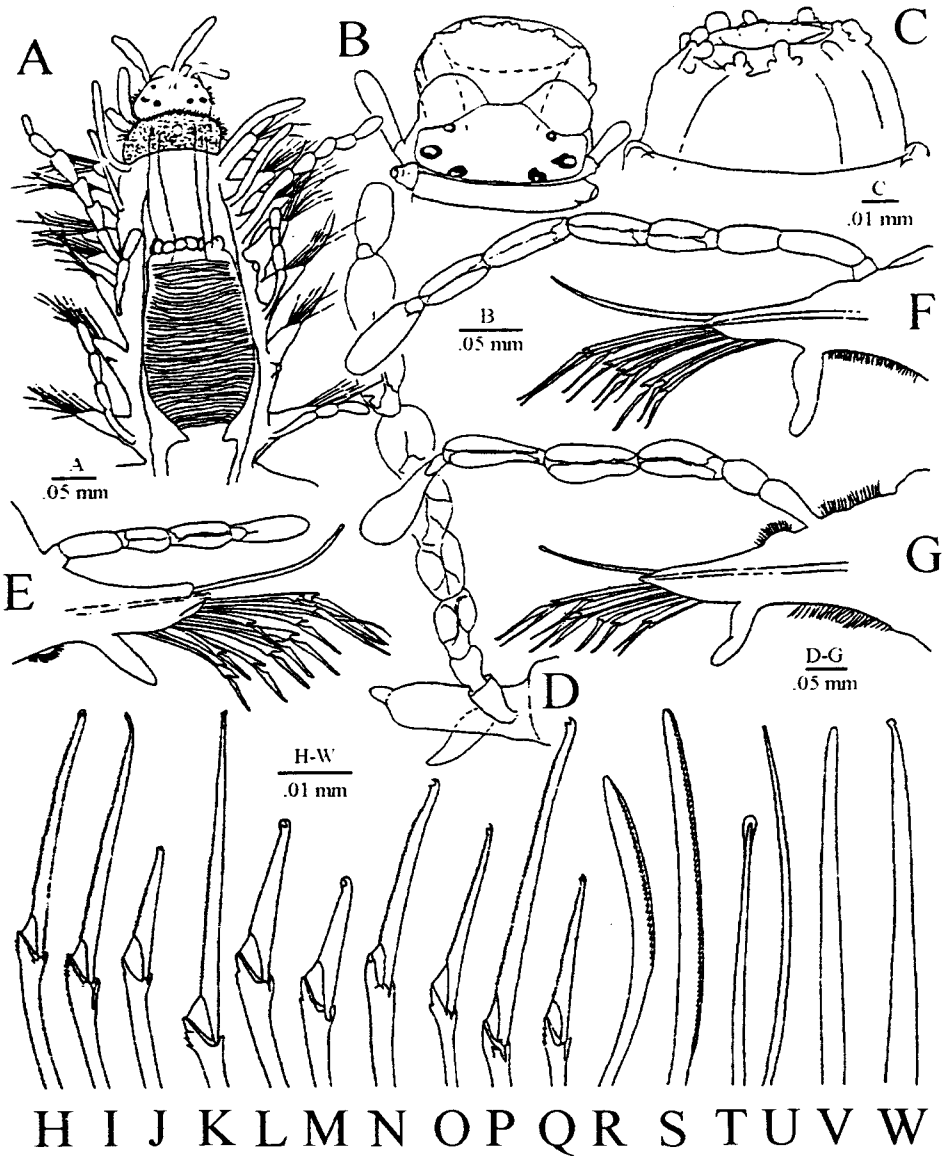

Figure 1.22. ***Syllides mikeli*** **Kudenov and Harris, new species**: A, anterior end, dorsal view; B, prostomium and pharynx everted, dorsal view; C, pharynx, dorsal view; D, left parapodium, setiger 5, dorsal view; E, left parapodium, setiger 7, anterior view; F, right parapodium, setiger 9, anterior view; G, right parapodium, setiger 19, anterior view; H-J, compound falcigers from setiger 1; H-I, superior setae; J, inferior seta; K-M, compound falcigers from setiger 3: K, superior seta; L, intermediate seta; M, inferior seta; N-O, inferior compound falcigers, setiger 6; P-Q, compound falciger from setiger 20; P, superior seta; Q, inferior seta; R-T, dorsal simple setae: R, setiger 1; S, setiger 16; T, setiger 20 with distal hood, dorsal view; U, ventral simple seta, setiger, far posterior segment; V-W, aciculae: V, setiger 2; W, setiger 19. (A-W, originals by JDK)

setae with distal hoods; and in having dorsal cirri with tear drop-shaped rather than spherical articles, and these numbering 5-8 per dorsal cirrus instead of 15-20. *Syllides mikeli* is characteristically associated with soft bottom habitats, in contrast to *S. reishi* which is associated with rocky substrata. *Syllides mikeli* differs from *S. japonica* in lacking 3-4 coarse basal serratia on the blades of superior compound falcigers; in having 5-8 tear drop-shaped instead of 20-30 spherical articles per dorsal cirrus; and in having digitiform rather than ellipsoidal ventral cirri. *Syllides mikeli* differs from *S. longocirrata* as described by Banse (1971) in having a single kind of dorsal superior simple seta instead of two kinds including a thick, stout and distally blunt form in setigers 1-5; in having bidentate rather than unidentate compound setae; and in lacking basal spurs on the blades of superior compound falcigers.

We suspect the five specimens described by Banse (1971) as *S. japonica* represent an undescribed species. For example, the blades of superior compound falcigers of Banse's specimens are five times the length of inferior blades within fascicles rather than two times as reported by Imajima (1966c); the number of setae per fascicle number 10-20 rather than 5-12; the proventriculus extends through 6 segments and not 4-5; and that number of articles in dorsal cirri number 10-20 instead of 20-30. Banse's materials need to be re-examined with these differences in mind.

Etymology. This species is named for Tim Mikel, ABC Laboratories, Ventura, California, in appreciation of his friendship to the first author.

Distribution. Central California.

Subfamily Syllinae

Genus *Ehlersia* Quatrefages, 1865

Type species: *Syllis sexoculata* Ehlers, 1864

Diagnosis. Prostomium with 3 antennae. Two pairs of tentacular cirri. Antennae, tentacular cirri and dorsal cirri of anterior segments articulated. Pharynx with subdistal middorsal tooth and smooth anterior marginal rim. Compound setae falcigerous, with superior blades spiniger-like in appearance, at least 4 times longer than inferior blades within fascicles of median and posterior parapodia. Two simple setae per median and posterior setal fascicles.

Remarks. Compound setae with extremely long blades invariably have blunt unidentate, knobbed or minutely bidentate tips, are present in the superiormost region of fascicles, and are most appropriately described as compound falcigers. Previous reports of compound spinigers tend to refer to these setae (Uebelacker, 1984; Dorsey and Phillips, 1987).

Dorsey and Phillips (1987) note that *Ehlersia* and *Typosyllis* differ primarily in the respective presence or absence of falcigers with long blades, and this trait has been used by other workers (Imajima, 1966e; Gardiner, 1976; Ben-Eliahu, 1977; Fauchald, 1977). Banse and Hobson (1974) first used blade ratios (4.0) within fascicles to separate species of these genera, as do Dorsey and Phillips (1987); Uebelacker (1984) uses a higher ratio (5.0). Preliminary morphometric data provided by Dorsey and Phillips (1987:155, 159) seem to support the use of setal ratios, although it is not possible to assess their data with regard to body size. A more rigorous multivariate analysis of setal variation in both of these taxa may substantiate the validity of this approach (see Vogt and Kudenov, 1994).

Key to the MMS Species of *Ehlersia* from the Northeast Pacific

1A. Prostomium with 3 pairs of eyes (Fig. 1.23A); blades of superior compound falcigers from midbody segments 4 times longer than inferior blades within fascicles (Fig. 1.23G,E); proventriculus in 6-9 segments with 30-36 rows of muscle cells ..... *Ehlersia heterochaeta*

1B. Prostomium without eyes (Fig. 1.24A,C); blades of superior compound falcigers from midbody segments 10 times longer than inferior blades within fascicles (Fig. 1.24G,H); proventriculus in 4-7 segments with 40-43 rows of muscle cells ..... *Ehlersia hyperioni*

Ehlersia heterochaeta (Moore, 1909)

Figure 1.23

Syllis (Ehlersia) heterochaeta Moore, 1909:322-325, pl. 15, figs. 1-5.—Treadwell, 1914:176.—Rioja, 1941:694-695.—Berkeley and Berkeley, 1948:76, fig. 113.—Banse and Hobson, 1974:62, fig. 16 k-l.—Dorsey and Phillips, 1987:153-156, fig. 1 a-h.

Syllis heterochaeta Moore, 1923:256.

Ehlersia heterochaeta: Hartman and Barnard, 1958:21, 55.

Langerhansia heterochaeta: Hartman and Barnard, 1960:90, 276.—Hartman, 1963:17; 1968:435-434, figs. 1-7.

Syllis (Ehlersia) cornuta: Pettibone, 1954:253, fig. 28f (in part). *Not* Rathke, 1843.

Syllis cornuta: Pettibone, 1963:118, figs. 31i,j (in part). *Not* Rathke, 1843.

Material Examined. California: Santa Maria Basin, Sta. BRA-16 rock (1, USNM 170935); off Point Buchon, Sta. 12 (1, SBMNH 142702); off Point Sal, Sta. 30 (2); off Purisima Point, Sta. 42 (1; USNM 98785); Santa Maria Basin, Sta. 52 (1); off Point Arguello, Stas. 64 (1); Sta. 72 (1; USNM 98784); off Point Sal, Stas. R-8 (4, USNM 170936); PJ-1 (1); PJ-2 (2); PJ-3 (2); PJ-6 (7); PJ-7 (5); PJ-8 (5); PJ-10 (2); J-11 (2).—San Nicolas Island, holotype (USNM 17400).

Description of Atoke. Length about 30 mm, 2 mm wide, for 80 segments (Moore, 1909; Dorsey and Phillips, 1987); MMS specimens 12 mm long, 0.6 mm wide without setae, for 110 segments. Large black pigment patch on posterior prostomium sometimes absent.

Prostomium pentagonal, wider than long; 3 pairs of eyes, middle pair largest, posterior pair lenticulate, all in trapezoidal arrangement; additional pair of eyes present as pigment specks on anterior margin (Fig. 1 23B,C). Antennae strongly articulated; median antenna long, with 13-26 articles, arising between 2 posterior pairs of eyes; lateral antennae arising from anterior prostomium margin, in front of, slightly medial to largest pair of eyes, each with 10-17 articles (Fig. 1.23B,C). Palps large, triangular, distally round, not fused basally. Everted pharynx with anterior unpaired tooth, surrounded by distal circlet of 10 soft papillae when everted. Proventriculus present in 6-9 setigers, with 30-36 rows of muscle cells.

Tentacular segment dorsally distinct from prostomium and setiger 1; 2 pairs of tentacular cirri with numerous articles, resembling antennae; dorsal pair each with 17-21 articles; ventral pair each with 9-12 articles (Fig. 1.23B,C).

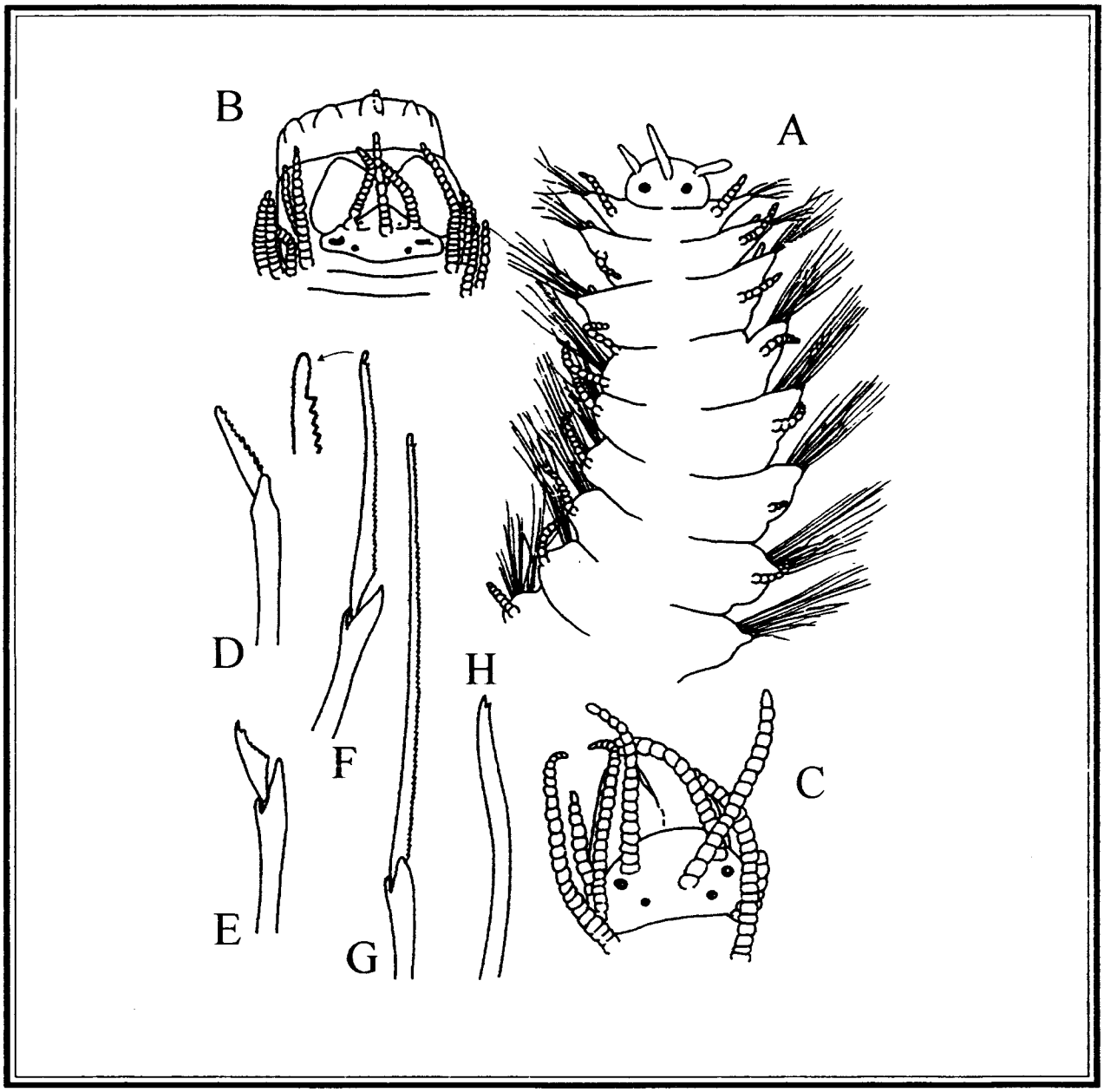

Figure 1.23. *Ehlersia heterochaeta*: A, anterior end, male epitoke, dorsal view; B, anterior end, atoke, dorsal view; C, anterior end, atoke, dorsal view; D, inferior compound falciger, anterior segment; E, inferior compound falciger, posterior segment; F, superior compound falciger, anterior segment, with detail of tip; G, superior compound falciger, posterior setiger; H, ventral simple seta, posterior setiger. (A-H, after Dorsey and Phillips, 1987).

Parapodia distally rounded. Compound setae bidentate falcigers (Fig. 1.23D-G), with 10-16 to 21-28 setae per anterior fascicle, decreasing to 6-7 per posterior fascicle. Blades decreasing in length inferiorly within fascicles. Superiormost falcigers with longest blades 3-4 times length of inferiormost blades within fascicles, numbering 3-4 per anterior fascicle decreasing to 2 per posterior fascicle, each with subterminal tooth round, poorly defined and finely denticulate cutting edges (Fig. 1.23F,G); middle, inferior blades short, sharply bidentate, with cutting edges coarsely serrated (Fig. 1.23D,E). Dorsal simple seta distally unidentate, present in median segments to end of body. Ventral simple seta distally bidentate, present in last few posterior segments (Fig. 1.23H). Five to 7 aciculae per anterior parapodium, decreasing to 1-2 per posterior parapodium.

Description of Epitoke. Male epitoke 8.7 mm long, 0.8 mm wide including parapodia (Dorsey and Phillips, 1987). Prostomium oval; 1 pair of eyes, lenticulate; antennae smooth with median antenna arising anterior to eyes, about two times longer than lateral antennae, which arise anterolaterally from prostomial border (Fig. 1.23A). Parapodial lobes conical. Compound falcigers distally bidentate, resembling those described for atokous form; 4-7 per fascicle including 1-2 superior setae with long blades 3-4 times length of inferior ones, latter with short blades strongly bidentate. Cutting edges of superior blades finely serrated; inferior blades coarsely serrated. One acicula per parapodium, thick, distally pointed, yellow. Long capillary swimming setae from setiger 3. Dorsal cirri articulated, long cirri with up to 11 articles alternating with short cirri with up to 8 articles. Ventral cirri digitiform, not extending to ends of parapodial lobes. Pygidium with paired anal cirri, each with 21 articles; ventromedian cirrus digitiform.

Remarks. *Ehlersia heterochaeta* is widely distributed along the Pacific coast of North America where it commonly inhabits mixed sediments. Dorsey and Phillips (1987:153) state that the holotype of *E. heterochaeta* is missing and established a neotype (ANSP 3328). In actuality, the holotype is at the National Museum of Natural History, Smithsonian Institution (USNM 17400; Loi, 1980). *Ehlersia heterochaeta* is also discussed below in the remarks for *E. hyperioni* (Dorsey and Phillips).

Habitat. Mixed sediments in shelf and canyon depths, 15-409 m.

Distribution. Western Mexico to Western Canada.

Ehlersia hyperioni (Dorsey and Phillips, 1987)

Figure 1.24

Syllis (Ehlersia) hyperioni Dorsey and Phillips, 1987:156-159, fig. 2 a-c, fig. 3 a-k.

Material Examined. California: western Santa Barbara Channel, Sta. 46 (1, USNM 000000); east of Point Conception, Sta. 94 (1, SBMNH 142904).—Santa Monica Bay, holotype (LACM-AHF Poly 1436); 3 paratypes (LACM-AHF Poly 1437-1439).

Description. Length up to 21.6 mm, 0.4 mm wide including parapodia at level of proventriculus, for 122 setigers (Dorsey and Phillips, 1987); MMS specimens anterior fragments, up to 3 mm long, 0.3 mm wide excluding parapodia and setae, for up to 22 setigers. Body long, threadlike; tan in color, occasionally with specks of dark pigment in dorsal cirri of anterior and median segments, parapodia, ventral cirri; pharynx orange-brown.

Prostomium wider than long, anterior margin with palps indistinct; eyes absent (Fig. 1.24A-C). Antennae with short ceratophores; median antenna arising from middle of prostomium, with up to 26 articles; lateral antennae two-thirds length of median, with 11-13 articles (Fig. 1.24A-C). Palps long, twice length of prostomium, fused basally (Fig. 1.24A,B). Retracted pharynx extending to setiger 13, with anterior middorsal tooth; surrounded by distal circlet of 10 soft papillae when everted (Fig. 1.24C). Proventriculus extending

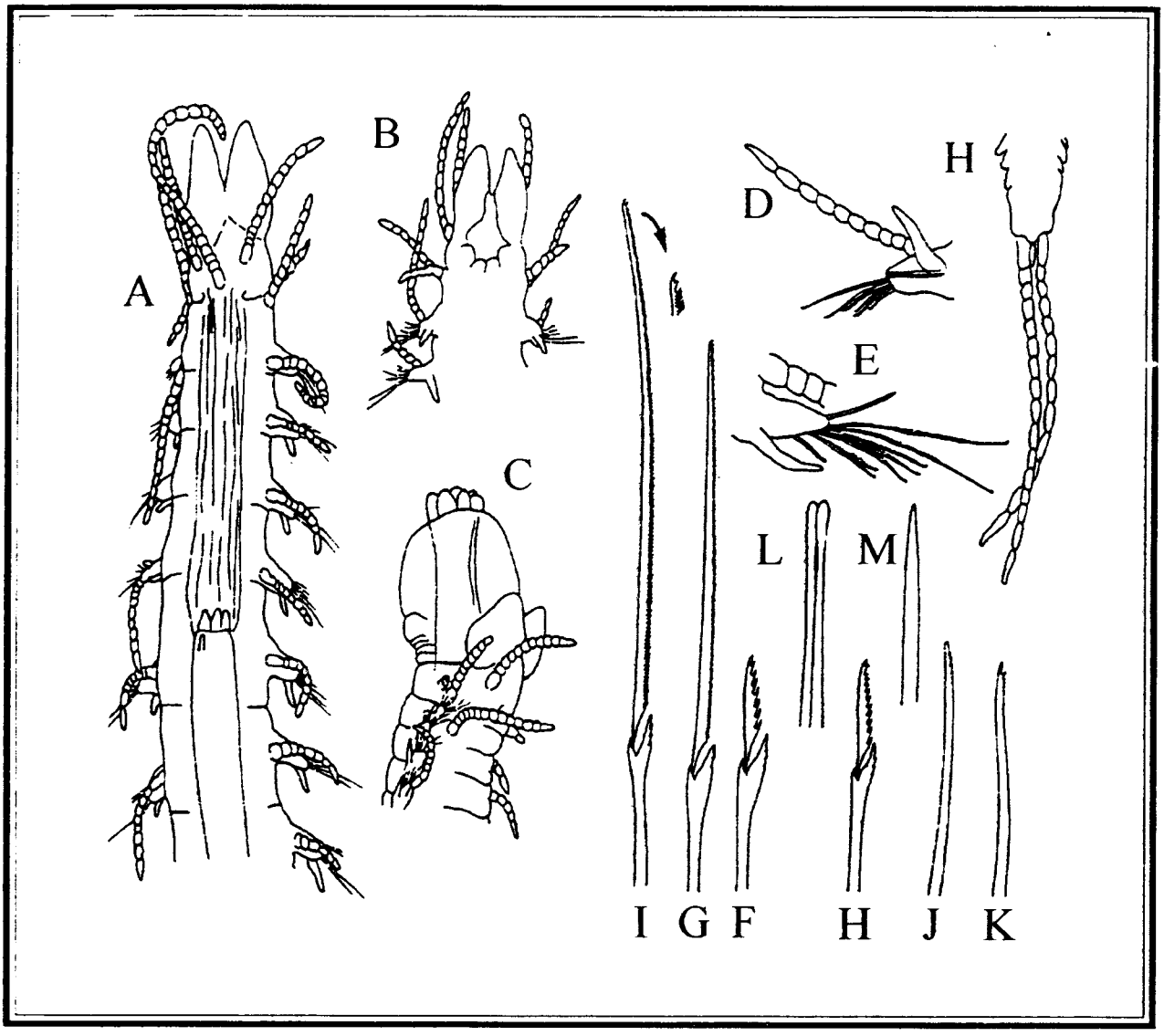

Figure 1.24. *Ehlersia hyperioni*: A, anterior end, holotype, dorsal view; B, anterior end, holotype, ventral view; C, anterior end, lateral view; D, left parapodium, setiger 9, posterior view; E, right parapodium, setiger 78, posterior view; F, inferior compound falciger, anterior setiger; G, superior compound falciger, posterior setiger; H, inferior compound falciger, posterior setiger; I, superior compound falciger, posterior setiger, with detail of tip not to scale; J, dorsal simple seta, posterior setiger; K, ventral simple seta, posterior setiger; L, paired aciculae, anterior setiger; M, acicula, posterior setiger; N, pygidium, holotype, dorsal view. (A-N, modified from Dorsey and Phillips, 1987)

through setigers 10-16 when pharynx inverted, 13 segments long when everted; 40-43 rows of muscle cells.

Tentacular segment distinct from prostomium, not fused to setiger 1; 2 pairs of cirri, with short cirrophores, dorsal pair longest, each with 7-15 articles; ventral pair each with 4-9 articles (Fig. 1.24A-C).

Anterior setigers 1.5 times wider than long (Fig. 1.24A). Anterior parapodial lobes conical, distally blunt, with small pre- and postsetal lobes, gradually becoming longer posteriorly (Fig. 1.24D,E). Compound falcigers distally bidentate (Fig. 1.24F-I), 8-11 per anterior fascicle, decreasing to 5-7 per posterior fascicle. Blades decreasing markedly in length inferiorly within fascicles. Superiormost blades 2-3 per fascicle, increasing in length posteriorly along body, each 6-8.5 times longer than inferior blades, with finely denticulate cutting

edges (Fig. 1.24G,I); inferior blades with cutting edges more coarsely serrated (Fig. 1.24F,H). Dorsal simple seta from middle setigers to end of body, unidentate, with coarsely serrated cutting surfaces (Fig. 1.24J). Ventral simple seta in posterior setigers, sigmoid, distally bidentate, with finely serrated cutting surface (Fig. 1.24K). Two aciculae per anterior parapodium, each distally blunt, sometimes dark (Fig. 1.24L), decreasing to 1 per posterior parapodium, stouter with pointed tips (Fig. 1.24M).

Dorsal cirri longest anteriorly, gradually decreasing posteriorly, not alternating in length, with short cirriphores; anterior cirri with 7-13 articles, middle and posterior cirri with 7-9 articles. Ventral cirri digitiform, short anteriorly, becoming longer posteriorly, extending just to end of parapodial lobes.

Pygidium with paired anal cirri, each with basal cirrophores and up to 18 articles; midventral unpaired papilla digitiform (Fig. 1.24N).

Remarks. *Ehlersia hyperioni* and *E. heterochaeta* are sympatric. *Ehlersia hyperioni* differs from *E. heterochaeta* in lacking eyes, and in having superior blades of compound falcigers from middle body segments up to 10 times longer than inferiormost blades of the same fascicle in contrast to four times longer in the same body region. Dorsey and Phillips (1987) provide morphometric data describing blades of compound setae for both of these species.

Habitat. In mixed to fine sediments on the continental shelf, 12-146 m.

Distribution. Southern California to Washington.

Genus *Eurysyllis* Ehlers, 1864

Type species: *Eurysyllis tuberculata* Ehlers, 1864

Diagnosis. Body short, flattened. Prostomium with 3 globular antennae. Palps globular, not fused basally. Two pairs of globular tentacular cirri. Pharynx with a trepan of 10 teeth and a middorsal tooth. Dorsal cirri globular. Dorsum covered with longitudinal rows of globular papillae.

Remarks. Hartman (1965:28) assigned *Eurysyllis,* without comment or subsequent discussion, to her new subfamily Eurysyllinae, from the Syllinae. The genus has also been associated with the Exogoninae. Hartmann-Schröder (1971) noted Hartman's subfamily and that *Eurysyllis* differs from Exogoninae species in palp morphology and pharyngeal armature, although its reproduction is more characteristic of the Syllinae. Garwood (1991) synonymized the Eurysyllinae with the Syllinae, formally transferring *Eurysyllis* to the Syllinae primarily on the basis of reproductive similarities. Garwood's revision is followed here.

Eurysyllis spicum Kudenov and Harris, new species

Figure 1.25

Material Examined. California: Santa Maria Basin, off Purisima Point, Stas. BRA-20, paratype (SBMNH 142655); BRC-13, holotype (USNM 170901); between Point San Luis and Point Sal, Sta. BRA-25, paratype (USNM 170902).—Western Santa Barbara Channel, off Point Conception, Sta. BRA-2, paratype (LACM-AHF Poly 1660).

Description. Holotype 2.2 mm long, 0.4 mm wide, without parapodia, 0.6 mm wide with parapodia, for 49 setigers; paratypes with 56-66 setigers. Body ribbon-like, dorsum slightly arched in cross section, ventrum flat; pigmentation absent in preserved specimens. Integument encrusted with fine sediment; thin, delicate, transparent, internal septa visible. Golden-brown granules in antennae, cirri and papillae of freshly preserved specimens (Fig. 1.25A). Sexual reproduction by stolons, beginning on setiger 40; sperm fill all but last 2-3 segments in males.

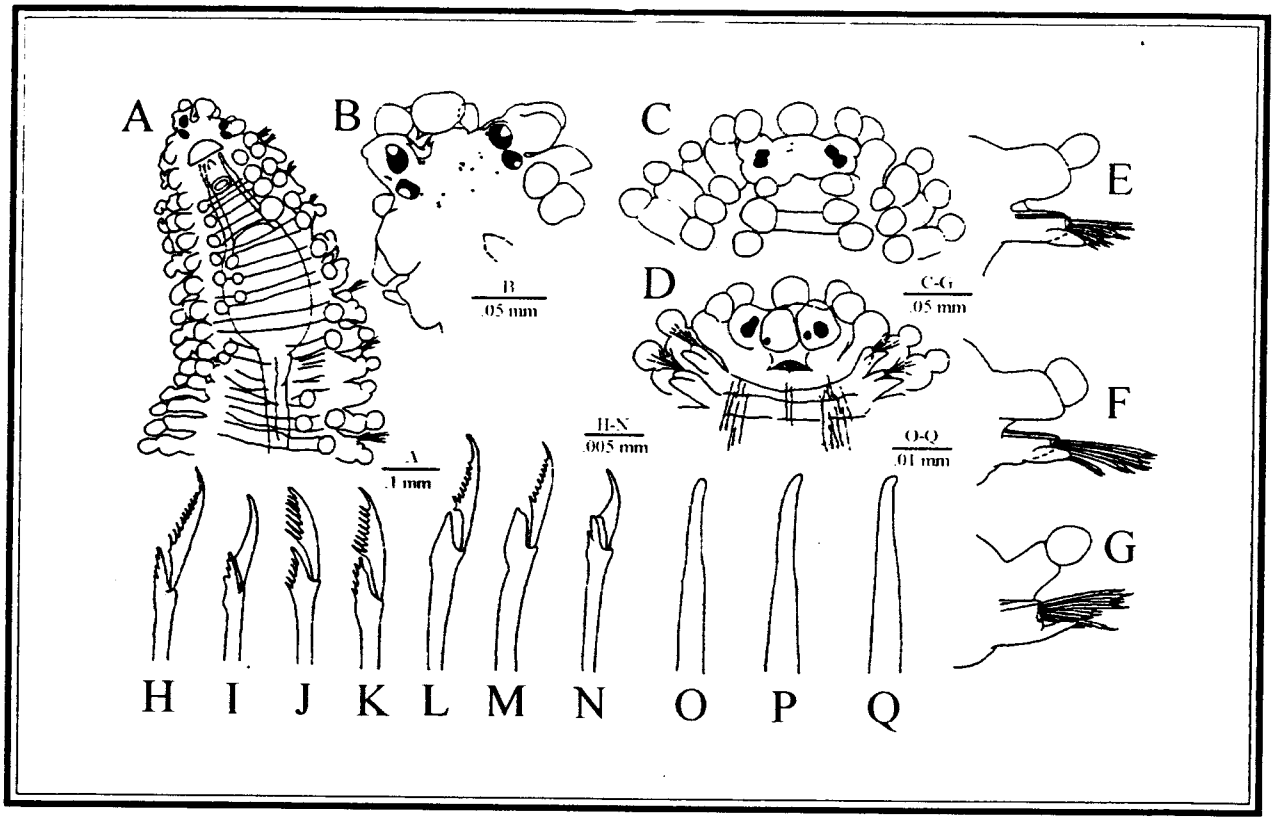

Figure 1.25. ***Eurysyllis spicum*** **Kudenov and Harris, new species**: A, anterior segments, dorsal view (SBMNH); B, prostomium, dorsal view (SBMNH); C, anterior segments, dorsal view (Sta. BRC-13); D, anterior segments, ventral view (Sta. BRC-13); E, right parapodium, setiger 11, posterior view; F, right parapodium, setiger 25, posterior view; G, right parapodium, setiger 50, posterior view; H, superior compound falciger, setiger 11; I, inferior compound falciger, setiger 11; J-K, superior compound falcigers, setiger 25; L-M, superior compound falcigers, setiger 50; N, inferior compound falciger, setiger 50; O, acicula, setiger 11; P, acicula, setiger 25; Q, acicula, setiger 50. (A-Q, originals by JDK)

Prostomium subrectangular, with large round lateral lobes, anterior middorsal region elevated; 3 pairs of eyes; 2 pairs large, lenticulate, in trapezoidal arrangement, plus additional ventral pair posterior to palps; numerous additional eye spots dispersed over prostomium (Fig. 1.25A-D). Antennae spherical, papilliform; median antenna arising from anterofrontal swelling; lateral antennae arising from anterolateral prostomial lobes (Fig. 1.25A-D). Palps spherical, papilliform, larger than antennae; basally free, projecting ventrally (Fig. 1.25D). Prostomium, antennae and tentacular cirri covered by thick cuticle; latter otherwise thin. Pharynx from setigers 2-3, extending to middle of setiger 7; middorsal tooth at anterior pharyngeal border (Fig. 1.25A); encompassed by distal circlet of 10 large, soft lobes when everted. Trepan of 10 small, sharply pointed, light-colored teeth. Proventriculus cylindrical, from middle of setiger 7 to 11, approximately 23 rows of muscle cells (Fig. 1.25A); attenuated extension lacking muscle cells in setiger 12.

Tentacular segment narrower than following segments; dorsal tentacular cirri spherical, slightly larger than either lateral antennae or following dorsal cirri; ventral pair one-half length of dorsal pair, attached ventrally, not visible from above (Fig. 1.25A-D).

Setigers 6-7 times wider than long (Fig. 1.25A). Parapodia small, distally rounded to conical anteriorly (Fig. 1.25E), becoming squared-off posteriorly (Fig. 1.25F,G). Setae generally compound falcigers with short unidentate blades (Fig. 1.25H-N); 18-20 per fascicle in anterior segments, decreasing to 13-15 posteriorly. Number of setae per fascicle increase with body size. Blades longest in anterior fascicles (Fig. 1.25H,I),

decreasing in length both inferiorly within fascicles (Fig. 1.25H,I) and posteriorly along body, becoming more strongly curved posteriorly (Fig. 1.25J-N). Cutting edges of superiormost 5-8 blades of fascicles with long, fine teeth (Fig. 1.25J,K); remaining setae smooth (Fig. 1.25I,N). Shaft tips of superiormost 5-8 setae within fascicles finely denticulate (Fig. 1.25H-I); remainder normally smooth (Fig. 1.25L-N). One acicula per parapodium, stout with bent, blunt tip (Fig. 1.25O-Q). Ventral simple seta present in 8 or fewer posteriormost setigers.

Dorsal cirri with single distal papilliform article attached to stout cirrophores, extending beyond parapodial lobes (Fig. 1.25E-G). Ventral cirri conical anteriorly (Fig. 1.25E,F) to digitiform posteriorly (Fig. 1.25G), extending beyond parapodial lobes, especially in posterior segments.

Dorsum with 4, occasionally 5, large globular papillae per segment, forming 4 longitudinal rows; fifth papilla located next to cirrophore (Fig. 1.25A).

Pygidium with 2 anal cirri similar in form to dorsal cirri, larger, distally pointed; cirrophores conspicuously developed.

Remarks. Four species of *Eurysyllis* are presently recognized: *E. spicum*, *E. tuberculata* (Ehlers, 1864), *E. ehlersi* Benham, 1927, and *E. pacificus* (Hartman, 1954). *Eurysyllis spicum*, *E. tuberculata* and *E. pacificus* all have longitudinal rows of conspicuous dorsal papillae, and are here considered members of this genus. In contrast, *E. ehlersi* clearly lacks dorsal papillae based on Benham's description, and most likely should be transferred to *Plakosyllis* Hartmann-Schröder, 1956. This decision, however, will be deferred pending examination of Benham's type, and *E. ehlersi* will continue to be considered a congener of the other three species treated here.

Eurysyllis spicum differs from *E. tuberculata* in having aciculae distally blunt rather than mucronate, the pharynx present in four to five segments instead of two to three segments, the proventriculus with 23 rows of muscle cells present in four segments in contrast to 13-20 rows in three segments, ventral cirri conical to digitiform instead of auricular, and unidentate blades of compound falcigers within the same fascicles both serrated and smooth instead of all serrated. In this latter feature, *E. spicum* also differs from *E. pacificus* in which the unidentate blades are smooth, and more noticeably curved distally. Additional published information providing detailed descriptions of *E. pacificus* are apparently nonexistent, and efforts to locate Hartman's paratype (originally described as *Sphaerodorum pacificum*) in the LACM-AHF collections were unsuccessful. Lützen (1961) first recognized the aberrant nature of Hartman's species, and Laubier (1968) strongly suspected it was a species of *Eurysyllis*. More detailed comparisons between *E. spicum* and *E. pacificus* must await examination of the latter's holotype. *Eurysyllis spicum* differs from *E. ehlersi* in having the pharynx in four to five rather than six segments, the proventriculus in four instead of eight segments, blades of compound falcigers unidentate and not bidentate, and ventral cirri conical to digitiform rather than ovoid and projecting beyond parapodial lobes.

Finally, Hartman (unpublished) seems to have suspected that *Plakosyllis americana* Hartman, 1961, had longitudinal rows of papillae on the dorsum, and should be assigned to *Eurysyllis*. Re-examination of the *Plakosyllis americana* types (LACM-AHF Poly 0865, 0866) did not confirm this suspicion, although the dorsal papillae are rather easily detached during the examination of preserved specimens of *E. spicum*.

Etymology. The term, *spicum*, is *Latin* for "ear of grain," and refers to the kernel-like arrangement of large dorsal papillae.

Distribution. Southern and central California.

Genus *Geminosyllis* Imajima, 1966d

Type species: *Trypanosyllis (Trypanedenta) ohma* Imajima and Hartman, 1964

Diagnosis. Body subcylindrical. Prostomium with 3 antennae. Two pairs of tentacular cirri. Antennae, tentacular cirri and dorsal cirri slender, articulated. Pharynx with a trepan of 10 teeth with or without a single large middorsal tooth. All setae simple.

Geminosyllis ohma (Imajima and Hartman, 1964)

Figure 1.26

Trypanosyllis (Trypanedenta) ohma Imajima and Hartman, 1964:129-130, pl. 31, figs. a-d.
Syllis (Haplosyllis) spongicola: Uschakov, 1955:179, fig. 50, A.
Geminosyllis ohma: Imajima, 1966d:233-235, text-fig. 43, a-g.

Material Examined. California: Santa Maria Basin, between Point San Luis and Point Sal, Sta. BRA-25 (1); off Point Arguello, Sta. BRA-6 (1, SBMNH 142704).—Western Santa Barbara Channel, east of Point Conception, Sta. BRC-1 (6).—Japan: Shirikishinai, 20 July 1959, holotype (LACM-AHF Poly 0857).

Description. Length up to 32 mm, 2 mm wide including parapodia, with 82 setigers (Imajima and Hartman, 1964); MMS specimen (SBMNH) complete, 3.5 mm long, 0.2 mm wide excluding parapodia and setae, for 31 setigers. Body subcylindrical; preserved specimens lacking color patterns.

Prostomium pentagonal in outline, posterior margin entire, lacking median cleft; 2 pairs of eyes, anterior pair reniform, largest, farthest apart; posterior pair round (Fig. 1.26A,B). Median antenna inserted between posterior pair of eyes, with 30 annulations (18 in MMS specimen); lateral antennae arising from anterior prostomium margin, each with about 25 annulations (11-13 in MMS specimen) (Fig. 1.26A,B). Palps thick, large, conspicuous, broadly triangular (Fig. 1.26A). Everted pharynx long, cylindrical, with distal circlet of 10 soft papillae, chitinized lining dark brown (inverted pharynx in setigers 1-8 in MMS specimen); trepan with 10 triangular teeth plus a sharp subterminal middorsal tooth (Fig. 1.26B). Proventriculus present in setigers 12-21 (in setigers 9-12 in MMS specimen), with 40-50 rows of muscle cells (holotype with 44 cells; MMS specimen with 50).

Dorsal tentacular cirri about as long as lateral antennae; ventral tentacular cirri one-half length of dorsal tentacular cirri (Fig. 1.26A,B).

Parapodia short, distally blunt, with presetal lobe (Fig. 1.26C). Setae simple, numbering 6-7 per fascicle; distally bifid, subdistally enlarged or spoon-shaped, with smooth to finely serrated cutting surfaces (Fig. 1.26D,E). Ventral simple seta present in far posterior segments (in last 10 setigers in MMS specimen), distally bifid (Fig. 1.26F). Aciculae distally rounded, 4 per median parapodia, decreasing to 1 in posterior segments (Fig. 1.26G).

Dorsal cirri of anterior segments alternating between long ones with 35 articles and short ones with about 30 articles (Fig. 1.26A,C); in MMS specimens, dorsal cirri of setiger 1 with 16 articles, short dorsal cirri of setiger 2 with 8-9, long alternating with 2 short of midbody segments with 8 and 4, respectively. Ventral cirri digitiform, extending just beyond parapodium (Fig. 1.26C).

Pygidium with long anal cirri (with 11 articles in MMS specimen).

Remarks. This is the first formal record of this species from the northeastern Pacific. The MMS specimens are generally consistent with the features previously described for *Geminosyllis ohma*, although they are significantly smaller in body size and sexually immature.

Distribution. Japan; Russia (Kurile Islands); southern California.

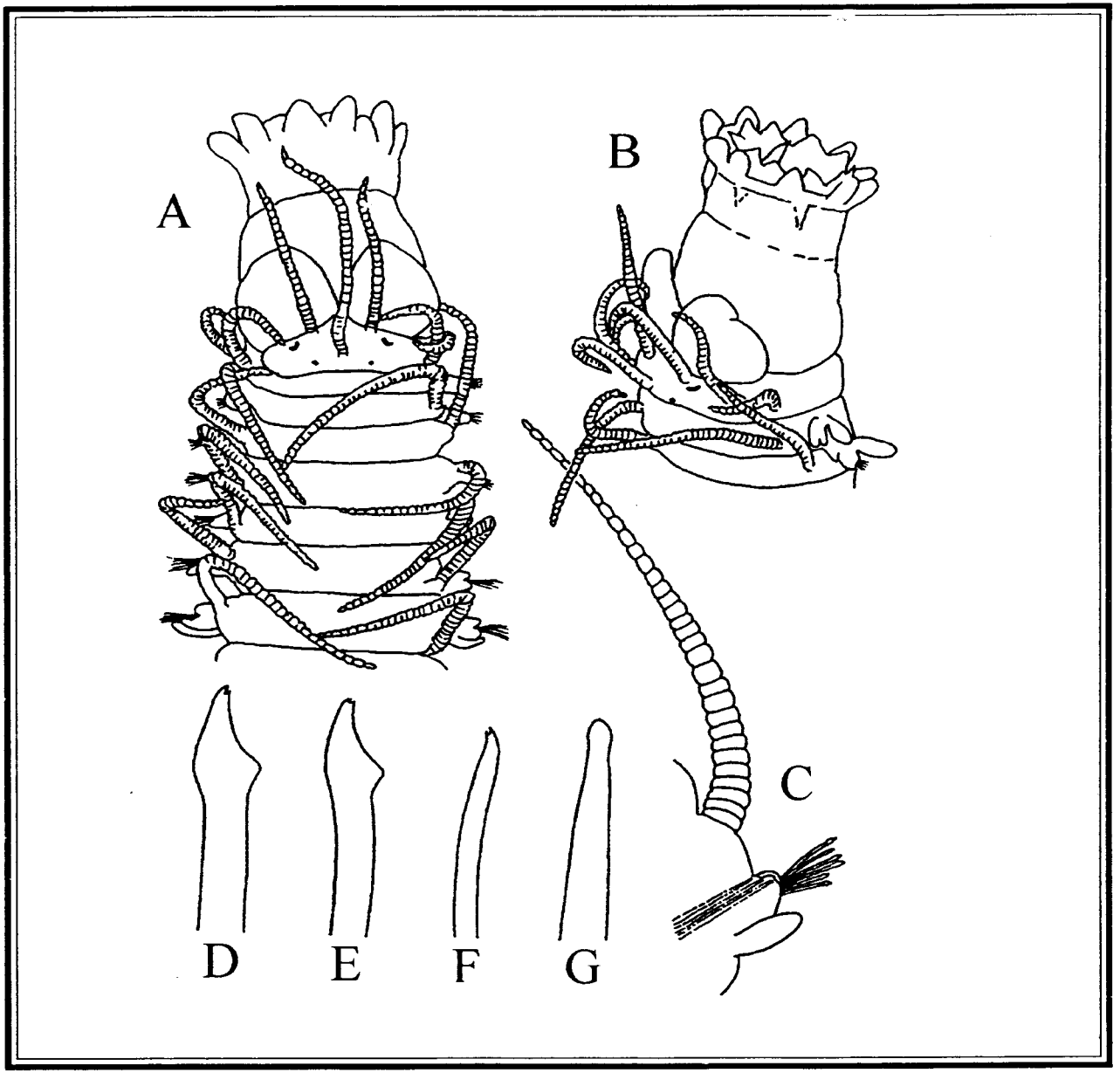

Figure 1.26. *Geminosyllis ohma*: A, anterior end with pharynx everted, dorsal view; B, anterior end, detail of pharyngeal armature, dorsolateral view; C, parapodium 18; D, bifid simple seta with smooth cutting edge from anterior parapodium; E, bifid simple seta with minute serrations along cutting edge from same anterior parapodium as D; F, ventral simple seta, posterior parapodium; G, acicula, posterior parapodium. (A-G, redrawn from Imajima, 1966d)

Type species: *Syllis monilaris* Lamarck, 1818

Diagnosis. Prostomium with 3 antennae. Two pairs of tentacular cirri. Antennae, tentacular cirri and dorsal cirri all strongly articulated. Pharynx with a single middorsal anterior tooth, smooth marginal rim and distal circlet of 10 soft terminal papillae. Compound falcigers present in all setigers and pseudocompound setae and a superior and/or inferior simple seta variably present from median segments.

Remarks. Species of *Syllis* are readily distinguished from those of *Typosyllis* by the presence of pseudocompound setae. Refer to the Remarks section following the diagnosis of *Typosyllis* for further comments.

Syllis spongiphila Verrill, 1885

Figure 1.27

Syllis spongiphila Verrill, 1885: 435.—Hartman, 1944: 339, pl. 24, fig. 10.—Pettibone, 1963: 114-115, fig. 30 g, h.—Banse and Hobson, 1974: 61, fig. 16p.—Imajima, 1966d:250-251, text-fig. 49l-s.

Syllis sclerolaema Ehlers, 1901: 86, pl. 10, figs. 1, 2.—Monro, 1930: 102, fig. 35.—Berkeley and Berkeley, 1938: 40, fig. 5.—Hartman, 1953: 20, fig. 2; 1964: 92.—Uschakov, 1955: 179, fig. 50, d.—Imajima and Hartman, 1964: 122-124, pl. 28, figs. i, j, pl. 29, figs. a-i. *Fide* Imajima, 1966d.

Syllis (Typosyllis) sclerolaema Wesenberg-Lund, 1962:54, fig. 15. *Fide* Imajima, 1966d.

Material Examined. California: Santa Maria Basin, Stas. BRA-20 rock (3, SBMNH 142705); BRA-13 (1); BRC-13 (1); BRA-16 (3); between Point San Luis and Point Sal, Sta. BRA-25 rock (1, USNM 170938).—Western Santa Barbara Channel, east of Point Conception, Sta. BRC-1 rock (4); south of Point Conception, Sta. BRC-2 (1).

Description. Length about 27 mm, 1.5 mm wide with parapodia, excluding setae, with about 90 segments (Hartman, 1944; Imajima, 1966d); complete MMS specimens (Sta. BRC-1) up to 13.5 mm long, 0.4 mm wide excluding parapodia and setae, for 68 segments. Body pigmentation patterns absent in preserved specimens. Mature specimen with a few oocytes in setigers 17-42 (Sta. BRC-1).

Prostomium slightly wider than long, subglobular; posterior margin entire; 2 pairs of eyes, set in trapezoidal arrangement, anterior pair largest; additional pair of eyespots absent (Fig. 1.27A). Median antenna with 25-30 articles (MMS specimens with 18-22), arising from center of prostomium; lateral antennae with slightly fewer articles (MMS specimens with 15), each arising anterior to anterior eyes (Fig. 1.27A). Palps large, subtriangular, basally free, about as long as prostomium (Fig. 1.27A). Everted pharynx in setigers 1-13 with middorsal anterior tooth; with distal circlet of 10 soft papillae and smooth anterior margin. Proventriculus extending from setiger 14 through setigers 22-24, with 47 rows of muscle cells.

Twp pairs of tentacular cirri, resembling antennae; dorsal pair about as long as median antenna (MMS specimens with 17-22 articles); ventral pair about two-thirds length of dorsal pair (MMS specimens with 9-14 articles) (Fig. 1.27A).

Parapodia conical (Fig. 1.27B). Setae generally pseudocompound (Fig. 1.27C-E), although 3-5 obviously compound falcigers with bidentate blades and serrated cutting edges usually present in anterior fascicles (Fig. 1.27C). Pseudocompound setae with distally bidentate tips numbering 6-8 per fascicle in median (Fig. 1.27E) and posterior fascicles, sometimes present also in anterior fascicles (Fig. 1.27D). Ventral simple seta slender, distally bidentate with subtly serrated cutting surfaces present in posterior parapodia (Fig. 1.27F). Aciculae distally curved, numbering 3-4 per parapodium in median segments (Fig. 1.27G).

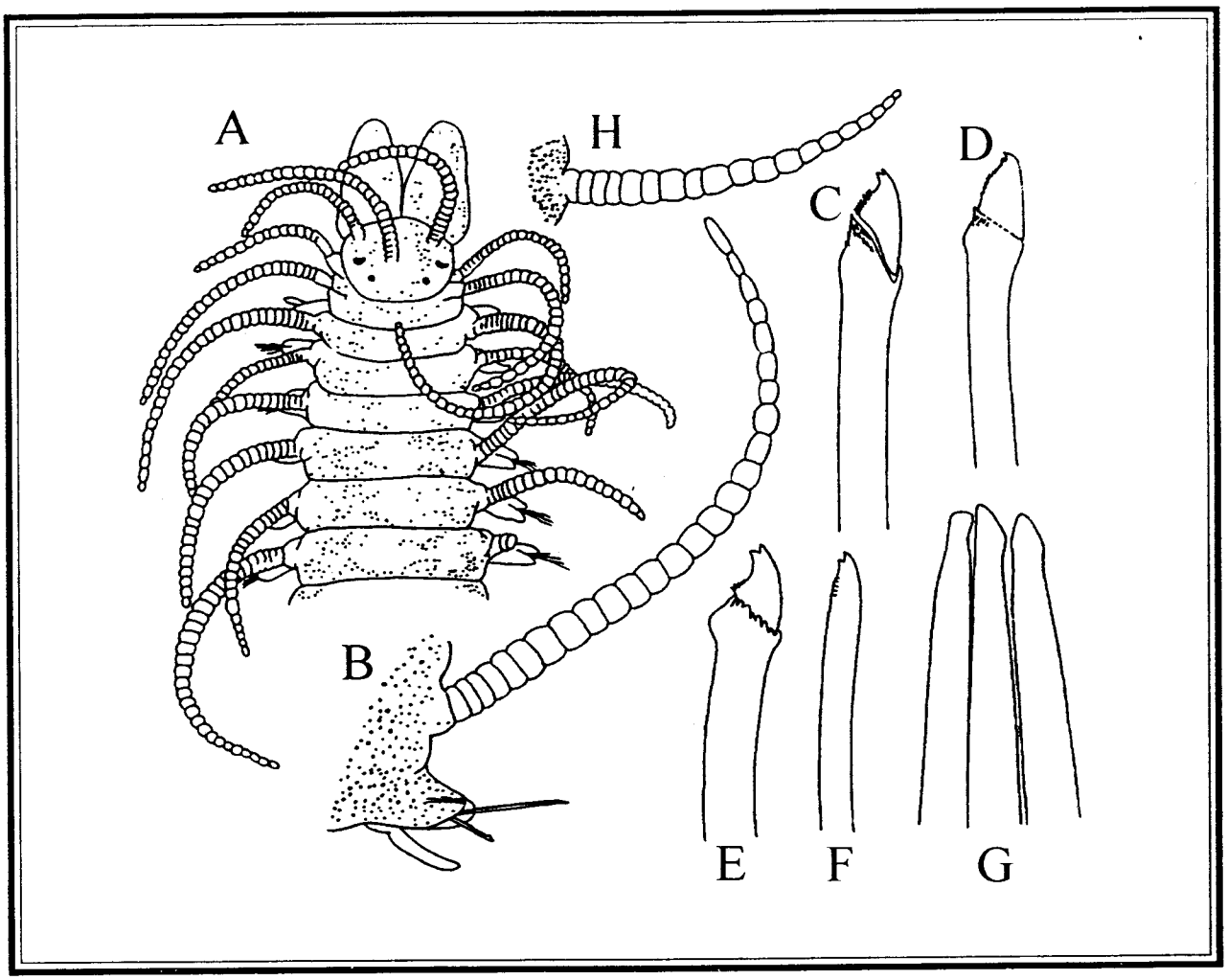

Figure 1.27. *Syllis spongiphila*: A, anterior end, dorsal view; B, parapodium 21 with long dorsal cirrus; C, composite falciger, setiger 1; D, pseudocomposite falciger, setiger 1; E, same, median parapodium; F, ventral simple seta, posterior parapodium; G, aciculae; H, short dorsal cirrus, parapodium 22. (A-H, redrawn from Imajima, 1966d)

Dorsal cirri articulated, alternating in length on median and posterior segments, and occasionally also on anterior segments (Fig. 1.27B,H); long cirri on setiger 1 each with 30-36 annulations (MMS specimens with 15-20); short cirri on setiger 2 each with 20 (MMS specimens with 9-10) (Fig. 1.27A); thereafter alternating with long cirri having 20-40 articles (MMS specimens with 8), and short ones with 16-30 (MMS specimens with 5). Ventral cirri slender, digitiform, extending to ends of parapodial lobes (Fig. 1.27B).

Pygidium with long paired anal cirri.

Remarks. As presently recognized, *Syllis spongiphila* is a widespread species associated with poriferans, mussels, mud, sand, gravel, and hard surfaces such as shells and rocks.

Distribution. Southern California; Washington; British Columbia; Japan; Sea of Okhotsk; Chile; Falkland Islands; Massachusetts.

Genus *Trypanosyllis* Claparède, 1864

Type species: *Syllis zebra* Grube, 1860.

Diagnosis. Body long, usually dorsoventrally flattened, with numerous short, wide segments. Prostomium with 3 antennae. Palps separate basally. Nuchal organs conspicuous ridges along postectal margin of prostomium. Two pairs of tentacular cirri. Antennae, tentacular cirri and dorsal cirri strongly articulated. Pharynx with terminal trepan of 10 teeth, with or without an additional middorsal anterior tooth. Setae simple or compound falcigers.

Remarks. Imajima and Hartman (1964) distinguish two major groups representing three subgenera of *Trypanosyllis* on the basis of the pharyngeal middorsal tooth and setae. For example, the first major group, represented by the stem genus *Trypanosyllis (Trypanosyllis)* is defined by the presence of a pharyngeal trepan with a middorsal tooth. The other major group has a trepan and lacks a middorsal tooth, and is characterized by two subgenera: *Trypanosyllis (Trypanedenta)* has compound setae only; and *Trypanosyllis (Trypanobia)* has simple setae only. This scheme is followed below.

Subgenus *Trypanosyllis (Trypanosyllis)* Imajima and Hartman, 1964

Type species: *Trypanosyllis (Trypanosyllis) zebra* (Grube, 1860)

Diagnosis. Trepan usually surrounded by fleshy distal circlet of 10 soft terminal papillae. Dorsal cirri long or short, closely articulated. Setae usually compound falcigers with uni- or bidentate blades; simple setae may be present in posterior segments. Tetraglene individuals produced asexually by budding of posterior segments.

Key to the Species of *Trypanosyllis (Trypanosyllis)* from California

1A. Blades of superior compound falcigers distally bidentate with serrated cutting edges, becoming unidentate and smooth inferiorly within fascicles (Figs. 1.28B-D, 1.29D-G) 2

1B. Blades of all compound falcigers distally bidentate, cutting edges of superior blades smooth, becoming serrated inferiorly within fascicles (Fig. 1.30F-H); proventriculus extending through 4-5 segments ..... *Trypanosyllis (Trypanosyllis)* sp. B

2A. Proventriculus in 7 segments; parapodia distally conical (Fig. 1.28A); aciculae not projecting through parapodia; ventral cirri not projecting beyond parapodial lobes; occipital flap absent ..... *Trypanosyllis (Trypanosyllis) coeliaca nipponica*

2B. Proventriculus in 3.5 segments; parapodia distally rounded (Fig. 1.29B,C); aciculae projecting through parapodia (Fig. 1.29B,C); ventral cirri projecting beyond parapodial lobes; occipital flap may be present (Fig. 1.29A) ..... *Trypanosyllis (Trypanosyllis)* sp. A

Trypanosyllis (Trypanosyllis) coeliaca nipponica Imajima and Hartman, 1964

Figure 1.28

Trypanosyllis (Trypanosyllis) coeliaca nipponica Imajima and Hartman, 1964:124-125, pl. 29, fig. j; pl. 30, figs. a-e.—Imajima, 1966d:236-237.

Material Examined. California: Santa Maria Basin, Sta. BRA-16 (1, USNM 170940).—Japan: Shirikishinae, holotype (LACM-AHF Poly 858) and paratypes (LACM-AHF Poly 859).

Description. Length up to 17 mm, 2.2 mm wide; with 140 setigers (Imajima and Hartman, 1964); MMS specimens about 4.5 mm long, 0.5 mm wide without parapodia, 0.7 mm wide with parapodia, for 63 setigers. Body strongly flattened, lacking color patterns in alcohol. Prostomium rectangular, 2 times wider than long, lacking obvious median cleft; 2 pairs of eyes, anterior pair largest (Fig. 1.28A). Palps conical, not fused (Fig. 1.28A). Median and lateral antennae stout, short, each with 10-12 distinct articulations; all arising from anterior margin of prostomium (Fig. 1.28A). Everted pharynx with distal circlet of 10 soft papillae; trepan with 11 teeth including middorsal one. Proventriculus short, extending through setigers 13 to junction of setigers 18-19. Parapodia short, conical (Fig. 1.28B). Setae generally compound falcigers (Fig. 1.28C-E). Blades with finely serrated cutting margins; superior blades within fascicles distally bidentate (Fig. 1.28C); middle and inferior blades distally unidentate with single accessory tooth (Fig. 1.28D); inferior blades unidentate (Fig. 1.28E); (uncommon in MMS specimens). Shafts with subdistal serratia on superior surfaces (Fig. 1.28C-E). Posteriormost parapodia each with a ventral simple seta with subdistal tooth. Dorsal cirri thick, short, with 8-14 annulations (MMS specimen with 10-13). Ventral cirri digitiform, not extending beyond parapodial lobes (Fig. 1.28B). Aciculae numbering 1-2 per parapodium, tapering to pointed tips (Fig. 1.28F). Pygidium with pair of short anal cirri.

Remarks. This is the first formal record of *Trypanosyllis (Trypanosyllis) coeliaca nipponica* from the northeastern Pacific. The MMS specimens are generally consistent with the features previously described for the subspecies, although they are significantly smaller in body size.

Distribution. Northern Japan; southern California.

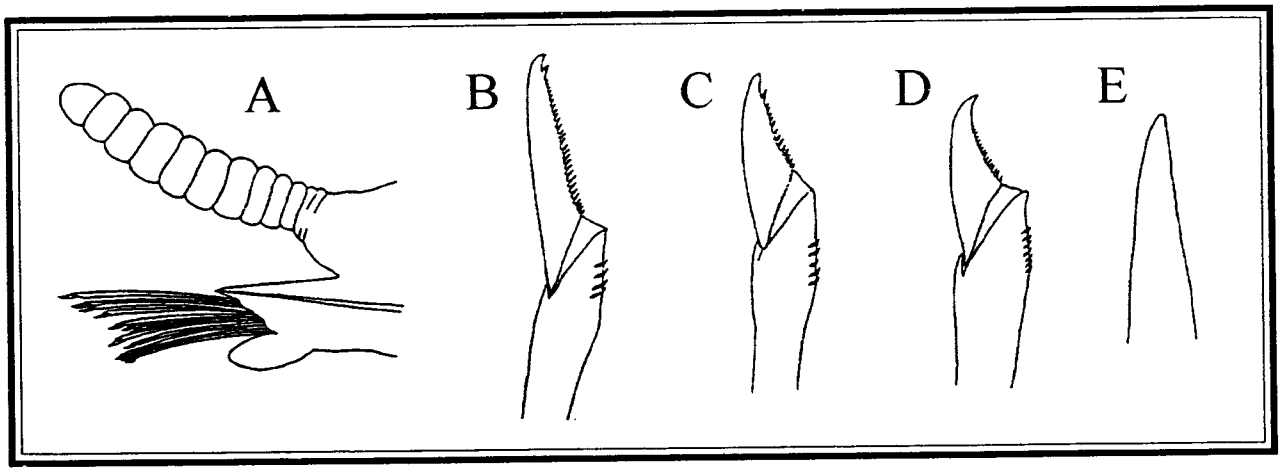

Figure 1.28. *Trypanosyllis (Trypanosyllis) coeliaca nipponica*: A, anterior end, dorsal view; B, median parapodium; C, superior compound bidentate falciger, setiger 6; D, median compound falciger, setiger 6; E, inferior compound unidentate falciger; F, acicula, distal end. (A-F, redrawn Imajima and Hartman, 1964)

Trypanosyllis (Trypanosyllis) sp. A

Figure 1.29

Material Examined. California: Santa Maria Basin, Stas. BRA-13 (1, USNM 170941), (1); BRA-16 (3); BRA-20 (4)—Western Santa Barbara Channel, south of Point Conception, Sta. BRC-2 (2).

Description. Complete specimens 4 mm long, 0.7 mm wide excluding setae, for 61 setigers. Body strongly flattened dorsoventrally; lacking pigmentation patterns, pale yellow in alcohol.

Prostomium subrectangular, shaped somewhat like a bowtie: 2 pairs of eyes, connate, lenticulate, anterior pair largest, all arranged trapezoidally (Fig. 1.29A). Antennae arise from anterior frontal margin of prostomium; median antenna slightly longer than prostomium, with about 8 articles; lateral antennae smaller, with 5-6 articles (Fig. 1.29A). Palps small, globular, shorter than prostomium, separate (Fig. 1.29A). Pharynx extending to setiger 10. Proventriculus present in setigers 11-14 or 15. Trepan partly visible through body wall, with obvious middorsal tooth plus 10 irregular denticles, all sharply pointed (not dissected).

Tentacular segment reduced dorsally; occipital flap small, marginally ciliated (Fig. 1.29A). Two pairs of tentacular cirri; dorsal pair largest, each with 3 distal articles and long cirrophore together nearly as long as prostomium; ventral pair smaller, each with 1-2 articles, about one-half length of dorsal pair (Fig. 1.29A).

Parapodia well developed, broadly rounded distally (Fig. 1.29B,C). Setae compound falcigers (Fig. 1.29D-G), numbering 7-8 per anterior fascicles, decreasing gradually to 3-5 in far posterior fascicles. Blades decreasing in length inferiorly within fascicles: superior ones longest, distally bidentate with serratia of cutting edge each long, coarse (Fig. 1.29D); intermediate blades also bidentate, cutting edges with a few poorly defined beadlike enlargements or smooth (Fig. 1.29E,F); inferior blades unidentate, smooth (Fig. 1.29G). One to 3 aciculae per parapodium, thick, sigmoid, projecting through parapodial lobes (Fig. 1.29H).

Dorsal cirri of setiger 1 with 8 distinct articles (Fig. 1.29A), those following each generally with 7, decreasing to 6 posteriorly (Fig. 1.29B,C), last few segments each with 4 articles (Fig. 1.29I); all with cirrophores, each around 2 times longer than wide. Ventral cirri bluntly conical, extending just beyond parapodial lobes, present on posterior face of parapodia (Fig. 1.29B,C).

Pygidium with paired anal cirri, tapered distally, each with 2 large articles (Fig. 1.29I).

Remarks. The MMS specimens have both bidentate and unidentate compound falcigers within the same fascicle, a feature characteristic of *Trypanosyllis (Trypanosyllis) coeliaca nipponica*. In addition, the median and lateral antennae of both species also arise from the frontal margin of the prostomium. *Trypanosyllis (Trypanosyllis)* sp. A differs from *T. (Trypanosyllis) coeliaca nipponica* in having an occipital flap and generally having compound falcigers with different blade morphology, although the superior compound falcigers of the two taxa are quite similar. It is probable that present materials of *T. (Trypanosyllis)* sp. A are all juvenile specimens and that the above differences are transient juvenile features: the specimens all are rather small and sexually immature. It therefore seems appropriate to note the apparent similarities between the present materials and *T. (Trypanosyllis) coeliaca nipponica*, and to tentatively identify these specimens as *T. Trypanosyllis* sp. A, pending acquisition of additional specimens.

Habitat. Rocky substrata, in depths of 75-237 m.

Distribution. Southern and central California.

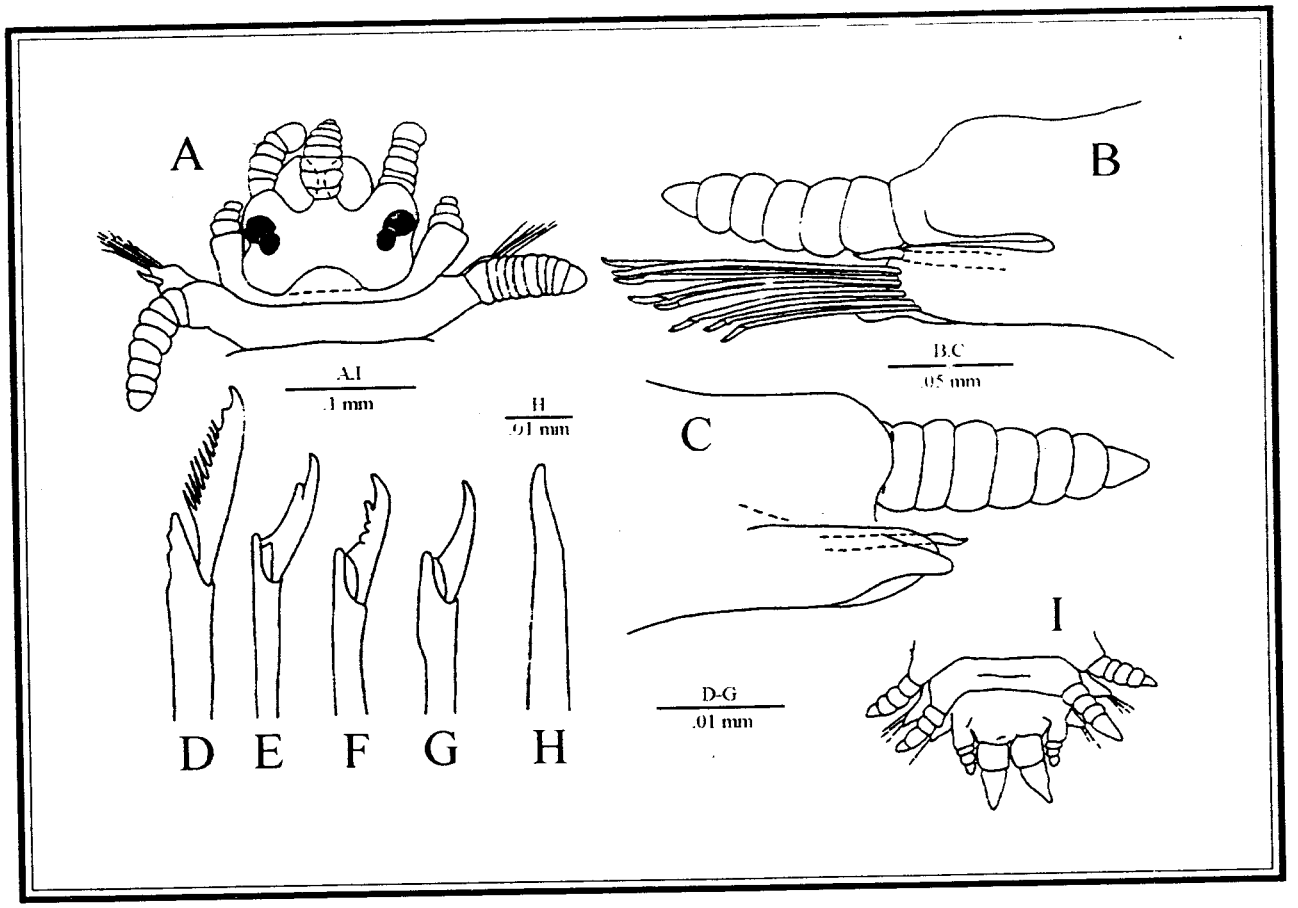

Figure 1.29. *Trypanosyllis (Trypanosyllis)* sp. A: A, prostomium and setiger 1, dorsal view, (USNM); B, right parapodium, setiger 13, anterior view; C, same, posterior view; D, superior compound falciger, setiger 13; E, intermediate compound falciger, setiger 13; F, low intermediate compound falciger, setiger 13; G, inferior compound falciger, setiger 13; H, acicula, setiger 13; I, Posterior end, dorsal view. (A-I, originals by JDK)

Trypanosyllis (Trypanosyllis) sp. B

Figure 1.30

Material Examined. California: Santa Maria Basin, Stas. BRA-16 rock (1, SBMNH 142707); BRA-20 rock (1, USNM 170942); west of Point Conception, Sta. BRA-4 (1, SBMNH 142708); between Point Estero and Point Buchon, Sta. 6, rocks (1).

Description. Length up to 2 mm, 1 mm wide excluding setae, for 29 segments including 10 regenerating posterior setigers (SBMNH voucher); USNM voucher an anterior macerated fragment, poorly preserved, 1.5 mm long, 0.8 mm wide excluding setae, for 18 setigers; all other specimens smaller. Body dorsoventrally flattened; pigmentation patterns absent in alcohol.

Prostomium wider than long, with posteromedian cleft; 2 pairs of eyes, lenticulate, anterior pair largest, all trapezoidally arranged (Fig. 1.30A,B). Antennae usually arising from anterofrontal margin of prostomium, all slightly longer than prostomium; median antenna with 9-12 distinct articles; lateral antennae each with 7-9 articles (Fig. 1.30A,B). Palps small, globular, one-half length of prostomium, separate (Fig.

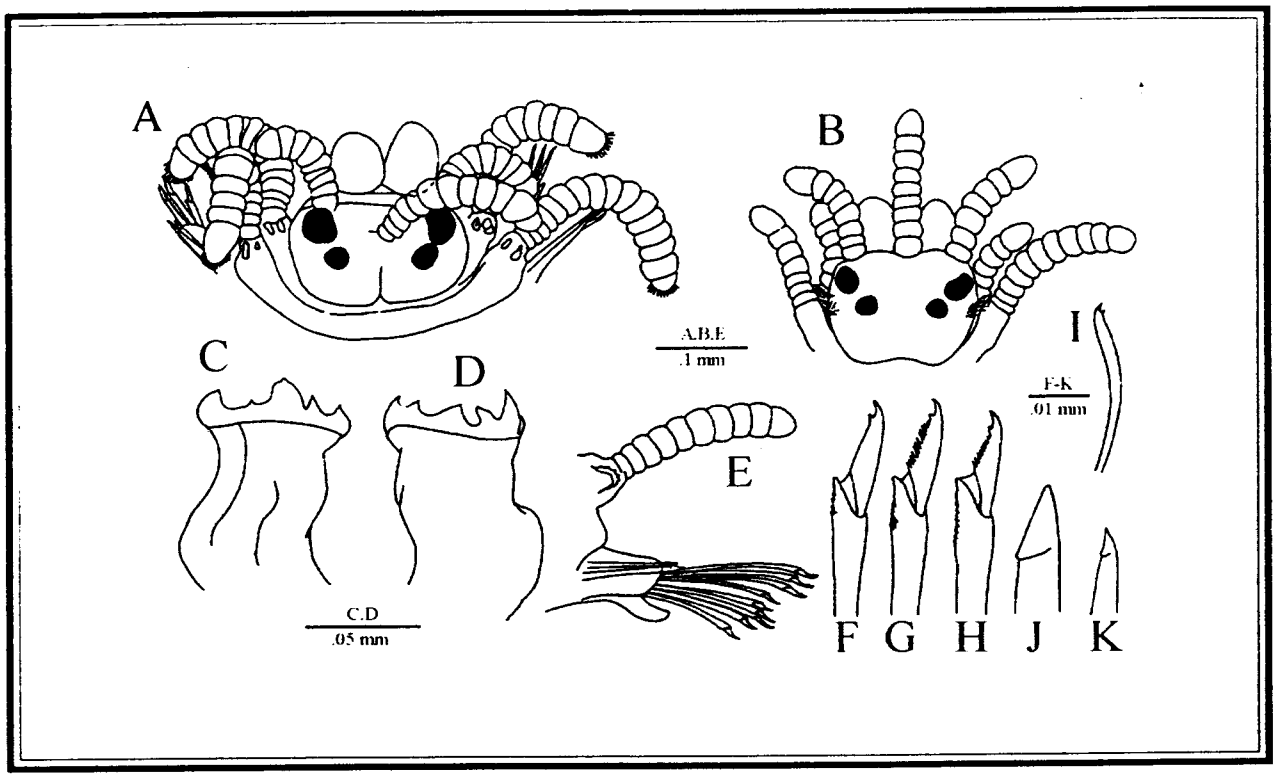

Figure 1.30. *Trypanosyllis (Trypanosyllis)* sp. B: A, prostomium and setigers 1-2, dorsal view (USNM); B, prostomium, dorsal view (SBMNH); C, everted pharynx showing trepan, dorsal view (SBMNH); D, everted pharynx showing trepan, ventral view; E, median segment, anterior view; F, superior compound falciger, median setiger; G, intermediate compound falciger, median setiger; H, inferior compound falciger, median setiger; I, ventral simple seta, setiger 25; J, inferior acicula, median setiger; K, superior acicula, median setiger. (A-K, originals by JDK)

1.30A,B). Pharynx extending to setigers 7-8. Trepan with middorsal tooth plus 10 distal teeth (Fig. 1.30C,D). Proventriculus extending through 4-5 segments, present in setigers 8-12 or 9-14.

Tentacular segment distinct, reduced dorsally (Fig. 1.30A,B). Two pairs of tentacular cirri, all with short cirrophores characteristically vesiculate; dorsal pair longest, longer than median antenna, with 12-14 articles; ventral pair one-half length of dorsal pair, each with about 5-7 articles (Fig. 1.30A,B).

Parapodia tapering slightly, distally truncate (Fig. 1.30E). Compound setae distally bidentate (Fig. 1.30F-H), numbering around 8-10 per anterior fascicles, decreasing in median and posterior fascicles. Blades subequally long within fascicles (Fig. 1.30F-H), length decreasing gradually posteriorly. Cutting edges of superior blades smooth (Fig. 1.30F), becoming conspicuously serrated inferiorly (Fig. 1.30G,H). Distal superior ends of shafts dentate (Fig. 1.30F-H). Ventral simple seta distally bidentate, sigmoid, sometimes present in far posterior segments (Fig. 1.30I; illustrated for specimen from Sta 6). Aciculae numbering 2-3 per parapodium, projecting through distal lobe; each with a characteristic ventrally thickened, hook-like subdistal collar (Fig. 1.30J,K).

Dorsal cirri short, each with 10-12 articles, not looping back on themselves; cirrophores short, each characteristically vesiculate (Fig. 1.30A,E). Ventral cirri digitiform, extending beyond parapodial lobes (Fig. 1.30E).

Pygidium (SBMNH secondary voucher) with paired anal cirri, regenerating, each with 5-6 articles.

Remarks. MMS materials of *Trypanosyllis (Trypanosyllis)* sp. B were originally identified in part as *T. (Trypanosyllis) brevicirrata* Uschakov, 1950, based on the presence of short dorsal cirri and the apparently unidentate falcigers in all setigers. All present MMS materials have bidentate compound falcigers, have a small body size, and lack gametes. It seems likely that specimens here identified as *T. (Trypanosyllis)* sp. B are unidentifiable juveniles. All are substantially smaller than mature forms of described Pacific west coast species which normally have large body sizes and numerous segments. For example, *T. (Trypanedenta) ingens* Johnson, 1901, is 130 mm long for 476 segments; *T. (Trypanedenta) gemmipara* Johnson, 1901, is 40-68 mm for 385 segments; and *T. (Trypanedenta) intermedia* Moore, 1909, is 60 mm for 230 segments. However, Perkins (1981) described sexually mature specimens of *T. (Trypanosyllis) savagei* from Florida less than 5 mm for 80 segments. All MMS specimens here referred to *T. (Trypanosyllis)* sp. B are less than 2 mm long, and are sexually immature. Two of these specimens are regenerating body parts: one a head plus anterior segments, the other posterior segments; none represent stolons.

Habitat. Rocky substrata, in depths of 91.5-237 m.

Distribution. Southern and central California.

Subgenus *Trypanosyllis (Trypanedenta)* Imajima and Hartman, 1964

Type species: *Trypanosyllis (Trypanedenta) gemmipara* Johnson, 1901

Diagnosis. Trepan with 10 teeth, middorsal subdistal tooth absent. Dorsal cirri thick, heavily articulated. Setae compound falcigers with uni- or bidentate blades. Tetraglene individuals produced asexually by budding of posterior segments.

***Trypanosyllis (Trypanedenta)* sp. A**

Figure 1.31

Material Examined. California: Santa Maria Basin, Sta. BRA-21 (1, USNM 170939).—*Trypanosyllis (Trepanedenta) gemmipara*: Tomales Bay, 9 June 1941, from bryozoan-sponge masses, coll. O. Hartman (LACM-AHF, Hartman lot N47).—La Jolla, Bird Rock, 30 May 1938, coll. O. Hartman (1, LACM-AHF, Hartman lot N1031); north of Scripps Pier, 13 Feb 1938, coll. O. Hartman (1, LACM-AHF, Hartman lot N1032).—Japan, Shirikishinai, October 1955, coll. M. Imajima (1, LACM-AHF, Hartman lot N11086).

Description. Length approximately 22 mm, 2 mm wide excluding parapodia, for around 120 segments. Body twisted into spiral, poorly preserved anteriorly, lacking antennae, tentacular and dorsal cirri; dorsal cirri present posteriorly; dorsum flesh colored, lacking color patterns; sexually mature.

Prostomium wider than long, with conspicuous posteromedian cleft, trapezoidal in shape, anterior margin widest. Two pairs of eyes, all lenticulate, anterior pair largest and farthest apart, all in subrectangular arrangement. Antennae lost. Palps about as long as prostomium, free basally, projecting ventrally. Pharynx long, extending to midsetiger 16; distally with 5 ventral and 7 dorsal terminal papillae, each group separated from the other by lateral gaps (dissected). Trepan with 10 pale brown teeth, largest appearing midventral; middorsal tooth absent. Proventriculus present from setiger 16 to 28; 39 muscle rows, each with conspicuous muscle cells.

Tentacular segment incomplete dorsally. Tentacular cirri lost.

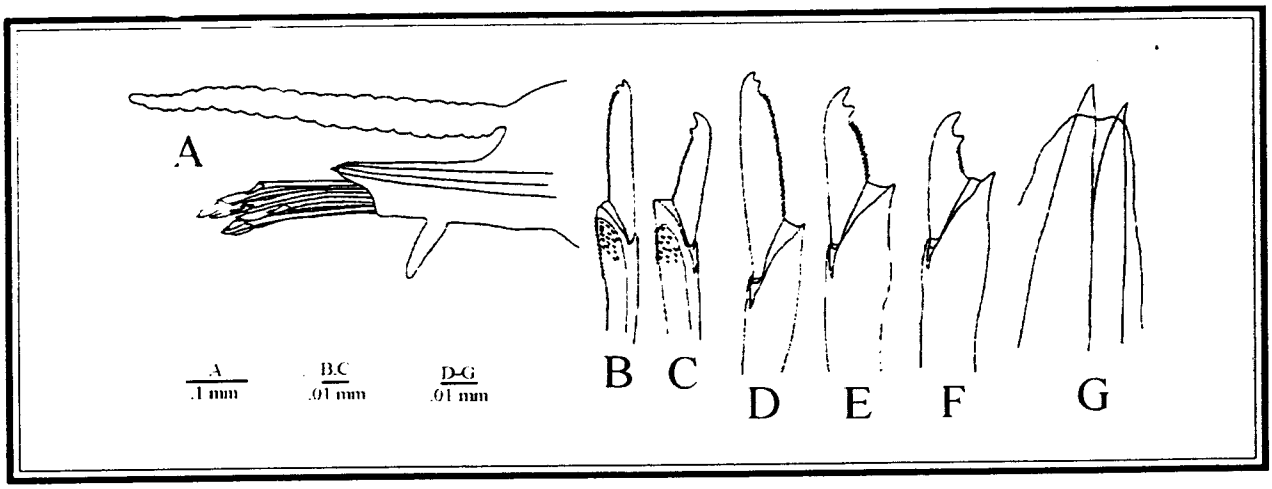

Figure 1.31. *Trypanosyllis (Trypanedenta)* sp. A: left parapodium from far posterior segment, posterior view; B-C, compound falcigers from setiger 15; D-F, compound falcigers from far posterior segment: D, superior seta; E, intermediate seta; F, inferior seta; G, aciculae from far posterior segment. (A-G, originals by JDK)

Parapodia long, distally pointed (Fig. 1.31A). Setae generally delicate, bidentate compound falcigers (Fig. 1.31B,C). Blades long, narrow with secondary tooth subdistal to primary tooth in most all falcigers (Fig. 1.31B,C), becoming more widely spaced in far posterior segments (Fig. 1.31D-F). Blades with cutting edges minutely serrated (Fig. 1.31B-F). Aciculae straight, projecting through parapodial lobes, up to 5 per anterior parapodium, decreasing to 1-2 posteriorly (Fig. 1.31G).

Dorsal cirri thick, alternating long and short along the body; in midposterior segments long cirri each with around 45 articles, short cirri each with 27. Ventral cirri short, smooth, digitiform, may extend to and sometimes beyond parapodial lobes in anterior and midbody segments.

Remarks. *Trypanosyllis (Tranpanedenta)* sp. A was collected from one location in Santa Maria Basin. Although poorly preserved, the species is partly characterized by having a pharynx that extends to midsetiger 16, with 2 distal groups of terminal papillae (5 ventral and 7 dorsal ones, observed by dissecting the inverted pharynx), which are separated from one another by lateral gaps, and a trepan with 10 teeth, the largest tooth appears to be midventral; a proventriculus in 13 segments (setiger 16 to 28) with 39 rows of conspicuously large muscle cells; delicate bidentate compound falcigers with blades long and narrow, secondary teeth all subdistal, and cutting edges minutely serrated in all fascicles; and ventral cirri extending to or slightly beyond parapodial lobes.

Trypanosyllis (Trypanedenta) sp. A is similar to specimens of *T. (T.) gemmipara* Johnson, 1901, noted above (see Materials Examined) in having bidentate compound falcigers in all setigers; it differs from *T. (T.) gemmipara* in having all secondary teeth subdistal rather than in the middle of the blade; blades all long and narrow with cutting edges minutely serrated, instead of short, stout triangular blades, with cutting edges smooth or serrated; 12 terminal pharyngeal papillae arranged in a ventral and dorsal group, in contrast to 8 or 11; a trepan of 10 teeth, the largest one of which appears to be midventral, instead of 8 or 11; and a proventriculus present in 13 segments rather than 4 or 8 segments.

The compound falcigers of the above MMS specimen are similar to those described by Imajima (1966d) from inferior and posterior fascicles of *T. (T.) gemmipara* from Japan. However, the MMS specimen is sexually mature, and is not a juvenile *T. (T.) gemmipara*. In addition, an examination of *T. (T.) gemmipara* specimens from California and Japan revealed that all had well-developed compound falcigers with stout, smooth triangular blades with the secondary tooth located about midway along the cutting edge; none had

long, narrow, distally bidentate blades with serrated cutting margins characterized by Imajima (1966d). Although the poorly preserved MMS specimen precludes a more detailed analysis, these findings suggest that the taxon it represents is not conspecific with *T. (T.) gemmipara*. Resolution of this question must await the acquisition of additional materials.

Finally, Imajima and Hartman (1964) do not describe the presence of a large midventral pharyngeal tooth in the genus *Trypanosyllis*. Such a character may be important at the level of subgenus. If this is true, then the speci represented by the MMS specimen described above may represent a new subgenus if the pharynges of all known *T. (Trypanedenta)* species are found to lack a midventral tooth.

Habitat. Associated with rocky substrates in depths of 75-90 m.

Distribution. Southern and central California.

Genus *Typosyllis* Langerhans, 1879

Type species: *Syllis krohnii* Ehlers, 1864

Diagnosis. Prostomium with 3 antennae. Two pairs of tentacular cirri. Palps broadly triangular, fused basally. Antennae, tentacular cirri and dorsal cirri strongly articulated. Pharynx with single middorsal anterior tooth, with smooth marginal rim, and distal circlet of 10 soft terminal papillae. Setae usually compound falcigers with uni- or bidentate blades, with a superior and/or inferior simple seta variably present in posterior setigers.

Remarks. Fauchald (1977) notes 89 described species of *Typosyllis*, which is one of the most complex and systematically challenging of syllid genera. Some workers include *Typosyllis* (and *Ehlersia, Haplosyllis*) as subgenera of *Syllis* (Fauvel, 1923; Day, 1967; Uebelacker, 1984; Dorsey and Phillips, 1987). *Haplosyllis* has simple setae, and is readily separable from the other three taxa. Note that the separation of *Syllis sensu lato* into three separate groups is based on setal traits not normally used to separate other syllid genera, and fails to reduce the nearly incomprehensible complexity of *Typosyllis* (Uebelacker, 1984). This strongly suggests that traditional means of identifying and separating *Typosyllis* species are inadequate, and that additional characters are needed before many of the systematic issues concerning *Typosyllis* can be resolved. Such an undertaking is well beyond the scope of this chapter. However, we prefer to recognize four separate but closely related genera for matters of practicality. Besides the approximate number of *Typosyllis* species noted above, at least 45 *Syllis* species, 16 *Ehlersia* species, and 10 *Haplosyllis* species have also been reported (Fauchald, 1977; Pettibone, 1982; Dorsey and Phillips, 1987). A single large genus (*Syllis*) with over 150 species tends to obscure the critical and urgent need to revise this taxon based on combinations of both traditional and new characters. To this end, Piltz (1980) provides an example of the kinds of characters that can be used to further resolve the complexity surrounding *Typosyllis* and *Syllis*.

Key to Species of *Typosyllis* from California

1A. Dorsum with 2 reddish brown transverse lines per anterior segment in life (instead of faded brown in preserved material) (Fig. 1.33B); palps not fused basally (Fig. 1.33A); dorsal cirri thick, alternating in length, long cirri of median segments each with 25 and short cirri with 14 articles (Fig. 1.33C) .. .. *Typosyllis bella*

1B. Dorsum with transverse bands of dark pigment on every 1-3 segments (Fig. 1.34A), or lacking any pigment pattern; palps fused basally (Figs. 1.32B, 1.34A); dorsal cirri usually slender, alternating in length, each with fewer articles in midbody segments 2

2A Dorsum usually with broad transverse bands of broken brown pigment on every 1-3 segments (Fig. 1.34A), or lacking pigment pattern; long dorsal cirri of median segments each with 14 (Fig. 1.34C) and short cirri with 11 articles (Fig. 1.34B); compound falcigers with short, stout blades (Fig. 1.34D-G) ..... *Typosyllis hyalina*

2B. Dorsum without pigmentation patterns; long dorsal cirri of median segments each with 25 (Fig. 1.32C) and short cirri with 18 articles; compound falcigers with longer, more narrow blades (Fig. 1.32F-I) ..... *Typosyllis alternata*

Typosyllis alternata (Moore, 1908)

Figure 1.32

Syllis alternata Moore, 1908:323-325, figs. a-f; 1909:321.—Annenkova, 1938:148.—Berkeley and Berkeley, 1938:37-38; 1948:77-78, fig 115.—Rioja, 1941:691-692, pl.3, figs. 1-9.
Typosyllis alternata: Hartman, 1948:21; 1968:479-480, figs. 1-5.—Imajima, 1966e:273-275, text-fig. 58a-l.
Syllis (Typosyllis) alternata: Uschakov, 1955:180, fig. 50, z-l.—Banse and Hobson, 1974:64, fig. 16 a.—Day, 1973:30.—Gardiner, 1976:141, fig. 13 b-c.
Syllis cornuta Pettibone, 1954:253 (in part).

Material Examined. California: off Point Arguello, Sta. BRA-6 rock (3, USNM 170944) + (3, SBMNH 142709); off El Morro, Sta. BRA-27 rock (1, USNM 170945); between Point Estero and Point Buchon, Sta. 6, rocks (5, USNM 170943).—Alaska: Behm Canal, holotype (USNM 5542).

Description. Length up to 44 mm, with 125-160 segments (Moore, 1908; Imajima, 1966e); MMS specimens 10 mm long, 0.4 mm wide excluding parapodia, for 88 segments. Glandular tissue on body wall present on every segment just posterior to dorsal cirri.

Prostomium wider than long, somewhat pentagonal; 3 pairs of eyes, all lenticulate, middle pair largest, farthest apart; posterior 2 pairs set in trapezoidal arrangement; anterior pair as eyespots, each present on anterior margin of prostomium, just medial to paired lateral antennae (Fig. 1.32A,B). Median antenna inserted between 2 posterior pairs of eyes, with up to 30 articles (14-19 in MMS specimens); lateral antennae inserted far forward on anterior margin of prostomium, each with 15-18 articles (9-12 in MMS specimens) (Fig. 1.32A,B). Palps broad, distally rounded, fused basally (Fig. 1.32A,B). Nuchal organs in juvenile specimen with 27 setigers small, paired, at postectal corners of prostomium (Fig. 1.32B). Pharynx usually present in setigers 1-8 or to setigers 10-12, anterior middorsal tooth large, conspicuously visible through body wall in setiger 3; with distal circlet of 10 soft papillae when everted. Proventriculus beginning from setigers 9-19 (9-16 in MMS materials), depending on extension of pharynx, extending through 12 segments, with an average of 39 rows muscle cells (34-40 in MMS specimens).

Tentacular segment forming complete, distinct ring (Fig. 1.32A). Two pairs of tentacular cirri, resembling prostomial antennae in form, shorter; dorsal pair longest, each about three-quarters length of median antenna, with 15-23 articles; ventral pair each about one-half length of dorsal pair, with 8-17 articles (Fig. 1.32A,B).

Parapodia thick, fleshy lobes (Fig. 1.32C-E). Setae generally compound falcigers with bidentate blades (Fig. 1.32F-J), around 8-12 per fascicle, thickest in medial segments. Blades longest superiorly (Fig. 1.32G), about 2 times longer than inferior blades in anterior segments decreasing to 1.5 in medial segments (Fig. 1.32F); all decreasing in length inferiorly within fascicles (Fig. 1.32I,J); all with coarsely serrated cutting edges. Dorsal and ventral simple setae present in posterior segments, each distally bidentate with serrated cutting surfaces (Fig. 1.32K-M). Up to 5 aciculae per anterior parapodium, decreasing to 1 in posterior parapodia; distally pointed, slightly curved distally, thickest emerging through parapodial lobes (Fig. 1.32N,O).

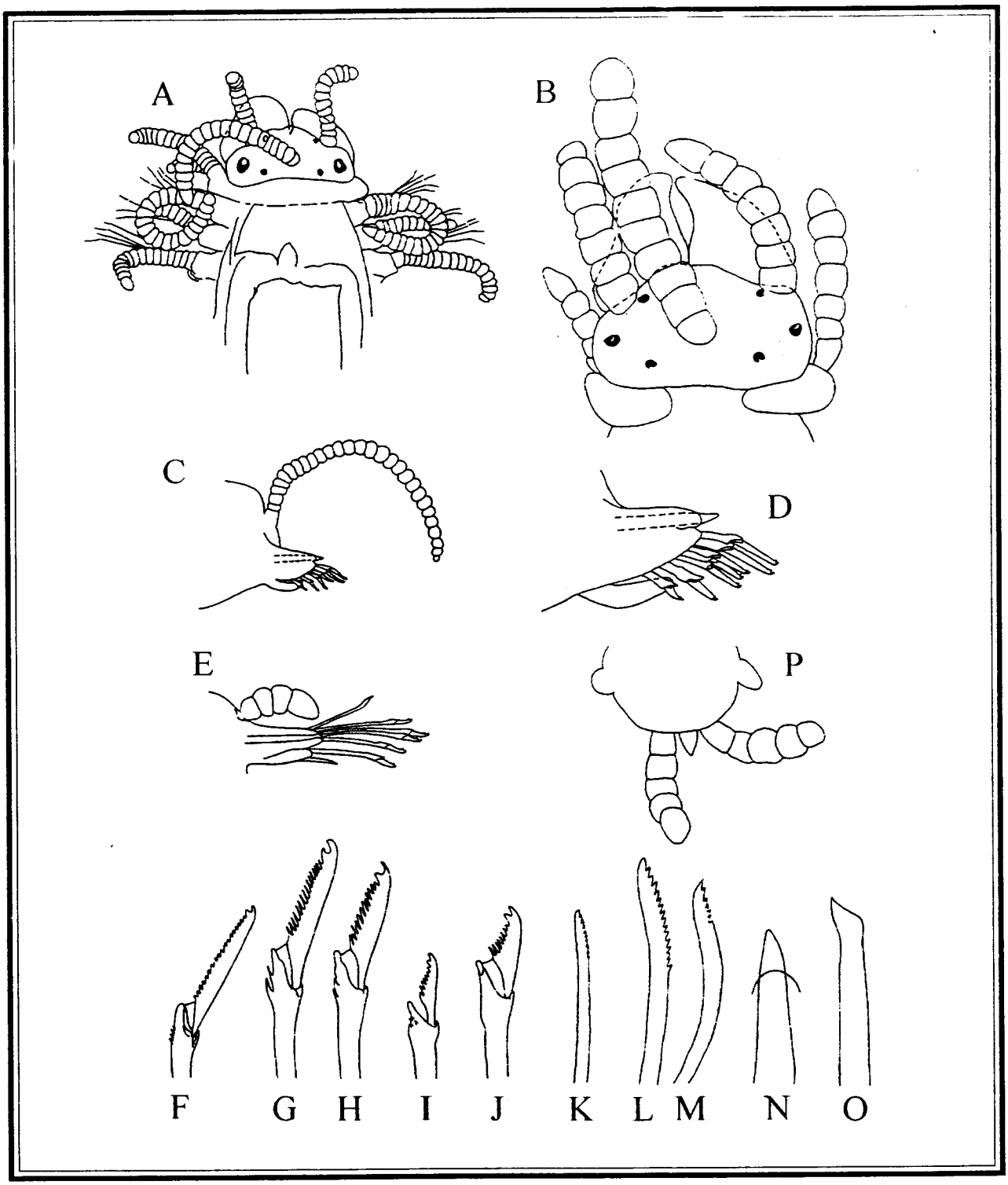

Figure 1.32. *Typosyllis alternata*: A, anterior segments, dorsal view; B, prostomium, dorsal view; C, left parapodium, median segment, anterior view; D, left parapodium, median segment, dorsal cirri omitted, anterior view; E, right parapodium, setiger 14, anterior view; F, superior compound falciger, median segment; G-H, J, compound falcigers from setiger 14: G, superior seta; H, intermediate seta; J, inferior seta; I, inferior compound falciger, median segment; K-L, dorsal simple setae: K, median segment; L, setiger 14; M, ventral simple seta, setiger 14; N-O, aciculae: N, median segment; O, setiger 14; P, pygidium, dorsal view. (A-P, originals by JDK) .

Dorsal cirri strongly articulated, alternating long and short, although longest overall in anterior 15 segments, decreasing gradually in medial and posterior segments. Dorsal cirri of setiger 1 longest, with 35 articles; setiger 2 with 25 articles; long ones in medial segments with 25, short ones with 18 articles. In specimens with about 60 segments, longest anterior dorsal cirri each with 25-31 articles, alternating with shorter ones having 17-23 articles; long ones of middle segments with 15-26, short ones with 8-21 articles. In juvenile specimen measuring 1.3 mm long for 27 setigers, dorsal cirri with limited number of articles in all segments; those of setiger 1 with 8 articles; setiger 2 with 7; setigers 3-4 each with 6; setigers 5-12 with 5; setigers 13-14 with 4; setigers 15-22 with 3; setigers 23-26 with 2; setige 27 with 1. Ventral cirri digitiform, extending beyond parapodial lobes.

Pygidium with paired anal cirri, each having up to 15-20 articles (Fig. 1.32P).

Remarks. The MMS specimens are generally consistent with the description of *Typosyllis alternata*, particularly in the pattern of alternating long and short dorsal cirri, although the dorsal cirri of the MMS specimens tend to have slightly greater numbers of articles than originally described by Moore (1908), they also have fewer numbers of acicu¹ae per parapodium, some of which project through the body wall; ventral cirri do not project beyond parapodia lobes; and the dorsal simple setae appear to be unidentate. Moore (1908) originally reported the ventral cirri to project beyond the parapodial lobes, although they do not in Japanese specimens (Imajima, 1966d).

Habitat. Mixed sediments, gravel, rocky substrata, to depths of 2560 m.

Distribution. California; Washington; British Columbia; Alaska; Japan.

Typosyllis bella Chamberlin, 1919

Figure 1.33

Typosyllis bella Chamberlin, 1919:7.

Material Examined. California: Western Santa Barbara Channel, east of Point Conception, Sta. BRC-1, rock (1, USNM 170946).

Description. Length about 20 mm, 1.25 mm wide in anterior region excluding parapodia, for about 145 segments (Chamberlin, 1919); MMS specimen incomplete, 5 mm long, 0.7 mm wide excluding parapodia, for 48 setigers. Color in life of mature female yellowish, each anterior segment with 2 transverse reddish-brown lines (Fig. 1.33B; Chamberlin, 1919); 2 transverse rust colored lines per segment through setigers 23-24 in MMS specimen.

Prostomium widest anteriorly; 2 pairs of eyes, elliptical; anterior pair largest; all trapezoidally arranged (Fig. 1.33A). Median antenna arising between anterior pair of eyes, with 21 distinct articles, nearly 2 times longer than prostomium; lateral antennae arising from anterofrontal margin of prostomium, about same length as median antenna, each with 15-18 articles (Fig. 1.33A). Palps nearly as long as prostomium, narrow, distally rounded, not fused basally (Fig. 1.33A). Pharynx extending through setiger 13, with an anterior middorsal tooth. Proventriculus present in setigers 14-23; rows of muscle cells not counted.

Tentacular segment reduced. Two pairs of tentacular cirri, similar in form to median antenna; dorsal pair longest, each longer than median antenna with 32-34 articles; ventral pair slightly less than one-half length of dorsal pair, each with about 15 articles.

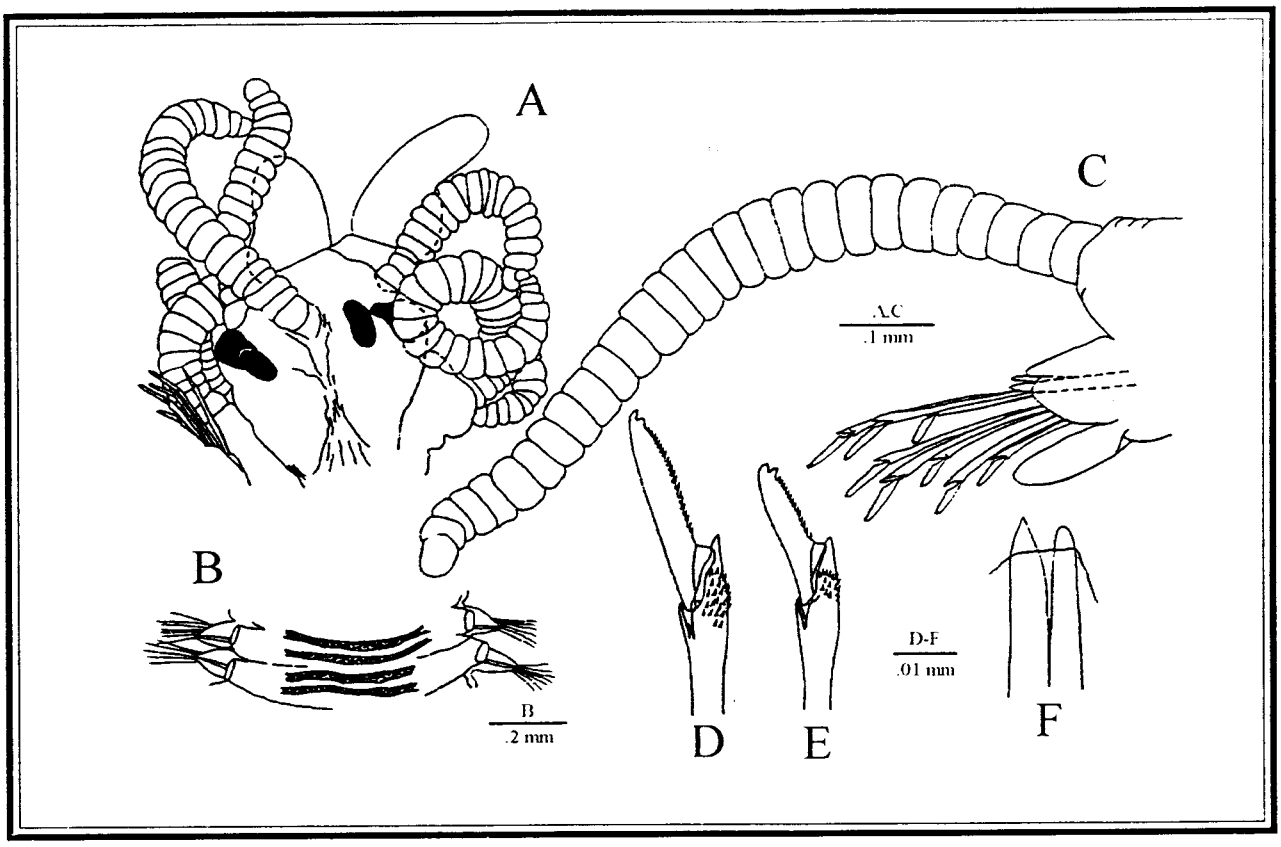

Figure 1.33. *Typosyllis bella*: A, prostomium, dorsal view; B, median segments with paired transverse bars of pigment per segment, dorsal view; C, right parapodium, setiger 2, anterior view; D, superior compound falciger, setiger 2; E, inferior compound falciger, setiger 2; E, paired aciculae, emerging through acicular lobe, superior acicula on right. (A-E, originals by JDK)

Parapodia thick, fleshy, conical in dorsal view; distally incised, forming small superior and larger round inferior lobe (Fig. 1.33C). Setae compound bidentate falcigers (Fig. 1.33C-E), 8-12 per anterior fascicle (11-13 in MMS specimen), decreasing posteriorly. Blades longest superiorly (Fig. 1.33D), 2-2.5 times longer than inferior blades within fascicles (Fig. 1.33E), all decreasing gradually in length inferiorly within fascicles, and posteriorly along body; all with wide angle between the distal and subdistal teeth and finely serrated cutting edges (Fig. 1.33D,E). Setal shafts with numerous subdistal denticles, these gradually decreasing in numbers inferiorly within fascicles (Fig. 1.33D,E). Two to 3 aciculae per parapodium (2 in MMS specimen), inferiormost usually large, pointed, superior ones smaller, distally blunt, middle one enlarged in posterior segments; all projecting through parapodial lobe at and just below distal incision (Fig. 1.33F).

Dorsal cirri extremely well developed, longest in anterior segments (Fig. 1.33C), alternating long with 32 articles, and short with about 18 articles, and gradually decreasing in overall length posteriorly (Chamberlin, 1919); those of MMS specimen generally lost, with dorsal cirri of setiger 1 longest, with 34 articles; setigers 2 and 4 each with 27; setigers 3 and 5 each with 16-17. Ventral cirri slender, digitiform, extending beyond parapodial lobes (Fig. 1.33C).

Pygidium unknown.

Remarks. The present specimen is remarkably consistent with Chamberlin's (1919) original description, especially for the prostomium, dorsal cirri and dorsal segmental pigmentation pattern. The holotype of this species is apparently deposited in the Museum of Comparative Zoology, Harvard, and has not been illustrated or redescribed since first reported, although Hartman (unpublished) did examine the holotype in 1937. The MMS specimen is tentatively referred to *Typosyllis bella* pending re-examination of the holotype.

Habitat. Originally reported from the low intertidal zone of Laguna Beach (Chamberlin, 1919); also associated with rocky substrata in depths of 73.5-78 m.

Distribution. Southern California.

Typosyllis hyalina (Grube, 1863)

Figure 1.34

Syllis (Typosyllis) hyalina Fauvel, 1923:262-263, fig. 98a-c.—Rullier, 1964:159-160.
Syllis hyalina Grube, 1863:45.—Ehlers, 1901:86.—Monro, 1933:30.—Berkeley and Berkeley, 1948: 74, figs. 107-108.—Rioja, 1941:692.—Banse and Hobson, 1974:62, fig. 16m.—Reish, 1968:214.—Westheide, 1974:47-51, pl. 20.—Ben-Eliahu, 1977:9-10.—Núñez, San Martín and Brito, 1992:120.
Typosyllis hyalina: Imajima, 1966e: 271-273, text-fig. 57, a-k.—Hartman, 1968:487-488, figs. 1-3.—Gardiner, 1976:140, fig. 12v-w.—Tebble, 1959:17.—Day, 1967:246, fig.12.2.v-x; 1973:29.
Typosyllis (Typosyllis) hyalina Hartmann-Schröder, 1965:95; 1979:89, figs. 57-61; 1980:50.
Typosyllis aciculata orientalis Imajima and Hartman, 1964:130-132, pl. 3, figs. e,f, pl. 32, figs. a-t. *Fide* Westheide, 1974.

Material Examined. California: Santa Maria Basin, Sta. BRA-21 (1, SBMNH 142710).—Western Santa Barbara Channel, east of Point Conception, Sta. BRC-1 (7, USNM 170947) + (1, USNM 170948); BRC-2 (5); BCC-1 (1).

Description. Body 10-35 mm long, 2 mm wide including parapodia; with over 100 segments (Imajima, 1966e; Hartman, 1968). Color in life variable: translucent, white or occasionally with dorsal pattern of broken or continuous transverse dark lines alternating on every 3 anterior segments (Fig. 1.34A).

Prostomium wider than long, subglobular; 2 pairs of black eyes, set in trapezoidal arrangement, plus an additional pair of frontal eyespots between bases of frontal antennae (Fig. 1.34A). Antennae long, extending beyond palps; median antenna arising from center of prostomium, with 13-14 articles; lateral antennae arising from anterior margin of prostomium, each with 10-12 articles (Fig. 1.34A). Palps large, thick, subtriangular, 1.5 times longer than prostomium, fused basally (Fig. 1.34A). Everted pharynx extending to setiger 9, anterior middorsal tooth conspicuous; with a distal circlet of 10 soft papillae. Proventriculus present in segments 10-21.

Tentacular cirri longer than antennae; dorsal pair each with 20 articles; ventral pair each about as long as median antenna (Fig. 1.34A).

Parapodia fleshy, bluntly conical (Fig. 1.34B,C,H). Setae generally compound falcigers (Fig. 1.34D-G), numbering around 10 per fascicle. Blades distally bidentate. Superior and inferior blades within fascicles subequal in length (Fig. 1.34D-G); those in anterior segments long, slender, conspicuously serrated (Fig. 1.34D,E); in median and posterior segments short, stout, finely serrated (Fig. 1.34F,G). A dorsal superior and a ventral inferior simple seta present in posterior fascicles, both distally bidentate with serrated cutting surfaces (Fig. 1.34I,J). Aciculae numbering 4 per anterior parapodium, decreasing to 1 posteriorly, each distally resembling bird's beak (Fig. 1.34K).

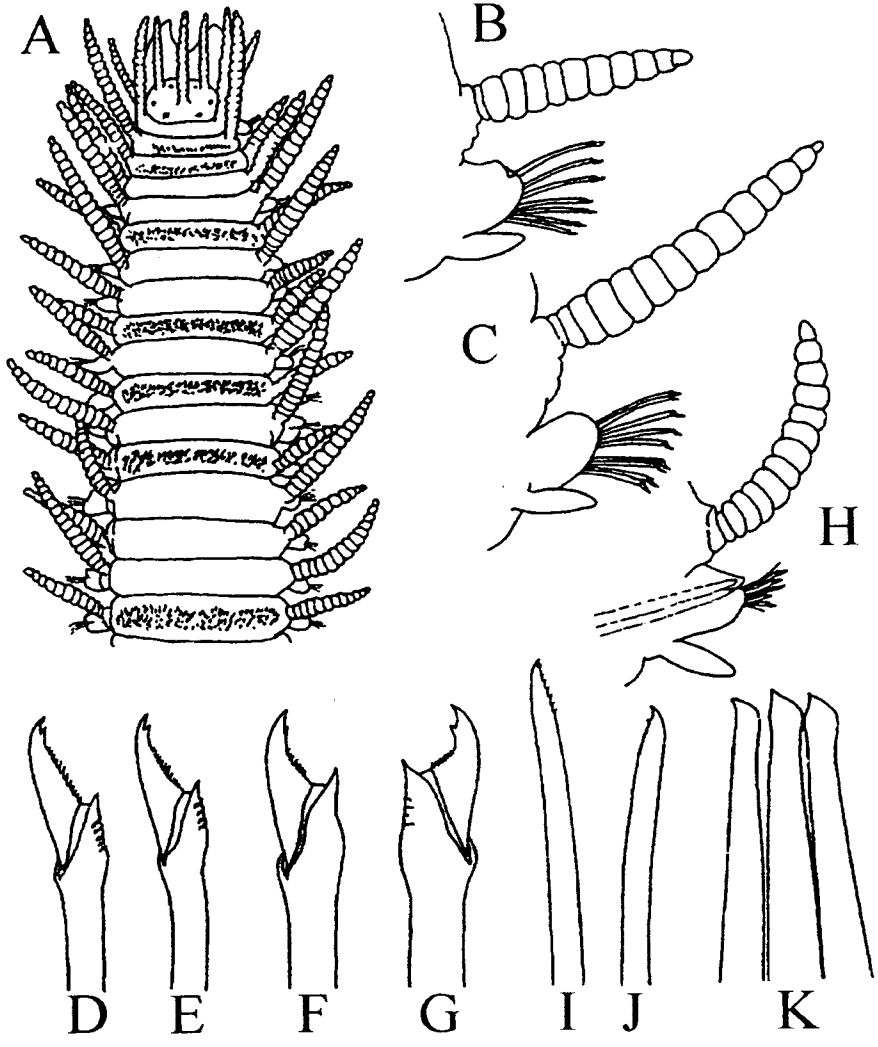

Figure 1.34. *Typosyllis hyalina*: A, anterior end, dorsal view; B, median parapodium with short dorsal cirrus, posterior view; C, median parapodium with long dorsal cirrus, posterior view; D, superior compound falciger, parapodium 10; E, inferior compound falciger, parapodium 10; F, compound falciger, median parapodium; G, compound falciger, posterior parapodium; H, posterior parapodium; I, dorsal simple seta, posterior parapodium; J, ventral simple seta from same parapodium as I; K, aciculae from median parapodium. (A-K, redrawn from Imajima, 1966e)

Dorsal cirri thickest basally, varying in length, strongly annulated; those of setiger 1 longest, with 20 annulations; setigers 2, 3, 5 short, each with 11-14 annulations; setigers 4, 6 long, with 16 annulations; setigers 7, 8 short; setiger 9 long; thereafter regularly alternating short (setiger 10, 11 annulations) and long (setiger 11, 14 annulations) to end of body (Fig. 1.34A). Ventral cirri digitiform, not extending beyond parapodial lobes (Fig. 1.34B,C,H).

Remarks. *Typosyllis hyalina* is a well-recognized, widespread species reported from both the north Pacific and Atlantic basins and the Mediterranean Sea. Local populations of both *T. hyalina* and *T. pulchra* were studied extensively by Piltz (1980).

Habitat. Associated with algae, poriferans and mussel beds in intertidal zones, and hard substrata at MMS stations in depths of 69-90 m.

Distribution. Panama; California north to British Columbia; Japan; North Atlantic Ocean; Mediterranean Sea.

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