

Studies of Psilopinae  
(Diptera: Ephydriidae), I:  
A Revision of the Shore Fly  
Genus *Placopsidella* Kertész

WAYNE N. MATHIS

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Studies of Psilopinae  
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## ABSTRACT

Mathis, Wayne N. Studies of Psilopinae (Diptera: Ephydriidae), I: A Revision of the Shore Fly Genus *Placopsidella* Kertész. *Smithsonian Contributions to Zoology*, number 430, 30 pages, 34 figures, 1986.—In recent catalog treatments of *Placopsidella*, the genus has been suggested to comprise two described species, with the type-species, *P. cynocephala*, being widespread. Other species were described, but these have been treated as junior synonyms. This study reveals that there are eight known species in the genus and that all of the so-called junior synonyms are valid species. *Placopsidella opaca* Miyagi, however, is here reported to be a synonym of *P. grandis* (Cresson). *Gymnopa marquesana* Malloch is also transferred to *Placopsidella*, and *P. insulana* and *P. phaeonota* are newly described. These species are segregated into two species groups, the *cynocephala* group, with six species, and the *liparoides* group, with two species; the relationships of the groups' component species are analyzed and discussed. Likewise the generic relationships are discussed, and a key to the tribes of Psilopinae is provided. For each species, revisionary treatment is presented, including illustrations of male terminalia and other appropriate characters and distribution maps. The phylogenetic relationships of the species are graphically presented in a cladogram.

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FIGURE 1.—Habitus views of *Placopsidella grandis*.

# Studies of Psilopinae (Diptera: Ephydridae), I: A Revision of the Shore Fly Genus *Placopsidella* Kertész

*Wayne N. Mathis*

## Introduction

Most scientific research has at least some elements that are serendipitous or opportunistic. During my career in biological systematics, the most productive or stimulating of these has resulted from field work. Collection of specimens and observations associated with them quite naturally provoke one's curiosity and stimulate further investigation. In the study and production of this revision of the genus *Placopsidella* Kertész, field work was an especially significant factor.

My initial interest in *Placopsidella* was prompted in 1980 when I unexpectedly discovered specimens of this genus along the coasts of Sri Lanka and India. These were my first observations of living examples of the genus, and a long series was collected. Upon further investigation, it was soon evident that one widespread Oriental species, *P. cynocephala* Kertész, was either quite variable or more than one species was involved in the taxon, as then characterized. In either case, additional study would be required for better resolution of the limits of *P. cynocephala*.

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*Wayne N. Mathis, Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington, D.C., 20560.*

More recently, as part of ongoing studies of the acalyptrate Diptera of Israel, Dr. Amnon Freidberg and colleagues sent specimens of *Placopsidella* they had collected along the eastern shores of the Mediterranean. The occurrence of *Placopsidella* in Israel was altogether unexpected and represents a major extension of the known distribution of the genus. Previously, the closest known localities to Israel were the Seychelles and Madagascar.

Preliminary work further revealed that there were indeed more species than previously thought (Cogan and Wirth, 1977; Cogan, 1980), especially as evidence from structures of the male terminalia was considered. The challenge, then, of finding distinguishing characters apart from those of the male terminalia and determining which species have valid names, as several are available (see references just cited), has resulted in the present study.

*Placopsidella* is an obscure genus of shore flies that occurs almost exclusively along the maritime coasts within the Pacific and Indian Ocean basins, particularly in tropical and subtropical zones. Although mostly restricted to warmer zones, some species, such as those of the *liparoides* group, are found as far north as Japan and Israel, where the climate is more temperate. Specimens



of *Placopsidella* are not common in museums, and in the field they are generally overlooked unless specifically sought. When the proper habitat is sampled, however, members of the genus are frequently abundant. For this study, I examined 864 specimens, assembled through collecting or borrowing from institutions (see "Acknowledgments," page 3).

The genus has few known species, and all were discovered relatively recently. The descriptive history of the genus, as a consequence, is fairly brief and straightforward. *Placopsidella*, with *P. cynocephala* as the type species, was discovered and described early in this century by the Hungarian dipterist Kertész (1901), who studied specimens collected in New Guinea. Eleven years later, the genus was independently redescribed twice (Enderlein, 1912; Lamb, 1912) but under different names and apparently without knowledge of any other work on the taxon. The synonymy of these names was soon discovered and reported (Kertész, 1912; Cresson, 1925), and in the latter paper Cresson also described *Gymnopa grandis*, a species that was later transferred to *Placopsidella*. For several decades thereafter the genus received meager attention until recent catalogs of Diptera from the Orient (Cogan and Wirth, 1977) and the afrotropics (Cogan, 1980) were published. In the first-mentioned catalog, *Gymnopa grandis* Cresson (1925) was correctly transferred to *Placopsidella*.

Coinciding with publication of these catalogs, Miyagi (1977) described *P. opaca* from Japan, and Tenorio (1980) described the adults and immatures of *P. marquesana* (Malloch) [as *P. cynocephala*, a misidentification] from the Hawaiian Islands. Both publications resulted from regional faunistic studies. In between the early studies and those of the last decade, Malloch (1933) described *Mosillus marquesana* from the Marquesas Islands and noted that, although this species was different from those typical of the genus *Mosillus* Latreille, he preferred placement of his species in that genus. Malloch justified this combination on what he perceived to be confused generic concepts among genera related to *Mosillus*. As *Mosillus* was the largest and best known

of these genera, he placed his species there. Malloch's species is herein transferred to *Placopsidella*. In this paper the generic limits of *Placopsidella* are redefined, and placement of the genus is analyzed within the context of related taxa in the subfamily Psilopinae, which is first recharacterized.

**METHODS.**—The general methodology used in this study was explained previously by Mathis (1982, 1983, 1985). The descriptive terminology, with the exceptions to be noted, follows that published in the recent *Manual of Nearctic Diptera* (McAlpine, 1981). I have followed Sabrosky (1983) in using "microtomentum" rather than pruinescence or pollinosity for the dustlike vestiture over much of the cuticular surface. The dustlike appearance, however, is the result of cuticular microtrichia at various densities, not a waxy substance, as on a plum (pruinescence), or dust (pollinosity).

To better assure effective communication about structures of the male terminalia, I have adopted the terminology of other workers in Ephydriidae (Cogan, 1968; Steyskal, 1970; Wirth, 1971; Andersson, 1971; Clausen, 1977; Miyagi, 1977). Usage of these terms, however, should not be taken as an endorsement of them from a more theoretical or morphological view over alternatives that have been proposed (Griffiths, 1972; McAlpine, 1981). Rather, I am deferring to tradition until the morphological issues are better resolved (see Figures 2 and 3 for terminology of parts).

One scutellar and two venational ratios are used commonly in the descriptions and are defined here for the convenience of the user (all ratios are averages of three specimens).

1. Costal vein ratio: the straight line distance between the apices of  $R_{2+3}$  and  $R_{4+5}$ /distance between the apices of  $R_1$  and  $R_{2+3}$ .

2. M vein ratio: the straight line distance along M basad of crossvein dm-cu/distance apicad of crossvein dm-cu.

3. The scutellar ratio is the scutellar length/scutellar width as measured between the two basal scutellar creases.

Descriptions are composite, not based solely on the holotypes. For the most part, information given in the generic or species group descriptions is not repeated in the species descriptions.

The phylogenetic analysis was greatly facilitated through the use of PHYSYS, a computer-assisted system developed by James S. Farris and Mary F. Mickevich. The methods used in the phylogenetic analysis were explained by Farris (1970, 1982, 1983) and Maddison et al. (1984). Of the many numerical options available in PHYSYS, I chose only those directly related to the generation of a cladogram (Wagner ground-plan analysis and tree plot) and a diagnosis of the cladogram and character evidence (A = apomorphies for each group, O = location on the tree of each origin of each character state, H = states of characters for each stem, and C = consistency index for each character).

**ACKNOWLEDGMENTS.**—Numerous persons and institutions have cooperated to make this study possible. I express my appreciation for their consideration, especially to the curators and their respective institutions, for loaning specimens (an asterisk denotes institutions from which type specimens were borrowed).

- AMS Australian Museum, Sydney, Australia (Dr. David K. McAlpine)
- ANSP\* Academy of Natural Sciences of Philadelphia, Pennsylvania (Dr. S.S. Roback)
- BBM\* Bernice P. Bishop Museum, Honolulu, Hawaii (Mr. Neal L. Evenhuis)
- BMNH\* British Museum (Natural History), London, England (Mr. Brian H. Cogan)
- HNHM\* Hungarian Natural History Museum, Budapest, Hungary (Dr. L. Papp)
- ITZA\* Instituut voor Taxonomische Zoölogie, Zoölogisch Museum, Universiteit van Amsterdam, Amsterdam, Netherlands (Dr. Th. H. van Leeuwen)
- NMW Naturhistorisches Museum, Wien, Austria (Dr. Ruth Contreras-Lichtenberg)
- PAN\* Polska Akademia Nauk, Instytut Zoologiczny, Warsaw, Poland (Dr. J.T. Nowakowski)
- UHH University of Hawaii, Honolulu, Hawaii (Dr. D. Elmo Hardy)
- UR\* University of the Ryukyus, Nakagami, Okinawa, Japan (Dr. I. Miyagi)

- USNM former United States National Museum collections, now in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Hollis B. Williams prepared the distribution maps and organized the locality data. Mary F. Mickevich generously and patiently assisted with the phylogenetic analysis, especially the use of PHYSYS, which was made available as a member of the Maryland Center of Systematic Entomology (MCSE), University of Maryland. MCSE is coordinated by Charles W. Mitter, whose cooperation is appreciated. For reviewing a draft of this paper, I thank Curtis W. Sabrosky and Norman E. Woodley. The illustrations were carefully prepared by George L. Venable and Young T. Sohn. For permission to reproduce the illustrations of the immature stages of *P. marquesana* (Figures 8–12, reprinted from Tenorio, 1980:315, fig. 125a–e), I thank The University Press of Hawaii (Mrs. Iris M. Wiley) and Drs. J.A. Tenorio and D. Elmo Hardy. I also thank S. Dillon Ripley, former Secretary, Smithsonian Institution, for a Fluid Research Grant to conduct field work in India, Sri Lanka, and Israel.

### Subfamily PSILOPINAE Cresson

PSILOPINAE Cresson, 1925:241.

**DIAGNOSIS.**—Minute to moderately small shore flies, length less than 1 mm to about 4 mm.

**Head:** Fronto-orbital bristles proclinate and reclinate, rarely one of them laterocline or mesocline; arista usually with several dorsally branching rays, occasionally with ventral rays also; midface bare, not setulose, lateral facial series of setae aligned vertically, usually parallel, if face is short, the series slightly convergent dorsally.

**Thorax:** Presutural bristles lacking; post-sutural bristles as follows: usually 1 larger pair of prescutellar acrostichal bristles; 1 intra-alar bristle, sometimes inserted anterior of anterior wing margin; frequently 1 supra-alar bristle; 1 postalar bristle.

Key to the Tribes of *Psilopinae*

1. Arista pectinate, branches sometimes pale and difficult to discern . . . . . 2  
Arista bare to macropubescent, or arista rudimentary; if pectinate, hairs shorter than  $\frac{1}{2}$  width of first flagellomere . . . . . 8
2. Posterior margin of postgena meeting occiput at an acute angle; postgena with fine pale setulae. Mostly or entirely shining black species with setation much reduced . . . . . **GYMNOPINI**, in part  
Posterior margin of postgena meeting occiput at obtuse and broadly rounded angle; postgena usually with coarse black setulae. Shining to dull species with setation usually well developed . . . . . 3
3. Anterior and posterior notopleural bristles equidistant from notopleural suture . . . . . 4  
Posterior notopleural bristle much farther from notopleural suture than anterior bristle . . . . . **ATISSINI**, in part
4. Vein  $R_{2+3}$  close to costal vein beyond end of vein  $R_1$ ; crossvein dm-cu with sharp angle near middle . . . . . **DISCOMYZINI**, in part  
Vein  $R_{2+3}$  well separated from costal vein; crossvein dm-cu not angulate . . . . . 5
5. Face strongly and coarsely sculptured on at least lower  $\frac{1}{2}$ ; facial bristles short, the longest at most  $\frac{3}{4}$  as long as its distance from opposite bristle . . . . . **DISCOMYZINI**, in part  
Face usually smooth, if finely striate the longest facial bristle at least as long as its distance from opposite bristle . . . . . 6
6. Notopleuron with short setulae around anterior bristle; anterior notopleural bristle almost 2 times as far from postpronotal bristle as from posterior notopleural bristle. Parafacial setulose or bare . . . . . **DISCOCERINI**, in part  
Notopleuron without short setulae; anterior notopleural bristle at most  $1\frac{1}{3}$  times as far from postpronotal bristle as from posterior notopleural bristle. Parafacial bare . . . . . 7
7. Ocellar bristles inserted behind anterior ocellus, sometimes only slightly so; pseudopostocellar bristles lateroconclinate, strongly divergent, sometimes very weak and indistinct . . . . . **PSILOPINI**  
Ocellar bristles inserted at or slightly in front of level of anterior ocellus; pseudopostocellar bristles proclinate, parallel or slightly divergent, moderately strong and distinct . . . . . **DISCOCERINI**, in part
8. Eye pyriform, strongly narrowed below. Body gray, heavily microtomentose . . . . . **ATISSINI**, in part  
Eye round to oval. Body dark colored, frequently black, extensively shining to subshining except for *Placopsidella*, which is densely microtomentose, usually dull but dark colored . . . . . **GYMNOPINI**, in part

Tribe **GYMNOPINI** Cresson

*GYMNOPINI* Cresson, 1942:103.

**DIAGNOSIS.**—Small to medium-sized shore flies, length 1.50–4.00 mm; mostly polished,

shining black species (*Placopsidella* is an exception, being mostly covered with a vestiture of dull, mostly gray-colored microtomentum).

*Head:* Face generally pitted or rugose, with facial setae inserted in such indentations; eye



round or obovate, not pyriform; gena, especially middle portion, mostly bare, its posterior margin sharp, acutely angulate, and usually reflexed, marginate.

**DISCUSSION.**—This tribe is closely related to Atissini, and there is extensive character state overlap between the two tribes, such as between the genera *Placopsidella* (Gymnopini) and *Hecamede* Haliday (Atissini). The similarity between these two genera, however, is mostly due to convergence, as the two are not closely related (*Placopsidella* is more similar and more closely related to genera of Gymnopini, such as *Mosillus* or *Chlorichaeta*, than to those of Atissini). Species of both genera occur in maritime habitats, and their superficial similarity may be due to adaptive convergence.

#### Genus *Placopsidella* Kertész

*Placopsidella* Kertész, 1901:424 [type species: *Placopsidella cynocephala* Kertész, by monotypy].—Cresson, 1945:54 [review of Indoaustralian species].

*Oscinomima* Enderlein, 1912:163 [type species: *Oscinomima signatella* Enderlein, by original designation and monotypy].—Cresson, 1925:230 [synonymy].

*Enchastes* Lamb, 1912:319 [type species: *Enchastes scotti* Lamb, by original designation].—Cresson, 1925:230 [synonymy, as *Encastes* (sic)]; 1948:23 [correction in spelling of "*Encastes*" to *Enchastes*].

**DIAGNOSIS.**—Small to medium-sized shore flies, length 1.70–3.85 mm, mostly appearing dull, microtomentose, gray to dark brown.

**Head:** Setation poorly developed, with fronto-orbital setae greatly reduced; ocellar setae inserted in front of anterior ocellus and widely separated, in *liparoides* group these setae closer to anterior margin of frons than to ocelli; outer vertical bristle lacking. Arista bare. Gena generally bare; posterior margin sharply angulate but not marginate.

**Thorax:** Notopleuron with 1 bristle, inserted near posteroventral angle; scutellar setae not arising from tubercles; 1 intra-alar bristle; 4–6 large setae between postalar bristle and base of scutellum; coloration of halter variable. Tarsi with basal 3 tarsomeres yellowish, apical 2 dark, mostly blackish brown. Wing vein  $R_2$  long, with costal section II at least twice length of section

III; vein  $CuA_1$  not reaching wing margin; alula wide, alular marginal setulae much shorter than alular width. Forefemur unarmed, size similar to femora of mid- and hindleg; tarsi yellowish except for blackish brown fifth tarsomere (sometimes fourth tarsomere also).

**Abdomen:** Terga 3 and 4 with anterior band (2 bands if a median gap is present as on tergum 4) of whitish microtomentum, band narrower medially; fifth tergum shorter than fourth, usually triangular. Male terminalia: epandrium (either with the surstyli fused or lacking) a relatively slender process in lateral view; cerci comparatively long, almost equal to length of epandrium, shape variable between species; gonites longer than aedeagus, with basoventral sclerite, usually triangular in shape, between extended gonial process and hypandrium, extended gonial process slender, shape variable between species; aedeagus longer than wide, usually narrowly triangular in dorsal view, pointed apically.

**DISTRIBUTION.**—Maritime coasts of tropics and subtropics primarily within the Pacific and Indian Ocean basins with extensions into the temperate north (Israel and Japan).

**NATURAL HISTORY.**—The larvae of various species of *Placopsidella* are apparently predators, perhaps scavengers, on various molluscs, especially small mussels, and barnacles. Tenorio (1980:351) described the larva and puparium of *P. marquesana* [as *P. cynocephala*, a misidentification] and reported success in rearing this species on a medium of seaweed. Whether the seaweed was a pure culture or contained a supplement of protein in the form of small molluscs or crustaceans is not known.

I have collected specimens of *Placopsidella* from seashore habitats that were covered with large rocks and was most successful by sweeping along man-made jetties or seawalls. I suspect that the specimens of *Placopsidella* were breeding as scavengers or predators on the molluscs or crustaceans that had colonized these habitats.

**DISCUSSION.**—The distributional data for a few of the species are limited because of inadequate sampling and could lead to erroneous conclusions. An example is the distribution of *P. signatella* (Enderlein), reported herein to occur

in Aldabra, Madagascar, and Taiwan. Although these localities are separated by thousands of miles of ocean and the distribution could easily be interpreted as disjunct or adventitious, I suspect that many more localities in between will be discovered and that the true distribution will be more continuous. Another errant conclusion re-

sulting from poor sampling is the notion that specimens of *Placopsidella* are rare. The present rarity of specimens in collections is, in my opinion, wholly attributable to poor sampling, as also alluded to in the Introduction. Field work and adequate sampling of the fauna are imperative to good systematic and biogeographic studies.

### Key to the Species Groups and the Species of *Placopsidella* Kertész

(Some couplets use characters of males only)

1. Ocellar bristles inserted immediately in front of anterior ocellus; microtomentum of fronto-orbits just above antennae a continuation in color and density of that on parafacials. Forefemur uniformly and moderately densely microtomentose; pleural areas mostly uniformly microtomentose, lacking distinct patches or stripes of longer microtomentum. Fifth tergum lacking dense patch of velvety-appearing microtomentum or the latter reduced (the *cynocephala* group) . . . . . 2
- Ocellar bristles inserted far forward, beyond anterior 1/2 of frons; microtomentum of parafacials extended dorsally to level slightly above antennal bases where there is a fairly distinctive patch of longer microtomentum slightly larger than an ocellus, microtomentum of parafacials not continued onto fronto-orbits. Forefemur with anterior 1/2 distinctly more densely microtomentose; dorsal margin of katapisternum with row of whitish gray microtomentum; anepisternum with whitish gray microtomentose patch near middle. Fifth tergum with 2 dense patches (sometimes partially fused anteriorly) of velvety-appearing microtomentum near middle (the *liparoides* group) . . . . . 7
2. Median facial carina narrow and long, about 3 times higher than wide, middle 1/3 with 4–6 distinct transverse rugae, lateral margins, especially at about dorsal 1/3, irregular, with shallow indentations; grayish white microtomentum of fronto-orbits with distinct brownish interruptions around base of fronto-orbital setae, brownish coloration usually traversing width of fronto-orbit. Scutellum with posteroapical margin broadly rounded . . . . . 3
- Median facial carina usually shorter and wider, 2–3 times higher than wide, surface appearing shining, usually lacking transverse rugae (*P. scotti* an exception), lateral margins more regular; grayish white microtomentum of fronto-orbits with indistinct brownish coloration immediately around base of fronto-orbital setae only, not traversing width of fronto-orbit. Scutellum with posterior margin narrowly rounded . . . . 4
3. Cerci of male terminalia more or less uniformly 1/2 ovate, median margin nearly straight; combined epandrium plus surstylus, in lateral view, slender, much thinner than greatest width of cercus in lateral view, and with preapical, angulate bend ventrad from posteroventral orientation (Taiwan and Madagascar) . . . . . *P. signatella* (Enderlein)

- Cerci of male terminalia not uniformly  $\frac{1}{2}$  ovate, median margin at ventral  $\frac{1}{3}$ – $\frac{1}{4}$  distinctly angulate; combined epandrium plus surstylus, in lateral view, robust, wider than greatest width of cercus in lateral view, and with preapical, somewhat angulate swelling along posteroventral surface but with orientation posteroventrad (India and Sri Lanka) . . . . . *P. phaeonota*, new species
4. Median facial carina with small but distinct transverse rugae (Seychelles) . . . . . *P. scotti* (Lamb)  
 Median facial carina usually lacking transverse rugae . . . . . 5
5. Cerci in posterior view with dorsal  $\frac{1}{2}$  twice width of ventral  $\frac{1}{2}$ , the ventral portion developed as a digital-like process that is slightly curved medially ventrally, forming a U-shaped pocket between the 2 cerci. Scutellum wider than long, broadly rounded apically. Yellowish gray microtomentose portion of fronto-orbit extended dorsad from parafacials usually reaching larger lateroreclinate fronto-orbital seta (Micronesia to Indonesia and Australia) . . . . . *P. cynocephala* Kertész
- Cerci ovate to lunate, usually with median margin straight. Scutellum as long as wide, narrowly rounded. Yellowish gray microtomentose portion of fronto-orbit extended dorsad from parafacials becoming attenuated dorsally, usually not reaching level of larger lateroreclinate fronto-orbital seta . . . . . 6
6. Epandrium plus surstylus of more or less uniform width throughout its length, apex of surstylus narrowly rounded; aedeagus, in lateral view, with basal  $\frac{1}{2}$  wide, becoming very slender apically (Hawaii and French Polynesia) . . . . . *P. marquesana* (Malloch)  
 Dorsal  $\frac{1}{2}$  of epandrium plus surstylus nearly twice width of ventral  $\frac{1}{2}$ , apex of surstylus bluntly rounded; aedeagus, in lateral view, nearly parallel sided to apical  $\frac{1}{4}$ , apically narrowed to a point (New Hebrides-Espiritu Santo) . . . . . *P. insulana*, new species
7. Median facial carina elongate, about twice as high as wide; microtomentum of face golden to brownish; antenna almost entirely yellowish orange . . . . . *P. liparoides* de Meijere  
 Median facial carina tuberculate; microtomentum of face silvery to grayish white; antenna blackish yellow, darker dorsobasad, paler ventroapical . . . . . *P. grandis* (Cresson)

**The cynocephala Group**

DIAGNOSIS.—*Head*: Ocellar bristles inserted immediately in front of anterior ocellus; ocellar triangle lacking evident setulae along lateral margins; bare facial area developed as a median carina, higher than wide and nearly extended entire length between ventral margin of antennal grooves and emarginate oral margin; face lacking

bare areas other than carina; microtomentum of parafacials extended dorsally onto fronto-orbits without change in density.

*Thorax*: Pleural areas generally uniformly microtomentose, brown to blackish brown; scutellum bearing 5–7 stout setae along lateral margin in addition to apical pair; forefemur with a uniform investment of microtomentum. Knob of halter variable in color.



**Abdomen:** Microtomentum of fifth tergum uniformly microtomentose, lacking distinctive dorsomedian patch. Male terminalia as follows: gonite long and slender, pointed apically; hypandrium lacking a well-sclerotized, median process.

**DISCUSSION.**—This species group, which includes the type species, *P. cynocephala*, comprises species most typical of traditional characterizations of *Placopsidella* (Cresson, 1925, 1948; Tenorio, 1980), notably in having a bare, vertical, midfacial carina. Within this species group I recognize two subgroupings of species, based mostly on the conformation and rugosity of the facial carina and the coloration of the fronto-orbital microtomentum (see couplet 2 of the species key, page 6). In the phylogenetic analysis (page 25), however, the *cynocephala* group is divided into three lineages forming an unresolved trichotomy.

### *Placopsidella cynocephala* Kertész

FIGURES 2-4

*Placopsidella cynocephala* Kertész, 1901:425.—de Meijere, 1911:394 [list, Java].—Cresson, 1925:230 [synonymy]; Cresson, 1945:55 [in part (misidentifications); review].—Bohart and Gressitt, 1951:45, 87 [list, Guam].—Cogan and Wirth, 1977:323 [in part, (misidentification); Oriental catalog].

**DIAGNOSTIC DESCRIPTION.**—Small to medium-sized shore flies, length 1.90–3.20 mm.

**Head:** Median facial carina usually short and wide, 2–3 times higher than wide, surface appearing shiny, at most microsculptured, lacking conspicuous transverse rugae, lateral margins more regular; yellowish gray microtomentose portion of fronto-orbit extended dorsad from parafacials to larger lateroreclinate fronto-orbital seta; microtomentum of fronto-orbits with indistinct and generally brownish coloration immediately around base of fronto-orbital setae only, coloration not traversing width of fronto-orbit, which otherwise is whitish to yellowish gray. Eye-to-cheek ratio 0.48.

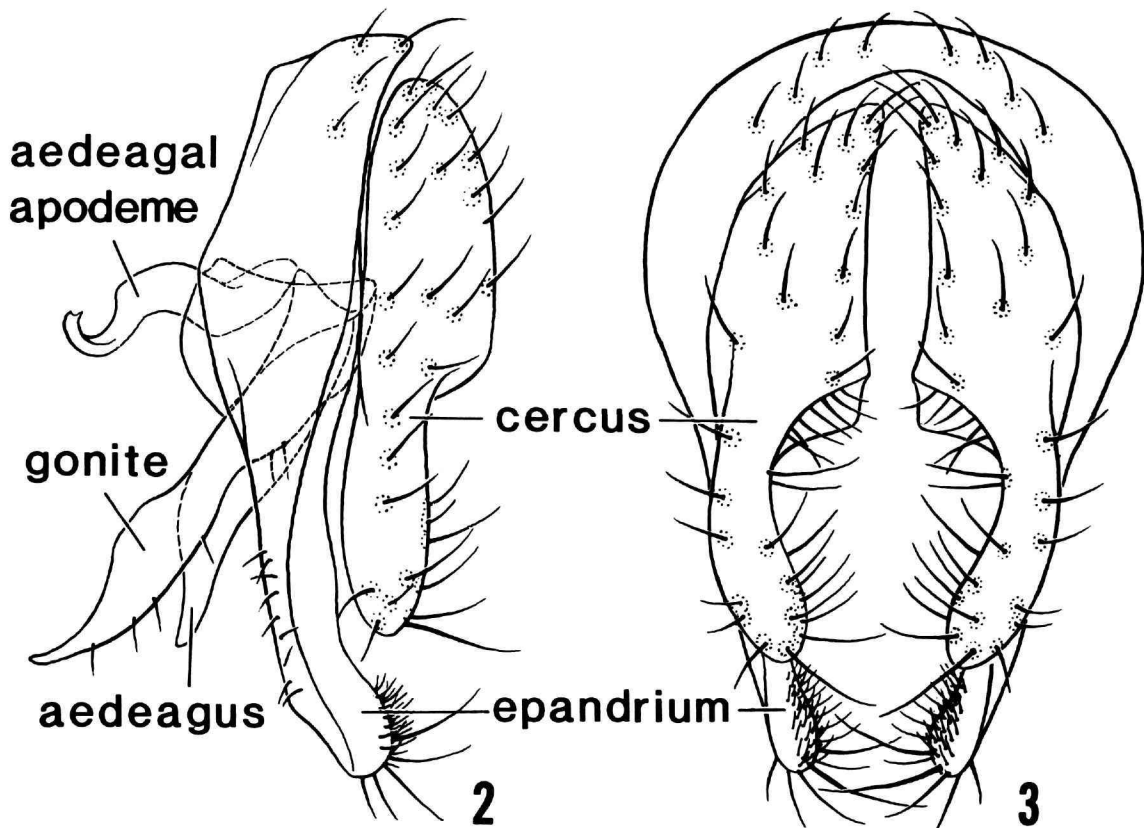
**Thorax:** Scutellum with posteroapical margin broadly rounded, wider than long; scutellar ratio

0.86; knob of halter yellowish. Costal vein ratio 0.48; M vein ratio 0.62.

**Abdomen:** Male terminalia (Figures 2, 3) as follows: epandrium (= epandrium + fused surstylus) with ventral  $\frac{1}{2}$  long and narrow, essentially parallel sided and slightly curved posteriorad, apex rounded and very slightly enlarged; cerci in posterior view with dorsal  $\frac{1}{2}$  twice width of ventral  $\frac{1}{2}$ , the ventral portion developed as a digital-like process that is slightly curved medially ventrally, forming a U-shaped pocket between the 2 cerci; gonite in lateral view long and narrow and with a ventrobasal triangular sclerite between extended arm and hypandrium, sides of extended arm irregularly shaped, with an angulate preapical flange on anterior surface, apex of arm reflexed anteriorly and acutely pointed; aedeagus in lateral view narrow with basal  $\frac{2}{3}$  more or less parallel sided to becoming slightly narrower, apical  $\frac{1}{3}$  becoming distinctly narrower, especially along anterior margin, apex narrowly pointed, aedeagus in dorsal view moderately narrowly subtriangular, basal width slightly more than double length, apex moderately rounded.]

**TYPE MATERIAL.**—The male lectotype, herein designated, is labeled “N. Guinea [L.] Biro [L. Biro was a collector in New Guinea around the turn of the twentieth century] [18]96/[West Sepik Province] Seleo Berlinhaf[en] [= Aitape]./[a black rectangular label with no apparent writing] /*Placopsidella cynocephala* Kert. det. Kertész Typus [handwritten except for “det Kertész”; “Typus” in red ink] / Holotypus [red border and ink].” The lectotype is double mounted (minute nadel in rectangular block), is in good condition, and is in the Hungarian Natural History Museum, Budapest. Two other syntype males, with similar label data as the lectotype, are here designated as paralectotypes.

**OTHER SPECIMENS EXAMINED.**—AUSTRALIA. *Queensland:* Cairns (Ellis Beach), 28 Apr 1957, W.W. Wirth (4♂, 1♀; USNM); Cape York Peninsula, Nesbitt River, 5 Nov 1958, J.L. Wassell (2♂, 6♀; AMS); Port Douglas, 24 Apr 1957, W.W. Wirth (4♂, 2♀; USNM). *BELAU. Babelthuap Island:* Airai, Ngarsung, 16 May 1957, C.W. Sabrosky



FIGURES 2, 3.—*Placopsidella cynocephala*: 2, male terminalia, lateral aspect; 3, male terminalia, posterior aspect.

(1♂; USNM); Ngaremlengui, 7 May–4 Jun 1957, C.W. Sabrosky (9♂, 6♀; BBM, USNM); Ngerehelong, 7 May 1957, C.W. Sabrosky (1♀; USNM); Ngesebus, 29 May 1957, C.W. Sabrosky (1♀; USNM); Ngiwal, 19 May 1957, C.W. Sabrosky (2♂, 1♀; BBM, USNM). *Koror Island*: 16 Apr–28 May 1957, C.W. Sabrosky (3♂, 22♀; BBM, USNM). *Ulebaehel Island*: 21–24 Apr 1957, C.W. Sabrosky (17♂, 29♀; BBM, USNM). FEDERATED STATES OF MICRONESIA. *Caroline Islands, Kosrae [Kusaie]*: Mutunlik, 30 Mar 1953, J.F.G. Clarke (5♂, 2♀; USNM); Mutunlik, 22 m elevation, 30 Mar–1 Apr 1953, J.F.G. Clarke (10♂, 3♀; BBM, USNM); Pukusrik, 1 m elevation, 2 Apr 1953, J.F.G. Clarke (57♂, 38♀; BBM, USNM); Yela Cave, 9 Apr 1953, J.F.G. Clarke (9♂; BBM,

USNM). *Merir Island*: N. Krauss (4♂, 7♀; BBM, USNM). *Pingelap Atoll*: 22 Jul 1949, R.P. Owen (2♂; BBM, USNM). *Ponape Island*: Colonia, Jun–Sep 1950–1956, P.A.A. Adams, M.R. Wheeler (4♂, 2♀; USNM). *Truk Island*: Moen, Oct 1952, J.W. Beardsley (3♀; BBM, USNM). GILBERT ISLANDS. *Abemama Atoll*: 25–30 May 1944, J.W. Enke (2♂; USNM). *Makin Atoll*: Butaritari, 13 Nov 1964, B.D. Perkins (1♀; USNM). *Tarawa Atoll*: Banraeaba, Dec 1957, N.L.H. Krauss (2♂, 2♀; BBM, USNM). GUAM. Sumay, 16 Oct 1938, R.G. Oakley (8♀; USNM); Umatac (on beach rocks), 5 Mar 1958, N.L.H. Krauss (1♂, 4♀; UHH). INDONESIA. *Java*: (6♂, 3♀; ITZA); Batavia [Djakarta], Oct 1908, (1♂; ITZA); Batavia [Djakarta], Muara Antjol, Dec 1907, E. Jacobson (4♂,

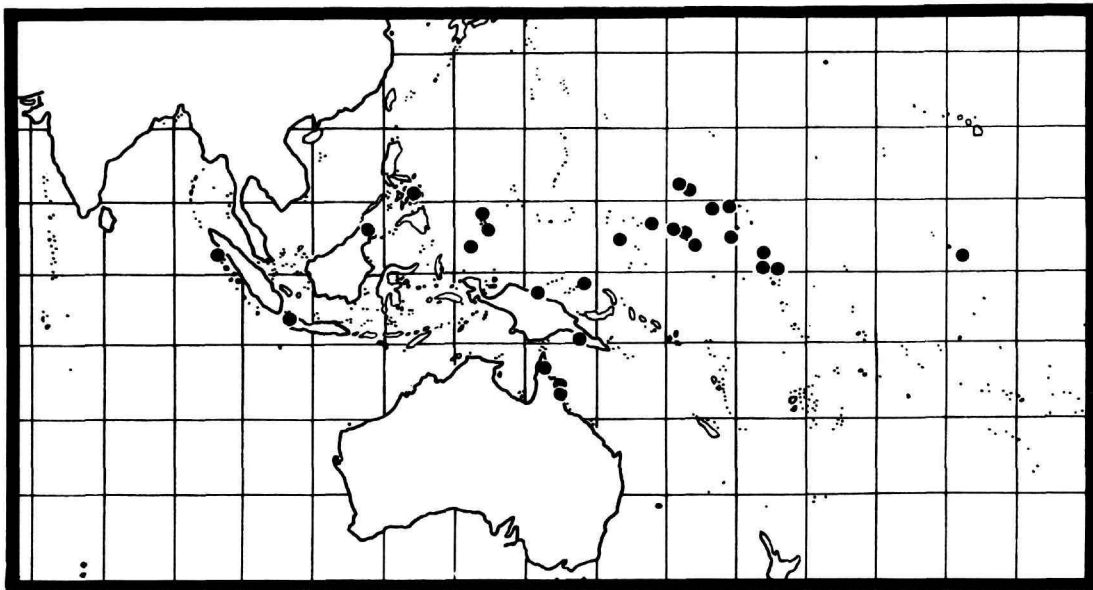


FIGURE 4.—Distribution map of *Placopsidella cynocephala*.

1♀; ITZA); Djakarta, Muara Angke, Jan 1908, E. Jacobson (15♂, 8♀; ITZA); Tandjung Periuk, Jun 1908, E. Jacobson (11♂, 14♀; ITZA). *Simeulue*: Lasikin, Apr 1913, E. Jacobson (1♂; ITZA); Pulu Babi, Apr 1913, E. Jacobson (1♀; ITZA). **KIRIBATI**. *Line Islands*: Christmas Island, 21 Oct 1934, E.C.Zimmerman (1?; BBM). **MALAYSIA**. *Sabah*: Kudat, 7 km NNW, Tanjung Tajau, 20 Sep 1983, G.F. and J.F. Hevel and W.E. Steiner (3♂, 3♀; USNM); Sandakan (5 km N), 16 Aug 1983, G.F. Hevel and W.E. Steiner (105♂, 18♀; USNM); Tanjung Aru Beach, 20 Aug 1983, G.F. Hevel and W.E. Steiner (1♀; USNM). **MARSHALL ISLANDS**. *Enewetok Atoll*: Parry Island, Aug–Sep 1955, M.R. Wheeler (2♂, 4♀; BBM, USNM). *Jaluit Atoll*: Majurirek Island, 26 Apr 1958, J.F.G. Clarke (3♀; BBM, USNM). *Kwajalein Atoll*: Kwajalein Island, 11–16 Aug 1944–1946, D.G. Hall, H.K. Townes (6♂, 8♀; USNM). *Likiep Atoll*: Likiep Islet, 30 Aug 1946, H.K. Townes (6♂, 2♀; USNM). **PAPUA NEW GUINEA**. *Central Province*: Gabagaba (W of Kwikila), 12 Dec 1982, J.W. Ismay (14♂; USNM). *West Sepik Province*: Seleo, Berlinhafen [Aitape], 1896, L. Biro (1♂; ITZA). *Bismark Archipelago*: Manus, Lorengau, 14 Jun

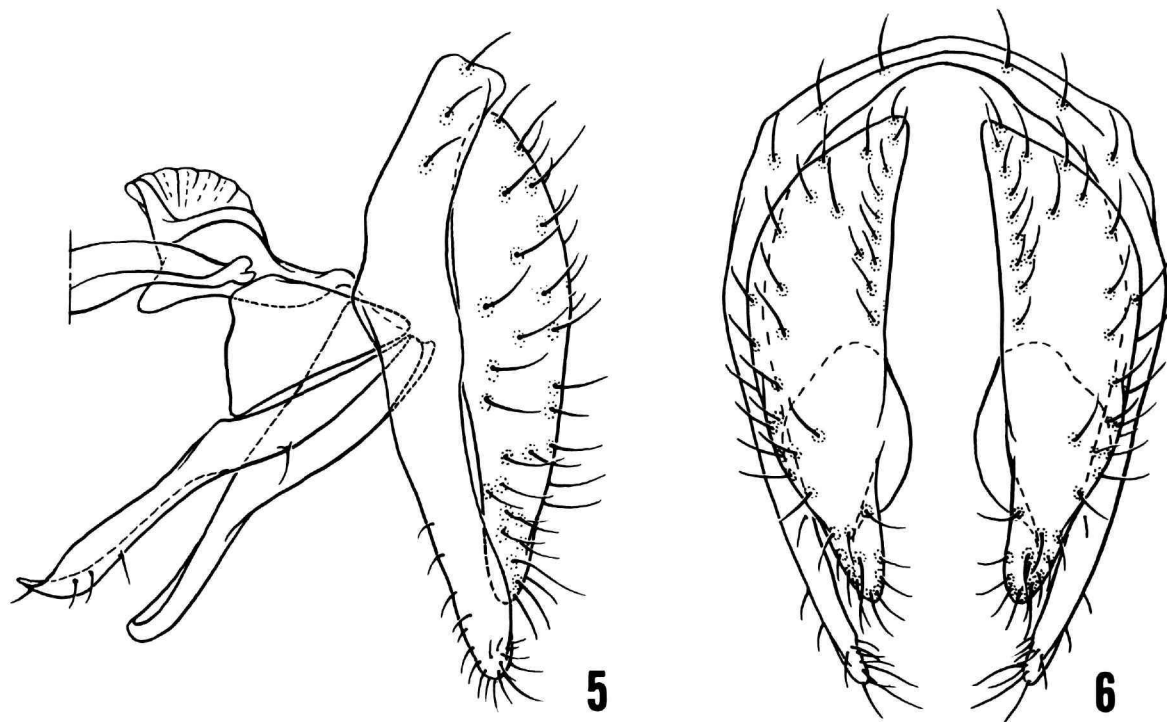
1962 (Noona Dan Exp. 1961–1962) (1♂, 1♀; USNM). **PHILIPPINES**. Biliran Island, Baker (4♂, 4♀; USNM).

**DISTRIBUTION** (Figure 4).—Australia, Belau, Federated States of Micronesia, Gilbert Islands, Guam, Indonesia, Kiribati, Malaysia, Marshall Islands, Papua New Guinea, and the Philippines.

**NATURAL HISTORY**.—The specimens collected at Cape York Peninsula (Australia) were “breeding in dead mussels *Fluviolanahus subortus* (Bunker).” Specimens collected at Ulebaehel Island (Belau) were taken from barnacles attached to a stick. Bohart and Gressitt (1951) collected a few specimens from traps baited with sea cucumbers.

**REMARKS**.—This species is most similar to *P. marquesana* and *P. insulana*, both of which also occur on islands of the Pacific Ocean basin. It may be distinguished from either of the latter two species by the shape of the scutellum (as wide or wider than long), the extent of the grayish microtomentum on the fronto-orbit (extended to the larger, lateroreclinate fronto-orbital seta), and the distinctive conformation of the male terminalia (see Figures 2 and 3).





FIGURES 5, 6.—*Placopsidella marquesana*: 5, male terminalia, lateral aspect; 6, male terminalia, posterior aspect.

Until this revision, the specific epithet of this species was generally applied incorrectly to several other species of the genus.

***Placopsidella marquesana* (Malloch),  
new combination**

FIGURES 5–12

*Mosillus marquesana* Malloch, 1933:13.

*Gymnopa marquesana*.—Cresson, 1945:54 [combination; species unrecognized].

*Placopsidella cynocephala* sensu authors [misidentification].—Adachi, 1952:354 [misidentification provided by Wirth (in litt.); listed under family Canacidae].—Hardy, 1952:446 [repeat of information cited by Adachi, 1952].—Tenorio, 1980:270–271, 350–351 [figures of female ventral receptacle, larva, and puparium].

**DIAGNOSTIC DESCRIPTION.**—Moderately small to medium-sized shore flies, length 2.65–3.30 mm.

**Head:** Median facial carina usually short and wide, 2 times higher than wide, surface appearing shiny, at most microsculptured, lacking conspicuous transverse rugae, lateral margins more regular, shallowly convex; yellowish gray microtomentose portion of fronto-orbit extended dorsad from parafacials to larger lateroreclinate fronto-orbital seta; microtomentum of fronto-orbits with indistinct and generally brownish coloration immediately around base of fronto-orbital setae only, not traversing width of fronto-orbit, otherwise whitish to yellowish gray. Eye-to-cheek ratio 0.37.

**Thorax:** Scutellum with posteroapical margin narrowly rounded to triangular, wider than long; scutellar ratio 0.90. Knob of halter yellowish to white. Costal vein ratio 0.50; M vein ratio 0.63.

**Abdomen:** Male terminalia (Figures 5, 6) as follows: epandrium plus fused surstyli in lateral view with width more or less uniform throughout

length, less than greatest width of cerci in profile, ventral portion slightly and gradually narrower; cerci in posterior view shaped like  $\frac{1}{2}$  of an oval with median margin nearly straight except for subventral, shallowly rounded flange, dorsal  $\frac{1}{2}$  wider than ventral  $\frac{1}{2}$ , ventral angle more acutely angulate, cerci in lateral view more or less elliptical, with anterior margin nearly straight; gonite in lateral view long and narrow and with a ventrobasal triangular sclerite between extended arm and hypandrium, sides of extended gonial arm more uniformly parallel and lacking prominent preapical flange on anterior surface, apex of arm reflexed anteriorly and acutely pointed; aedeagus in lateral view with basal  $\frac{1}{2}$  gradually becoming narrower, apical  $\frac{1}{2}$  nearly parallel sided and apex slightly curved anteriorly and bluntly rounded, aedeagus in dorsal view moderately narrowly subtriangular, basal width slightly more than double length, apex bluntly rounded.

**TYPE MATERIAL.**—The holotype male is labeled "Tahauku, HivaOa VII-10-29 [10 Jul 1929, date handwritten]/sea shore/Marquesas Islands/Mumford Adamson/Pacific Entomological Survey/Placopsidella cynocephala Kertész 150. [1950?] det WWirth [handwritten except for "det WWirth"; black submargin]/Mosillus marquesana Type det. JRMALLOCH [species epithet and "Type" handwritten; black submargin]." The holotype is double mounted (glued to a paper point), is in good condition, and is in the B.P. Bishop Museum, Honolulu, Hawaii.

**OTHER SPECIMENS EXAMINED.**—**AMERICAN SAMOA.** *Tutuila*: Auasi, 10 Dec 1953, C. Hoyt (5♂, 2♀; BBM, USNM); Pago Pago, 7–11 Oct 1963, N.R. Spencer (7♂, 17♀; BBM); Fagatogo, 2 Sep–29 Jun 1963–1964, N.R. Spencer (10♂, 27♀; BBM); Malinua, 7 Jan 1964, N.R. Spencer (1♀; BBM); Tapuna, 13 Oct 1964, N.R. Spencer (1♀; BBM); Taputimu, 19 Aug–7 Nov 1963–1964, N.R. Spencer (3♂, 5♀; BBM). **LINE ISLANDS.** Palmyra Island, Feb 1948, N.L.H. Krauss (2♂, 1♀; USNM); Line Island, Jul 1962, M.R. Wheeler (1♂, 1♀; USNM). **FRENCH POLYNESIA.** *Society Islands*: Bora Bora Island, Apr 1961, J.N. Belkin (9♂; USNM); Tahiti Island, Papeete, Blue La-

goon, 4 Mar 1934, E.C. Zimmerman (3♂, 4♀; BBM, USNM); Arihiri, Pare, 14 Mar 1934, E.C. Zimmerman (1?; BBM). **HAWAIIAN ISLANDS.** *Hawaii*: Hilo, 6 Jul 1968, G. Steyskal (2♂, 2♀; USNM); Hilo Bay, mouth of Wailuku River, 30 May 1970, J.A. Tenorio (6♂, 2♀; UHH); Kealahou, 12 May 1959, S. Kimoto (2♂; BBM). *Kauai*: Nawiliwili Dock, 14 Jul 1968, J.A. Tenorio (1♀; UHH). *Maui*: Hana, Aug. N.L.H. Krauss (3♂, 1♀; BBM). *Oahu*: Aiea, Mar 1959, D.E. Hardy (23♂, 5♀; UHH, HNHM, USNM); Haleiwa, Sep 1955 (2♂; UHH); Hanauma Bay, 6–7 Mar 1952–1961, M.S. Adachi, A.L. Melander, L.W. Quate (14♂, 7♀; BBM, UHH, USNM); Honolulu, 10 Nov–19 Dec 1941–1952 (some specimens intercepted from planes), R.W. Cox, C.R. Joyce (3♂, 8♀; UHH, USNM); Waikiki (on dead fish), Mar 1957, M.S. Adachi (1♂, 1♀; UHH). *Wake Island*: 21 Nov 1959 (on dead fish) (2♂, 4♀; USNM). **SOLOMON ISLANDS.** Florida Island, Mar 1945, G.E. Bohart (1♂, 8♀; USNM).

**DISTRIBUTION** (Figure 7).—Marquesas Islands, American Samoa, French Polynesia, Hawaiian Islands, Solomon Islands, and Line Islands.

**NATURAL HISTORY.**—Tenorio (1980) provided information about this species from observations in the field and laboratory. This species occurs commonly in seaweed and other debris, especially sugar cane debris, on beaches of the Hawaiian Islands. Although specific experiments on food ingestion were not conducted, Tenorio successfully bred this species on a medium of seaweed that was maintained in gallon jars. Whether the flies fed directly on the seaweed or as scavengers on crustacea or other animals among the seaweed is not known. The trophic requirements of the genus, as a consequence, remain unresolved, but the leads of Tenorio coupled with the data under *P. cynocephala* (page 10) ought to provide good possibilities for future studies.

Based on laboratory rearings of *P. marquesana*, Tenorio (1980:351) reported the following schedule for the life cycle of this species: eggs hatched in about 24 hours; larval development ranged from 8 to 10 days; and the puparial

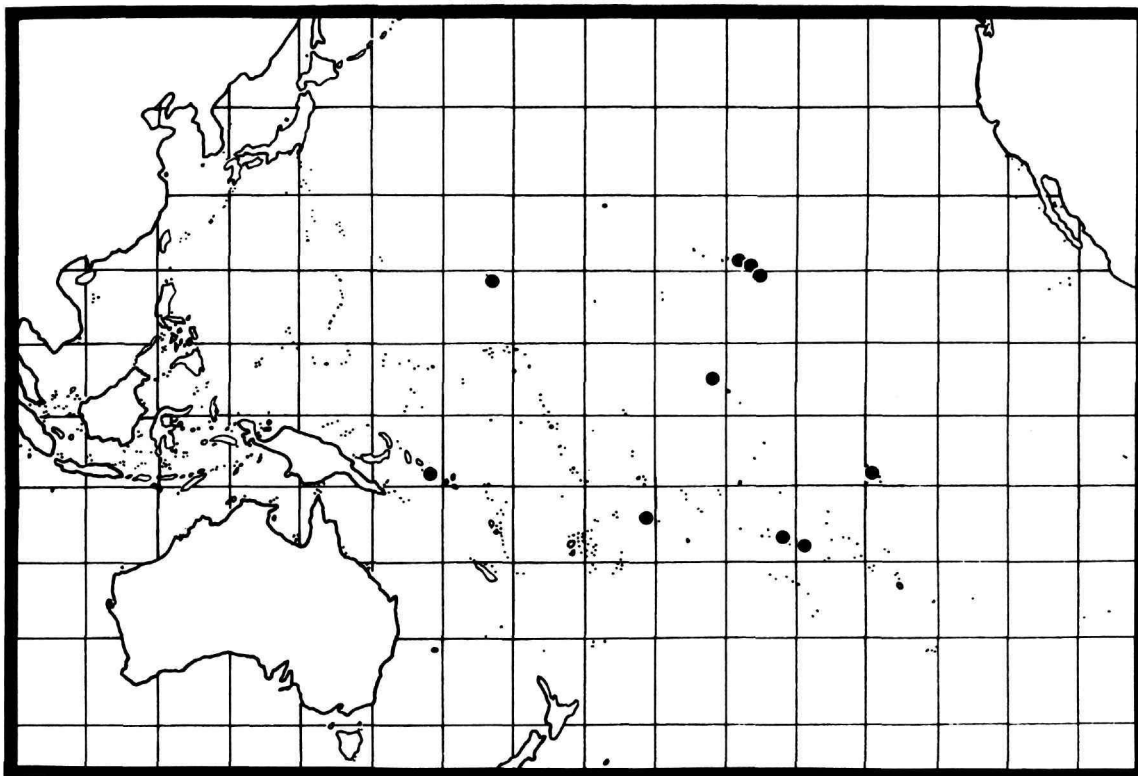


FIGURE 7.—Distribution map of *Placopsidella marquesana*.

period was 10–13 days. A complete life cycle, egg to adult, would span 19–23 days.

Tenorio's description (here included with Figures 8–12) of the third instar larva and puparium is as follows (1980:350–351; original reference to figures has been deleted):

Mature larvae and puparia about 4 mm in length.

*Larvae:* White; body segments with lateral margins dorsally and ventrally expanded into pointed spines, these spines difficult to see in the white larva, but very conspicuous on puparium; smaller tubercles are present on dorsal and ventral surfaces of segments. Anterior spiracles not externally evident in larva. Posterior spiracular tubes dorsoapical, very short, with three spiracular openings; four groups of palmate hairs border the openings, the hairs reaching to about the rim of the spiracular tube. Cephalopharyngeal skeleton as . . . figure[d].

*Puparia:* Yellow, spines as described for the larva, every evident on the puparium. Anterior spiracles conspicuous, borne on flattened disc, rimmed with about 14 to 15 digits.

**REMARKS.**—This species and *P. insulana* are closely related, as evidenced by their close similarity. The only characters that I have found to consistently distinguish between them are those of the male terminalia, especially the shape of the aedeagus, which, in *P. marquesana*, is more slender, especially the apical half in lateral view.

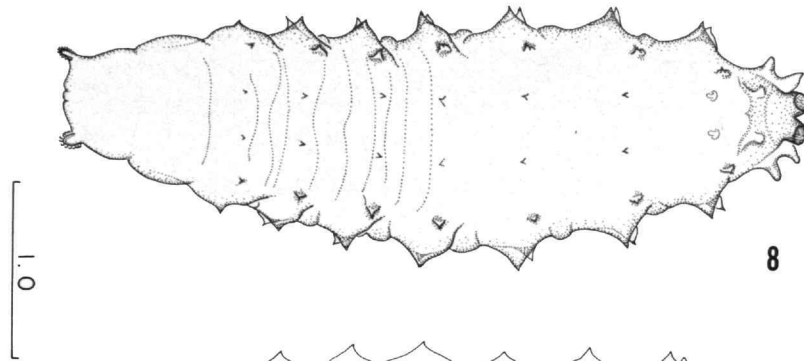
As noted in the synonymy, *P. marquesana* was either unrecognized (Cresson, 1945:54) or the name was confused with *P. cynocephala* (Adachi, 1952:354; Hardy, 1952:446; Tenorio, 1980:270–271, 350–351) by past workers.

#### *Placopsidella insulana*, new species

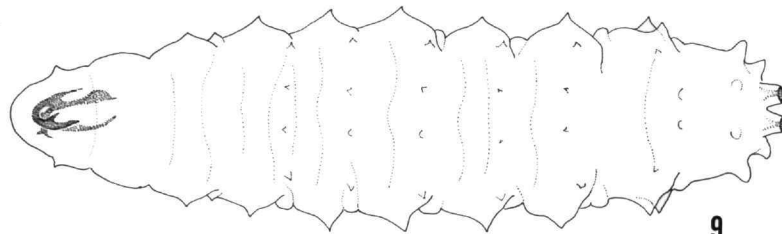
FIGURES 13–15

**DIAGNOSTIC DESCRIPTION.**—Moderately small shore flies, length 2.25–2.60 mm.

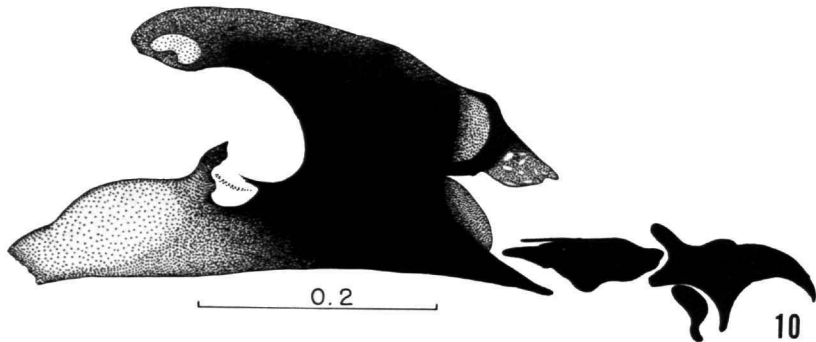
*Head:* Median facial carina 2 times higher than wide, surface appearing shiny, at most mi-



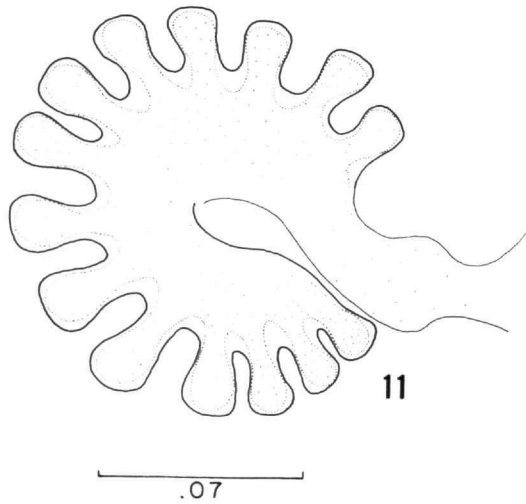
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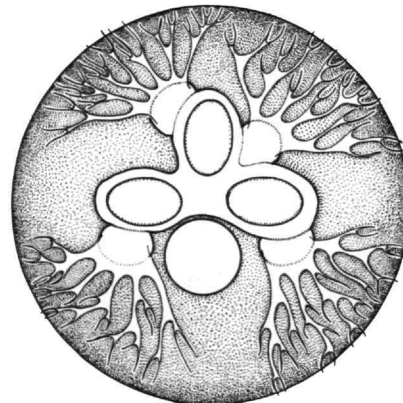
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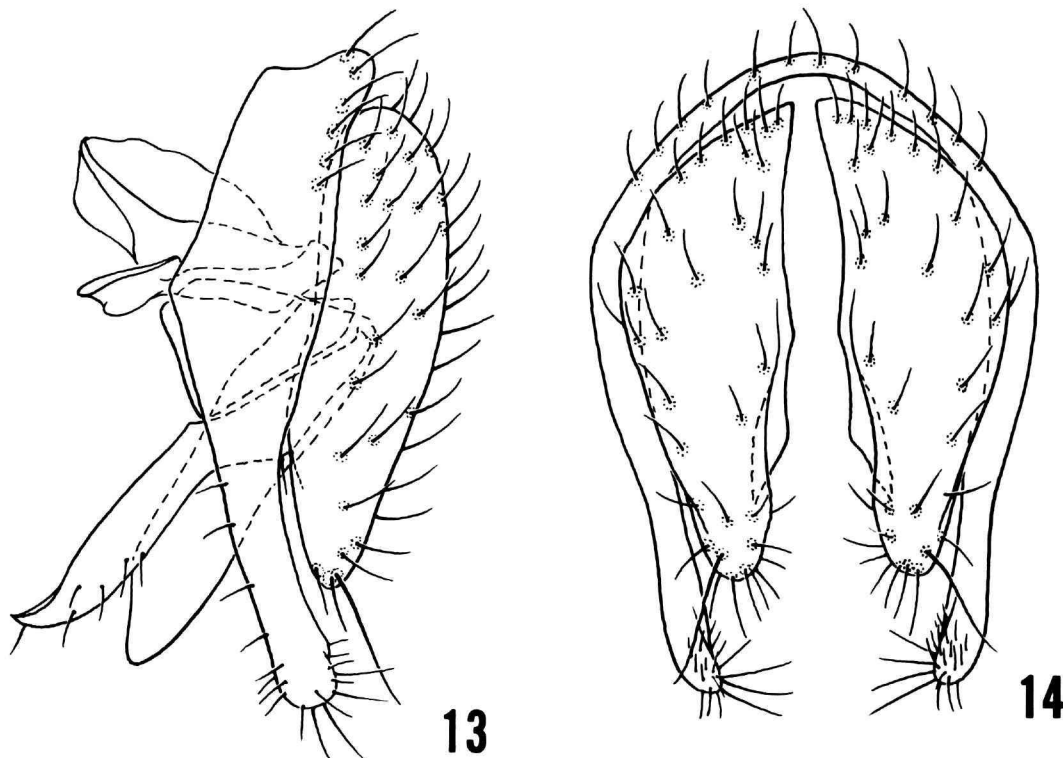
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11



12



FIGURES 13, 14.—*Placopsidella insulana*: 13, male terminalia, lateral aspect; 14, male terminalia, posterior aspect.

crosscultured, lacking conspicuous transverse rugae, lateral margins more regular, shallowly convex; yellowish gray microtomentose portion of fronto-orbit extended dorsad from parafacials to larger lateroreclinate fronto-orbital seta; microtomentum of fronto-orbits with indistinct and generally brownish coloration immediately around base of fronto-orbital setae only, not traversing width of fronto-orbit, otherwise whitish to yellowish gray. Eye-to-cheek ratio 0.42.

**Thorax:** Scutellum with posteroapical margin narrowly rounded to triangular, wider than long;

scutellar ratio 0.91. Knob of halter yellowish to white. Costal vein ratio 0.40; M vein ratio 0.60.

**Abdomen:** Male terminalia (Figures 13, 14) as follows: epandrium plus fused surstyli in lateral view with width of dorsal  $\frac{1}{2}$  nearly double that of ventral  $\frac{1}{2}$ , width of ventral  $\frac{1}{2}$  less than greatest width of cercus in profile, apex bluntly rounded; cerci in posterior view like  $\frac{1}{2}$  an oval with median margin nearly straight except for subventral, shallowly rounded flange, dorsal  $\frac{1}{2}$  wider than ventral  $\frac{1}{2}$ , ventral angle more acutely angulate; cerci, in lateral view, more or less elliptical, with anterior margin nearly straight, ventral  $\frac{1}{4}$  narrowed, especially near anterior margin; gonite in lateral view long and narrow with a ventrobasal triangular sclerite between extended arm and hypandrium, sides of extended gonial arm more uniformly parallel and lacking promi-

FIGURES 8–12.—*Placopsidella marquesana*: 8, puparium, dorsal aspect; 9, third instar larva, dorsal aspect; 10, cephalopharyngeal skeleton of third instar larva; 11, anterior spiracle, puparium; 12, posterior spiracle, third instar larva.



ment preapical flange on anterior surface, apex of arm reflexed anteriorly and acutely pointed; aedeagus, in lateral view, nearly parallel sided throughout length, apical  $\frac{1}{4}$  narrowed, pointed apically; aedeagus in dorsal view moderately narrowly subtriangular, basal width slightly more than double length, apex bluntly rounded.

**TYPE MATERIAL.**—The holotype male is labeled "Segond Chan-nel, E. Santo, [Vanuatu] N[ew]. Heb[rides]. 8-1944 [Aug 1944]/Jean Laf-foon coll. #164." The allotype female and 10 paratypes (8♂, 2♀; USNM) bear the same label data as the holotype. The holotype is double mounted (minute nadel in cork block), is in good condition, and is in the National Museum of Natural History, Smithsonian Institution.

**DISTRIBUTION** (Figure 15).—This species is presently known only from the type-locality.

**ETYMOLOGY.**—The species epithet, *insulana*, is an adjective of Latin derivation and refers to the island habitat of this species.

**REMARKS.**—This species and *P. marquesana* are very closely related, as evidenced by their close similarity (externally I cannot distinguish between the two species). I can distinguish the former only by reference to characters of the male terminalia, especially the shape of the aedeagus (Figures 8, 9; see species key couplet number 5, page 7).

### *Placopsidella scotti* (Lamb)

FIGURE 15

*Enchastes scotti* Lamb, 1912:320.

*Placopsidella scotti*.—Cresson, 1925:230 [combination, as a synonym of *P. cynocephala*]; 1945:55 [as a synonym of *P. cynocephala*].—Cogan, 1980:656 [afrotropical catalog, as a synonym of *P. cynocephala*].

**DIAGNOSTIC DESCRIPTION.**—Moderately small shore flies, length 2.81 mm.

**Head:** Median facial carina usually short and wide, 2 times higher than wide, surface appearing shining, but with conspicuous but small transverse rugae, lateral margins more regular, shallowly convex; yellowish gray microtomentose portion of fronto-orbit extended dorsad from

parafacials to larger laterorecline fronto-orbital seta; microtomentum of fronto-orbits with indistinct and generally brownish coloration immediately around base of fronto-orbital setae only, not traversing width of fronto-orbit, otherwise whitish to yellowish gray. Eye-to-cheek ratio 0.36.

**Thorax:** Scutellum with posteroapical margin narrowly rounded to triangular, wider than long; scutellar ratio 0.89. Knob of halter yellowish to white. Costal vein ratio 0.48; M vein ratio 0.52.

**TYPE MATERIAL.**—The female holotype is labeled "Mahe, '08-9 Seychelles Exp. [glued to a rectangular block of cork] 140 [handwritten on top of same cork block]/Type H[olo].T[ype]. [on disk with red border]/F. H. 24 [handwritten in pencil]/Seychelles Is. Prof. J S Gardiner. 1914-537 E. scotti. Lamb [species name handwritten] /TYPE [blue label, glued to a larger label] Enchastes Scotti. Lamb det CGL [handwritten]." The holotype is double mounted (pin in cork rectangular block), is in good condition, and is in the British Museum (Natural History).

**DISTRIBUTION** (Figure 15).—This species is known only from the Seychelles (Mahe).

**REMARKS.**—The status of this species must still be considered tentative, as it is represented only by the holotype female. When additional specimens are available, especially males, it may be found to be conspecific with one of its congeners. For now, I am treating it as a valid species that is closely related and very similar to *P. marquesana* and *P. insulana*. It differs from both in having distinct although small transverse rugae on the shining facial carina.

### *Placopsidella phaeonota*, new species

FIGURES 15-20

**DIAGNOSTIC DESCRIPTION.**—Small to moderately small shore flies, length 1.70-2.95 mm.

**Head** (Figures 16, 17): Median facial carina usually long and narrow, about 3 times higher than wide, middle  $\frac{1}{3}$  with 4-6 transverse rugae, lateral margins, especially at dorsal  $\frac{1}{3}$ , irregular, with shallow indentations; grayish white microtomentum of fronto-orbit is a dorsal extension

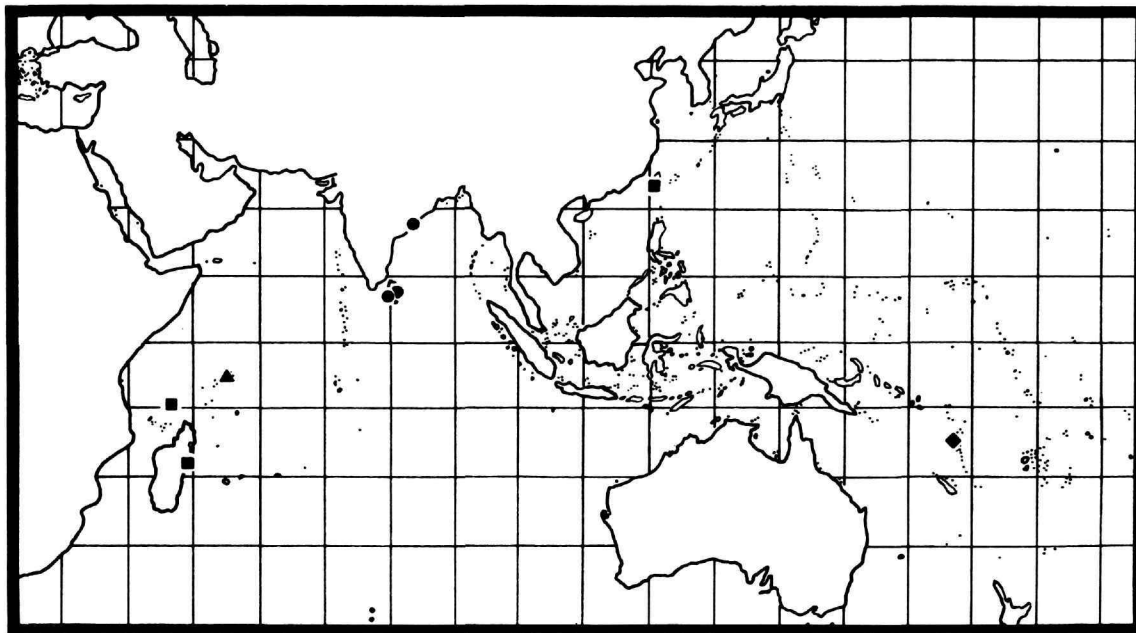


FIGURE 15.—Distribution map of *Placopsidella insulana* (diamond), *Placopsidella scotti* (triangle), *Placopsidella phaeonota* (circles), and *Placopsidella signatella* (squares).

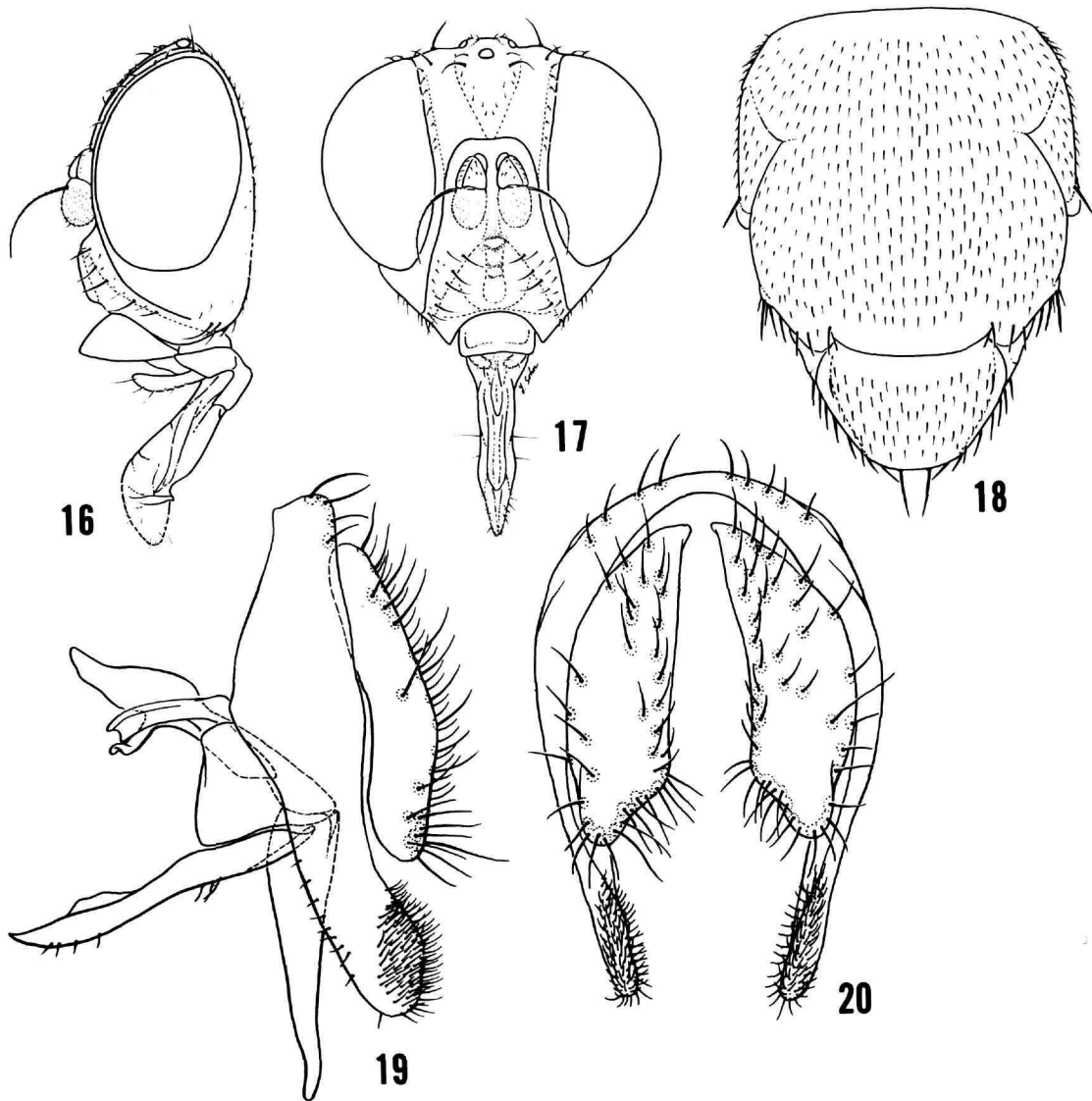
or continuation of microtomentum and coloration of parafacials, extended to larger lateroreclinate fronto-orbital seta; microtomentum of fronto-orbits with distinct, brownish coloration around base of fronto-orbital setae, coloration usually traversing width of fronto-orbit, otherwise fronto-orbit whitish to yellowish gray. Eye-to-cheek ratio 0.46.

**Thorax** (Figure 18): Scutellum with posteroapical margin broadly rounded; scutellar ratio 0.90; knob of halter blackish. Costal vein ratio 0.47; M vein ratio 0.63.

**Abdomen.** Male terminalia (Figures 19, 20) as follows: epandrium plus fused surstyli in lateral view with ventral  $\frac{1}{2}$  moderately narrow, but not as narrow as cerci in profile, curved slightly caudad, mostly parallel sided, although with slightly preapical swelling on posterior margin, broadly rounded; cerci in posterior view shaped like  $\frac{1}{2}$  of an oval with median margin nearly straight, however, with ventral angle lacking, as if broken off, leaving a truncate ventral margin,

cerci in lateral view more or less parallel sided, reniform; gonite in lateral view long and narrow and with a ventrobasal triangular sclerite between extended arm and hypandrium, sides of extended arm irregularly shaped, with an angulate preapical flange on anterior surface, apex of arm reflexed anteriorly and acutely pointed; aedeagus in lateral view narrowly and slightly irregularly triangular, with preapical shallowly reflexed portion, apex narrowly pointed, aedeagus in dorsal view moderately narrowly subtriangular, basal width slightly more than double length, apex bluntly rounded.

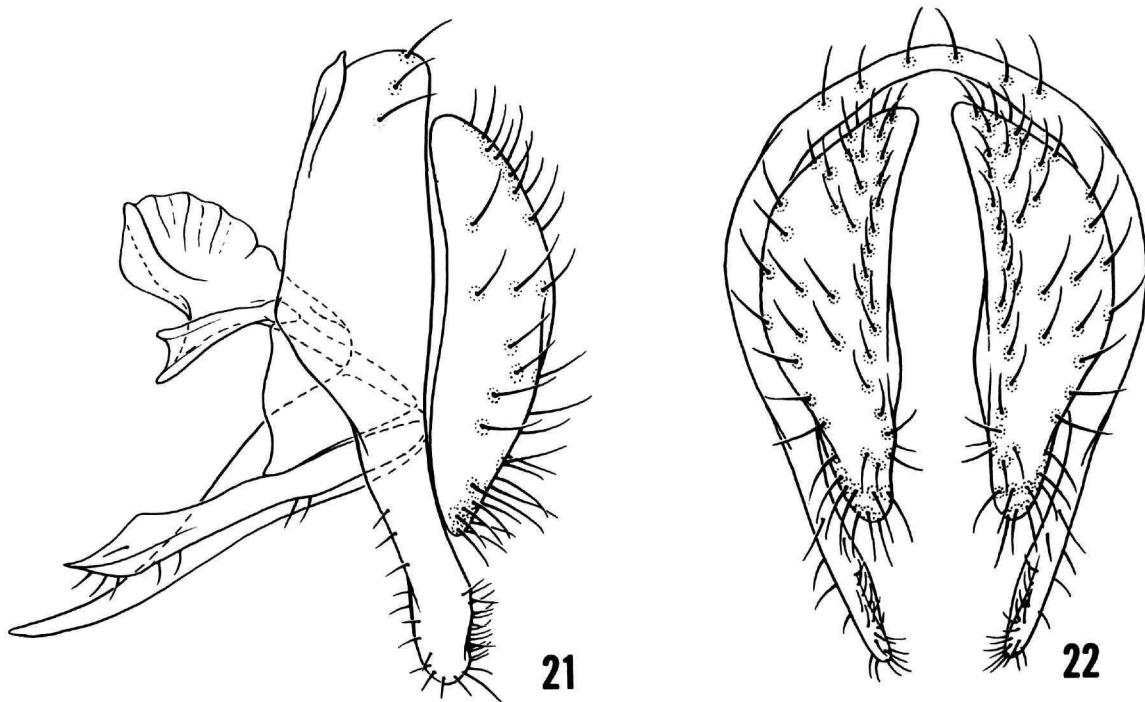
**TYPE MATERIAL.**—Holotype male is labeled "SRI LANKA: Tri[ncomalee]. Dist. Nilaveli (5 km N) 3 May 1980/Collectors: W.N. Mathis[,] T. Wijesinhe[,] L. Jayawickrema." Allotype female and 30 other paratypes (21♂, 9♀; USNM) bear the same label data as the holotype. The holotype is double mounted (minute nadel in polyporus block), is in excellent condition, and is in the National Museum of Natural History, Smithson-



FIGURES 16-20.—*Placopsidella phaeonota*: 16, head, lateral aspect; 17, head, anterior aspect; 18, thorax, dorsal aspect; 19, male terminalia, lateral aspect; 20, male terminalia, posterior aspect.

ian Institution. Other paratypes are as follows: SRI LANKA. *Colombo District*: Colombo, 14 Apr 1980, W.N. Mathis (7♂, 11♀; USNM). *Batticaloa District*: Panichchankeni, 2 May 1980, W.N.

Mathis, T. Wijesinhe, and L. Jayawickrema (2♂; USNM). *Galle District*: Mirigama, 26 Apr 1980, W.N. Mathis, T. Wijesinhe, and L. Jayawickrema (5♂, 10♀; USNM). *Hambantota District*: Kirinda,



FIGURES 21, 22.—*Placopsidella signatella*: 21, male terminalia, lateral aspect; 22, male terminalia, posterior aspect.

25 Apr 1980, W.N. Mathis, T. Wijesinhe, and L. Jayawickrema (1♂, 4♀; USNM). INDIA. Orissa: Konarak, 17 Apr 1980, A. Freidberg (7♂, 8♀; USNM).

**DISTRIBUTION** (Figure 10).—Indian Subcontinent.

**ETYMOLOGY**.—The species epithet, *phaeonota*, is an adjective of Greek derivation and means brown or dusky back, in allusion to the coloration of the mesonotum of this species.

**NATURAL HISTORY**.—The two series I collected in Sri Lanka were taken by sweeping close to large rocks that were part of an artificial sea wall near port facilities.

**REMARKS**.—This species is very closely related to *P. signatella*, and I can distinguish between the two only through comparison of structures of the male terminalia (Figures 19, 20; see couplet 3 of species key, pages 6, 7).

***Placopsidella signatella* (Enderlein)**

FIGURES 15, 21, 22

*Oscinomima signatella* Enderlein, 1912:164.

*Placopsidella signatella*.—Kertész, 1912:548 [combination].—Cresson, 1925:230 [review]; 1945:55 [review].

**DIAGNOSTIC DESCRIPTION**.—Moderately small to medium-sized shore flies, length 2.10–3.10 mm.

**Head**: Median facial carina usually long and narrow, about 3 times higher than wide, middle 1/3 with 4–6 transverse rugae, lateral margins, especially at dorsal 1/3, irregular, with shallow indentations; grayish white microtomentum of fronto-orbit is a dorsal extension or continuation of microtomentum and coloration of parafacials, extended to larger lateroreclinate fronto-orbital seta; microtomentum of fronto-orbits with dis-

tinct, brownish coloration around base of fronto-orbital setae, coloration usually traversing width of fronto-orbit, otherwise fronto-orbit whitish to yellowish gray. Eye-to-cheek ratio 0.64.

**Thorax:** Scutellum with posteroapical margin broadly rounded; scutellar ratio 0.78; knob of halter blackish. Costal vein ratio 0.56; M vein ratio 0.60.

**Abdomen:** Male terminalia (Figures 21, 22) as follows: epandrium plus fused surstyli in lateral view with ventral  $\frac{1}{2}$  narrow, more so than cerci in profile, directed slightly posteriorad, mostly parallel sided and straight except for preapical, slight turn more directly ventrad; cerci in posterior view shaped like  $\frac{1}{2}$  of an oval, slightly wider mid-dorsally and with median margin nearly straight, cerci in lateral view more or less reniform; gonite in lateral view long and narrow and with a ventrobasal triangular sclerite between extended arm and hypandrium, sides of extended gonal arm irregularly shaped, with an angulate preapical triangular flange on anterior surface, apex of arm reflexed anteriorly and acutely pointed; aedeagus in lateral view narrowly and slightly irregularly triangular, with preapical shallowly reflexed portion, basal  $\frac{1}{3}$  more or less parallel sided, thereafter gradually narrowed to apex, apex narrowly pointed, aedeagus in dorsal view very narrowly subtriangular, basal width about  $\frac{1}{4}$  length, apex narrowly rounded.

**TYPE MATERIAL.**—The holotype (gender unknown) is from Taiwan [Formosa]: Takao, 31 Oct 1907, H. Sauter and is in the Polska Akademia Nauk, Instytut Zoologiczny, Warsaw, Poland (formerly, in part, Stettiner Naturhistorisches Museum).

**OTHER SPECIMENS EXAMINED.**—ALDABRA. Isle Picard, channel at extreme south end on limestone rock face, 21 Mar 1985, P. Mundel (3♂, 3♀; USNM). MADAGASCAR. Fenerive (on beach), Dec 1955, B. Stuckenberg (1♂; USNM). TAIWAN. Takao, 24 Oct–1 Nov 1907, H. Sauter (3♂; HNHM, USNM).

**DISTRIBUTION** (Figure 15).—Taiwan, Aldabra, and Madagascar. Although the present distribution of this species is widely disjunct and

could be the result of adventive events, I suspect that the observed pattern is more likely the result of sampling error. When suitable habitats are better sampled between and around Taiwan, Aldabra, and Madagascar I predict that other populations will be found and that the pattern that will then emerge will not be as disjunct.

**REMARKS.**—As noted under *P. phaeonota*, this species and the former are very similar, and I can distinguish between them only by examination of structures of the male terminalia (Figures 21, 22; see couplet 3 of the species key, pages 6, 7).

### The *liparoides* Group

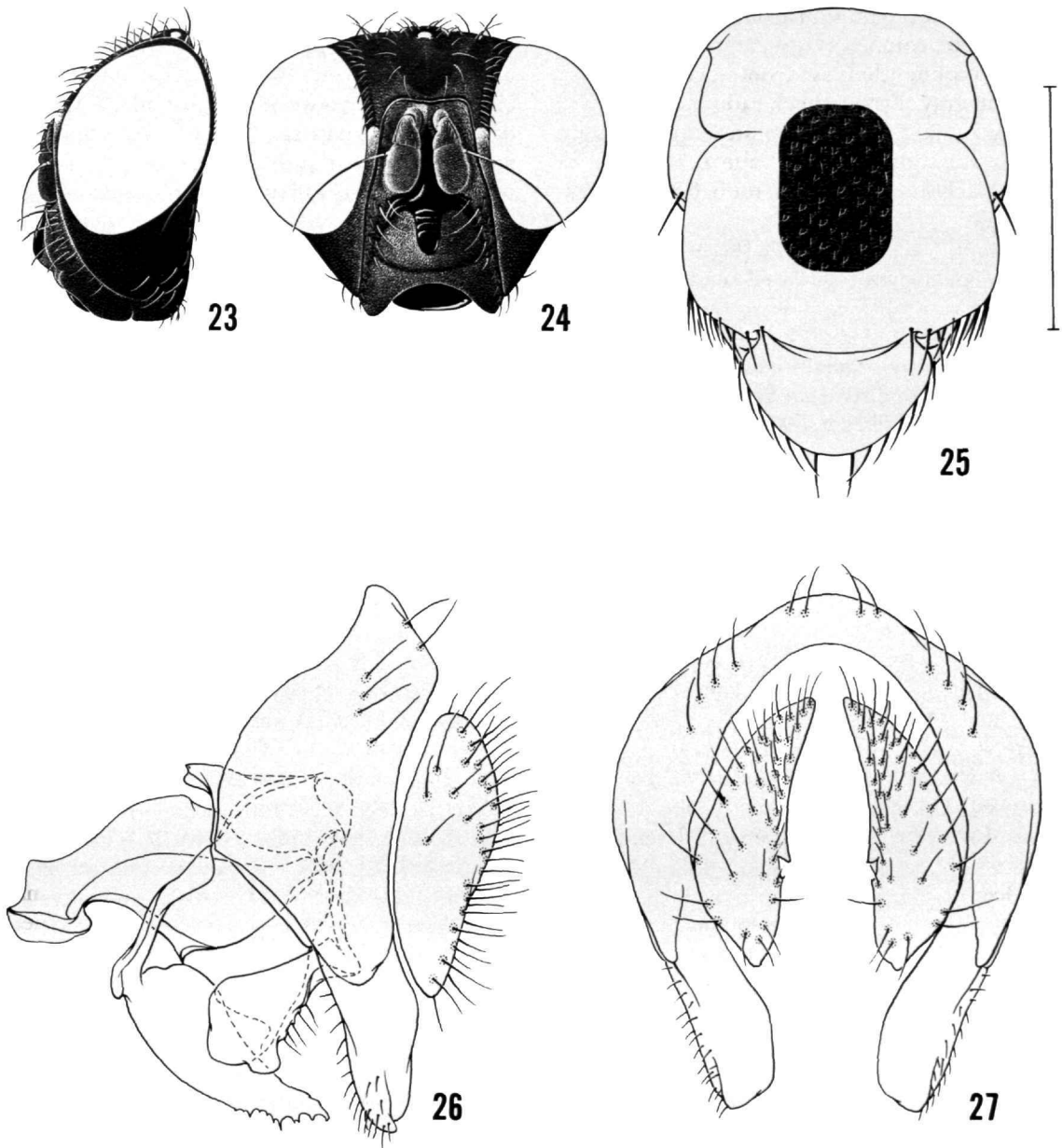
**DIAGNOSIS.**—**Head:** Ocellar bristles inserted far forward, beyond anterior  $\frac{1}{2}$  of frons near anterior margin of ocellar triangle; lateral margins of ocellar triangle with several setulae; bare facial area or prominence tuberculate, round or vertically carinate, if latter not extended to ventral  $\frac{1}{3}$  of face; face a bare linear area descending from either side of facial tubercle to oral margin; microtomentum of parafacials extended dorsally to level slightly above antennal bases where there is a distinctive patch of longer microtomentum slightly larger than an ocellus.

**Thorax:** Katepisternum with band of grayish microtomentum along dorsal margin, contrasted with blackish brown microtomentum elsewhere on pleural sclerites; anepimeron with a small whitish patch of distinctive longer microtomentum near middle; scutellum bearing 2 or 5–7 stout setae basolaterally in addition to apical pair; forefemur with anterior  $\frac{1}{2}$  more densely covered with longer microtomentum, contrasted distinctly with the sparser microtomentum on posterior  $\frac{1}{2}$ . Knob of halter black.

**Abdomen:** Fifth tergum with distinctive patch of dense, velvety-appearing microtomentum medially. Male terminalia as follows: gonite as wide as long, not pointed apically; hypandrium bearing a well-sclerotized, median process that projects posteriorad and is variously shaped, depending on the species.

**DISCUSSION.**—This species group is somewhat intermediate between the genus *Mosillus* and the





FIGURES 23-27.—*Placopsidella liparoides*: 23, head, lateral aspect; 24, head, anterior aspect; 25, thorax, dorsal aspect; 26, male terminalia, lateral aspect; 27, male terminalia, posterior aspect.

*cynocephala* group, with some character overlap with both. Although somewhat intermediate there is little doubt that this group and the *cynocephala* group are sister groups, as evidenced by numerous characters (see "Phylogenetic Considerations," page 25).

***Placopsidella liparoides* de Meijere**

FIGURES 23–28

*Placopsidella liparoides* de Meijere, 1916:61.

*Placopsidella cynocephala* sensu Cresson [in part (misidentification)], 1925:230 [synonymy of *P. liparoides*]; 1945:55 [review, as a synonym of *P. cynocephala*].

**DIAGNOSTIC DESCRIPTION.**—Medium-sized shore flies, length 3.45–3.85 mm.

**Head** (Figures 23, 24): Facial carina vertical, about twice as high as wide, dorsal  $\frac{1}{3}$  with transverse rugae, widely rounded ventrally; shiny area of medial carina extended obliquely ventrad from dorsum of facial carina becoming gradually attenuated, not continued much below  $\frac{1}{2}$  distance between carina and oral margin; microtomentum of face golden to brownish. Antenna almost entirely yellowish orange. Eye-to-cheek ratio 0.43.

**Thorax** (Figure 25): Apical scutellar bristles apparently not arising from tubercles, or these much reduced and not evident; scutellar bristles along posterolateral margin 5–6 in addition to apical pair. Scutellar ratio 0.78. Costal vein ratio 0.46; M vein ratio 0.78.

**Abdomen:** Velvety-appearing microtomentose area of fifth tergum as 2 reniform-shaped spots with entire median margins approximate, thus the 2 forming an oval spot. Male terminalia (Figures 26, 27) as follows: epandrium-surstylus juncture indicated by a distinct suture; epandrium, in lateral view, with dorsal portion gradually becoming wider to level of attachment with hypandrium, thereafter abruptly narrowed anteriorly to form a uniformly rounded ventral portion that is about as long as wide; surstylus with basal margins, in lateral view, parallel sided, apicoventral  $\frac{1}{2}$  narrowed gradually to a rounded apex and with a small, median ridge; surstylus,

in posterior view, angulate, especially the subrectangular ventral  $\frac{1}{2}$ ; cerci slightly more than  $\frac{1}{2}$  combined length of epandrial-surstylar length; gonite very irregularly clavate, apical  $\frac{1}{2}$  angulate, apex with truncate, triangular gonial process longer than basal width; aedeagal apodeme more or less like a parallelogram; hypandrium with median process pointed apically, apicoventral surface irregularly dentate, rough; aedeagus, in lateral view.

**TYPE MATERIAL.**—The lectotype female, herein designated, is labeled "Edw. Jacobson [Indonesia. Simeulue:] Sinabang. Sima nr. Sum[atra]. II [Feb] 1913 [black submargin]/[a yellow rectangular label with "16 66" on the underside]/*Placopsidella liparoides* det. de Meijere. Type. [species epithet and "Type." handwritten; black submargin]/Lectotype [red]/Lectotype *Placopsidella liparoides* de Mei det. B.H. Cogan 1971. [except for "det. B.H. Cogan 197" handwritten]." The lectotype is double mounted (minute nadel in polyporus block), is in good condition, and is in the Instituut voor Taxonomische Zoologie, Amsterdam. Two other syntype females, one with label data similar to those of the lectotype, the other from Pulu Babi, are here designated paralectotypes.

**OTHER SPECIMENS EXAMINED.**—BELAU. *Palau Islands*: Ngaiang Atoll, 9 May 1957, C.W. Sabrosky (1♀; USNM); Ngurukdabel Island, Ngaremediu, 24 Apr 1957, C.W. Sabrosky (1♀; USNM).

**DISTRIBUTION** (Figure 28).—Indonesia (Simeulue) and Belau (Palau Islands).

**REMARKS.**—This is the largest species of the genus, and its size plus the unique conformation of the facial carina and almost entirely yellowish orange antenna distinguish this species from congeners. The shape of the structures of the male terminalia is likewise unique and very distinctive.

***Placopsidella grandis* (Cresson)**

FIGURES 1, 28–33

*Gymnopa grandis* Cresson, 1925:232; 1945:54 [review].

*Placopsidella grandis*.—Cogan and Wirth, 1977:323 [combination; Oriental catalog].

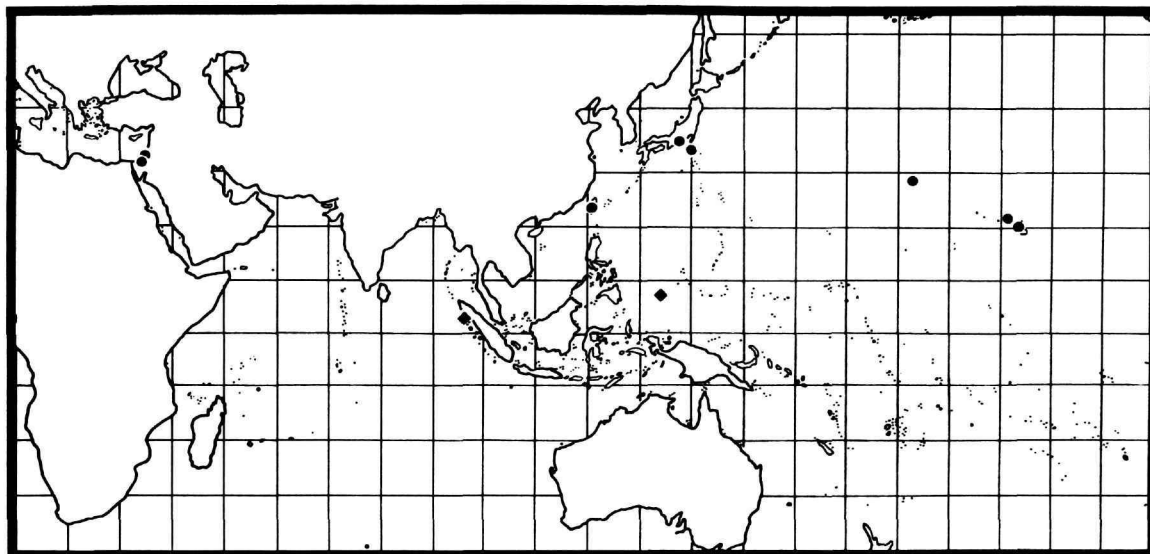


FIGURE 28.—Distribution map of *Placopsidella liparoides* (diamonds) and *Placopsidella grandis* (circles).

*Placopsidella opaca* Miyagi, 1977:30–31.—Cogan, 1984:129 [palaeartic catalog; new synonym].

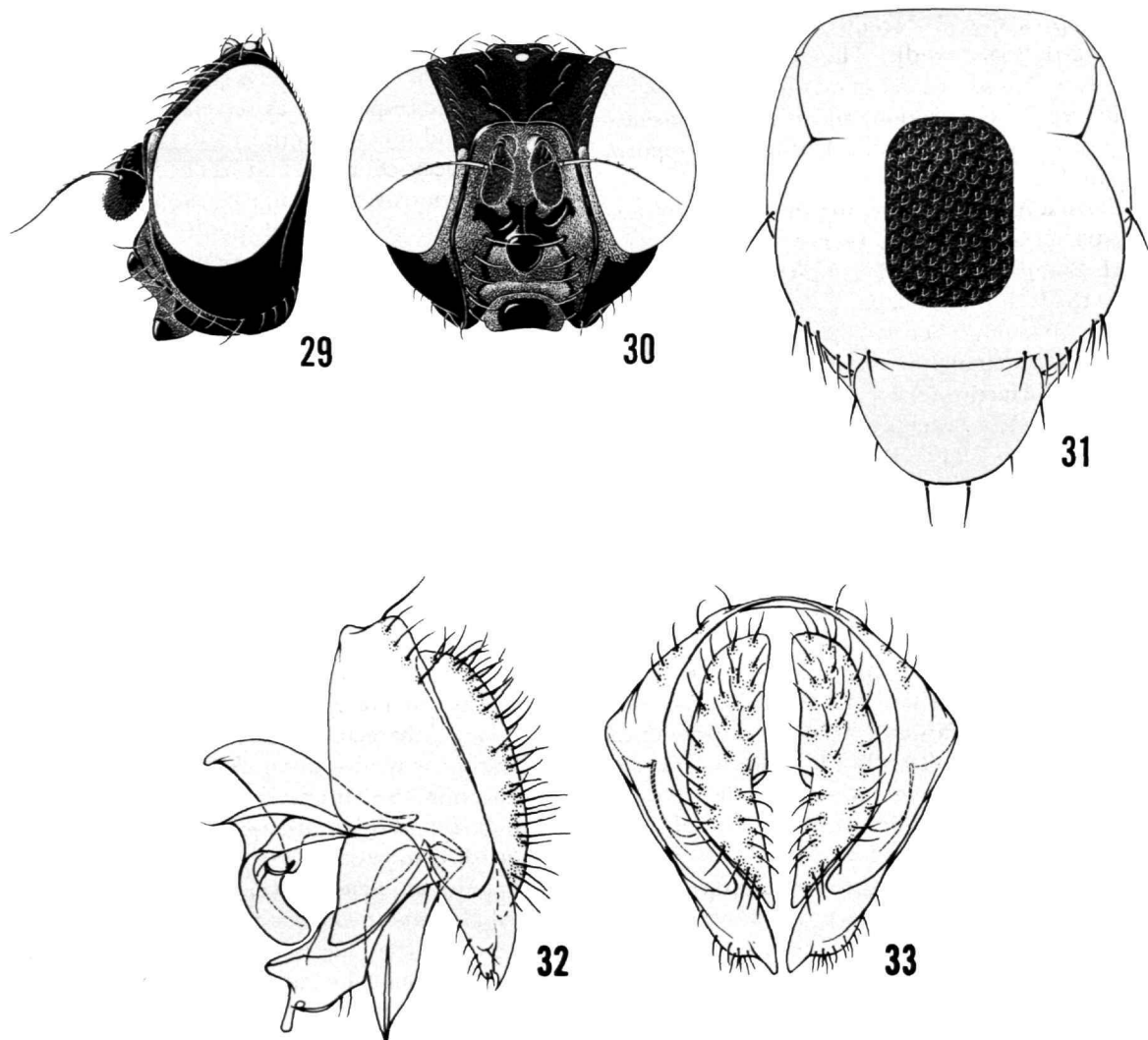
*Mosillus grandis*.—Tenorio, 1980:268 [combination; review of Hawaiian species].

**DIAGNOSTIC DESCRIPTION.**—Moderately small to medium-sized shore flies, length 2.70–3.70 mm.

**Head** (Figures 29, 30): Face and parafacials almost entirely microtomentose, whitish to slightly grayish; bare, shiny black portions of face restricted to area immediately around frontal suture, facial tubercle, 2 divergent and descendant lines from facial tubercle, and ventral margins of antennal grooves; facial prominence distinctly tuberculate. Antenna mostly blackish yellow, blackish coloration more on dorsobasal portions. Eye-to-cheek ratio 0.39.

**Thorax** (Figure 31): Apical scutellar bristles arising from tubercles, these fairly conspicuous; scutellar bristles along posterolateral margin 2, inserted on basal  $\frac{1}{2}$ , in addition to apical pair. Scutellar ratio 0.74. Costal vein ratio 0.57; M vein ratio 0.68.

**Abdomen:** Velvety-appearing microtomentose area of fifth tergum as 2 reniform-shaped spots with anteromedian margin approximate, posteromedian margins separate. Male terminalia (Figures 32, 33) as follows: epandrium-surstylus juncture indicated by a distinct suture; epandrium in lateral view with dorsal portion gradually becoming wider to level of attachment with hypandrium, thereafter abruptly narrowed anteriorly to form a uniformly rounded ventral portion that is slightly longer than wide; surstylus with basal margins in lateral view parallel sided, apicoventral  $\frac{1}{2}$  narrowed gradually to an acute point posteroventrally but with a small emargination anteroventrally, surstylus in posterior view with long median process; cerci slightly more than  $\frac{2}{3}$  combined length of epandrial-surstylar length; gonite with apical  $\frac{1}{2}$  roughly rectangular, apex with truncate, digitate process; triangular gonapophysis longer than basal width; aedeagal apodeme more or less triangular, but with dorsal margin broadly rounded; hypandrium with median process rounded apically; aedeagus in lateral



FIGURES 29–33.—*Placopsidella grandis*: 29, head, lateral aspect; 30, head, anterior aspect; 31, thorax, dorsal aspect; 32, male terminalia, lateral aspect; 33, male terminalia, posterior aspect.

view irregularly triangular, base wide, thereafter becoming narrow, especially dorsal surface but with preapical, dorsal, shallow swelling, aedeagus in dorsal view mostly oval with short, basal, parallel-sided attachment, spoon shaped.

**TYPE MATERIAL.**—The female holotype of *Gymnopa grandis* is labeled “Formosa [Taiwan] [H.] Sauter/Takao 1907. VI 24 [24 Jun 1907; month and day handwritten]/16 [handwritten on

a pale pink rectangle]/1147/Holo-TYPE *Gymnopa* GRANDIS E. T. Cresson Jr [species name handwritten; red].” The holotype is double mounted (minute nadel in foam rectangle), is in good condition, and is in the Academy of Natural Sciences of Philadelphia, 6353.

The male holotype of *P. opaca* is labeled “JAPAN: Is. Hachijo[-jima] July 16 [19]63 I. MIYAGI/o / [red rectangular label]/-type *Placopsi-*

della opaca sp.n. I. Miyagi [handwritten except for “-type”; label red].” The holotype is double mounted (minute nadel in cardboard rectangle), is in excellent condition, and is in the Entomological Institute, Hokkaido University, Sapporo, Japan.

OTHER SPECIMENS EXAMINED.—HAWAIIAN ISLANDS. *Kahoolawe*: Sida, 14 Feb 1931, salt bush, E.H. Bryan, Jr. (5♀; BBM). *Midway Island*: May–Jun 1941, F.X. Williams (2♀; UHH, USNM). *Oahu*: Mokapu, 5 Sep 1923, E.H. Bryan, Jr. (1♀; BBM); Waimanalo, Sep 1951, ex *Scaeola frutescens*, D.E. Hardy (1♂; UHH). ISRAEL. Herzliyya, 20 Jun 1981, A. Freidberg (1♂; TAU); Ma’agan Michael, Mar–30 Jul 1980–1982, A. Valdenberg (2♂, 13♀; TAU, USNM). JAPAN. Hachijo-jima, 16 Jul 1963, I. Miyagi (1♀; UR). *Honshu*: Omaezaki, 22 Jul 1963, I. Miyagi (1♂; UR). PANAMA. *Canal Zone*: Kobbe Beach, Jul 1967, W.W. Wirth (1♂; USNM). TAIWAN. Takao, 16 Jun 1907, H. Sauter (3♀; HNHM).

DISTRIBUTION (Figure 28).—Widespread throughout the Pacific basin (Hawaiian Islands, Japan, Panama, Taiwan); from there disjunct to the Mediterranean (Israel). This is the most widespread species of the genus, and its distribution throughout the Pacific basin is undoubtedly through natural dispersal mechanisms. Its occurrence in Israel, however, which is far removed from the Pacific basin, is probably adventitious, through recent commerce by man.

NATURAL HISTORY.—The specimens from Kahoolawe were collected from salt bush (*Atriplex semibaccata*), a plant introduced from Australia in the early part of this century.

REMARKS.—When Miyagi (1977) described *P. opaca* he was not aware that *P. grandis* was an available and valid name. The holotypes of *P. opaca* and *P. grandis* are conspecific, and as *P. grandis* is the older name, it has priority.

This species is distinguished from congeners, especially *P. liparoides*, by its smaller size, silvery white facial microtomentum, pattern of shiny areas on face, tuberculate facial prominence, darker antenna, number of scutellar bristles, and the unique conformation of the male terminalia.

### Phylogenetic Considerations

For a number of years the generic concept of *Placopsidella*, especially as it relates to that of *Mosillus* and other genera of the tribe Gymnolini, has been confused and has generated considerable controversy. Malloch (1933:14), for example, when he described *Mosillus marquesana* (herein transferred to *Placopsidella*), stated:

It is very probable that some other systematist would place this species in a different and new genus on the basis of the lack of facial elevations at the bases of the hairs, and the different frontal sculpture, or rather lack of the latter, but it appears to me that there are already too many quite poorly defined genera in this immediate group in the family and that the erection of more would merely further complicate the classification which is already quite badly confused.

Much of the confusion arose because undue or total emphasis (weight) was given to differences rather than relationships in deciding which lineages were to be recognized as formal taxonomic categories. Moreover, the differences, as in the case of *Placopsidella*, were limited to a single “key” character, the vertical midfacial carina, rather than to suites of features, preferably apomorphies, to characterize the taxa. Thus species that shared other apomorphies with *Placopsidella* were sometimes excluded or treated in other genera. Tenorio (1980), for example, treated *P. grandis* as a species of *Mosillus*, even while noting that there was greater similarity, including apomorphic characters, between that species and *P. marquesana* [as *P. cynocephala*, misidentification] than between the former and *M. tibialis*.

To address the issues Malloch and others have raised has required a complete phylogenetic analysis of *Placopsidella* and related taxa. This section presents the results of this analysis, the character evidence, and more importantly, a cladogram of the relationships among the species of *Placopsidella*. The discussion and elaboration of character evidence are given in addition to the cladogram (Figure 34), with coordination of numbers from the following list with the latter and in discussion of character evidence. In the character



analysis, the outgroup method was used to determine the polarity of the characters. The genus *Mosillus*, with its type species *M. subsultans* (Fabricius) as the exemplar, was used as the outgroup in the analysis. The computerized analysis (PHYSYS) resulted in a single tree (Figure 34) with 29 steps and is discussed below.

*Placopsidella* is indeed closely related to *Mosillus*, as evidenced by two apomorphies: (1) the lack of prominent, dorsally branching, arisal rays (character number 5); and (2) the loss of an anterior notopleural bristle (character number 16). *Placopsidella*, however, is distinguished from *Mosillus*, and its monophyly is established by numerous apomorphies (character numbers 1, 2, 3, 5, 7, 10, 12, 14, 15, 18).

Within *Placopsidella* there is an initial basic dichotomy, and each lineage has been given status as a species group, the *liparoides* and *cynocephala* groups. Of the two, the *liparoides* group, is somewhat intermediate between *Mosillus*, the outgroup, and the *cynocephala* group, and presently includes two species: *P. liparoides* and *P. grandis*. Although intermediate, the monophyly of the *liparoides* group is supported by several characters (character numbers 13, 19, 20, and 22).

The second species group, the *cynocephala* group, includes five species, and is corroborated by characters 4, 8, 9, 11, and 21. This lineage then gives rise to an unresolved trichotomy as follows (with corroborating character evidence in parentheses): (1) *P. cynocephala* is the only species of one lineage; (2) *P. insulana*, *P. marquesana*, and *P. scotti* comprise the second lineage (character 14); and (3) *P. signatella* and *P. phaeonota* comprise the third lineage (character 9).

Twenty-two characters were used in the phylogenetic analysis. Of these, only characters 6 and 17 demonstrated any tendency toward homoplasy, with consistency indexes below 100%. Although some homoplasy may be evident in these two characters I have left them as originally coded. Character evidence for the cladogram and the generalized versus derived condition of the characters is as follows (the plesiomorphic

condition is coded 0, the more apomorphic, 1, 2, etc., with the highest number being the most apomorphic; the numerical code is inserted parenthetically after the relative condition is described):

1. *Vestiture of body*: The generalized or plesiomorphic condition in the tribe Gymnolini is a reduction or lack of vestiture, with the cuticle appearing shiny or subshiny (0). The apomorphic condition, as exemplified in *Placopsidella*, is a dense investment of microtomentum (1). Microtomentose vestiture, however, as in *Placopsidella*, represents a reversal to the generalized or plesiomorphic condition in the family, and thus is secondarily derived.

2. *General coloration*: Most genera of Gymnolini are black, frequently shiny black (0), and that condition is plesiomorphic with respect to *Placopsidella*. *Placopsidella* is grayish to blackish brown (1), the apomorphic condition.

3. *Number of vertical bristles*: The typical number of vertical bristles throughout the family, as well as in the outgroup taxa, is two, an inner and outer one (0). The lack of an outer bristle (1), as in *Placopsidella*, is the apomorphic condition.

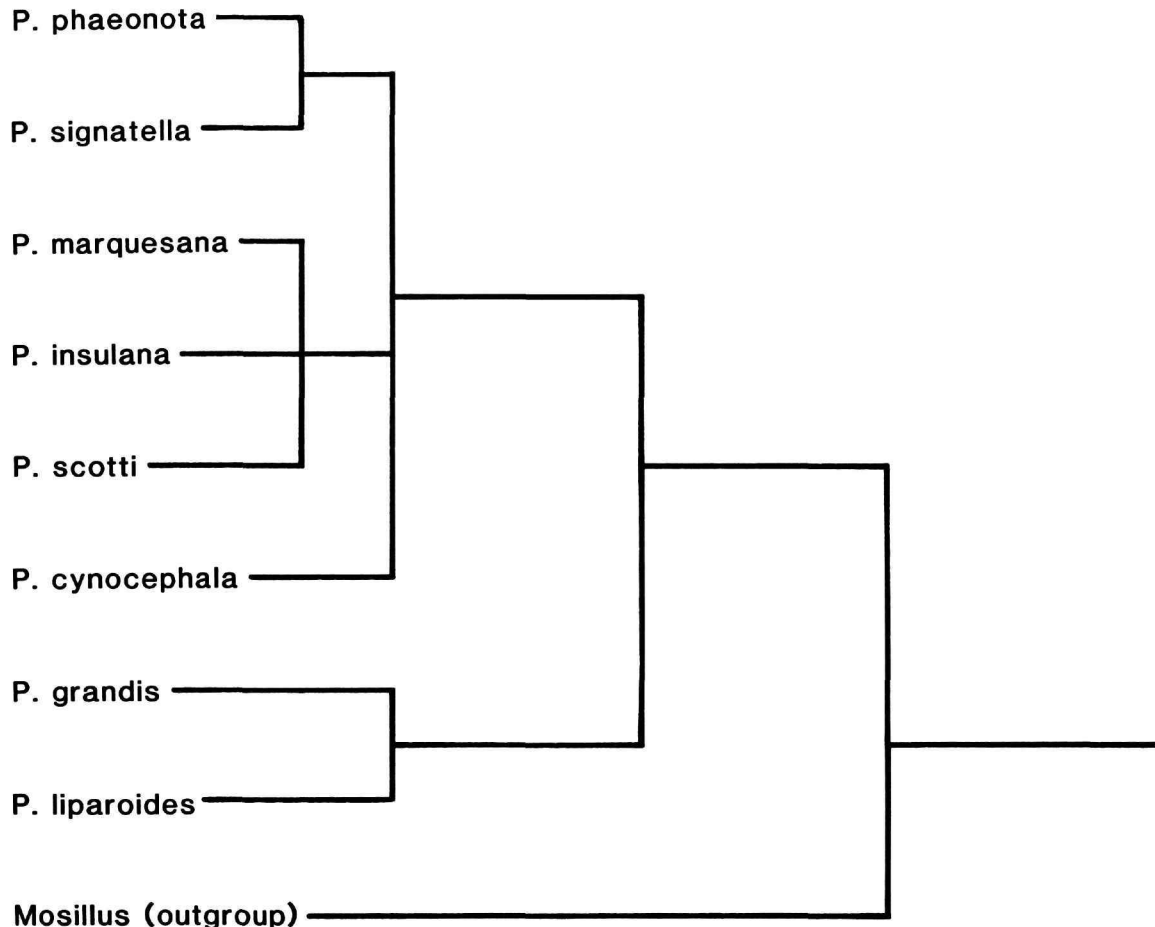
4. *Shape of facial prominence*: The tuberculate, facial prominence is plesiomorphic (0), as found in *Mosillus* and most other genera of Gymnolini. A median facial carina, which runs half the height of the face, goes from the intermediate condition (1) to a median carina running the full length of the face (2), the most apomorphic condition.

5. *Arista*: The plesiomorphic condition for the tribe Gymnolini is a pectinate arista, with several dorsally branching rays (0). For *Mosillus*, *Chlorichaeta*, and *Placopsidella* there is a general reduction, first in the size of the branching hairs (1), and finally their loss altogether (2). The latter is the condition in *Placopsidella* and is apomorphic.

6. *Coloration of antennae*: The antennal coloration of most gymnolines is black (0), the plesiomorphic condition. The various degrees of pale coloration are progressively more apomorphic states. These states have been encoded as follows: first flagellomere and second antennal segment mostly dark (1); first flagellomere yellow, second antennal segment brownish (2); both first flagellomere and second antennal segment yellowish (3).

7. *Vestiture of parafacials*: The generalized condition is a bare parafacial or the latter with patches of microtomentum (0). An entirely microtomentose parafacial is apomorphic (1).

8. *Vestiture of fronto-orbits*: The plesiomorphic condition is a bare or very thinly microtomentose fronto-orbit (0). The apomorphic condition is a densely microtomentose fronto-orbit (1), as in *Placopsidella*.

FIGURE 34.—Cladogram of species of *Placopsidella*.

9. *Coloration of fronto-orbital microtomentum*: The generalized condition is for the microtomentum to be unicolorous (0). The progressively more apomorphic conditions are: anterior 1/2 whitish, posterior 1/2 brownish (1); brownish around bases of fronto-orbital setulae (2).

10. *Armature of forefemur*: The forefemur of *Mosillus*, *Chlorichaeta*, and other genera of Gymnolini is armed with ventral spines (0), which is plesiomorphic. The unarmed condition, as in *Placopsidella*, is the apomorphic condition (1).

11. *Vestiture of forecoxa*: In the outgroup the anterior portion of the forecoxa is densely microtomentose; the posterior portion is thinly so or bare (0). In some species of *Placopsidella*, the forecoxa is entirely densely microtomentose (1).

12. *Coloration of foretarsus*: In *Mosillus* and *Chlorichaeta* the foretarsus is entirely dark, usually blackish (0).

In *Placopsidella* the basal three tarsomeres are yellowish, the apical two blackish (1).

13. *Vestiture of katepisternum and anepimeron*: Typically the vestiture of these pleural sclerites is undifferentiated (0). The progressively more apomorphic conditions are: faint whitish microtomentose patches (1); conspicuous whitish microtomentose patches (2).

14. *Coloration of halter knob*: This structure is typically pale, mostly whitish (0). The ground-plan state for *Placopsidella* is a dark, usually blackish knob (1). There is, however, a secondary reversal to pale coloration in a few species of *Placopsidella* (2).

15. *Setation between postalar bristle and base of scutellum*: Usually there are no setae between these two bristles (0). The occurrence of five to seven stout setae, as in *Placopsidella*, is obviously apomorphic (1).

16. *Number of notopleural bristles*: For more gymno-

pines there are two notopleural bristles, an anterior and posterior one (0). The loss of the anterior bristle is apomorphic (1).

17. *Number of scutellar bristles:* There are three conditions here, given in apomorphic progression: 1 apical, 1 basal (0); 1 apical, 2 basal (1); 1 apical, 5–7 basal (2).

18. *Vestiture of anterior margin of terga 3 and 4:* Typically these terga are bare (0). In *Placopsidella*, however, the anterior margins of these terga are densely and finely whitish microtomentose (1).

19. *Vestiture of fifth tergum:* For most gymnopines the vestiture of this tergum is fairly uniform (0). At most there is a slight concentration of microtomentum. In some species of *Placopsidella* there are two dense, micro-

tomentose areas that appear velvety (1).

20. *Hypandrium:* Typically this structure is U-shaped, sometimes the lateral arms bear other processes (0). In certain species of *Placopsidella*, a well-sclerotized, median projection is an apomorphic condition (1).

21. *Gonite:* In *Mosillus* and some species of *Placopsidella* the gonite is as wide as long (0), the plesiomorphic condition. In other species of *Placopsidella* the gonite is long and narrow (1).

22. *Epandrium-surstylar juncture:* This juncture is generally not indicated with a furrow or indentation in other gymnopines (0). In some species of *Placopsidella*, however, the juncture is indicated by a furrow (1).

## Literature Cited

- Adachi, M.  
1952. A New Canaceid from Oahu [under "Notes and Exhibitions"]. *Proceedings of the Hawaiian Entomological Society*, 14(3):354.
- Andersson, H.  
1971. The European Species of *Limnellia* (Diptera, Ephydriidae). *Entomologica Scandinavica*, 2(1): 53–59, 3 figures.
- Bohart, G.E., and J.L. Gressitt.  
1951. Filth-Inhabiting Flies of Guam. *Bulletin of the Bernice P. Bishop Museum*, 204:1–152, 17 plates.
- Clausen, P.J.  
1977. A Revision of the Nearctic, Neotropical, and Palearctic Species of the Genus *Ochthera*, Including One Ethiopian Species, and One New Species from India. *Transactions of the American Entomological Society*, 103:451–530, 176 figures.
- Cogan, B.H.  
1968. A Revision of the Ethiopian Species of the Tribe Notiphilini (Diptera: Ephydriidae). *Bulletin of the British Museum (Natural History), Entomology*, 21(6):281–365, 96 figures, 1 plate.  
1980. 71, Family Ephydriidae. In R.W. Crosskey, editor, *Catalogue of the Diptera of the Afrotropical Region*, pages 655–669. London: British Museum (Natural History).  
1984. Family Ephydriidae. In A. Soos, editor, *Catalogue of the Diptera of the Palaearctic Region*, pages 126–176. Budapest: Hungarian Academy of Sciences.
- Cogan, B.H., and W.W. Wirth.  
1977. Family Ephydriidae. In M.D. Delfinado and D.E. Hardy, editors, *A Catalogue of the Diptera of the Oriental Region, Volume III: Suborder Cyclorhapha (Excluding Division Aschiza)*, pages 321–339. Honolulu: University Press of Hawaii.
- Cresson, E.T., Jr.  
1925. Studies in the Dipterous Family Ephydriidae, Excluding the North and South American Faunas. *Transactions of the American Entomological Society*, 51:227–258.  
1942. Synopses of North American Ephydriidae (Diptera), I: The Subfamily Psilopininae, with Descriptions of New Species. *Transactions of the American Entomological Society*, 68:101–128.  
1945. A Systematic Annotated Arrangement of the Genera and Species of the Indoaustralian Ephydriidae (Diptera), I: The Subfamily Psilopininae. *Transactions of the American Entomological Society*, 71:47–75.  
1948. A Systematic Annotated Arrangement of the Genera and Species of the Indo-australian Ephydriidae (Diptera), II: The Subfamily Notiphilinae and Supplement to Part I on the Subfamily Psilopininae. *Transactions of the American Entomological Society*, 74:1–28.
- de Meijere, J.C.H.  
1911. Studien über sudostasiatische Dipteren, VI. *Tijdschrift voor Entomologie*, 54:258–432, 5 plates. Enderlein, G.  
1912. Über eine mimetische Ephydridengattung (*Oscinomima* nov. gen.). *Stettiner Entomologische Zeitung*, 73:163–165.
- Farris, J.S.  
1970. Methods for Computing Wagner Trees. *Systematic Zoology*, 19:83–92.  
1982. Outgroups and Parsimony. *Systematic Zoology*, 31(3):328–334.  
1983. The Logical Basis of Phylogenetic Analysis. In N.I. Platnick and V.A. Funk, editors, *Advances in Cladistics*. 2:7–36. New York: Columbia University Press. [Proceedings of the Willi Hennig Society.]
- Griffiths, G.C.D.  
1972. The Phylogenetic Classification of Diptera Cyclorhapha with Special Reference to the Structure of the Male Postabdomen. In E. Schimitschek, editor, *Series Entomologica*, 8: 340 pages, 154 figures, 2 plates. The Hague: W. Junk N.V.
- Hardy, D.E.  
1952. Additions and Corrections to Bryan's Check List of the Hawaiian Diptera. *Proceedings of the Hawaiian Entomological Society*, 14(3):443–484.
- Hendel, F.  
1930. Eine neue interessante Ephydridengattung (Diptera). *Konowia*, 9:66–70.
- Kertész, K.  
1901. Neue und bekannte Dipteren in der Sammlung des Ungarischen National-Museums. *Termeszettudományi Füzetek*, 24:414–432.  
1912. Über einige Muscidae Acalypteratae. *Annales Historico-Naturales Musei Nationalis Hungarici*, 10:541–548, 4 figures.
- Lamb, C.G.  
1912. The Percy Sladen Trust Expedition to the Indian

- Ocean in 1905, under the leadership of Mr. J. Stanley Gardiner, M.A., Volume IV, No. XIX, Diptera: Lonchaeidae, Sapromyzidae, Ephydriidae, Chloropidae, Agromyzidae. *Transactions of the Linnean Society of London*, series 2 (zoology), 15:303-348.
- Maddison, W.P., M.J. Donoghue, and D.R. Maddison.  
1984. Outgroup Analysis and Parsimony. *Systematic Zoology*, 33(1):83-103, 15 figures.
- Malloch, J.R.  
1933. Some Acalyptrate Diptera from the Marquesas Islands. *Pacific Entomological Survey Publications*, 7(1):3-31, 9 figures. [Reprinted in 1935 as *Bernice P. Bishop Museum Bulletin*, 114:3-31, 9 figures.]
- Mathis, W.N.  
1977. Key to the Neotropical Genera of Parydrinae with a Revision of the Genus *Eleleides* Cresson (Diptera: Ephydriidae). *Proceedings of the Biological Society of Washington*, 90(3):553-565, 13 figures.  
1982. Studies of Ephydrinae (Diptera: Ephydriidae), VII: Revision of the Genus *Setacera* Cresson. *Smithsonian Contributions to Zoology*, 350: iv + 57 pages, 138 figures.  
1983. Notes on *Brachydeutera* Loew (Diptera: Ephydriidae) from North America. *Entomological News*, 94(5):177-180, 6 figures.  
1985. Studies of Parydrinae (Diptera: Ephydriidae), II: Revision of the Genus *Pelinoides* Cresson. *Smithsonian Contributions to Zoology*, 410: iv + 46 pages, 59 figures.
- Mathis, W.N., and K.D. Ghorpadé  
1985. Studies of Parydrinae (Diptera: Ephydriidae), I: A Review of the Genus *Brachydeutera* Loew from the Oriental, Australian, and Oceanian Regions. *Smithsonian Contributions to Zoology*, 406: iii + 25 pages, 27 figures.
- McAlpine, J.F.  
1981. Morphology and Terminology—Adults [chapter]. In J.F. McAlpine et al., editors, *Manual of Nearctic Diptera*, Vol. 1. *Agriculture Canada, Research Branch, Monograph*, 27:9-63, 146 figures. Ottawa.
- Miyagi, I.  
1977. Ephydriidae (Insecta: Diptera). In *Fauna Japonica*, 113 pages, 500 figures, 49 plates. Tokyo: Keigaku Publishing Co.  
1916. Fauna Simalurensis-Diptera. *Tijdschrift voor Entomologie*, 58(1915):1-63.
- Sabrosky, C.W.  
1983. A Synopsis of the World Species of *Desmometopa* Loew (Diptera, Milichiidae). *Contributions to the American Entomological Institute*, 19(8):1-69, 28 figures.
- Steyskal, G.C.  
1970. The Species of the Genus *Dimecoenia* (Diptera: Ephydriidae) in America North of Panama, with the Description of a New Species. *Annals of the Entomological Society of America*, 63(2):462-465, 6 figures.
- Tenorio, J.A.  
1980. Family Ephydriidae. In D.E. Hardy and M.D. Del-finado, editors, *Diptera: Cyclorrhapha III, Insects of Hawaii*, 13:251-351, 141 figures. Honolulu: University Press of Hawaii.
- Wirth, W.W.  
1971. The Brine Flies of the Genus *Ephydra* in North America (Diptera: Ephydriidae). *Annals of the Entomological Society of America*, 64(2):357-377, 41 figures.







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