

Notes on the Genus *Thalassomyia* Schiner, with Descriptions
of Two New Species (Diptera: Tendipedidae)

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Introduction.—The writer became interested in the marine genus *Thalassomyia* after collecting material at Hilo, Hawaii, which apparently represents a new species. Through the kindness of Dr. L. G. Saunders of the University of Saskatchewan additional material of *Thalassomyia* was received for study, including all stages of *T. frauenfeldi* from Italy and adults and pupae of what apparently is also an undescribed species from Hong Kong, China. Dr. F. X. Williams¹ of the Hawaiian Sugar Planters' Experiment Station kindly loaned a series of adults and a pupal skin of *Thalassomyia* from New Caledonia which proved to be identical with the Hong King material. Specimens of *Thalassomyia* from the Marquesas Islands in the Bernice P. Bishop Museum at Honolulu were studied through the courtesy of E. C. Zimmerman. It is therefore possible in the present paper to redescribe two of the known species, to describe as new two additional species, and to give notes on the larvae and pupae of *Thalassomyia*.

Historical.—The genus *Thalassomyia* was erected in 1856 by Schiner for the marine species *frauenfeldi* from Trieste. Chevrel in 1903 described *Scopelodromus isemerinus* from Brittany and gave notes on the larva. In 1904 Chevrel made *Scopelodromus* a synonym of *Thalassomyia*, but maintained that *frauenfeldi* and *isemerinus* were distinct species. The species of *Thalassomyia* from fresh-water streams described by Tomosvary (*congregata*, 1884), Johannsen (*obscura*, 1903; *fulva*, 1908), and Harnisch (*glabripennis*, 1924) have been referred to the genus *Cardiocladius* Kieffer (see Edwards, 1926; Thienenmann, 1932). Lynch-Arribalzaga's *Chironomus obscuripennis* (1894), described from a female collected under a stone on the seashore at Montevideo, Uruguay, was considered by Edwards (1931) to be a *Thalassomyia*, most likely *frauenfeldi*, as Edwards reported *frauenfeldi* twice from Montevideo, first in 1926 (p. 786), and again in 1931, (p. 304) the latter from females taken on his South American trip in 1926. The insects described by Santos-Abreu (1918) from the Canary Islands

¹ Grateful appreciation is extended to Dr. Williams, who has contributed much to the study of water-loving insects in Hawaii, and has been a constant source of help and inspiration to the writer.

as *Scopelodromus canariensis*, as well as Chevrel's *isemerinus*, were placed in synonymy with *T. frauenfeldi* by Edwards in 1926, and in 1929 Edwards also submerged Wollaston's *Chironomus pedestris* (1858) under *frauenfeldi*.

In the Pacific region, Johnson (1924) described a new genus and species, *Galapagomyia longipes*, from the Galapagos Islands. In 1926 Edwards pointed out that *longipes* was probably a *Thalassomyia* and described a new species, *T. africana*, from a male taken on the coast of Tanganyika. In 1928 Edwards described *T. pilipes* from Samoa, and in 1935 in recording *pilipes* from the Marquesas Islands, he stated that after examining specimens of *Thalassomyia* collected by Miss Cheesman in the Galapagos, he concluded that his *pilipes* was most probably identical with *longipes* (Johnson). At the same time he recorded *T. africana* from the Marquesas, including a description of the female.

In 1830 Johnston described *Camptonia eruciformis* as an annelid worm, from between tidemarks, Berwick Bay, Northumberland, England. However, as reviewed by Bezzi (1913) and Edwards (1926), it was early agreed that *Camptonia* was a marine insect larva, and Miall (in Theobald, 1892) suggested it to be *T. frauenfeldi*. Although Edwards (1926) refused to adopt the name *Camptonia*, since in view of the discrepancies in Johnston's description and figure it could apply about equally well to several marine tendipedids, Townes (1945) has pressed the rule of oldest (valid) included genus in using the subfamily name *Camptoniinae* for the established *Clunioninae*. If *Camptonia* were to be adopted in the sense of *Clunioninae*, it would probably be applied to *Thalassomyia*, as *frauenfeldi* occurs in Britain.

Thalassomyia Schiner

Thalassomyia Schiner, Verh. Zool. bot. Ver., 6:218, 1856; Edwards, Ent. Mo. Mag., 60:204, 1924 (diagnosed and compared with *Cardiocladius*); Proc. Zool. Soc. Lond., 51:786, 1926 (diagnosis; syn.: *Scopelodromus*, *Galapagomyia*); Trans. R. Ent. Soc. Lond., 77:371, 1929 (diagnosis).

(?) *Camptonia*, Johnston, Zool. Journ., 3:325, 1830 (as annelid worm).

Scopelodromus, Chevrel, Arch. Zool. Exp., 1:1, 1903.

Galapagomyia, Johnson, Zoologica, 5:86, 1924.

Adult.—Sexes similar, wings well-developed. Eyes round, not emarginate, bare. Antennae (fig. 4) alike in both sexes, 7-segmented, last segment (figs. 1, 2, 4) with a nipple-like terminal constriction, all segments with an encircling row of long bristles. Palpi (fig. 5) long, often longer than the antennae, 4-segmented, the two distal segments quite long and narrowed. Pronotum reduced, divided into lateral lobes which may be narrowly or widely separated. No trace of suture dividing anepisternite from the sternopleurite. Legs elongate, front coxa enlarged, femora somewhat thickened

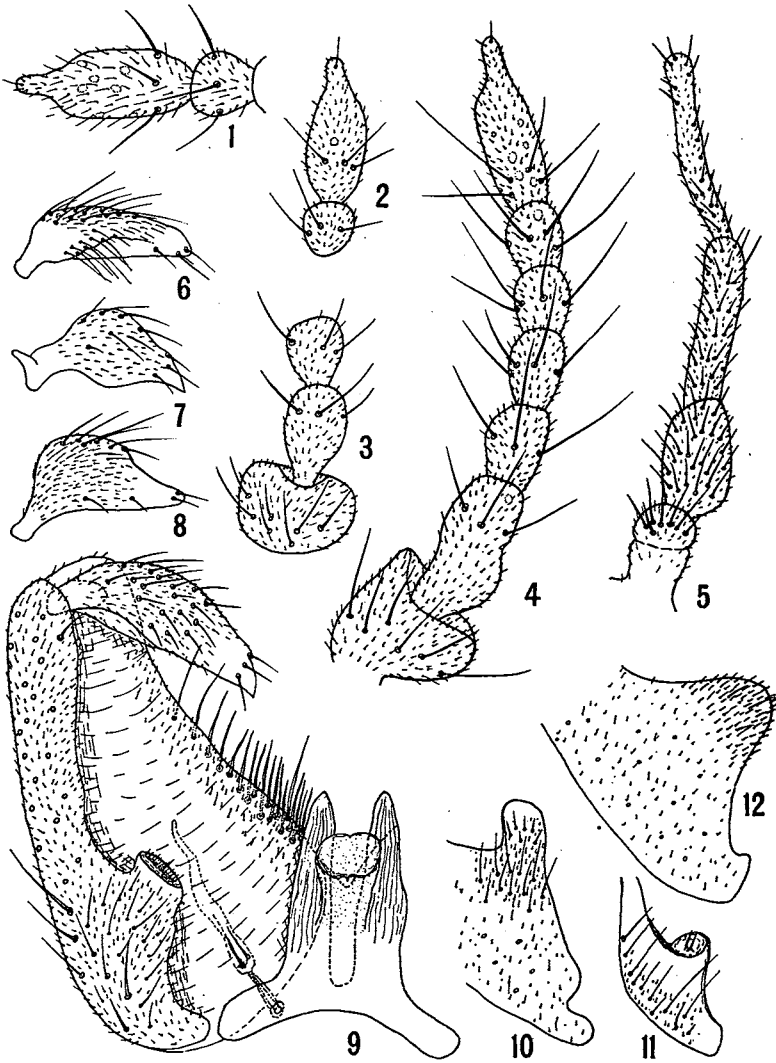


PLATE II

Figures 1-4, antennae. 1. *frauenfeldi*. 2, 3. *maritima*. 4. *setosipennis*. Figure 5, palpus, *setosipennis*. Figures 6-8, male dististyles. 6. *africana*. 7. *maritima*. 8. *frauenfeldi*. Figure 9, male genitalia of *setosipennis*, dorsal view, right gonostyle removed. Figures 10-12, dorsal lobes of basistyle. 10. *africana*. 11. *maritima*. 12. *frauenfeldi*.

toward base, tibial spurs well-developed, one on front legs, two on posterior pairs; third tarsal segment bilobed at tip; fourth segment short and strongly cordiform; fifth simple, not trilobed at tip; empodium very long, pectinately plumose; anterior claws of front and middle legs of male pectinate at tip, other claws of male and all claws of female sharp; pulvilli present as hyaline lanceolate lamellae. Wings with venation like *Tendipes*, R_{2+3} absent, R_1 short, r-m proximad of wing-middle, fCu at or slightly beyond base of r-m; squama fringed; wing entirely covered with microtrichiae, setae on costa and all of radial veins, in one species also on bases of remaining veins. Male genitalia (fig. 9) small, turned through 180° as in related groups, dorsal lobe (figs. 9-12) present on (primitively or morphologically) dorsal margin of basistyle (coxite), dististyles (styles) (figs. 6-9) infolded; female cerci (figs. 13-15) prominent, patch of long hairs (fig. 13) present on last abdominal sternite of female.

Larva.—Long, without conspicuous setae, head slightly longer than broad; antennae (fig. 17) small, 4-segmented; mandibles strongly sclerotized and dentate, mentum (fig. 19) broad, with median large pointed tooth and smaller lateral teeth. Anterior pseudopods short and fused on basal half, with many small hooks and spines distally and on lateral and posterior sides; posterior pseudopods short, not fused at base, with distal strong recurved hooks (figs. 20, 21).

Pupa.—Cephalothorax with antenna-cases prominent, projecting latero-ventrad; respiratory organs (figs. 22, 23) borne laterally, extending cephalad, horn-shaped with spiracle on basal third or narrow and cylindrical with sub-apical spiracle. Leg and wing-cases free but appressed to body. Abdomen not tapering, preapical segments without prominent appendages or spines, terminal segment (figs. 24-26) obliquely truncated, with a large flattened elliptical heavily-sclerotized dorso-posterior shield with emarginate dentated rim.

KEY TO SPECIES OF THALASSOMYIA

1. Wing veins M, Cu, and 1st A as well as costa and radius with setae; male dististyles not markedly swollen at base (fig. 9); female cerci slender (fig. 15).....*setosipennis* sp. nov.
Wing veins M, Cu, and 1st A without setae, only costa and radius setose2
2. Male dististyles strongly bilobed at tip; legs of male with long hair (3 times diameter of leg); last abdominal sternite of female with patch of dark-colored hairs; general color almost black; fCu much beyond base of r-m.....*pilipes* Edwards
Male dististyles simple at tip, not bilobed (figs. 6-9); hair on legs of male long or short; last abdominal sternite of female with patch of long yellowish hairs (fig. 13); general color light brown; fCu at or but slightly beyond base of r-m.....3
3. Last antennal segment abruptly narrowed to terminal nipple (fig. 1); fCu at level of base of r-m; female cerci greatly and abruptly expanded at base (fig. 14); male dististyles swollen at base, snout-like, rounded at tip (fig. 8); hairs on male legs short as in female, length less than diameter of leg.....*frauenfeldi* Schiner
Last antennal segment tapering to terminal nipple (fig. 2); fCu beyond base of r-m; female cerci slender, gradually tapering from base (figs. 13, 15); male dististyles slender or swollen at base, sharp or blunt at tip (figs. 6, 7, 9); hairs on male legs short or long4

4. Male dististyles swollen at base, beaklike, sharply pointed and bare at tip (fig. 7); dorsal lobe of basistyle small, conical, with fine hairs in hollowed-out apex (fig. 11); hairs on male legs about twice as long as diameter of tibia; female cerci moderately slender on distal portion (fig. 13).....*maritima* sp. nov.
 Male dististyles slender, not swollen at base, tip bluntly pointed, bearing two setae at extreme apex; dorsal lobe of basistyle large, flattened, thumb-shaped, with bare apex but fine setae on sides (fig. 10); hairs on male legs variable, from one to three times the diameter of a tibia; female cerci very slender on distal portion.....*africana* Edwards

(Note: *T. longipes* [Johnson] from the Galapagos Is. is not included in the above key, as the description is short and specimens were not available; it is probably close to *pilipes* or *setosipennis*).

1. *Thalassomyia setosipennis* sp. nov.

Adult.—Length of body, 2-3 mm.; wing, 2.1 mm.; breadth of wing, 0.9 mm.; general color light brown, anterior two-thirds of mesonotum between subdorsal setae, lateral vittae of mesonotum behind humeral depressions, postscutellum and sternum dark brown; pronotal lobes, wing bases, scutellum, and halteres yellowish-white; a jet black line on posterior side of mid coxa. Antennae (fig. 4) 7-segmented; basal segment about twice the diameter of distal segments, about two-thirds as long as broad; second segment elongate, about twice as long as broad, constricted in middle; segments three to six subspherical; seventh segment about three times as long as broad, with terminal fourth abruptly constricted and nipple-like; each segment with an encircling row of long bristles. Ratio of lengths of antennal segments beginning proximad 18:30:20:20:17:17:42. Palpi (fig. 5) 4-segmented, long, nearly twice the length of the antennae; basal two segments broad, about twice as long as wide, first segment with encircling row of large bristles, second entirely covered with large bristles; third and fourth segments narrowed and greatly elongate, each nearly twice the length of second segment, bristles on third segment strong and dense, on fourth segment fine and quite sparse; ratio of lengths of palpal segments beginning proximad 40:40:100:110. Paraglossae ovoid, bristly, about size and shape of second palpal segment. Clypeus and vertex evenly set with numerous strong bristles; vertex slightly darkened.

Pronotum narrowly divided medianly into lateral lobes, these very narrow and each bearing a line of about 15 long setae. Mesonotum large, roundly arched, somewhat flattened between wing-bases, with rows of long setae as follows: a median longitudinal row which divides about two-thirds the way back to form an irregular double row extending to scutellum; two subdorsal longitudinal rows from anterior margin to scutellum; an irregular linear patch on each lateral margin from humeral angle to wing-base, connected anteriorly by a transverse row at right angles to the subdorsal rows. Scutellum quite convex, about half again as wide as long, bearing about 20 long dark setae densest laterally; postscutellum about size of scutellum, flattened, darker in color and quite bare.

Wings covered with microtrichiae, appearing smoky grey-brown; costa and radial branches infuscated with light brown; costa, R, R₁, and R₄₊₅ densely set with strong dark setae, base of M, Cu, and 1st A also setose; squama and posterior wing margin fringed with long hairs, these decreasing in size toward wing tip. R₁ enters costa at a little less than half the length of R₄₊₅; R₂₊₃ absent; R₄₊₅ curved, almost paralleling costa which it enters slightly before wing tip; M almost straight, slightly curved distally to meet wing margin slightly below the apex; Cu forks slightly beyond base of r-m, the fork very narrow basad; Cu₁ slightly curved to meet wing-margin halfway between tips

of M and Cu₁, Cu₂ also but gently curved; 1st A inconspicuous and does not reach wing-margin. Relative lengths of R, R₁, R₄₊₅, base of M, and distal section of M, 5.5:5:10:4.5:12 respectively.

Legs long; relative lengths of segments from coxa distad, 3:1:9:11:6:2.5:1.4:0.5:1 on front legs, 2.5:1:13:12.5:5:2:1.2:0.4:1 on middle legs and 3.5:1:14:14:7:3.2:0.5:1 on hind legs. Femora slightly clavate basally, tibiae long, cylindrical, tarsal segments sub-cylindrical, except fourth segment cordate; last segment simple; empodium long, pectinately plumose; claws simple, the anterior claw on each front and middle leg of male pectinate at tip, posterior claws on all legs as well as anterior claw on hind legs of male and all claws of female sharp; pulvilli arise from base of each claw as a lanceolate hyaline lamella. Legs densely setigerous, most of these setae about as long as diameter of segment, but there are a few scattered heavy spines dorsally on each tibia about twice as long as the rest.

Abdomen moderately stout, all segments clothed with bristles, these stronger on anterior tergites, becoming finer caudad and on the sternites. Male genitalia (fig. 9) inverted, ventral surface thereby lying uppermost, broad; basistyles broad at base, about twice as long as broad at base, abruptly narrowing midway to the truncated apex; a flattened elliptical cup-like lobe near base on (morphologically) dorsal side, this lobe about half as high as broad, outer surface bare but the hollowed-out end with minute apparently glandular or sensory hairs; ventro-mesal margin of basistyle with dense patch of long hairs toward base. Dististyles folded inwards; proximal third somewhat enlarged, gradually tapering distally to a sharp point; proximal portion densely hairy, distal portion bare except for four or five sub-terminal setae. Aedeagus projecting dorso-caudad between bases of basistyles, consisting of a short dorsal hyaline penis lobe with bluntly rounding apical lips, flanked ventrolaterally by a pair of heavily sclerotized laminiform guard-plates with rather sharply rounded apices; anal opening by membranous protuberance on eighth tergite just anterior to aedeagus. Female abdomen stouter, downcurved, rounded distally; cerci (fig. 15) prominent, gradually tapering from rounded base to pointed downcurved tip; valves of ovipositor inconspicuous; all parts of female genitalia densely pilose; last abdominal sternite with a dense patch of long light-colored hairs, these over half the length of the cerci.

Larva.—Length mature, about 8 mm.; head capsule 0.6 mm. long by 0.4 mm. wide. Body whitish; head sclerotized light brown in color, blackish on cervical margin and distal portion of mandibles and mentum; hooks of pseudopods brownish black.

Head oval, roundly tapering anteriorly and down-curved toward labrum. Frons and clypeo-labrum not separated by a suture; the posterior portion of frons about twice as long as wide, widest at about middle, tapering caudad to a blunt point at junction of arms of epicranial suture; anterior portion constricted to about two-thirds of greatest width of frons, giving frons-clypeolabrum complex a spindle shaped appearance; integument of frons faintly reticulate. Clypeolabrum about as wide as long, widest caudad, tapering anteriorly to the blunt nose-like labrum; lateral margins with a distinct emarginate sclerotization which is broken and articulated at posterior third forming a distinct posterior clypealia and anterior torma, the latter being secondarily produced ventrad for the articulation of the premandibles; mesally the clypeolabrum is membranous, clypeal sclerites absent, but with prominent platelike integumental thickenings giving integument an "alligator-hide" appearance. Paired lateral setae arise from basal tubercles as follows: a pair near anterior margin of clypeolabrum; a second pair about half-way back; a third pair at posterior lateral extremity; a fourth pair just caudad of third at anterior constriction of frons; and a fifth pair just anterior to widest portion of frons. The vertex is also finely reticulate, with a seta-less tubercle on each side along frontal suture just posterior to fifth frontal setae mentioned above, and a fine seta on each side about midway between this tubercle and junction of frontal sutures. The small antennae are borne laterally at level

of the frontal-clypeal junction, consisting of a stout barrel-shaped proximal segment slightly longer than wide and about twice as long as distal segments combined, bearing distally three minute progressively smaller distal segments and an adjacent membranous biramous Lauterborn's organ as long as these combined. Lateral margin of head bears two fine setae on each side just behind bases of mandibles and a ventrolateral pair just behind lateral corners of mentum; ventral surface of head capsule with the integumental reticulations rather prominently pebble-grained. A small irregular eye-spot is faintly indicated on each side just caudad of base of mandibles.

Cephalic margin of labrum with several pairs of very fine setae mesally and a pair of sublateral tufts of flattened feathered hairs; just below on overhanging ventral margin are a median patch of minute blunt spines and tubercles and a prominent lateral tuft of flattened feathered hairs. The paired premandibles are articulated basally to a ventral projection of the tormae, each forming a heavily sclerotized appendage about twice as long as broad with broad flattened lobe-like apex bearing a closely appressed hyaline distally-frayed veil. Mandibles stout, with five or six stout blackened teeth on distal third, a compact bristia of about ten long laterally-fringed hairs near base of dorsal side and ventro-lateral margin bears two long setae. Maxillae simple, a large triangular dorso-basal sclerite bears two long setae; an ovate ventral sclerite bears a distal membrane with a ventral beard of small flattened hairs, long setae, and several small blunt spines; a small unsegmented palpus about as broad as long with several minute sensillae on the truncated membranous apex is borne about midway of distal margin of maxilla, two slender setae arise from maxilla near base of palpus; dorsal margin of maxilla membranous and fringed with flattened amber hairs. Hypopharynx consists of a small median oval transverse membranous lobe bearing a dense beard of curved flattened hairs supported by two slender sclerotized arms in a V-shaped bridge, the arms of the V connected by a fine membrane bearing very fine hairs. Mentum triangular in outline, the median tooth triangular with pointed apex, five or six smaller progressively much shorter teeth on each side.

Anterior pseudopod shallowly bilobed, each lobe bearing a crown of spines of posterior side ranging in size from minute recurved spicules well up on side of lobe to long slender slightly curved hooks at apex. Integument of thorax and eight preapical abdominal segments bare, without discernible setae. Ninth segment of abdomen rounding dorso-posteriorly and bearing ventrally a pair of stout tapering pseudopods each slightly longer than broad and bearing an apical posteriorly interrupted crown of 14-15 simple rather slender and strongly recurved hooks. A pair of long fine sublateral hairs on posterior extremity of ninth segment, and each posterior pseudopod bears 4-5 minute black hairs on posterior and lateral sides. Anal gills absent.

Pupa.—Length about 5 mm. Integument of cephalothorax and terminal abdominal disc with pebble-grained sclerotized thickening; preapical abdominal segments transparent except for narrow U-shaped sclerotized lines along basal and lateral margins of tergites and sternites, small shagreened patches at apices of each lateral sclerotized line, third sternite with a prominent broad median longitudinal amber-colored area of blunt raised tubercles. Cephalic region set off as a broadly rounded emarginate anterior lobe, the antenna cases arising laterally as two latero-posteriorly projecting horns, a long hair arising just mesad of each horn. Thorax arched dorso-anteriorly, a prominent slender respiratory organ projecting forward, upward, and laterally from each humeral corner; these organs quite slender and elongate, about six to eight times as long as wide, the apex rounded with the spiracle located dorsally at the apex; tracheal trunk nearly as large as lobe except at distal fifth which is greatly constricted; spiracle with lip radially segmented into about ten divisions. Two long hairs arise just cephalad of base of each respiratory organ; two or three submedian pairs of fine hairs along midline of dorsum, and two sublateral pairs anterior to bases of wing-cases. Wing-

and leg-cases project caudad to about level of third abdominal segment, free from but closely appressed to lateral and ventral surface of body. Abdominal segments slightly wider than long, slightly tapering from segments I to VII, without evident setae. Terminal segment obliquely truncate forming a dorso-posteriorly flattened emarginate elliptical shield or disc. Face of this disc divided at upper sixth by a dorsally-arched transverse suture; portion above the suture almost perpendicular to body axis, forming an angle with the posterior portion of the disc. Rim of anterior portion with heavily sclerotized denticles without hairs; rim of posterior portion with denticles fused in groups of one to five, bearing long amber hairs except at posterior extremity which is divided into two bare rounded lobes each with a strong apical ventrally-curved spike. Face of disc with extremely coarse pebble-grained sclerotizations; two long black hairs are placed laterally in a trapezoid on posterior sclerite. The trunk of the eighth segment anterior to the disc is not sclerotized but bears long dark hairs as follows: a subdorsal pair at rim of disc, two pairs on each side near ends of transverse suture of disc, and a pair about halfway back near rim of posterior sclerite of disc. The adult gonostyles are enclosed in a pair of prominent lobes of posterior margin of eighth sternite appressed to ventral surface of disc; in the male these are broadly rounding but in the female are longer and much narrower.

Holotype: Male, Hilo, Hawaii, March 2, 1946, W. W. Wirth (on rocks on beach) (pinned).

Allotype: Female, Hilo, Hawaii, December 4, 1945, W. W. Wirth (light trap near beach) (slide mount).

Paratypes: 20 males, 5 females, Hilo, Hawaii, December, 1945-January, 1946, (light trap); 2 males, 1 female, Hilo, Hawaii, February 27, 1946, W. W. Wirth (scampering over large boulders on bay shore in company with *Telmatogeton* spp. and *Clunio* sp.); 1 male, 6 females, Kilauea, Kauai, September 8, 1946, W. W. Wirth (on boulders on beach, Kilauea Bay); 30 males, 17 females, Nawiliwili Bay, Kauai, September 9, 1946, W. W. Wirth (on rocks in bay); 3 males, 2 females, Nawiliwili-Kauai, September 8, 1946, W. W. Wirth (at light).

The types are deposited in the U. S. National Museum; paratypes are in the collections of the Bernice P. Bishop Museum, the California Academy of Sciences, and of the author.

Many larvae and pupal exuviae were found floating in eddies around wave-washed rocks in Nawiliwili Bay, Kauai. All hand collections of *T. setosipennis* at Hilo, Hawaii, and at Kilauea and Nawiliwili, Kauai, were from inter-tidal rocks along the shores of shallow bays receiving considerable fresh-water from stream outlets. Heavy growths of the algae *Ulva* sp. and *Enteromorpha* sp. were present on these rocks in each case, indicating perhaps that *Thalassomyia* prefers water of less salinity than sea-water. However these insects are also probably quite dependent upon the tidal rhythm as are other marine insects, and upon wave action, hence their habitat is restricted to open shores near stream outlets.

The adults of *T. setosipennis* are quite active, hard to catch, much more inclined to flight, and stronger fliers than *Telmatogeton* and *Clunio*. *T. setosipennis* is most active at night, as indicated

by the numbers caught in the light trap at Hilo, Hawaii, and at light at Nawiliwili, Kauai. Moreover, the adults taken during the day were encountered most frequently in the dark shaded crevices under the edges of rocks and boulders on the shore; when disturbed the adults seemed to seek even darker retreats, avoiding the sunlight whenever possible.

The most useful characters of *T. setosipennis* can be briefly summarized as follows: color light brown; head densely setose; antenna with second segment constricted in middle, last segment abruptly constricted to nipple-like tip; pronotal lobes narrow, closely approximated mesad; long hairs on legs of male about twice the diameter of leg; abdomen with dense, large setae; male dististyles not greatly swollen at base, sharp-pointed at apex; dorsal lobe of basistyle broad and flattened elliptical in cross-section, hollowed-out and with fine hairs at tip; female cerci slender and gradually tapering; hair patch on last abdominal sternite of female with long light-colored hairs, these not flattened. The respiratory horn of the pupa is almost identical in shape and structure with that of *T. maritima* described and figured below (fig. 23); the terminal shield is also quite similar to that of *maritima*, but the shagreening of the preapical segments is quite distinctive.

2. *Thalassomyia pilipes* Edwards.

Thalassomyia pilipes Edwards, Ins. of Samoa, pt. 6, fasc. 2: 60, 1928 (Samoa; male, female); B. P. Bishop Mus. Bull. 114: 87, 1935 (Marquesas Is.; male; prob. same as *longipes* [Johnson]).

Edwards (1935) recorded one male of *Thalassomyia pilipes* and three males and four females of *T. africana* from the Marquesas Islands. The male of *pilipes* and two females and one male of *africana* determined by Edwards and deposited in the B. P. Bishop Museum were examined by the writer, and genitalia mounts were made of the males. Although the male determined by Edwards as *pilipes* possessed long hairs on the legs (three times the diameter of the leg), it agreed in all other respects with the specimens of *africana*. The dististyles of this male with long hairs on the legs are not bilobed at the tip, the dorsal lobe of the basistyle is large and thumb-shaped, and in all other characters of the male genitalia it is evident that the Marquesas material represents one species which is here referred to *T. africana*.

The important characters of *pilipes*, as paraphrased from Edwards (1928) are: 1) color dark, body almost black; 2) male genitalia with bristles on ventral side of basistyle short, flattened and scale-like, also a number of similar bristles present on inner surface of basistyle near the base; 3) dististyles strongly bilobed at tip, additional lobe being developed on inner (flexor) surface; 4) cerci of female slightly and evenly widened towards base; 5) legs of male (but not of female) with rather long erect hair, which

is especially noticeable on the hind femora and tibiae, the hairs about three times as long as diameter of legs; 6) cubital fork short, its base much beyond level of base of R_{4+5} ; 7) wing length about 3.5 mm.

3. *Thalassomyia frauenfeldi* Schiner.

Thalassomyia frauenfeldi, Schiner, Verh. Zool. bot. Ver. 6: 218, 1856 (female; Trieste); Theobald, An Account of British Flies, 202, 1892 (note by Swainson on occurrence in Britain, larva marine); Miall on *Camponia* (= *T. frauenfeldi*); Edwards, Ent. Mo. mag., 10: 204, 1924 (male described; Dalmatia; Suffolk); Proc. Zool. Soc. Lond., 51: 786, 1926 (syn.: *Scopelodromus isemerinus* Chevrel, *S. canariensis* Santos-Abreu; recorded from Montevideo, Uruguay); Trans. R. Ent. Soc. Lond., 77: 371, 1929 (? new syn.: *Chironomus pedestris* Wollaston; 4 British locality records); Dipt. Pat. & S. Chile, pt. 2, fasc. 5: 304, 1931 (Montevideo; ? syn.: *Chironomus obscuripennis* Lynch-Arribalzaga); Goetghebuer, Faune de France, 23: 143, 1932 (short description of adult, larva, pupa; male genitalia, wing figured).

Thalassomyia frauenfeldi, var. *luteipes*, Strobl, Wien. Ent. Zeit., 19: 173, 1900 (Algeciras, Spain).

Scopelodromus isemerinus, Chevrel, Arch. Zool. Exp., 1: 1, 1903 (Brittany; larva and adult).

Thalassomyia isemerinus, Chevrel, Arch. Zool. Exp., 2: 29, 1904 (from *Scopelodromus*); Johannsen, Cornell Agr. Exp. Sta. Mem. 205: 36, 1937 (brief diagnosis of larva in table).

Scopelodromus canariensis, Santos-Abreu, Mem. R. Acad. Barcelona, 14: 167, 1918 (Canary Islands).

(?) *Chironomus pedestris* Wollaston, Ann. Mag. Nat. Hist. [3] 1: 114, 1858 (I. Madeira).

(?) *Chironomus obscuripennis* Lynch-Arribalzaga, Bol. Acad. Nac. Cordoba, 13: 243, 1894 (Montevideo, Uruguay).

Adult.—Length of body, 3-5 mm.; wing, 2.7 mm.; breadth of wing, 1 mm.; this description made from old alcoholic material, so coloration is obscure, though apparently mostly light brown. Antenna (fig. 1) 7-segmented, the first segment large and sub-spherical, about twice the diameter of distal segments; second segment about twice as long as broad distally, constricted slightly beyond the middle; segments three to six subspherical, seventh segment a little more than twice as long as broad, with terminal fourth abruptly narrowed to a distinct nipple-like tip; first segment with many large bristles, distal segments each encircled with a row of long bristles, those of second on distal portion and of seventh on proximal portion. Ratio of lengths of antennal segments beginning proximad, 30:30:18:15:15:15:35. Palpi 4-segmented; as long as antennae, first two segments enlarged, first twice as long as wide, with long spines distad, second sub-spherical, covered with many long spines, third and fourth elongate, cylindrical, each markedly smaller in diameter than the preceding and less hairy, fourth almost bare; ratio of lengths of palpal segments beginning proximad,

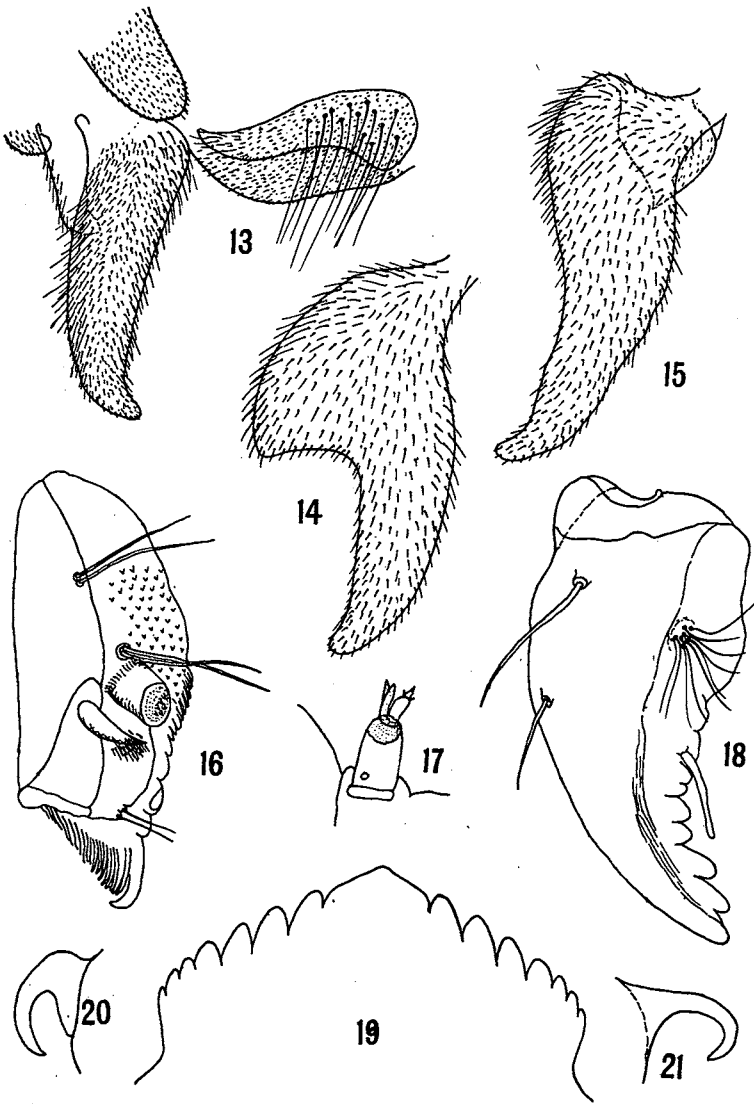


PLATE III

Figures 13-15, cerci of female. 13. *maritima* (also showing hairs on last sternite). 14. *frauenfeldi*. 15. *maritima*. Figures 16-21, larva of *frauenfeldi*. 16. maxilla, ventral view. 17. antenna. 18. mandible, dorsal view. 19. mentum. 20-21. hooks of posterior pseudopod.

30:25:50:60. Paraglossae bulbous, a little larger than second palpal segment. Clypeus and vertex with many stout bristles, those of clypeus somewhat longer and denser.

Pronotum widely divided into small lateral lobes; these each with about 8-10 long setae. Mesonotum roundly arched, with rows of long setae as follows: a median longitudinal row which divides about two-thirds the way back to form an irregularly double row extending to the scutellum; two subdorsal longitudinal rows from anterior margin to the scutellum; an irregularly linear patch which stair-steps twice in extending from the wing-base to meet the subdorsal row above the humeral angle. Scutellum quite convex, transverse, with 30-40 long dark bristles. Postscutellum nearly as long as broad, flattened and bare.

Wings covered with microtrichiae, appearing light smoky gray; subcosta and radial veins infuscated with light brown; costa and radial veins with numerous small sharp setae, other veins bare; squama and posterior wing margin fringed with long hairs, those of the latter becoming smaller toward wing-tip. R_1 enters the costa at about half the length of R_{4+5} , R_{2+3} absent; R_{4+5} curved parallel to costa to meet it just before wing tip; M nearly straight, reaching wing-margin slightly below the apex; Cu forks well beyond base of r-m, Cu_1 slightly curved to reach the wing-margin at a 45° angle halfway between tips of M and Cu_2 ; the latter curves rather more than Cu_1 to meet the wing-margin at about a 75° angle; 1st A scarcely discernible. Relative lengths of R, R_1 , R_{4+5} , base of M, and distal section of M, 7.5:7:13:6:15 respectively.

Legs long, slender, relative lengths of segments from coxa distad, 3.5:1.5:12:14:8:3.4:2:0.6:1.5 on front legs; 2.5:1:18:15:7:2.5:1.8:0.6:1.5 on middle legs, and 3.4:1:17:18:9:4.5:2.2:0.6:1.5 on hind legs. Femora slightly clavate basally; tibiae slender, subcylindrical; tarsal segments one to three subcylindrical, long and slender, fourth segment very short, as wide as long, cordate; fifth segment slender and simple. Tarsal claws simple, the anterior claws on front and middle legs of male pectinate at tip, other claws of male and all claws of female sharp; empodium long and pectinately plumose; pulvilli arise from base of each claw as slender hyaline lanceolate lamellae. Legs densely covered with fine setae, length of these not more than diameter of tibia.

Abdomen moderately stout, densely covered with long hairs on tergites, and with sparse inconspicuous setae on sternites. Male genitalia turned through 180° ; basistyles broad at base, rounded laterally, abruptly narrowed on distal half; dorso-lateral margin expanded at base and bearing a flattened broadly-rounded setigerous lobe (fig. 12); with a patch of very long bristles on ventral side at base. Dististyles (fig. 8) folded inwards, snout-shaped, broadly expanded on basal two-thirds, narrowed distad, with apex rounded. Aedeagus with short rounded median lobe flanked by a pair of saber-shaped hyaline lateral plates about twice as long. Membranous anal lobe projecting dorsad just anterior to aedeagus well developed. Female abdomen stouter than male, not markedly curved, tapering strongly at genital segments. Cerci (fig. 14) broad at base with broad ventral tooth or lobe, suddenly constricted halfway, distal portion narrow, downcurved to a sharp apex. Genital segments densely pubescent, patch of long hairs on last sternite light-colored.

Larva.—Length mature, about 10 mm.; head capsule 0.7 mm. long by 0.55 mm. wide. Body semi-hyaline, head heavily sclerotized and dark brown in color, almost black on cervical margin and apices of mandibular and labial teeth. Head oval, slightly tapering to anterior, ovoid in cross-section, curving, dorsally convex. Frons very long, ovoid, about twice as long as broad; broadest at anterior third, distinctly narrowed posteriorly to a rounding point at the junction of the arms of the epicranial suture at about one-fourth way from cervical margin; curving anteriorly to base of clypeus which it touches in an antero-curved suture about half as long as greatest width of frons; two

pairs of small hairs on lateral borders of frons, one near clypeal suture, the second about one-third way back; a pair of small hairs on head near epicranial suture just laterad of the posterior frontal hair, a second pair posterior to these by distance equal to that separating the anterior and posterior frontal hairs, a third pair just below each eye-spot, and a fourth pair anterior to the third at level of fronto-clypeal suture. Antennae (fig. 17) borne laterally at level of fronto-clypeal suture; small, four-segmented, the proximal segment stout and barrel-shaped, bearing a membranous biramous Lauterborn's organ adjacent to and as long as the three distal antennal segments; second segment peg-like, the third and fourth segments minute, forming a sharp point; second segment also bears some minute spines apically. A small irregular shaped eye-spot on each side of head just behind base of mandibles. Clypeo-labrum transverse, about twice as wide as long from dorsal aspect, apparently clypeus and labrum are fused together, lateral margins broadly emarginate and very heavily sclerotized; anterior margin folded ventrad in a straight line and continued ventro-caudad in a prominent overhanging lip; a pair of widely spaced sub-lateral hairs dorsally near the anterior margin; the concave under-surface of the lip bears a number of stout spines, feathery hairs and a median brush. Posterior to these on the ventral side is a transverse heavily sclerotized bridge to the lateral ends of which the premandibles are articulated, and which bears between these an assortment of small feathery spines and brushes. The premandibles are about twice as long as wide, proximal portion heavily sclerotized, distal portion broadly expanded into a thin hyaline apically-rounded incompletely two-lobed plate appressed to which is a membranous distally-pectinate brush or veil. The mandibles (fig. 18) bear seven heavily sclerotized teeth, the distal teeth stronger; just basad of the proximal tooth is a strong appressed hyaline distally directed spine, and a compact brush of about ten long slightly frayed hairs is borne about midway on mesal margin; the convex surface bears two long setae. The maxillae (fig. 16) are comparatively flattened and membranous, bearing an assortment of flattened spines, pegs, spicules, setae, and platelets distally; maxillary palpi one-segmented, bearing about eight minute sensillae on the distal membrane. Hypopharynx membranous, supported by a very slender inverted U-shaped sclerite, the space within the "U" densely set with long fine hairs, and the semicircular membranous lip distad of the base of the "U" with close-set heavy curved-tipped spines. Mentum (fig. 19) wide, with 15 teeth, the median tooth broad, rather broadly pointed in the middle, the lateral teeth progressively shorter and smaller laterad.

Anterior pseudopods fused together proximad, separated only on distal half; at tip and extending about one-third way up on lateral and caudal sides with numerous spines ranging in size and shape from very long almost straight spines on anterior and mesal margin of distal extremity, progressively shorter and more curved until these spines are recurved hooklets well up on the posterior and lateral sides of the pseudopod. Hairs of the thorax and abdominal segments quite inconspicuous or absent. Thoracic and abdominal segments quite cylindrical, only slightly tapering toward caudal segments; leg buds show through integument on thoracic segments; abdomen nine-segmented, ninth segment tapering and rounded dorso-posteriorly and bearing the posterior pseudopods ventrally. A pair of blunt anal lobes project ventrad just posterior and adjacent to the posterior pseudopods, anal gills rudimentary. A pair of long hairs sub-laterally placed on caudal extremity of ninth segment, apparently not arising from a tubercle; there are a few other hairs scattered on ninth segment and on the pseudopods but they are very small and inconspicuous and often absent. Hooks of posterior pseudopods about 15 on each leg, in a triple row with a gap free from hooks about one-fifth of circumference on caudo-mesal side; individual hook (figs. 20, 21) heavily sclerotized dark-brown; broad basally and strongly recurving to a single sharp point.

Pupa.—Length, about 5-6 mm.; stout; exuviae with pebble-grained integumental sclerotization in region of cephalothorax and terminal abdominal disc; preapical abdominal segments transparent except for narrow U-shaped sclerotized lines along basal and lateral borders of tergites and sternites, these segments shagreened, especially adjacent to these lines, third sternite with a very heavily shagreened patch. Cephalic region set off from thorax as an emarginate anterior lobe, the antenna-cases arising laterally as two horns projecting latero-posteriorly over the pronotal lobes, a long hair arises just mesad of the base of each antenna. Thorax arched antero-dorsally, a prominent forward-projecting horn-shaped respiratory organ (fig. 22) arising from each humeral corner; spiracular opening located dorsally near outer margin at widest point of lobe, which is about one-third way from base; two long hairs on each side of mesonotum mesad of respiratory organ, and a single hair just anterior to and mesad of each wing base. Scutellum evident only as rounded arched posterior portion of cephalothorax. Wing and leg cases projecting posteriorad, closely appressed to ventral surface of body, halteres not evident. Abdominal segments slightly decreasing in width progressively from segments I to VII; these without hairs or bristles. Terminal segment (fig. 26) obliquely truncate, forming an oblique dorso-posterior flattened emarginate elliptical shield. Face of this shield divided at upper fourth by a dorsally arched transverse suture; rim of portion above this suture with heavily sclerotized denticles, rim of posterior portion of shield with denticles in groups of two to four bearing fine long amber hairs; these absent on postero-ventral margin which terminates in two rounded bare lobes each with a strong apical ventrally curved spike or hook. In the male pupa there are two pairs of long black setae placed sublaterally in a trapezoid on the caudal sclerite of the shield; in the female there is but one pair of sublateral hairs on this sclerite; upper sclerite without setae. The trunk of the eighth segment anterior to the shield is not sclerotized, but bears long black hairs as follows: a dorso-lateral pair, two on each side just below ends of the transverse suture, two pairs in like position just below ends of suture, a ventro-lateral pair about two-thirds the way caudad on posterior ventral margin of unmodified portion of eighth segment. In the male pupa the gonostyles are evident as two large appressed ventral lobes, while in the female pupa there are in the same region two small anterior lobes and two larger posterior lobes containing the developing ovipositor and cerci of the imago.

The above descriptions of *T. frauenfeldi* are based on alcoholic specimens kindly furnished by Dr. L. G. Saunders, collected at San Remo, Italy, May 23, 1928; 2 males, 2 females, 8 larvae, and 1 male and 1 female pupae were examined.

Johannsen (1937) includes a brief diagnosis of the larva of "*(Scopelodromus) Thalassomyia isemerinus* (Chevrel)" in a key, in which there are several discrepancies with the present material. It might be well to point out that in the present material the claws of the posterior pseudopods have a single point, rather than "one, two, or three" points, as Johannsen (and also Chevrel, 1904) states; the proximal corner of the base of the claw is quite easily mistaken for a second tooth, but on close examination it can be seen that the claw is fused to the leg at this point. In the present material there was but a single irregular eyespot on each side of the head, rather than "two distinctly separated, but unequal eyespots on each side of head," this character is probably variable. The mentum possesses fifteen teeth, rather than "thirteen," but the lateral teeth were small and could have been overlooked or the number may be vari-

able; the middle tooth is roundly pointed apically as in related genera, rather than "with an apical notch." The dorsal "preanal papillae" are rudimentary, there being but a pair of single hairs in the corresponding position, rather than "a tuft of bristles." A further comparison of larvae from the Atlantic coast of Europe should be made with Mediterranean larvae in order to clarify Chevrel's larval description.

The pupa of *Thalassomyia* resembles that of *Telmatogeton* quite closely in general aspect and in the shape and structure of the terminal shield of the abdomen; in *frauenfeldi* the respiratory organs are also like those of *Telmatogeton*, but in *maritima* these organs are quite remarkably different, being long and cylindrical, with the spiracle subapically located. Goetghebuer's (1932, p. 143) description of the pupa of *frauenfeldi* is too short to be of much use—"Nymphe—L. 4-5.5 mm. Le segment anal est court et formé de deux lobes, qui portent chacun une soie apicale." Furthermore his description of the larva differs in several respects from the present material—" . . . le labium est composé d'une rangée de 14 dents, dont 2 médianes, plus longues que les latérales . . . les mandibules sont pourvues de 5 dents; les pseudopodes postérieurs sont courts et présentent 8-10 crochets bifides . . ."

4. *Thalassomyia* *maritima* sp. nov.

Adult.—Length of body, 2 mm.; wing, 2 mm.; breadth of wing, 0.6 mm.; color light fuscous brown, without conspicuous markings. Antenna (figs. 2, 3) 7-segmented; basal segment (fig. 3) about twice the diameter of distal segments, about one-fourth wider than long; second segment (fig. 3) about twice as long as wide; tapering at base but not constricted in middle; segments three to six subspherical; seventh segment (fig. 2) about two and a half times as long as broad, tapering on distal half to a rather long nipple-like constricted tip; basal segment with scattered long bristles, segments two to seven each with an encircling row of long bristles, those of second at distal end and those of seventh at proximal end; all segments also pubescent. Ratio of length of antennal segments beginning proximad 20:20:12:12:12:12:32. Palpi 4-segmented, elongate, about as long as antennae; first segment about half again as long as broad, constricted in middle, distal part with four or five long bristles; second segment ovoid, about half again as long as broad, with scattered long bristles, third and fourth segments each about two-thirds as wide as the preceding and greatly elongate, and with bristles reduced; ratio of length of palpal segments, beginning proximad, 20:22:45:60. Paraglossae ovoid, bristly, clypeus and vertex with scattered bristles, these much sparser than in *frauenfeldi* and *africana*, there being only about 20-25 bristles on the clypeus and 30-40 on the vertex; median third of vertex entirely bare.

Pronotum widely divided medianly into lateral lobes, these quite narrow and each bearing 5-7 long setae. Mesonotum full and arched anteriorly, somewhat narrowed and longitudinally ridged between wing-bases, with longitudinal rows of long setae arising from light-colored ocellate spots as follows: a median row from anterior margin becoming an irregularly double row extending to the scutellum (15-20 setae), two subdorsal rows not quite reaching either the anterior margin or the scutellum (14 setae each), and two irregular lateral rows from near humeral area to above the wing-bases (12-13 setae each). Scutellum very convex, about half again as wide as long; with about 10 long dark setae. Postscutellum flattened, about as wide as long, bare.

Wings covered with microtrichiae, appearing smoky grey brown; costa and radial veins infuscated with light brown; costa densely setose, about 25 fine small setae on radial veins, most of these on R and R_1 , other veins bare; squama fringed with about 5-10 fine hairs, posterior wing margin fringed with alternating long and short very fine hairs, these decreasing in length toward wing-tip. R_1 enters the costa at about a third the length of R_{4+5} ; R_{2+3} absent; R_{4+5} curved almost parallel to costa which it enters just before wing-tip; M almost straight, slightly curving distad to enter margin of wing just below tip; Cu forks just beyond base of r-m, the fork very narrow basad; Cu_1 very slightly curved, Cu_2 curved toward tip; Cu_1 reaches wing margin halfway between the tips of M and Cu_2 ; 1st A inconspicuous. Relative lengths of R, R_1 , R_{4+5} , base of M, and distal section of M, 7:4:12:6:13 respectively.

Legs long, relative lengths of segments from coxa distad, 2.5:1:6.5:7.5:4:1.6:1:0.4:1 on front legs, 2.5:0.8:9.5:8.5:3.5:1.3:1:0.4:1 on middle legs, and 3:0.8:11:11:5.7:2.6:1.5:0.4:1 on hind legs. Femora slightly clavate basally, tibiae long, slender, cylindrical; tarsal segments subcylindrical except fourth segment cordate, last segment simple; empodium long, pectinately plumose; claws simple, the anterior claw on each front and middle leg of male pectinate at tip, other claws of male and all claws of female sharp; pulvilli arise at base of each claw as a lanceolate hyaline lamella. Legs densely setigerous, in the female these setae are nearly all short, about half the diameter of a tibial segment, but in the male, especially on the hind legs, most of the setae are longer, from one to two times the diameter of a tibia.

Abdomen moderately slender, rather sparsely covered with fine setae, these but slightly larger on the tergites and not markedly reduced caudad; the setae of the female abdomen particularly short. Male genitalia turned through 180° , small, slightly broader than long. Basistyles broad at base, narrowed on distal half, basad at the dorsal margin with a small conical lobe (fig. 11) bearing a few very fine sensory or glandular hairs in the hollowed-out apex; ventrally with the entire mesal margin set with long stout bristles; about eight similar bristles on inner surface near the base. Dististyles (fig. 7) folded inwards, much swollen at basal third, tapering beak-like to a sharp apical point; with numerous long setae and fine hairs. Aedeagus projects dorso-caudad between the bases of the basistyles, consisting of a short dorsal hyaline penis lobe with rounded apical lips, and a pair of straight laminiform rather sharp-pointed guard plates laterad and ventrad of the former; internal parameres prominent. Anal lobe membranous, finely setigerous, located on the dorsum just anterior to the aedeagus. Tip of female abdomen rather bluntly rounded, cerci (fig. 13) conspicuous, slender, tapering gradually from base, down-curved at tip; entire female genitalia densely pubescent; patch of hairs on last abdominal sternite light-colored, not as long as in *frauenfeldi* and *africana*.

Male pupa.—Length, about 3-4 mm; exuviae with pebble-grained integumental thickening in region of cephalothorax and terminal abdominal shield; preapical abdominal segments transparent except for very narrow sclerotized lines along basal and lateral margins, segments I-VII shagreened, more heavily so in transverse subapical patches on each tergite and sternite. Cephalic region set off from thorax as an emarginate antero-ventral lobe; the antennal cases prominent, arising laterally as two horns projecting latero-posteriorly over the pronotal lobes, not markedly tapering and with blunt obliquely truncated apex; a long dorsal seta arises just mesad of the base of each antenna. Thorax arched antero-dorsally; a prominent antero-laterally projecting cylindrical respiratory organ (fig. 23) arising from each humeral angle; this organ very elongate, about six times as long as wide, not tapering but rounded apically, spiracle located less than its diameter from the apex, tracheal trunk cylindrical and about half the diameter of the lobe, with slight

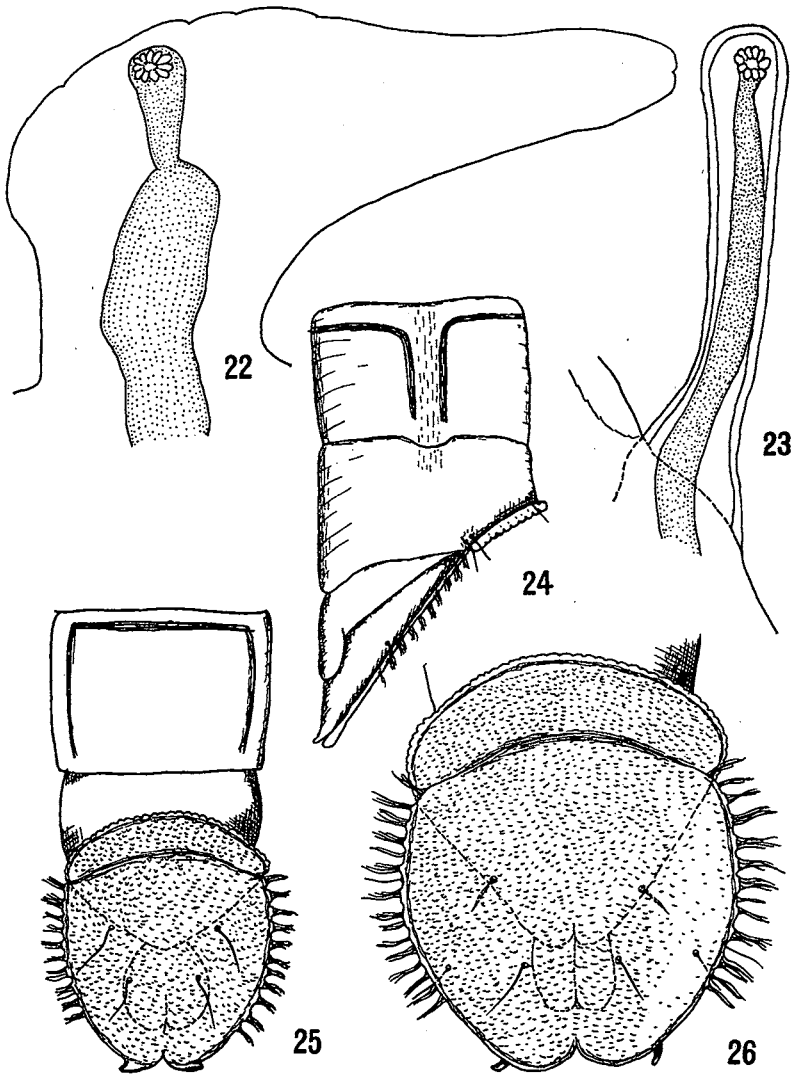


PLATE IV

Figures 22, 23. respiratory horn of pupa, dorsal view. 22. *frauenfeldi*. 23. *maritima*. Figures 24-26, terminal abdominal segments of pupa. 24. *maritima* (male), lateral view. 25. same, dorsal view. 26. *frauenfeldi*, (female) dorsal view.

(Note: All drawings made with aid of ocular grid to same scale; figures 1-23, high power, figures 24-26, low power of compound microscope.)

constriction about one-fifth way proximad of spiracle; a pair of long very fine hairs on each side of thorax mesad of respiratory organ, and three pairs of fine hairs near midline of dorsum just anterior to bases of wing-cases. Wing and leg cases project caudad; free from but closely appressed to lateral and ventral surface of body. Abdominal segments slightly wider than long, decreasing but very slightly in width progressively from I to VII, without evident hairs or bristles. Terminal segment obliquely truncate (figs. 24, 25), forming an oblique, dorso-posteriorly flattened emarginate elliptical shield. Face of this shield divided at upper fourth by a dorsally arched transverse suture; portion above this suture almost perpendicular to body axis, forming an angle with the posterior portion of shield; rim of anterior portion with heavily sclerotized denticles without hairs; rim of posterior portion of shield with denticles fused in groups of from one to six and bearing long amber hairs except at posterior extremity which is divided into two bare rounded lobes each with a strong apical ventrally-directed curved spike or hook. Face of the shield with two pairs of long hairs placed sublaterally in a trapezoid on the posterior sclerite. The trunk of the eighth segment anterior to the shield is not sclerotized but bears long dark hairs as follows: a subdorsal pair at rim of shield, two pairs on each side near ends of the transverse suture of the shield and a pair about half-way back near the rim of the posterior sclerite of shield. The male gonostyles are prominent as two large flattened ventral lobes of eighth segment appressed to the venter of the shield.

Holotype, female; *Allotype*, male, Hong Kong, China, November 18, 1933, L. G. Saunders (balsam slide mounts).

Paratypes, 10 males, 1 female, Hong Kong, China, November 18, 1933, L. G. Saunders (alcoholic material); 3 males, 3 females, Noumea, New Caledonia, July 5, 1940, F. X. Williams, "running on sea rocks" (pinned).

The types will be deposited in the U. S. National Museum. The Hong Kong paratypes are in the collections of Dr. L. G. Saunders, the Bernice P. Bishop Museum, The California Academy of Sciences, and of the author; the New Caledonia material is in the Hawaiian Sugar Planters' Association Experiment Station collection. The Hong Kong material also included two pupal exuviae, one of which will be deposited in the U. S. National Museum and the other will be retained by the author; Dr. Williams' collection also included one pupal exuvium from Noumea, "floating on back-water." Larval specimens were not included.

T. maritima can be readily separated from other species of the genus by the following characters: second antennal segment tapering to base, not constricted in middle; last antennal segment gradually tapering to tip; clypeus and vertex with sparse setae; wing veins M, Cu, and 1st A not setose; hairs on hind legs of male about twice the diameter of leg, male dististyles swollen basally, with sharp tip; female cerci slender, gradually tapering from base. The pupae of *maritima* are quite similar to those of *frauenfeldi* in the structure of the terminal shield, though the shield of *maritima* is more elongately elliptical; but the thoracic respiratory organs are quite different.

5. *Thalassomyia africana* Edwards.

Thalassomyia africana Edwards, Proc. Zool. Soc. Lond., 51:787, 1926 (Tanganyika, E. Africa; male; on or near sea-shore); B. P. Bishop Mus. Bull. 114:88, 1935 (Marquesas Is.; female described).

Adult.—Length of wing, 2 mm. General color dark brown; legs chocolate brown, thorax and abdomen almost blackish, palpi, wing bases, and halteres yellow. Antennae 7-segmented; basal segment a little more than twice the diameter of the distal segments, about two-thirds as long as broad; second segment about twice as long as broad, but slightly constricted in middle; segments three to six subspherical, seventh segment nearly three times as long as broad, tapering at distal third to a long nipple-like tip; first segment with dense long setae, distal segments each with an encircling row of long setae, those of second segment on distal portion and of seventh segment on proximal portion. Palpi long, about twice the length of the antennae, proximal two segments short and broad, distal two segments greatly narrowed and elongate; color yellowish, with scattered long dark bristles on proximal segments and a few small light setae on distal segments. Clypeus quite convex, densely clad with long dark setae. Vertex flattened, with the anterior margin greatly curved in a semi-ellipse above the bases of the antennae and between the eyes; with many long dark setae laterally, almost bare in middle.

Pronotal lobes narrowly separated at midline by about the width of first antennal segment, each with a line of 10-12 long black setae. Mesonotum large, roundly arched; humeral depressions rather prominent, curved; a slightly raised longitudinal area just anterior to scutellum; with rows of long black setae as follows: a median longitudinal row from anterior margin of mesonotum to scutellum (about 25 setae); two sub-dorsal longitudinal rows failing to reach both anterior margin and scutellum by distance equivalent to that between sub-dorsal and median rows (20 setae each); and an irregular linear patch zig-zagging along each lateral margin from wing base to humeral depression (15 setae). Scutellum very convex, about half again as wide as long (partially denuded, ? setae); post-scutellum slightly longer, narrower, and flatter than scutellum, bare.

Wings covered with microtrichiae, appearing smoky grey-brown; costa and radius infuscated with light brown; costa and radial veins densely set with rather fine setae (in some specimens these are quite short, but in one specimen with long hairs on the legs, the setae at the base of the costa are especially long), other veins bare; squama and posterior wing margin fringed. R_1 enters costa at about half the length of R_{4+5} , R_{2+3} absent; Cu forks much beyond the base of r-m (at the level of tip of r-m), the fork very narrow at the base; Cu_1 subequal to base of Cu, slightly curved, Cu_2 well curved.

Legs with hair short, less than diameter of tibia in females and in one male, in the second male the hair on the legs is quite long, about three times the diameter of a tibia. Empodia and pulvilli especially long.

Abdomen with bristles moderately long and dense, these not reduced on posterior segments. Male genitalia turned through 180°, small. Basistyles broad at base, tapering distally, dorso-mesal surface hollowed out, dorso-lateral margin greatly produced at base in a thin integumental fold bearing a prominent flat thumb-shaped sclerotized lobe (fig. 10) bare except for half a dozen minute preapical setae. Entire ventro-mesal margin of basistyle thickly set with sharp setae, some quite fine and others spine-like, internal surface about midway near mesal margin with a group of half a dozen short, stout spines. Dististyles (fig. 6) quite narrow, curved, not greatly enlarged near base, but gradually tapering to apex which is rather bluntly pointed and bears two long setae at extreme tip; a third rather strong sub-terminal seta; proximal portion with many fine setae and long hairs. Aedeagus projects

dorso-caudad between the bases of the basistyles, consisting of a short dorsal hyaline penis lobe with rounded apical lips, flanked by a pair of long crooked lamiform heavily sclerotized guard plates with proximal third swollen and distal two-thirds narrowed and arcuate. Anal lobe prominent, just anterior to base of aedeagus. Female cerci narrow at base and tapering to a very slender down-curved apex; female genital segments pubescent, patch of long brown hairs on last sternite.

Material examined.—2 males, 2 females, Vaituha, Eiao, Marquesas Islands, at light, October 2, 1929, A. M. Adamson, coll. (Pacific Entomological Survey); from Bernice P. Bishop Museum collection.

The two females and one male with short hair on the legs were determined as *africana* by Edwards, who reported (1935) that they were carefully compared with the type male from Dar-es-Salaam and no specific differences could be found. The male with long hair on the legs was determined as *pilipes* by Edwards, but it is believed that this determination was erroneous. The specimens agree in all respects except the long hair on the legs with the specimens of *africana*, and the male genitalia, which were carefully dissected and mounted on a slip by the writer, also closely agree with *africana*. All the Marquesas material is therefore considered to be one species.

The most useful characters of *T. africana* are: dististyles slender, with blunt tip bearing two setae at extreme apex; basal lobe of basistyle large and thumb-shaped and bare at tip; long, extremely slender female cerci; wing veins M, Cu, and 1st A bare of setae; last antennal segment rather tapering toward terminal nipple.

6. *Thalassomyia longipes* (Johnson).

Galapagomyia longipes Johnson, Zoologica, 5: 86, 1924 (Galapagos Is.; 1 male; 1 female); Edwards, Ins. of Samoa, pt. 6, fasc. 2: 61, 1928 (? [= *pilipes* Edwards]).

Thalassomyia longipes Edwards, B. P. Bishop Mus. Bull. 114: 87, 1935 (from *Galapagomyia*; ? [= *pilipes* Edwards]).

T. longipes and *pilipes* were considered as probably identical by Edwards, in which case *longipes* would have priority over the latter name; however in order to point out the doubtful status of this species, Johnson's original description of *Galapagomyia longipes* is quoted in full:

Galapagomyia longipes gen. et sp. nov.

Male: head yellowish, the prominent facial protuberance bearing long black hairs, the proboscis nearly as long as the face, palpi large, yellow with black hairs, antennae yellow, scape about three times the diameter of the first joint of the flagellum, the joints of the latter six in number, are rounded, and each bear three verticilli; the terminal joint, which is about double the length of the preceding joint, tapers to a point. Thorax brown, with three dorsal rows of hairs, pleura yellow, with a large brown central spot, scutellum

brown. Abdomen with both the dorsal and ventral segments brown, margined posteriorly with yellow, hypopygium comparatively small, in form similar to a *Diamesa*. Legs long, femora yellow, thickened at the basal half, tibiae brown, the front tibiae about one-fourth longer than the femora, the others but slightly longer; tarsi brown, the metatarsi about one-half the length of the tibiae, the other joints of the tarsi together not quite as long as the metatarsi, fourth joint less than one-half the length of the third; legs covered with fine black hairs, halteres yellow, wings brownish hyaline, the costa, first and second veins hairy. Length 4 mm.

"*Female*. Similar to the male but only 3 mm. in length. Ovipositor short. The eggs show distinctly through the thin distended sides of the abdomen.

"Two specimens in alcohol, Seymour Bay, Indefatigable, April 26th."

Edwards (1926) recognized *longipes* as a *Thalassomyia* soon after the description came to his attention. When describing *T. pilipes* from Samoa in 1928, he called attention to the possibility that his might be the same as Johnson's species. Then in 1935, when recording *pilipes* and *africana* from the Marquesas Islands, Edwards stated that he had succeeded in obtaining additional material from the Galapagos, collected by Miss Cheesman (though all specimens were damaged and lacked the abdomen) which agreed as far as he could tell with *pilipes*. In the present paper, it is shown (after examining genitalia of the male) that the specimen Edwards determined as *pilipes* from the Marquesas in reality represents an aberrant male of *africana* in which the hair on the legs is unusually long; this finding seriously hinders the use of the criterion of hairy legs with which Edwards likens *pilipes* and *longipes*. Moreover, Edwards states that *pilipes* is a dark species; from Johnson's description above, *longipes* seems to be lighter with a great deal of yellow coloration; this would suggest identity with *setosipennis* from Hawaii, but Johnson states that in *longipes* only the costa, first and second veins are hairy. Therefore it is deemed best to treat *longipes* as distinct from either *pilipes* or *setosipennis* until the types of *longipes* can be examined or fresh material obtained from the Galapagos. In an effort to locate Johnson's types of *Galapagomyia longipes*, inquiry was made of Dr. C. L. Michener of the American Museum of Natural History in New York, where it was thought that the material treated in "Zoologica" might be kept. As Dr. Michener could not locate the types there, he kindly referred the inquiry to Dr. J. Bequaert of the Harvard College Museum of Comparative Zoology in Cambridge, who replied that no specimen of *longipes* was in that Museum. Dr. Bequaert adds, "As Johnson's private collection of Diptera and all his types were acquired by this Museum, it would seem that Johnson did not retain the type of *T. longipes*." Appreciation is extended to Dr. Michener and Dr. Bequaert for their generous assistance in the search for the types.

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