

Studies of the Subtribe Tachyina
(Coleoptera: Carabidae: Bembidiini),
Part III: Systematics, Phylogeny,
and Zoogeography of the
Genus *Tachyta* Kirby

TERRY L. ERWIN

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Terry L. Erwin

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ABSTRACT

Erwin, Terry L. Studies of the Subtribe Tachyina (Coleoptera: Carabidae: Bembidiini), Part III: Systematics, Phylogeny, and Zoogeography of the Genus *Tachyta* Kirby. *Smithsonian Contributions to Zoology*, number 208, 68 pages, 175 figures, 2 tables, 1975.—The worldwide genus *Tachyta* is systematized. Two species, *Tachyta philipi* of New Guinea, and *Tachyta gilloglyi* of the Republic of South Viet Nam, are described as new. Seventeen of thirty-three previously described species are recognized as valid; one of these is polytypic having three subspecies. Of the sixteen synonyms, one is declared for the first time. A key to species, species groups, and subgenera is given for adults and pertinent character states are illustrated. All taxa are described or redescribed and partially illustrated with line drawings, halftone illustrations, or scanning electron micrographs. Larval stages of *Tachyta* and *Tachymenis* are keyed, illustrated, and compared; the larval stage of *Tachymenis* is illustrated and described for the first time. Locality data for each species are listed in an appendix and dot-maps show the range of each species. Evolutionary considerations, natural history, and behavior are discussed.

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Studies of the Subtribe Tachyina (Coleoptera: Carabidae: Bembidiini), Part III: Systematics, Phylogeny, and Zoogeography of the Genus *Tachyta* Kirby

Terry L. Erwin

Introduction

The purposes, goals, and general methods of this study were explained in Part I (Erwin, 1973). More specific methods and terminology were discussed in Part II (Erwin, 1974a). The present part deals with a small, yet worldwide, genus of medium-sized Tachyina that are associated with wood decay and, in small part, with forest foliage.

The species of *Tachyta* have never been collectively reviewed, although local faunal monographs have dealt with certain species or groups of species (Andrewes, 1925; Lindroth, 1963; and Darlington, 1962). Bruneau de Miré (1964) revised the African species as part of his studies on African Tachyina. Darlington (1962) and Lindroth (1945, 1963) briefly discussed ecology, Perris (1862) described the larval and pupal stages of *Tachyta nana nana* (Gyllenhal), and Gardner (1938) described the third instar larva of *T. umbrosa* (Motschulsky).

Between 1860 and 1933, Bates, Schaum, Casey, Chaudoir, and Alluaud regarded *Tachyta* as a separate genus; the "French school" similarly did so beginning with Jeannel (1941) and ending with

Bruneau de Miré (1964). Lindroth (1963) and most North American authors preferred to include *Tachyta* species in *Tachys* sensu lato. All of these authors were working on faunules of restricted nature; none had a world overview of the Tribe Tachyina, a criterion absolutely necessary before a balanced carabid classification can be set forth. It is my judgment, based on an analysis of the world Tachyina, that several genera need to be established or reestablished to more accurately reflect phylogenetic relationships within the subtribe (Erwin, 1974b) on a balance with other recently revised groups. These genera will be established not only by using external morphological character states, but also by using exclusive ecological ranges, larval characteristics, and geographical distribution. In addition, some fossil evidence is available (Erwin, 1971). Based on these criteria, I believe that *Tachyta* should be recognized as a separate genus.

Herein, I deal with the world fauna, describing or redescribing all 19 known species and placing them in a classification of subgenera and informal species groups based on synapomorphies. The larval stage of *Tachyta nana inornata* Casey is illustrated for the first time and compared with larvae of *T. umbrosus*, *T. nana nana*, and *Tachytenis* spp., the latter also previously undescribed.

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Species of both these genera are found under bark and in decaying wood; they are not closely related, but are complementary in distribution with a small North American-Middle American overlap involving only three species. Therefore, it is appro-

priate that the forms should be compared and discussed here. However, *Tachymenis* has over 100 undescribed species (Erwin, 1974b) which must be dealt with before a thorough discussion can be offered.

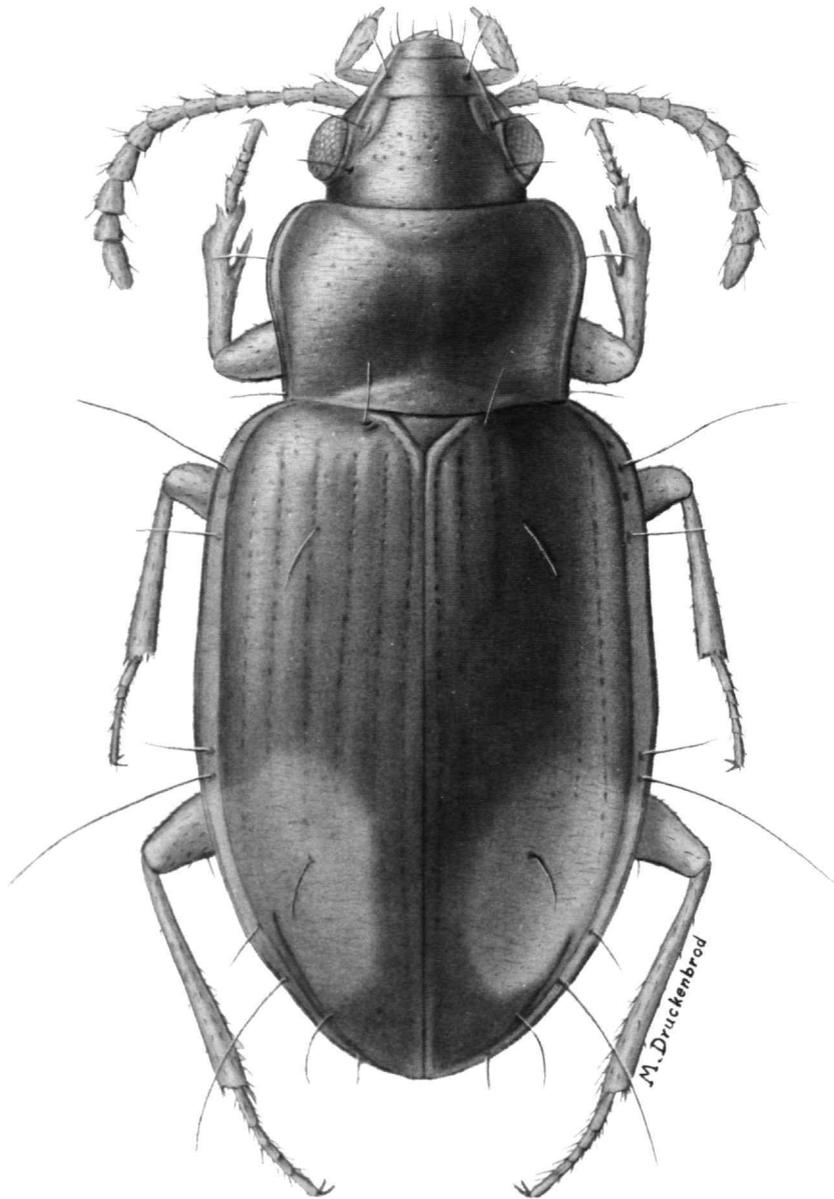


FIGURE 1.—Habitus of *T. hispaniolae* female, St. Marc, Haiti.

Information about occurrence of larvae and pupae can be inferred from the discovery of teneral adults. This information is given under each pertinent species description and then summarized and analyzed under "Natural History."

Andrewes (1925) recognized the similarities among the species of the *coracina* and *nana* groups as here defined and included all of these species in his single "*nanus* group" of *Tachys*. Based on a reevaluation of character states mentioned by Andrewes and new evidence, I support Andrewes' interpretation of relationships. However, in the interest of a balanced classification in the Tachyina, Bembidiini, and Carabidae as a whole, I have recognized two subgenera, *Paratachyta* with one species group, and *Tachyta* sensu stricto with six species groups. These subgenera and species groups are based on morphological characteristics (synapomorphies), ecological ranges, and geographic distributions as illustrated in Table 1 and Figure 175.

Since taxa at various levels are arbitrarily assigned to categorical levels, I have chosen to judge morphological and ecological divergence and "gaps" between taxa, using the same criteria as some other recent authors (Ball, 1959, 1966, 1970; Ball and Erwin, 1969; Ball and Nègre, 1972; Darlington, 1962, 1968; Erwin, 1970; Lindroth, 1969; and Whitehead, 1972, 1973). It is incumbent upon Caraboid systematists to arrive at an overall balanced classification so that zoogeographical and biological comparisons can be made at equal taxonomic levels (Erwin, 1970:198); therefore, similar groupings of taxa should be ranked similarly at equal categorical levels. Balanced classifications can be obtained only by workers overviewing the world fauna of any particular major group. When regional studies are done, the practice followed by Lindroth (1961-69) of using broad generic concepts is excellent. No new names are introduced nor are groups split beyond manageable levels. Yet, the included information content is easily extracted, especially when informal species groups are recognized. Based on these thoughts, I have come to use two self-imposed rules in the "art" of taxonomic classification: (1) Classify or reclassify only after acquiring a world knowledge of a tribe or larger taxon; (2) remain conservative when dealing in faunal studies or minor revisions by

using established or broad generic concepts to handle and impart information.

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METHODS.—This study is the result of examination of 2464 specimens of *Tachyta* and several thousand specimens of other Tachyina. Members of *Tachyta* species are easily and commonly collected because of their under-bark habitat and attraction to lights. I hope this systematic contribution will stimulate natural history studies of these forest predators; the fruits of such studies should provide much useful information relevant to the study of forest wood decay.

The methods used in this study are, for the most part, the same as described in Part I and Part II (Erwin, 1973, 1974a). Note that the short line accompanying the habitus and body profile illustrations equals 1.0 mm, and the line accompanying the genitalia illustrations equals 0.20 mm. The magnifications of electron scanning micrographs are given in the legends. On the distribution maps, a circled star represents a locality I could not find

precisely or a locality given on a label simply as county or state without specific reference, unless otherwise specified. All type-specimens were seen unless otherwise noted.

The acronyms given under "Acknowledgments" indicate museums from which specimens were borrowed or type depositories. Locality records are listed in an appendix in the following sequence: country, state, province, or other political subdivision, exact locality, month of collection (museum acronym).

Larvae of *Tachyta* and *Tachymenis* spp. were dried by the critical point method (W. D. Hope, pers. comm.) and then glued to minutin pins, which were previously glued to rounded rivet heads. The rivets fit the mounting slot in the scanning electron microscope. Adult beetles, after cleaning, in an ultrasonic device with glass-distilled water and detergent, were mounted in the same way with the pin inserted between the apical abdominal segments. The photomicrographs were made with a Kent-Cambridge Stereoscan, Mark IIA.

TERMINOLOGY.—Terms and elytral setal code designations are explained in Part II (Erwin, 1974a). All other terms are of standard usage.

Checklist of *Tachyta* species

Paratachyta, new subgenus

The *coracina* group

1. *T. coracina* (Putzeys), 1875:739
2. *T. acuticollis* (Putzeys), 1875:740
3. *T. philipi*, new species
4. *T. wallacei* (Andrewes), 1925:490

Subgenus *Tachyta* sensu stricto

The *umbrosa* group

5. *T. umbrosa* (Motschulsky), 1851:507
6. *T. gilloglyi*, new species
7. *T. monostigma* (Andrewes), 1925:163
8. *T. brunnipennis* (Macleay), 1873:118

The *malayica* group

9. *T. malayica* (Andrewes), 1925:161
10. *T. barda* (Darlington), 1962:478

The *picina* group

11. *T. picina* (Boheman), 1848:229
12. *T. subvirens* Chaudoir, 1878:193
13. *T. guineensis* Alluaud, 1933:7
14. *T. hispaniolae* (Darlington), 1934:77

The *pseudovirens* group

15. *T. pseudovirens* de Miré, 1964:96

The *falli* group

16. *T. falli* (Hayward), 1900:199

17. *T. angulata* Casey, 1918:216
 The *nana* group
 18. *T. nana* (Gyllenhal), 1810:30
 18a. *T. nana nana* (Gyllenhal), 1810:30
 18b. *T. nana inornata* (Say), 1823:87
 18c. *T. nana kirbyi* Casey, 1918:216
 19. *T. parvicornis* Notman, 1922:100

Genus *Tachyta* Kirby

Tachyta Kirby, 1837:56.
Tachys, of authors.
Tachymenis, of authors.

TYPE-SPECIES.—*Tachyta picipes* Kirby (1837:56), by monotypy; *T. picipes* is a junior synonym of *T. nana inornata* (Say).

DIAGNOSIS.—The combination of form and location of the elytral recurrent groove, elytral chaetotaxy, apically notched anterior tibia, denticulate claws, and nonfoveate mentum are distinctive in the subtribe.

DESCRIPTION.—*Form* (Figure 1): Broad and depressed or subconvex. Head short and broad with prominent eyes.

Color: Rufous to black, members of some species with elytral spotting; appendages testaceous to piceous.

Head: Mentum (Figure 23) with acute tooth on anterior margin, nonfoveate; antenna (Figure 151) with pubescence on apical two-thirds of article 4 and all of articles 5–11, articles 2 and 3 plurisetose; head with 2 supraorbital setae per eye; eyes and frons sparsely microsetiferous; ligula slightly bilobed, bisetose at middle (Figure 16).

Prothorax: Prosternum plurisetose; coxal cavities biperforate-separate-closed; tibia (Figure 48) deeply notched laterally at apex; claws denticulate (Figure 131); pronotum sulcate laterally or not, always with two pairs of lateral setae and with deeply impressed basal transverse impression.

Mesothorax: Elytron with marginal explanation finely setulose or not, recurrent groove (Figures 14, 60, 105) elongate, parallel and close to side margin with apex slightly curved medially, disc with 1 to 8 interneurs, interneur 8 (Figure 60) entire or not, plica present; chaetotaxy various; middle coxae conjunct-confluent.

Abdomen: Sterna 3–5 each with one pair of ambulatory setae, often with short sparse microsetae; sternum VI (Figure 106) of female with four setigerous pores arrayed in parallel with apical margin of sternum, males with two such pores.

Secondary sexual characteristics: Male with basal two anterior tarsal articles (Figures 24, 116, 117) dilated, medially spiniform, ventrally with scale-shaped setae arrayed in single row diagonally across spiniform process; male genitalic parameres slender apically, each with 3 to 5 setae, endophallus complex and variously pigmented; female with stylus (Figures 13, 107) of ovipositor triangular and bladellike, lateroventral edge with two large spines, laterodorsal edge with single such spine, medial edge near apex with long seta.

Size: Length, 1.80 to 3.28 mm; width, 0.84 to 1.44 mm.

DISTRIBUTION.—Species of this tachyine group are found in boreal, temperate, and tropical situations on all major continents and on one Caribbean island, several Indoaustralian islands, and the Solomons. In the New World, species occur only north of the equator from Nova Scotia and Alaska south to Belize and Guatemala and on the Greater Antillian island of Hispaniola. In the Old World, one species occurs across the Palearctic, several are in the African tropics, one is in South Africa, several species are found in the Oriental Region, and one in northern Australia. One tropical African species was introduced into Madagascar probably by man.

Key to the Subgenera and Species

1. Dorsal surface very shiny and smooth, microsculpture absent except on labrum..... (subgenus *Paratachyta*) 2
- Dorsal surface shiny or dull, at least frons and usually entire dorsal surface with reticulate microsculpture (subgenus *Tachyta*) 5
2. (1) Pronotum carinate laterally, carina extended from near hind angle anteriorly to at least middle and parallel to broadly reflexed side margin..... 3
- Pronotum without lateral carina; side margin beaded and narrowly reflexed..... 1. *T. coracina* (Putzeys)

3. (2) Elytron with entire and striate sutural interneur, interneurs 2 to 4 coarsely and unevenly punctate, and disc without white spots.....4. *T. wallacei* (Andrewes)
Elytron with sutural interneur striate posterior to middle, absent basally, disc white-spotted4
4. (3) Elytron with basal and apical white spots.....2. *T. acuticollis* (Putzeys)
Elytron with basal white spot only.....3. *T. philipi*, new species
5. (1) Specimens from the Nearctic, Neotropical, or Palearctic Region6
Specimens from the Ethiopian, Oriental, or Australian Region12
6. (5) Elytra each with orange spot in apical half; elytral seta Ed6 in position b (in fourth interneur); interneurs coarsely punctate, punctures separate or randomly confluent14. *T. hispaniolae* (Darlington)
Elytra concolorous, without spots; elytral seta Ed6 in position a (in third interneur); interneurs striate, punctures absent7
7. (6) Head between eyes flat or slightly depressed; pronotum with side margins moderately to strongly convergent basally, sides slightly sinuate in front of hind angles; elytra elongate, narrow, and depressed.....17. *T. angulata* Casey
Head between eyes slightly convex; pronotum with side margins not strongly convergent basally, sides barely or not at all sinuate in front of hind angles; elytra broad and depressed or narrow and subconvex, never elongate8
8. (7) Pronotum with well-developed carina near hind angle; elytra broad and depressed.....9
Pronotum without carina or with rudimentary carina near hind angle; elytra narrow and subconvex10
9. (8) Elytral surface transversely wrinkled, shiny; interneurs 1 to 6 striate and well impressed (6 less so); pronotum with laterobasal carina elongate and sharp; head narrow and without dense punctulation between eyes16. *T. falli* (Hayward)
Elytral surface not transversely wrinkled, dull; interneurs 1 to 4 striate and well impressed (4 less so); pronotum with laterobasal carina shorter and more rounded; head broad and with dense punctulation on vertex between eyes18. *T. nana kirbyi* Casey
10. (8) Elytron with interneur 8 sulcate and well impressed throughout its length.....19. *T. parvicornis* Notman
Elytron with interneur 8 sulcate in apical half and basal fourth, effaced or nearly so at middle11
11. (10) Pronotum with rudimentary carina laterobasally; range Palearctic.....18a. *T. nana nana* (Gyllenhal)
Pronotum without carina or rudiments of one laterobasally; range Nearctic and Neotropical18b. *T. nana inornata* (Say)
12. (5) Specimens from the Ethiopian Region13
Specimens from the Oriental or Australian Region16
13. (12) Color piceous to black, appendages darkly infuscated14
Color rufopiceous, appendages testaceous11. *T. picina* (Boheman)
14. (13) Pronotum with median longitudinal impression sulcate, deeply impressed; laterobasal carina elongate and extended anteriorly beyond middle15
Pronotum with median longitudinal impression finely engraved, shallow; laterobasal carina short, extended only one-fourth the distance to anterior angle.....15. *T. pseudovirens* de Miré
15. (14) Head, pronotum, and elytra coarsely microsculptured and rugosely punctured.....13. *T. quineensis* Alluaud
Head, pronotum, and elytra finely microsculptured and sparsely and finely punctulate12. *T. subvirens* Chaudoir
16. (12) Dorsal surface coarsely punctate and granulate, dull due to deeply engraved isodiametric reticulate microsculpture8. *T. brunnipennis* (Macleay)
Dorsal surface smooth or very finely punctulate and shiny, microsculpture of finely engraved transverse meshes17
17. (16) Elytron with seta Ed6 in position a (in interneur 3).....18
Elytron with seta Ed6 in position b (in interneur 4).....19
18. (17) Elytron bicolored, base rufopiceous, apex pale ferrugineous; pronotum without microsculpture on disc9. *T. malayica* (Andrewes)

- Elytron unicolorous, flavous; pronotum with lightly impressed transverse mesh microsculpture10. *T. barda* (Darlington)
19. (17) Elytron bicolored, base rufous, apex pale ferruginous; pronotum with nearly effaced microsculpture7. *T. monostigma* (Andrewes)
- Elytron unicolorous, flavopiceous to piceous; pronotum with deeply engraved reticulate microsculpture and finely impressed scattered punctulae20
20. (19) Elytron with seta Ed3 located anterior of seta Eo4 (Figure 47); pronotum with lateral margins more abruptly sinuate at basal third, sides more or less straight and parallel before base (Figure 46)6. *T. gilloglyi*, new species
- Elytron with seta Ed3 located posterior of seta Eo4 (Figure 39); pronotum with lateral margins shallowly sinuate at basal third, sides more or less converging to base (Figure 38)5. *T. umbrosa* (Motschulsky)

Paratachyta, new subgenus

TYPE-SPECIES.—*Tachys coracinus* Putzeys, 1875: 739, here designated.

DIAGNOSIS.—Subconvex, dorsal microreticulation totally effaced or restricted to scutellum and/or labrum, elytral interneurs 1 and 8 present, others absent or very feebly impressed, and dorsal setae thick.

DESCRIPTION.—*Form* (Figures 2, 3, 4, 5): Broad, short, and subconvex; head very short and wide with large, prominent eyes.

Color: Black to rufous, appendages infuscated or testaceous, some species with white spots on elytra.

Head (Figures 10, 17, 20, 26): Short and broad, eyes large and hemispherical; frontal furrows well developed.

Prothorax (Figures 11, 18, 21, 27): Pronotum with or without deeply sulcate lateral margins.

Mesothorax: Elytral interneurs not or feebly impressed, disc smooth.

Abdomen: As described for genus.

Secondary sexual characteristics: As described for genus.

Size: Length, 1.80 to 2.56 mm; width, 0.84 to 1.12 mm.

DISTRIBUTION.—Members of this subgenus occur in both the Oriental and Australian Regions, from the Philippines west to eastern India and Burma and south to New Guinea.

The *coracina* group

The members of the *coracina* group are characterized by their lack of dorsal microreticulation, reduction or lack of impressed elytral interneurs, and similarity in form of the male endophallus.

Besides the characteristics above, members of two species have highly contrastive white spots on the dark elytra, and another has members with suggested spotting. The morphologically least derived species of the group has concolorous members.

Members of three species occur under bark or on logs in forests. The most morphologically derived species has members found in foliage possibly running on leaves; this is the only *Tachyta* which has apparently left the woody parts of trees.

The four species representing this group have a combined range that extends from eastern India and Burma east to the Philippines and south to New Guinea.

1. *Tachyta coracina* (Putzeys), new combination

FIGURES 2, 6, 10-15

Tachys coracinus Putzeys, 1875:739 [types in GCM and IRSN, not seen by me; type-locality: Sarawak, Borneo].—Andrewes, 1925:165.

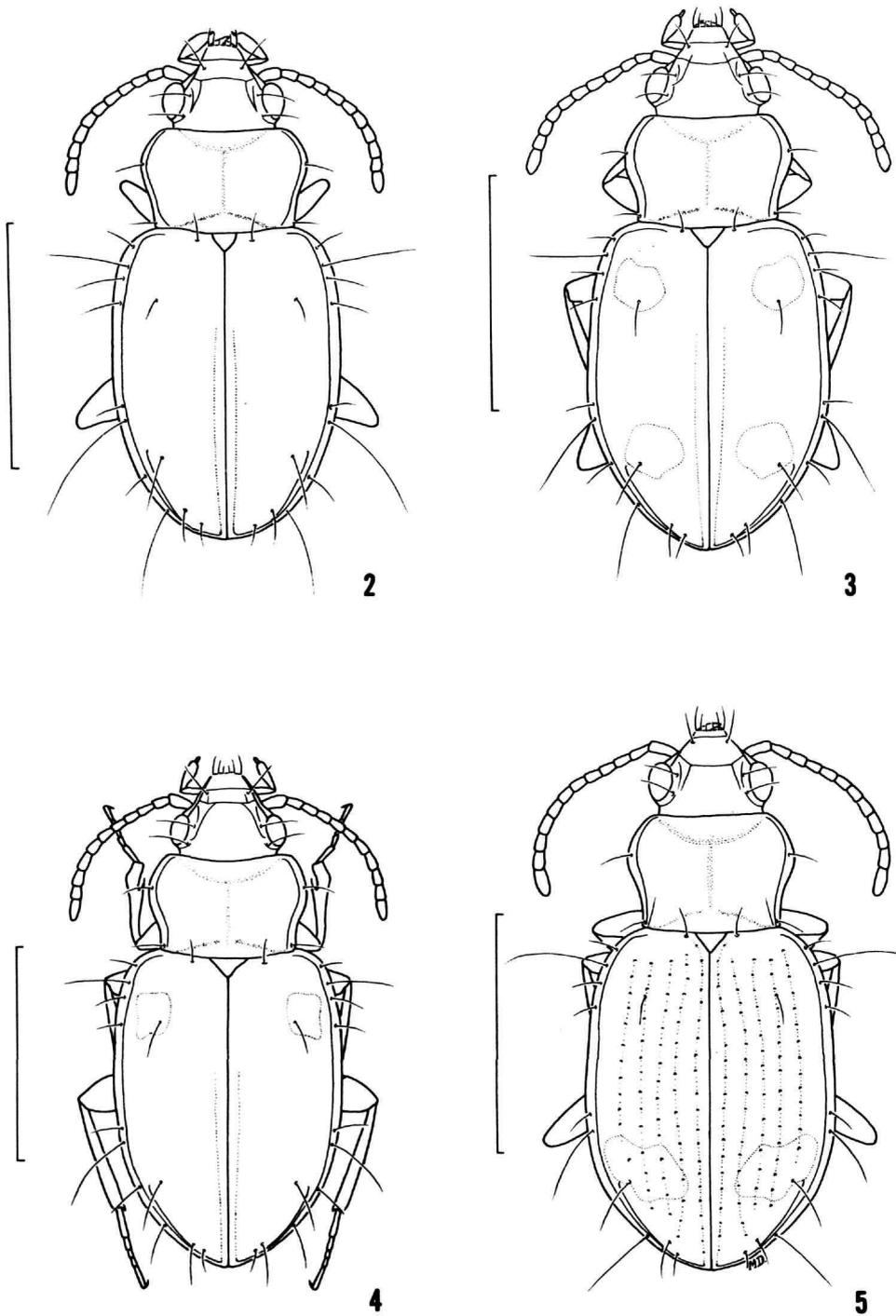
Tachys remotiporis Bates, 1892:290 [types in BMNH; type-locality: Kawkaeet and Meetan, Tenasserim, (Burma)].—Andrewes, 1925:165.

DIAGNOSIS.—The nonreflexed pronotal lateral margins, concolorous dorsal surface, and lack of microsculpture are distinctive in the genus.

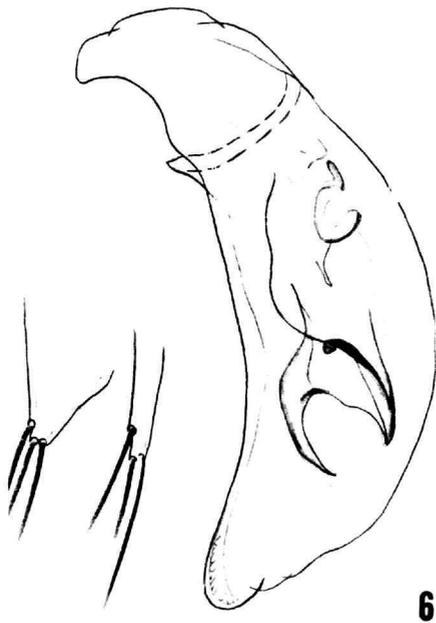
DESCRIPTION.—*Form* (Figure 2): Short and robust, dorsum convex. Pronotum transversely cordiform; elytra parallel-sided to apical third, then acutely convergent.

Color: Shining piceous dorsally, shiny rufous or rufopiceous ventrally. Appendages testaceous, except infuscated femora.

Head (Figure 10): Broad and short; frontal furrows moderately impressed and extended onto



FIGURES 2-5.—Dorsal outline with details of *Tachyta* species: 2, *T. coracina* male, Sitio Taglawig, Mindanao, Philippines; 3, *T. acuticollis* female, Joangeng, New Guinea; 4, *T. philipi* female, Okapa, New Guinea; 5, *T. wallacei* male, vicinity of Hollandia, New Guinea.



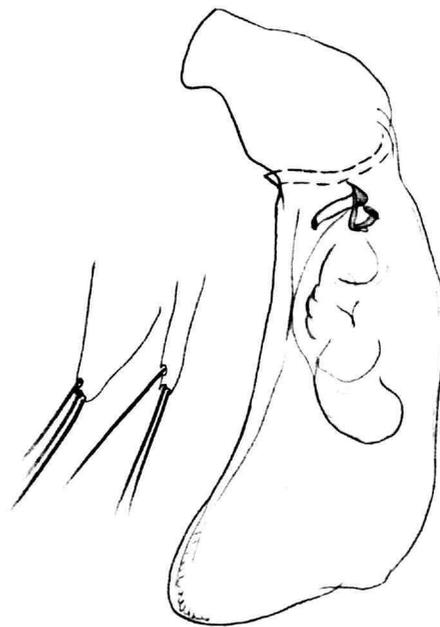
6



7



8



9

FIGURES 6-9.—Male genitalia, left lateral aspect and apices of parameres: 6, *T. coracina*, Bacungan, Palawan, Philippines; 7, *T. acuticollis*, Morotai Island, Indonesia; 8, *T. philipi*, Star Mountains, New Guinea; 9, *T. wallacei*, Dobodura, New Guinea.

clypeus, each delimited laterally by prominent carina and convoluted depression adjacent to eye; eyes large and very prominent; mouthparts as in Figure 16.

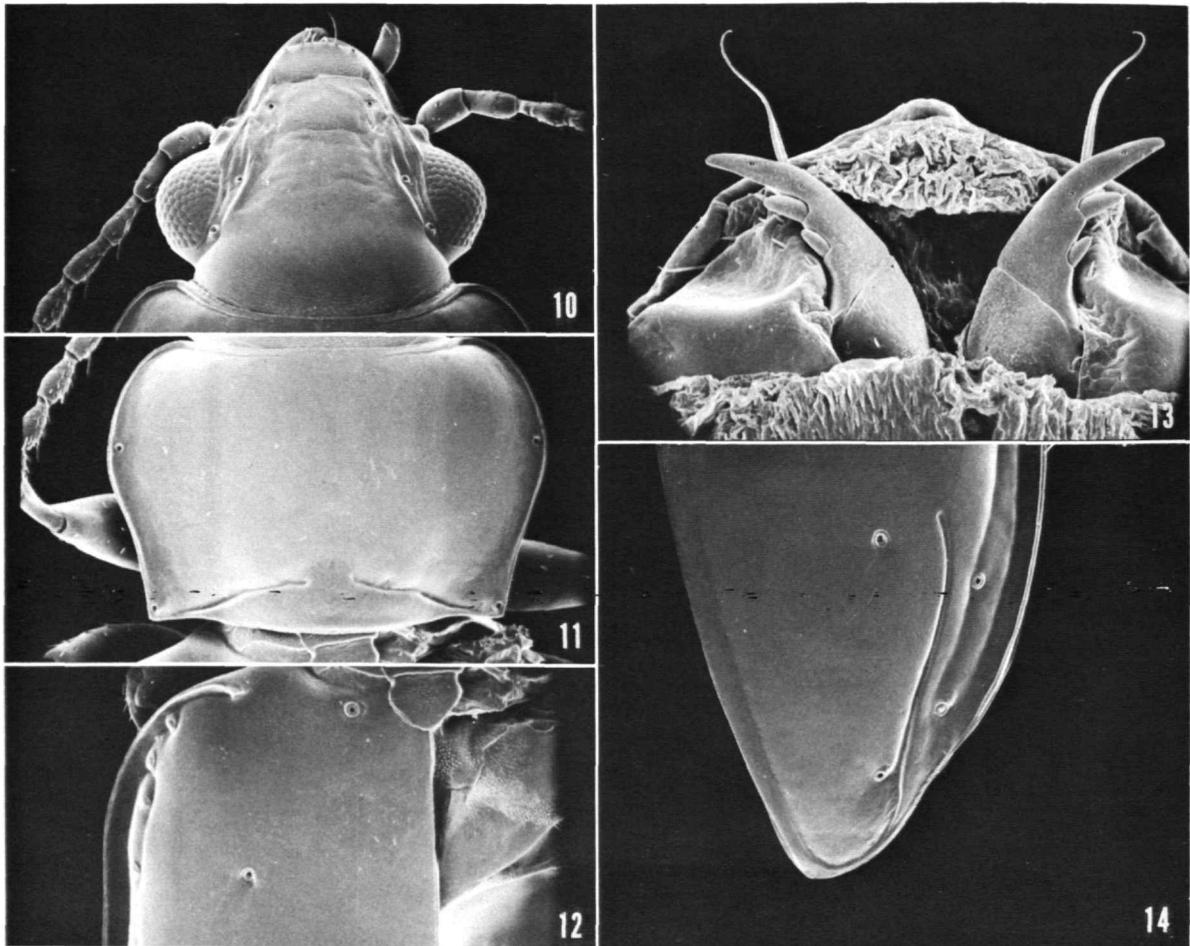
Pronotum (Figure 11): Broadly transverse, sides slightly sinuate basally, hind angles slightly obtuse; basal transverse impression deeply engraved and broadly interrupted at middle; disc convex to marginal bead, sides not reflexed.

Elytra (Figures 12, 14): Disc smooth with no trace of interneurs except 1, which is striate behind middle, and 8, which is slightly sulcate and

entire; sides broadly reflexed; humerus broadly rounded to level of seta Ed3b; recurrent groove sulcate, deeply engraved, and parallel to side margin to level of Ed6b; lateral edge nonsetulose.

Microsculpture (Figures 10, 12): Generally absent. Traces present on labrum, occiput, and scutellum.

Genitalia (Figures 6, 13): Male endophallus with two apical acute structures and a large basal C-shaped sclerite. Female stylus with two ventral spines and one dorsal spine on an arcuate and acute blade; blade with subterminal seta.



FIGURES 10-14.—*T. coracina* male, dorsal aspect, Mt. McKinley, Mindanao, Philippines: 10, head $\times 185$; 11, pronotum $\times 92$; 12, left elytral base and humerus, $\times 95$. Female, Sitio Taglawig, Mindanao, Philippines: 13, styli of ovipositor, ventral aspect $\times 370$; 14, left elytral apex with recurrent groove $\times 104$.

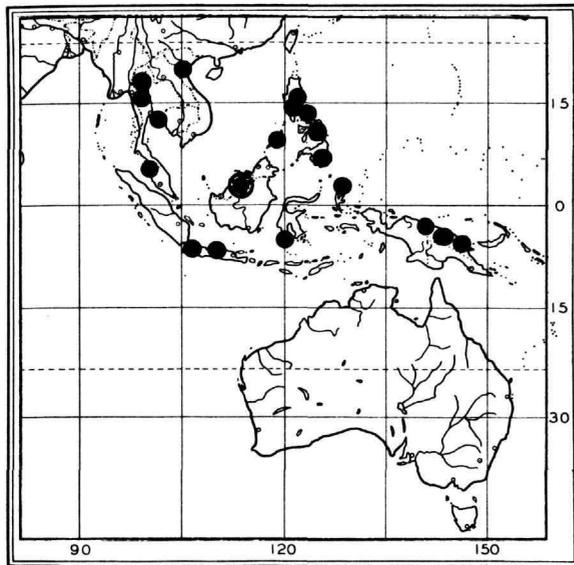


FIGURE 15.—Distribution map of *T. coracina*.

Size: Length, 1.90 to 2.56 mm; width, 0.86 to 1.12 mm, 8 specimens measured.

NATURAL HISTORY.—Numerous records indicate that these beetles live under or on the bark of logs. Specimens from Palawan (FMNH) are labeled “second growth forest” and others “original dipterocarp forest.” I have seen specimens collected in January, March, May through September, November; no teneral specimens seen. Altitudinally, these beetles are found between sea level and 1000 m.

DISTRIBUTION (Figure 15).—The range of this species extends from Assam and Burma east to the Philippines and south to New Guinea. This statement is based in part on Andrewes (1925:166), who gives the following localities: “Pegu, Tenasserim, Burma, Assam, Siam, Indo-China, Singapore, Malay Peninsula, and most of the large Malay Islands.”

NOTES.—Both Andrewes (1925) and Darlington (1962) indicated that a lectotype need be designated for *T. coracina*. Cotypes of *T. remotiporis* Bates are in BMNH. I have studied these and agree with Andrewes that the two forms are conspecific, if other specimens I studied labeled “*T. coracinus*, comp. with types, H. E. Andrewes” were accurately compared.

2. *Tachyta acuticollis* (Putzeys), new combination

FIGURES 3, 7, 16–19, 29

Tachyta acuticollis Putzeys, 1875:740 [holotype, sex unknown, in GCM, not seen by me; type-locality: Wokan, Aru Islands].—Andrewes, 1925:166.

DIAGNOSIS.—The reflexed pronotal margins, four spotted elytra, and lack of microsculpture are distinctive in the genus.

DESCRIPTION.—*Form* (Figure 3): Short and robust, dorsum convex. Pronotum quadrately cordiform; elytra parallel-sided to apical third then convergently rounded, generally shorter, and broader than members of *T. coracina*.

Color: Shiny piceous dorsally, more rufous ventrally. Each elytron with one basal and one apical white spot. Appendages testaceous, except femora infuscated.

Head (Figure 17): Slightly broader and shorter than in *T. coracina* members, with more deeply impressed and abruptly convergent frontal furrows; eyes large and prominent; mouthparts (Figure 16).

Pronotum (Figure 18): Quadrately cordiform, sides slightly sinuate basally, hind angles acute; basal transverse impression deeply engraved, sinuate, and broadly interrupted at middle; disc highly convex to lateral ridge, sides broadly reflexed much as in members of the New World *Tachymenis*.

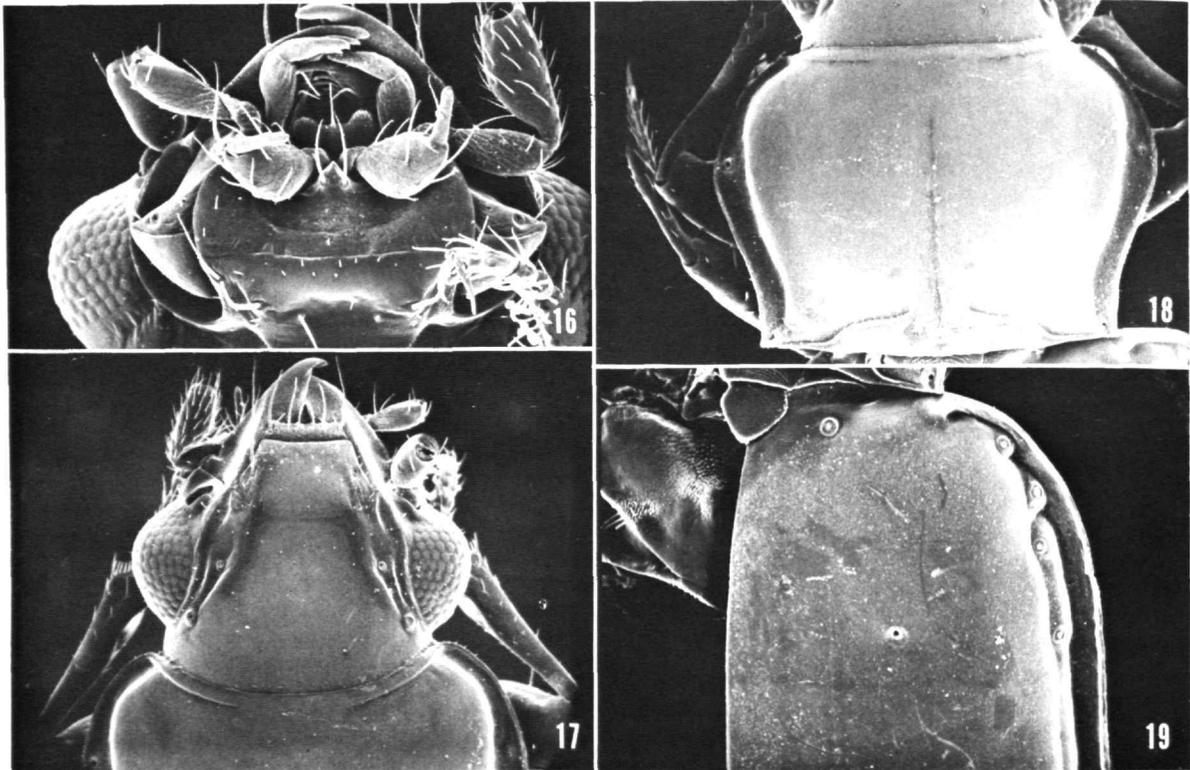
Elytra (Figure 19): As in *T. coracina* members.

Microsculpture: Absent from dorsal surface, except labrum.

Genitalia (Figure 7): Median lobe shorter and less bent ventrad than in *T. coracina* males; two apical structures more rounded and C-shaped sclerite less developed. Female stylus as in Figure 13.

Size: Length, 1.80 to 2.30 mm; width, 0.84 to 1.08 mm, 8 specimens measured.

NATURAL HISTORY.—According to Darlington (1962), “This species probably occurs at low altitudes throughout New Guinea, on the bark of fallen trees and logs in rainforest. . . .” I have seen specimens collected in January, March, April, May, July, August, September, October, and December; some of those collected in March to July and in August were teneral. No specimen has been recorded above 500 m elevation.



FIGURES 16-19.—*T. acuticollis* male, Dobodura, New Guinea: 16, mouthparts, ventral aspect $\times 185$; 17, head $\times 118$; 18, pronotum $\times 118$; 19, right elytral base and humerus $\times 118$.

DISTRIBUTION (Figure 29).—The range of this species extends from the Philippines south to New Guinea and Aru Island, east to New Ireland, and west to the Moluccas (in part from Darlington, 1962). As Darlington (1962) points out, this species is complementary in distribution to *T. coracina* although some overlap occurs.

NOTES.—Darlington (1971) gives additional localities for "*T. acuticollis*" and notes that all of these specimens have only basal elytral spots. Male genital studies show that the two-spotted forms are not conspecific with the four-spotted forms, and I refer the reader to *T. philipi*, which follows.

3. *Tachyta philipi*, new species

FIGURES 4, 8, 20-24, 29

TYPE-LOCALITY.—Sibil Valley, Star Mountains, Irian (West New Guinea), 1245 m.

TYPE-SPECIMENS.—The holotype male and allotype are in MCZ. Both were collected by L. W. Quate in 1961. Four paratypes: MCZ, 1; USNM, 3. Two additional paratypes from Okapa are listed in the appendix.

DIAGNOSIS.—Very similar to members of *T. acuticollis* with the exception of having only basal elytral spots. In addition, the relative size ratio between prothorax and elytra is different; *T. philipi* members have much smaller elytra and a larger prothorax.

DESCRIPTION.—*Form* (Figure 4): Short and robust, dorsum convex. Pronotum transversely cordiform; elytra parallel-sided to apical third then acutely convergent to apex, shorter and narrower than in members of *T. acuticollis*.

Color: Shiny piceous dorsally, more rufous ventrally. Each elytron with one basal white spot. Appendages testaceous, except infuscated femora.

Head (Figure 20): As in members of *T. acuti-*

collis, except frontal furrows more deeply engraved; mouthparts (Figure 23).

Pronotum (Figure 21): Transversely cordiform, sides slightly sinuate basally, hind angles acute; basal transverse impression deeply engraved, not as sinuate as in members of *T. acuticollis*, and broadly interrupted at middle; disc and lateral reflexion as in members of *T. acuticollis*.

Elytra (Figure 22): As in *T. coracina* members.

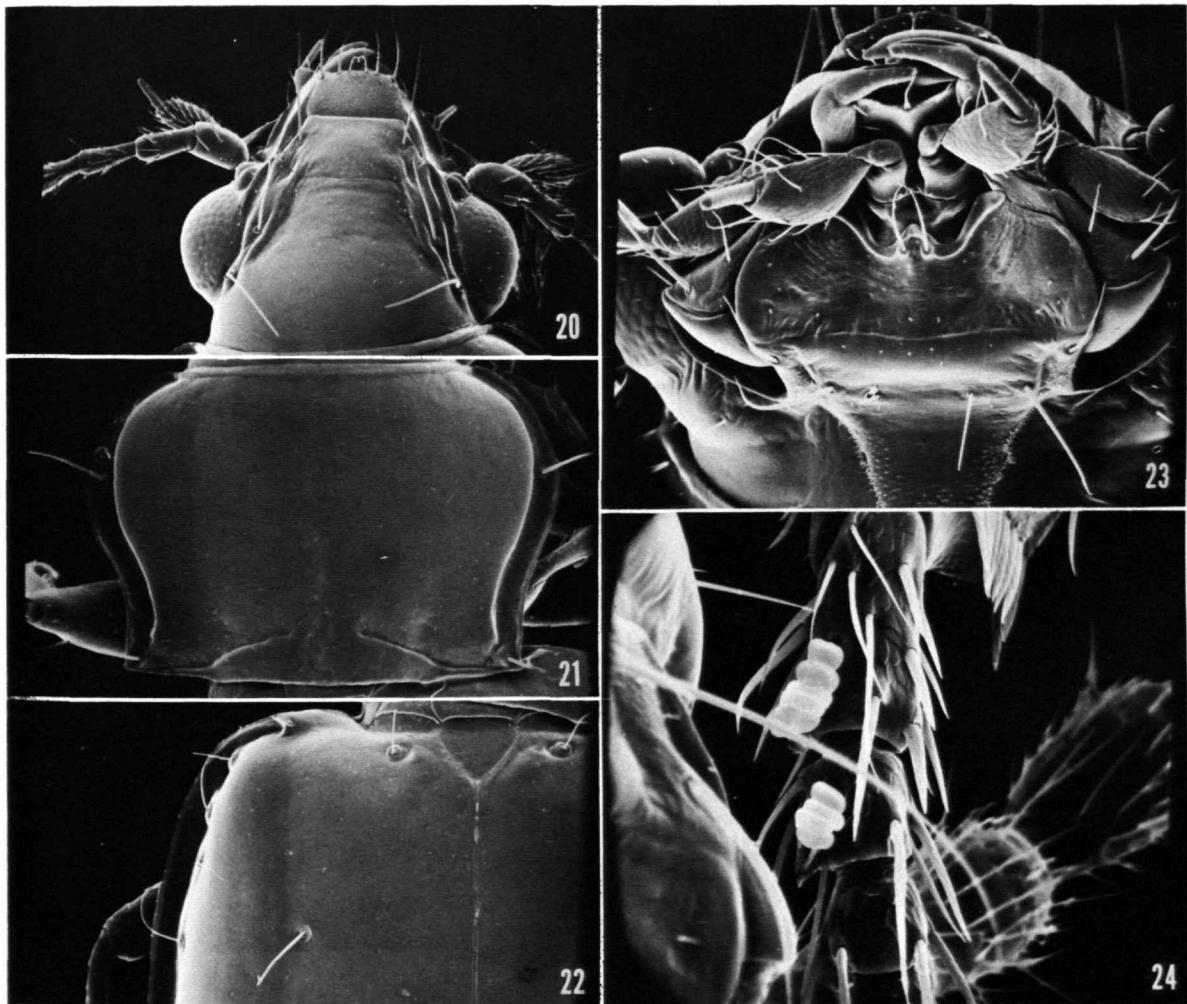
Microsculpture: Absent from dorsal surface, except labrum.

Genitalia (Figure 8): Median lobe slightly arcu-

ate, not bent as described for the two previous species; apical structure of endophallus broadly rounded, no trace of spinelike structures and C-shaped sclerite small. Female stylus as in Figure 13.

Size: Length, 2.18 to 2.28 mm; width, 0.98 to 1.04 mm, 2 specimens measured.

NATURAL HISTORY.—It seems likely that the habits of this species are the same as the preceding, but I have seen no label data indicating habitat or ecology. The few specimens available were collected in August, October, and November; two



FIGURES 20-24.—*T. philipi* male, Okapa, New Guinea: 20, head $\times 92$; 21, pronotum $\times 92$; 22, left elytral base and humerus $\times 92$; 23, mouthparts $\times 185$; 24, basal three articles of anterior tarsus, ventral aspect $\times 462$.

October–November specimens were teneral. Those specimens taken in Sibil Valley were at an elevation of 1245 m. Since no specimens of *T. acuticollis* were collected above 500 m it is possible these very similar species are altitudinal complements, as well as sister species.

DISTRIBUTION (Figure 29).—Presently, *T. philipi* is known only from the two localities listed in the appendix. These are listed by Darlington (1971) for "*T. acuticollis*."

ETYMOLOGY.—The genitive patronym, *philipi*, honors my friend and mentor, Philip J. Darlington, Jr., who has done so much to further our knowledge of the New Guinea Carabidae.

4. *Tachyta wallacei* (Andrewes), new combination

FIGURES 5, 9, 25–29

Tachys wallacei Andrewes, 1925:164 [holotype, female, in BMNH; type-locality: New Guinea].

DIAGNOSIS.—The reflexed pronotal margins, lack

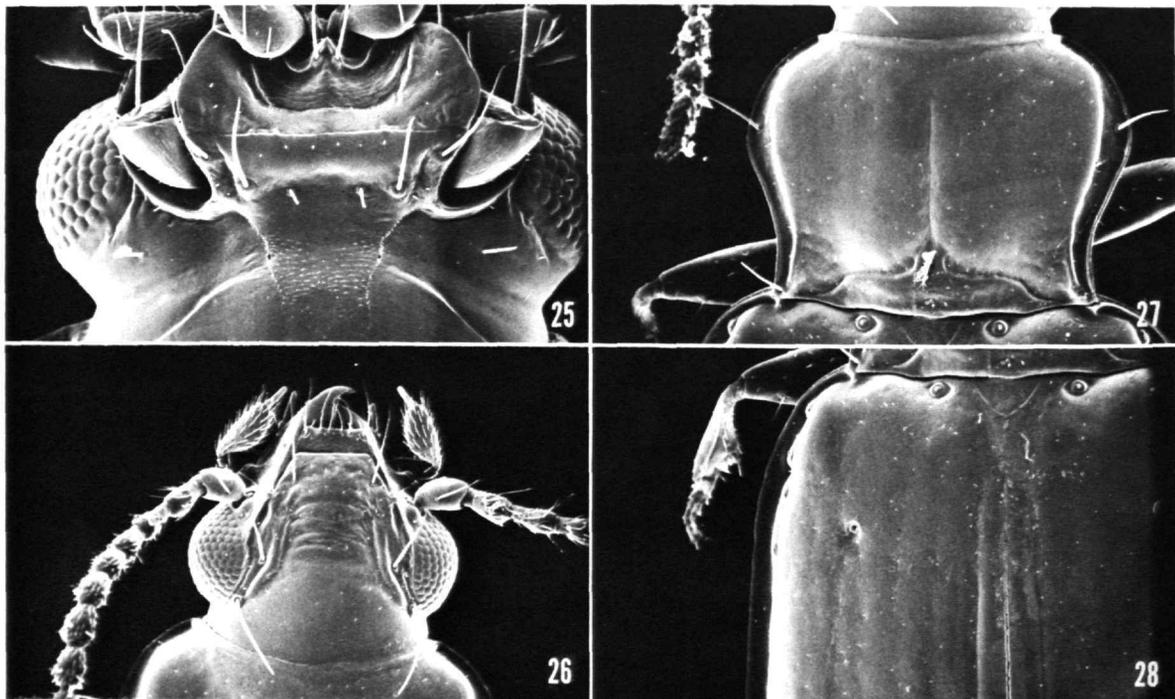
of microsculpture, and indications of striate-punctate elytral interneurs are distinctive in the genus.

DESCRIPTION.—*Form* (Figure 5): Short, robust, and highly convex. Pronotum quadrately cordiform; elytra inflated especially at apical third where widest, sides arcuate, narrowly rounded at apex.

Color: Shiny rufopiceous dorsally, rufous or rufotestaceous ventrally. With or without vague spots humeral and at apical third of elytron. Appendages testaceous.

Head (Figure 26): Smaller and narrower than the three preceding species, with more deeply engraved frontal furrows and a tendency for transverse frontal wrinkles; mouthparts as in members of *T. acuticollis* except mentum (Figure 25), which is deeply sulcate anteriorly.

Pronotum (Figure 27): Quadrately cordiform, sides strongly sinuate basally, hind angles strongly acute; basal transverse impression deeply engraved, sinuate, and curved anteriorly medially where it is broadly interrupted; disc highly convex to lat-



FIGURES 25–28.—*T. wallacei* female, lower Busu River, New Guinea: 25, mentum and gular region $\times 185$; 26, head $\times 92$; 27, pronotum $\times 92$; 28, left elytral base and humerus $\times 92$.

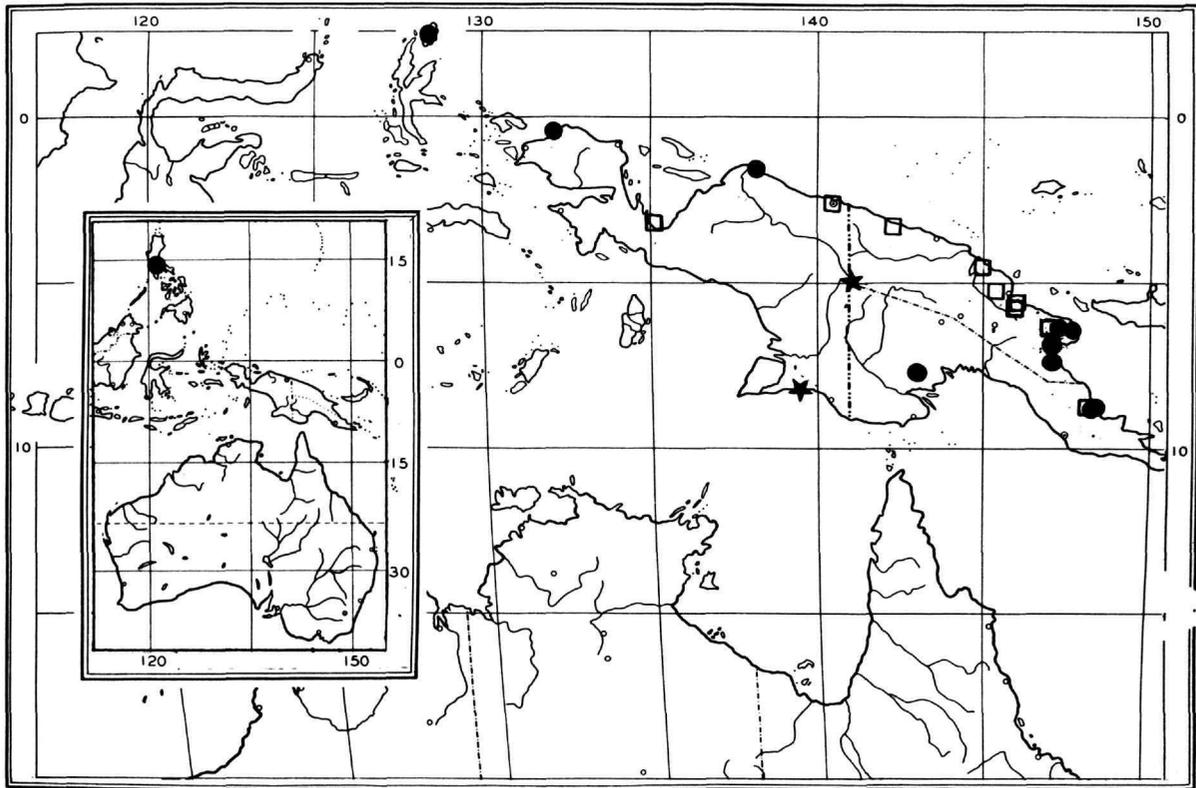


FIGURE 29.—Distribution map of *T. acuticollis* (circles), *T. philipi* (stars), *T. wallacei* (squares).

eral ridge and with deeply engraved median longitudinal impression, sides broadly reflexed.

Elytra (Figure 28): As in members of *T. acuticollis* except more convex, sutural interneur striate and entire, and disc with traces of striate-punctate interneurs in basal half.

Microsculpture: Absent from dorsal surface, except labrum.

Genitalia (Figure 9): Male median lobe most similar to members of *T. philipi* except with broader and more rounded apex. Endophallus with apical structures narrowly rounded, and curved; C-shaped sclerite well developed. Female stylus as in Figure 13.

Size: Length, 1.90 to 2.18 mm; width, 0.88 to 1.00 mm, 3 specimens measured.

NATURAL HISTORY.—Darlington (1962) states "My specimens were taken by beating foliage, especially dense clumps of leaves or moss-like epiphytes on the branches of low trees in the

understory of rain forest." Specimens have been collected in the months March through October; no teneral specimens seen. Specimens were collected between sea level and 1000 m elevation.

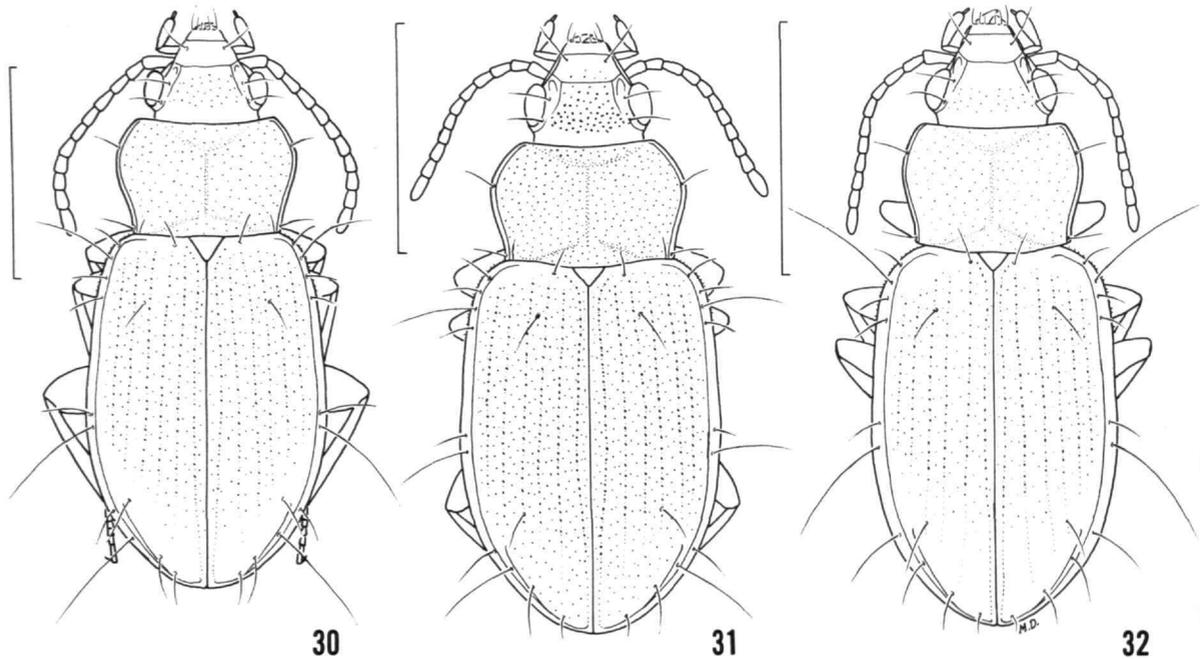
DISTRIBUTION (Figure 29).—This species is widely distributed throughout New Guinea.

Subgenus *Tachyta*, sensu stricto

DIAGNOSIS.—With the characters listed for the genus plus dorsal surface microreticulate, elytral interneurs variously present but at least 1–3 feebly striate, and dorsal setae not thick.

The *umbrosa* group

Members of the *umbrosa* group are characterized by their broad and depressed form, elytral chaetotaxy with Ed 6 in position b (fourth interneur), and transversely meshed microreticulation.



FIGURES 30-32.—Dorsal outline with details of *Tachyta* species; 30, *T. umbrosa* female, Mt. Maquiling, Luzon, Philippines; 31, *T. gilloglyi* female, Tiger Lake area, Republic of South Viet Nam; 32, *T. brunnipennis* female, Lockerie, Australia.

In addition, male members have a lightly pigmented and noncomplex endophallus. One member has bicolored elytra, another member has short but clearly visible pubescence.

Three of the four species representing this group have been found under bark of logs, while the fourth is known only from two specimens without habitat labels. The larval stage of *T. umbrosus* is known (Gardner, 1938).

The four species of the group have a combined range extending from Sri Lanka (Ceylon) and northern India east to the Japanese Ryu Kyu Islands, south through New Guinea to northern Queensland, Australia, and east to the Solomons. This large range is that of one of the species, *T. umbrosa*; the other three species have very small ranges, within the area already delimited.

5. *Tachyta umbrosa* (Motschulsky), new combination

FIGURES 30, 33, 36.43

Tachys umbrosus Motschulsky, 1851:507 [types in MMM;

type-locality: "Ind or" as given originally by Motschulsky, herewith restricted to Ratnapura, Sri Lanka (Ceylon)].

Tachys parallelus Motschulsky, 1851:507 [types in MMM and HUB (not seen by me) according to Andrewes, 1925:162; type-locality: "Ind or"].—Andrewes, 1925:163.

Acupalpus extremus Walker, 1858:204 [types in BMNH; type-locality: Ceylon].—Andrewes, 1925:162.

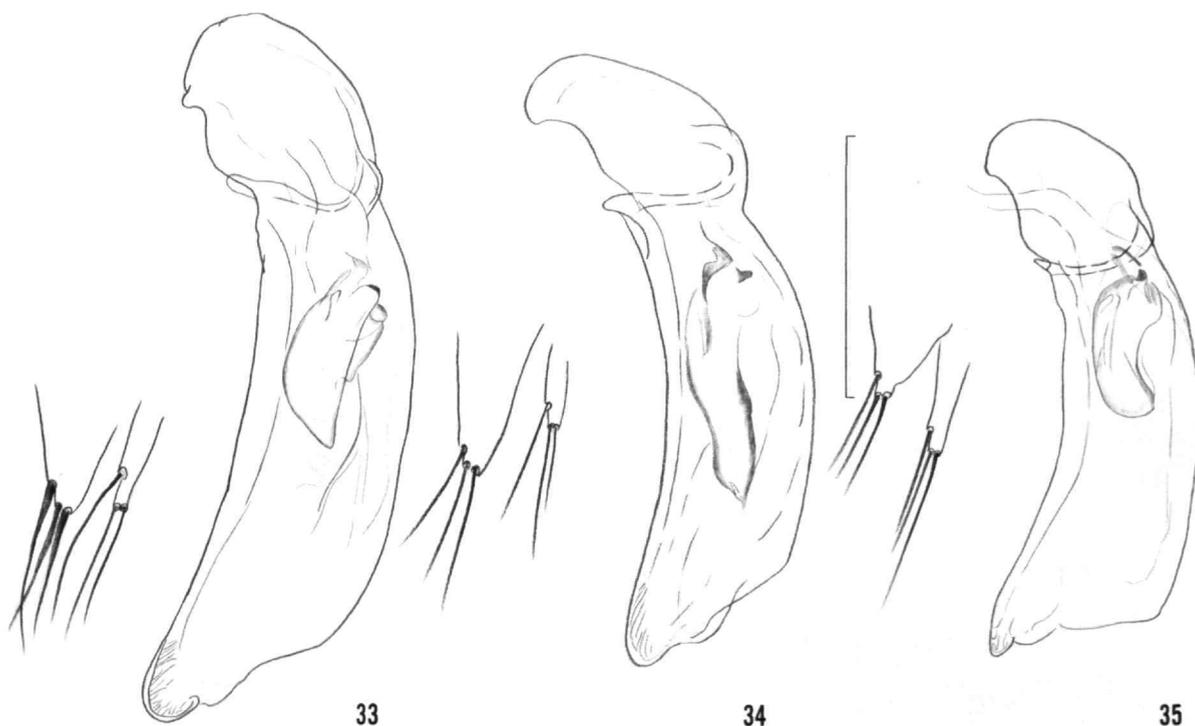
Tachyta nietneri Schaum, 1863:88 [types not seen by me, in HUB according to Andrewes, 1925:162; type-locality: Ceylon].—Andrewes, 1925:162.

DIAGNOSIS.—The elytral chaetotaxy (Ed 6 in position b, Ed 3 located on same plane with seta Eo 4), broadly transverse meshes of elytral microreticulation, and shape of pronotum are distinctive in the genus.

DESCRIPTION.—*Form* (Figure 30): Moderately elongate, broad, and quite depressed; head broad with very prominent eyes.

Color: Shiny rufopiceous throughout, except specimens from Sri Lanka (Ceylon) with piceous head and pronotum, flavopiceous elytra; appendages flavous or flavotestaceous.

Head (Figure 37): Very broad, equal across eyes to width of pronotum across anterior angles; fron-



FIGURES 33-35.—Male genitalia, left lateral aspect and apices of parameres: 33, *T. umbrosa*, Morotai Island, Indonesia; 34, *T. gilloglyi*, Tiger Lake area, Republic of South Viet Nam; 35, *T. brunipennis*, Bamaga, Australia.

tal furrows (Figure 37) shallow and limited laterally by two low carinae which are interrupted just posterior of frontoclypeal suture; front between eyes coarsely and sparsely punctulate, punctulae microsetiferous and not grouped into transverse band; eyes very prominent. Mouthparts (Figure 36).

Pronotum (Figure 38): Broadly transverse, disc depressed at middle, subconvex laterally; sides moderately sinuate posteriorly, margins narrowly beaded, slightly reflexed; surface laterobasally with carina (Figure 38); hind angles slightly obtuse; basal transverse impression well engraved laterally, narrowly interrupted medially; anterior angles not at all produced.

Elytra (Figure 39): Sutural interneur striate and well impressed, entire; interneurs 2 to 6 striate-punctate and well impressed to apical sixth, 7 punctate and effaced behind middle, 8 sulcate and well impressed throughout; humeral margin

rounded to base of interneur 5, margin broadly reflexed and explanate from humerus to plica, edge finely setose near humerus; chaetotaxy as in *T. nana* except Ed 6 in position b, that is in the fourth interneur, and Ed 3 located on same plane with seta Eo 4; plica well developed and visible externally.

Microsculpture (Figures 40, 41, 42): Moderately coarsely engraved, transversely arranged lines with tendency to form meshes and transverse rows; more nearly isodiametric on frons.

Genitalia: Male (Figure 33) with internal sac of median lobe very lightly pigmented (7 examined); female as in Figure 107 (5 examined).

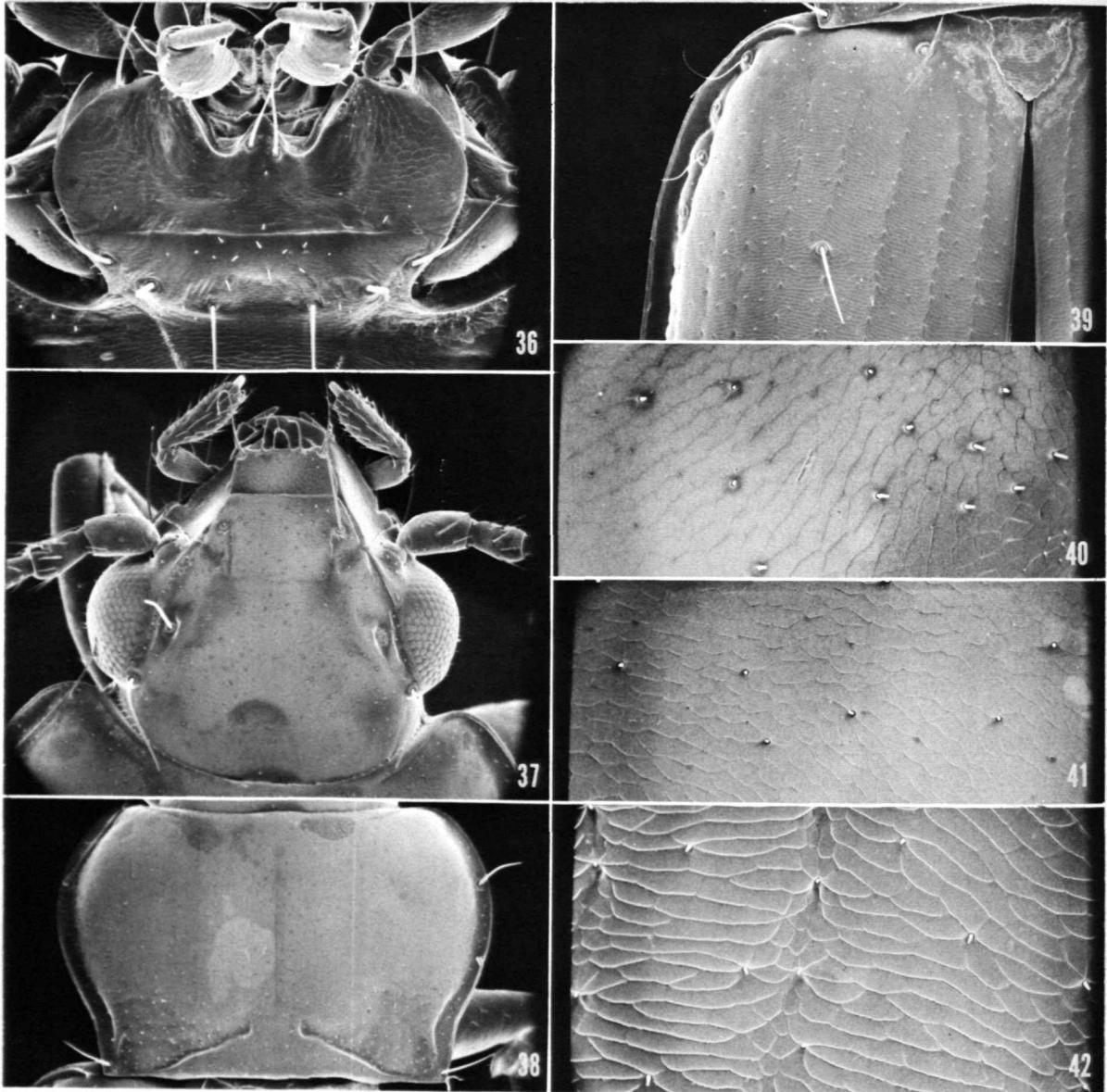
Size: Length, 2.54 to 3.04 mm; width, 1.00 to 1.30 mm, 8 specimens measured.

VARIATION.—Aside from the color variation mentioned above, there seems to be intrapopulation variation in the width of the pronotum.

NATURAL HISTORY.—Both Andrewes (1925) and

Darlington (1962) indicated that these beetles live under bark and in wood, but neither mentioned host species names. Gardner (1938) found adults and a larva under bark of *Pinus longifolia* in Almora, India. Several specimens I have studied

have labels indicating that the specimens were found under bark, but none of these give host species names. Adults have been found in all months of the year; teneral adults were found in January, May, July–August, and November. Elevation rec-



FIGURES 36–42.—*T. umbrosa* male, Mt. McKinley, Mindanao, Philippines: 36, mentum $\times 185$; 37, head $\times 92$; 38, pronotum $\times 74$; 39, left elytral base and humerus $\times 92$; 40, microreticulation of left frons $\times 462$; 41, same of left pronotum $\times 462$; 42, same of left elytron $\times 462$.

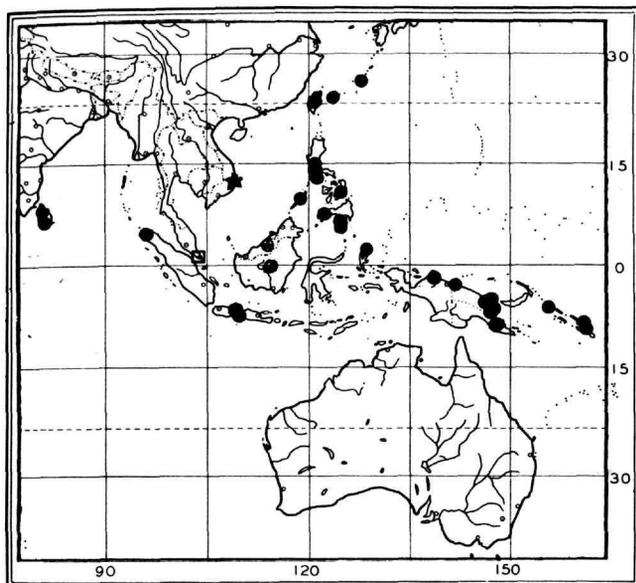


FIGURE 43.—Distribution map of *T. umbrosa* (circles), *T. gilloglyi* (star), *T. monostigma* (square).

ords indicate an altitudinal range from sea level to 518 m, although I expect the Himalayan populations will greatly exceed this.

DISTRIBUTION. (Figure 43).—The range of this species extends from Sri Lanka (Ceylon) and northern India east to the Philippines and Okinawa, south through New Guinea to Bougainville in the Solomon Islands.

6. *Tachyta gilloglyi*, new species

FIGURES 31, 34, 43–51

TYPE-LOCALITY.—Tiger Lake Area, Cam Rahn Bay, Republic of South Viet Nam.

TYPE-SPECIMENS.—The holotype male and allotype are in USNM. Both were collected by A. R. Gillogly in 1970. Two paratypes from the same locality, collected by W. H. Tyson are in USNM.

DIAGNOSIS.—The elytral chaetotaxy (E 6 in position b, and Ed 3 located anterior of seta Eo 4), broadly transverse “false” meshes of the elytral microreticulation, and subconvex elytral intervals are distinctive in the genus.

DESCRIPTION.—*Form* (Figure 31): Narrower

than members of *T. umbrosa* and with more attenuated elytra.

Color: Shiny rufous throughout, apex of elytra slightly paler; appendages flavotestaceous.

Head (Figure 45): Narrower across eyes than in *T. umbrosa* members although still equal across eyes to width of pronotum across anterior angles; frontal furrows shallow, less impressed on clypeus than in *T. umbrosa* members; front between eyes finely and sparsely punctulate, punctulae not grouped into transverse band; eyes very prominent. Mouthparts (Figure 44) with mentum more truncate anteriorly and more excavate ventrally than in *T. umbrosa* members.

Pronotum (Figure 46): Transverse, less so than in members of *T. umbrosa* and with disc less depressed at middle, sides less abruptly sinuate posteriorly; laterobasal carina (Figure 46) more developed and longer than in *T. umbrosa* members; hind angles almost 90°; basal transverse impression well engraved laterally, narrowly interrupted medially, less so than in *T. umbrosa*; anterior angles more prominent than in *T. umbrosa* members.

Elytra (Figure 47): As in *T. umbrosa* except interneurons more deeply striate and punctulate, especially the seventh, and intervals more convex; seta Ed 3 located anterior of Eo 4.

Microsculpture (Figures 49–51): Very similar to that of *T. umbrosa* members but with less tendency to form meshes, especially on pronotum and elytra, i.e., the engraved lines do not actually connect in most cases but give the impression of a mesh when viewed with light microscopes.

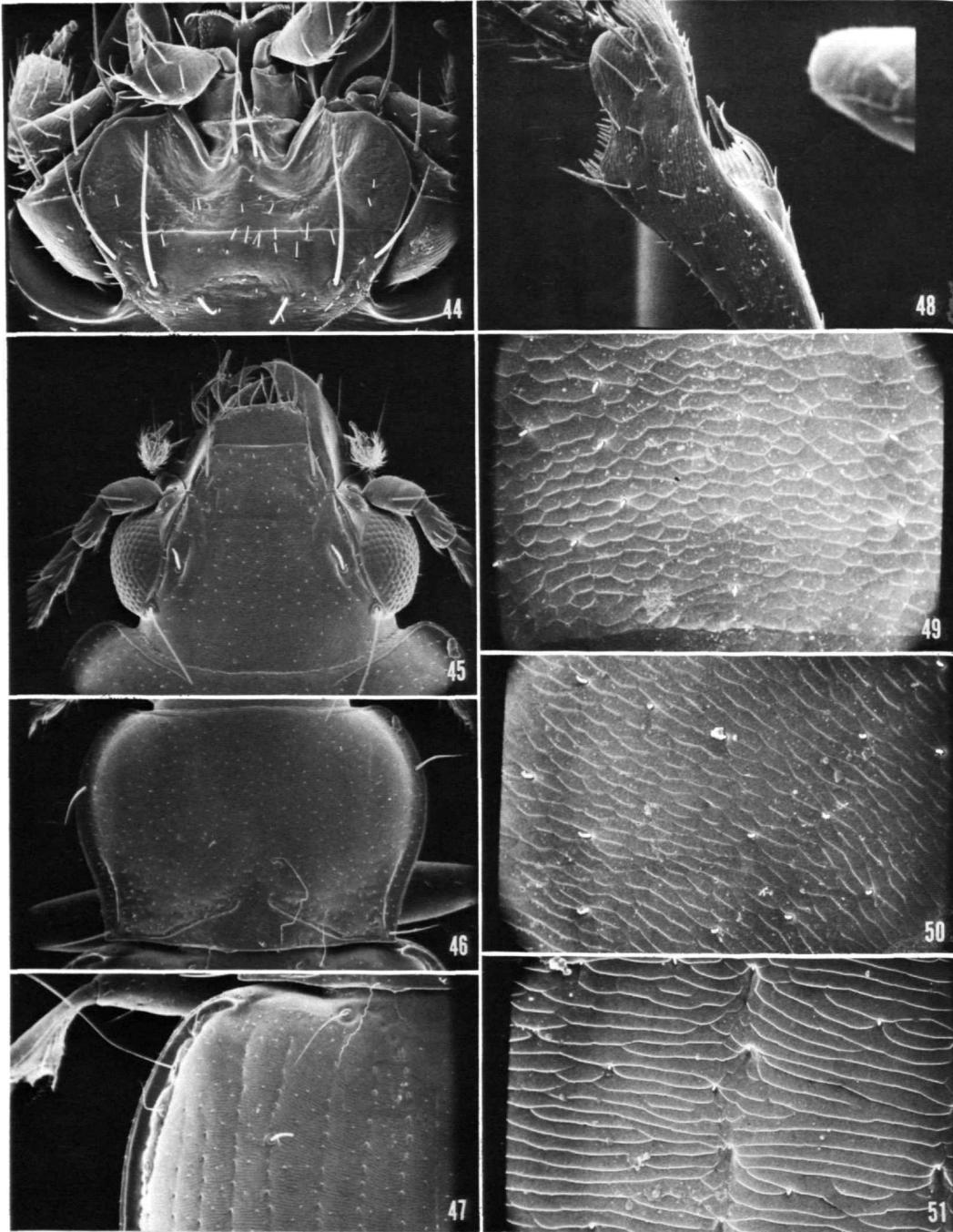
Genitalia: Male (Figure 34) median lobe shorter and slightly more arcuate than in males of *T. umbrosa*, yet with internal sac more elongate and apically attenuate, also very lightly pigmented (1 examined); female as in *T. falli* (1 examined).

Size: Length, 2.48 to 2.66 mm; width, 1.06 to 1.14 mm, 3 specimens measured.

VARIATION.—The small sample available is quite homogeneous.

NATURAL HISTORY.—All four specimens seen were collected under bark (host species unnamed) in June and the specimens are not teneral. The type-locality is at sea level.

DISTRIBUTION (Figure 43).—This species is known only from the type-locality.



FIGURES 44-51.—*T. gillogyi* female, Tiger Lake area, Republic of South Viet Nam: 44 mentum $\times 185$; 45, head $\times 92$; 46, pronotum $\times 74$; 47, left elytral base and humerus $\times 92$; 48, left anterior tibial apex $\times 222$; 49, microreticulation of left frons $\times 462$; 50, same of left pronotum $\times 462$; 51, same of left elytron $\times 462$.

7. *Tachyta monostigma* (Andrewes), new combination

FIGURE 43

Tachys monostigma Andrewes, 1925:163 [lectotype, a male, here selected, in BMNH; type-locality: Singapore, Malaysia].

DIAGNOSIS.—The elytral chaetotaxy (Ed 6 in position b, i.e., in interval 4) together with the single apical elytral reddish spot and vaguely impressed pronotal microreticulation are distinctive in the genus.

DESCRIPTION.—The two specimens available were adequately described by Andrewes (1925) as follows:

Tachys monostigma sp. nov.

Length: 2.3 mm. Piceous, shiny; palpi, antennae, and legs testaceous, margin of prothorax and of front half of elytra vaguely red, a common large light red spot at apex. *Head* with wide rather shallow furrows, diverging behind and bounded outwardly by a ridge, eyes moderately prominent, mentum without pores, antennae moniliform, joint 2 = 3. *Prothorax* rather flat, half as wide again as long, sides with the border minutely setulose, rounded in front, contracted and sinuate behind, base a little wider than apex, the angles right and very sharp, with a slight carina; median line deep, widening and almost bifurcating behind, basal sulcus deep, a little uneven but not crenulate, interrupted but without pore at middle, sides of base rather hollowed out. *Elytra* flat, elongate-ovate, border setulose, extending inwards very little beyond hind angles of prothorax; fully striate, the striae moderately impressed and finely punctate, the outer ones more faintly, 1 entire, the rest barely reaching base and shortened behind, 8 deep behind, clearly punctate on the interrupted portion in front, striole long, near margin, the pore at its apical third; dorsal pores on stria 4, at a sixth and near the end of the striole. Surface finely and sparsely punctate. Microsculpture with a reticulation of moderately wide meshes on the elytra, hardly visible on the prothorax, the disk appearing quite smooth, head with faint nearly isodiametric meshes. Setulose beneath, the prosternum slightly sulcate, metasternal process finely bordered, protarsi ♂ with two dilated joints, claws denticulate.

Smaller, narrower, and more shiny than *umbrosus*, similarly coloured, but with the antennae and legs lighter, and a common red spot at apex of elytra. Joint 2 of the antennae as long as 3 the median line on prothorax widening behind, the elytral striae deeper and more clearly punctate, including 7, the microsculpture of the prothorax obsolete.

Malay States: Singapore (C. J. Saunders—coll. W. J. Saunders) 2 ex.

Note: I studied the single male remaining in the BMNH in 1971 but could not locate the second specimen mentioned by Andrewes (1925).

8. *Tachyta brunnipennis* (MacLeay), new combination

FIGURES 32, 35, 52-61

Bembidium brunnipenne MacLeay, 1873:118 [types probably in the MacLeay Museum or CSIRO, not seen by me; type-locality: Gayndah, South Queensland, Australia].

DIAGNOSIS.—The elytral chaetotaxy (Ed 6 in position b, i.e., in the fourth interneur, and Ed 3 located anterior of Eo 4), coarsely engraved microreticulation, and dense punctation of the dorsal surface are distinctive in the genus.

DESCRIPTION.—*Form* (Figure 32): Broad and much more convex than members of other species in the group.

Color: Dull rufous throughout; appendages flavotestaceous.

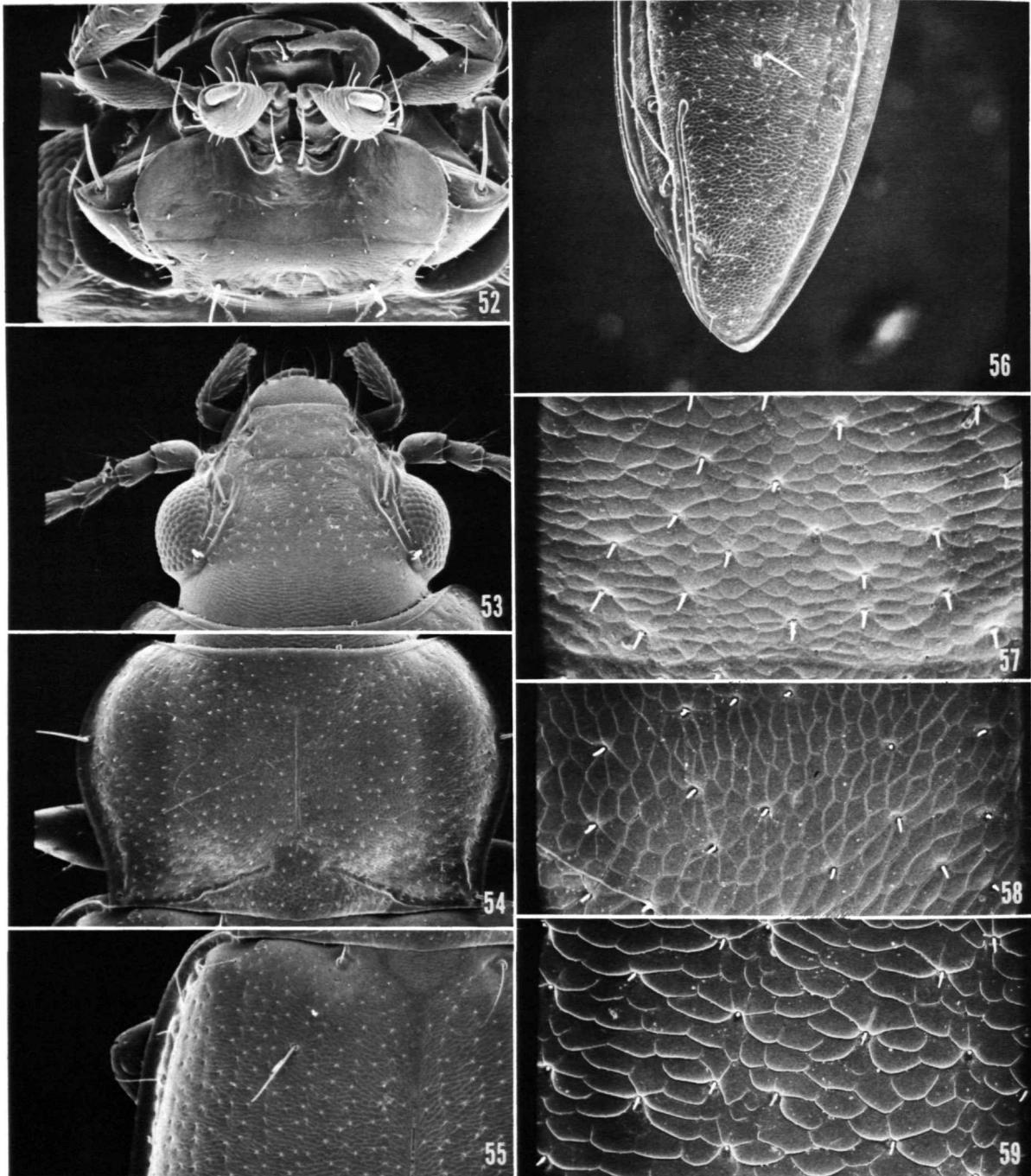
Head (Figure 53): Moderately broad and more convex than in *T. umbrosa* members, equal across eyes to width of pronotum across anterior angles; frontal furrows (Figure 53) more deeply impressed than in *T. umbrosa* members and with lateral carina better developed; front between eyes coarsely and sparsely punctulate, each puncture with well-developed seta, which is clearly visible in oblique view (50X); eyes very prominent. Mouthparts (Figure 52) as in *T. umbrosa* members.

Pronotum (Figure 54): Transverse, disc more convex and densely punctulate than in any other species of the group, punctures each with well-developed seta; sides moderately sinuate posteriorly, margins narrowly beaded, slightly reflexed; surface laterobasally with poorly developed carina (Figure 54); hind angles about right angles; basal transverse impression well engraved laterally, broadly interrupted medially; anterior angles not at all produced.

Elytra (Figures 55, 56, 60): As in *T. umbrosa*, members except interneurs less well developed, intervals flat; Ed 3 located anterior of Eo 4; recurrent groove and plica (Figure 56).

Microsculpture (Figures 57-59): Very coarsely engraved nearly isodiametric meshes with tendency toward longitudinal arrangement on pronotum and transverse rows on elytra.

Genitalia: Male (Figure 35) median lobe smaller and more arcuate than in *T. umbrosa* males and with more attenuated apex; internal sac also more arcuate yet with same light pigmen-



FIGURES 52-59.—*T. brunnipennis* female, Lockerbie, Australia: 52, mentum $\times 185$; 53, head $\times 92$; 54, pronotum $\times 92$; 55, left elytral base and humerus $\times 92$; 56, left elytral apex, oblique aspect $\times 74$; 57, microreticulation of left frons $\times 462$; 58, same of left pronotum $\times 462$; 59, same of left elytron $\times 462$.

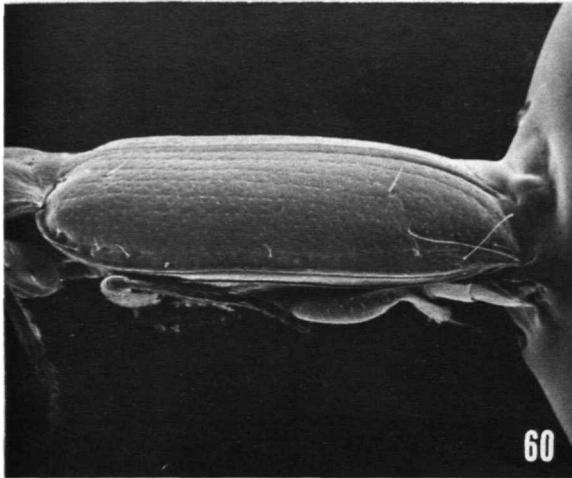


FIGURE 60.—*T. brunnipennis* female, Lockerbie, Australia, chaetotaxy of left elytron $\times 37$.

tation (2 examined); female as in *T. falli* (5 examined).

Size: Length, 2.40 to 2.58 mm; width, 1.10 to 1.16 mm, 4 specimens measured.

VARIATION.—The width of the pronotum in relation to the width of the elytra is somewhat vari-

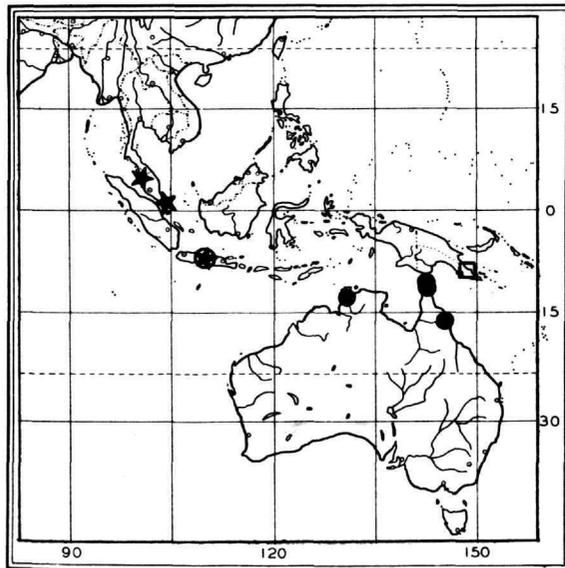


FIGURE 61.—Distribution map of *T. brunnipennis* (circles), *T. malayica* (stars), and *T. barda* (squares).

able; in one specimen from Lockerbie, Queensland, both the elytra and pronotum are very narrow, although others in the same sample are normal.

NATURAL HISTORY.—MacLeay (1873) states that these beetles were found “on stony ground, and on the summit of a high hill remote from water.” This habitat is probably the result of wind drift during dispersal flights. All specimens available to me from MCZ were collected by Darlington. He states (1960) that all three of these localities are “light rain forest,” two of them in the lowlands and one, Ravenshoe, at 915 m. At the latter locale, Darlington collected in logs and I suspect that is where the beetles may be found. Adults were found in January and February; several of those labeled January are teneral.

DISTRIBUTION (Figure 61).—The range of this species extends from Port Darwin to the tip of Cape York peninsula in Australia; it is not known to reach New Guinea.

The *malayica* group

The members of the *malayica* group are characterized by the effacement of elytral microreticulation, elytral chaetotaxy with Ed 6 in position a (third interneur), and similarities of the male endophallus. Both species have members with more testaceous appendages and more rufous bodies than in the previous group.

One species has members found under bark; the other's habitat is unknown.

The two species representing this group have a combined range extending from Malaysia south to New Guinea.

9. *Tachyta malayica* (Andrewes), new combination

FIGURES 61, 62, 64

Tachys malayicus Andrewes, 1925:161 [lectotype, male, here selected, in BMNH; type-locality: Singapore, Malaysia].

DIAGNOSIS.—The elytral chaetotaxy (Ed 6 in position a, i.e., in the third interneur, and Ed 3 located on the same plane with seta Eo 3), effacement of elytral microreticulation, and coloration of the elytra are highly distinctive in the genus.

DESCRIPTION.—*Form* (Figure 62): Moderately elongate, broad and depressed; head broad and

short, frontal area depressed, eyes very prominent.

Color: Shiny rufopiceous, apex of elytra bright rufous; appendages testaceous.

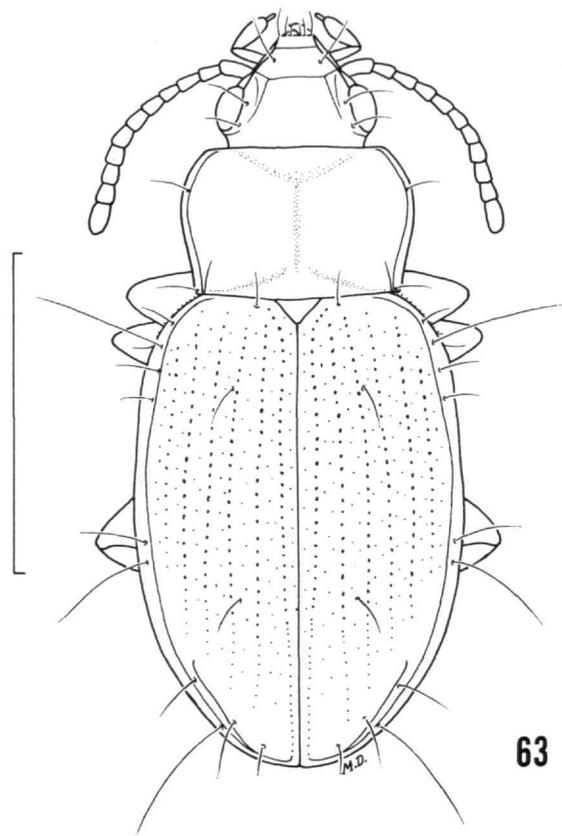
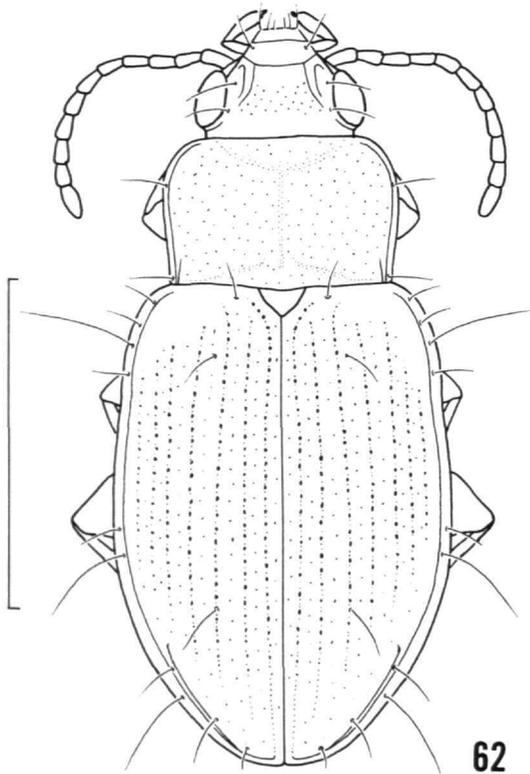
Head (Figure 62): Very broad, short and depressed, wider across eyes than pronotum across anterior angles; frontal furrows deep and abrupt laterally due to highly raised carinae; anterior supraorbital seta located in large deep fovea; frontal area depressed, even clypeus raised above it; eyes very prominent.

Pronotum (Figure 62): Broadly transverse, disc convex; sides almost straight before right hind angles, margins moderately reflexed; surface laterobasally strongly carinate, carina extended to anterior lateral seta; basal transverse impression well engraved laterally, narrowly interrupted medially, interruption area with deep fovea; discal

longitudinal impression deepened anteriorly, foveiform; anterior angles not at all produced.

Elytra (Figure 62): Sutural interneur striate-punctate and well impressed, entire, the second interneur almost so but less impressed at apex; interneurs 3 to 7 less striate, strongly punctate, and well impressed to at least middle of elytron; interneur 8 feebly punctulate; humeral margin rounded to base of interneur 5, margin broadly reflexed and explanate from humerus to plica, edge finely setulose near humerus; chaetotaxy as in *T. nana* except Ed 3 located far forward on the same plane with Eo 3; plica well developed and visible externally.

Microsculpture: Very lightly engraved transverse lines laterally, almost effaced discally on pronotum and elytra; head basally as in pronotum, frons



FIGURES 62-63.—Dorsal outline with details of *Tachyta* species: 62, *T. malayica* male, Singapore, Indonesia; 63, *T. barda* female, Dobodura, New Guinea.

with large nearly isodiametric microreticulation.

Genitalia: Male (Figure 64) with internal sac of median lobe darkly pigmented, "C" sclerite large and well developed (1 examined); female as in *T. falli* (1 examined).

Size: Length, 2.22 to 2.30 mm; width, 1.02 to 1.08 mm, 3 specimens measured.

NATURAL HISTORY.—Andrewes (1925) and specimen labels indicated that these beetles are found under bark.

DISTRIBUTION (Figure 61).—The range of this species extends from Malaysia to Java according to existing records. It is probably more widespread than this, however, and quite likely occurs on most of the Indonesian islands.

10. *Tachyta barda* (Darlington), new combination

FIGURES 61, 63, 65

Tachys bardus Darlington, 1962:478 [holotype, male, MCZ; type-locality: Dobodura, Papua, New Guinea].

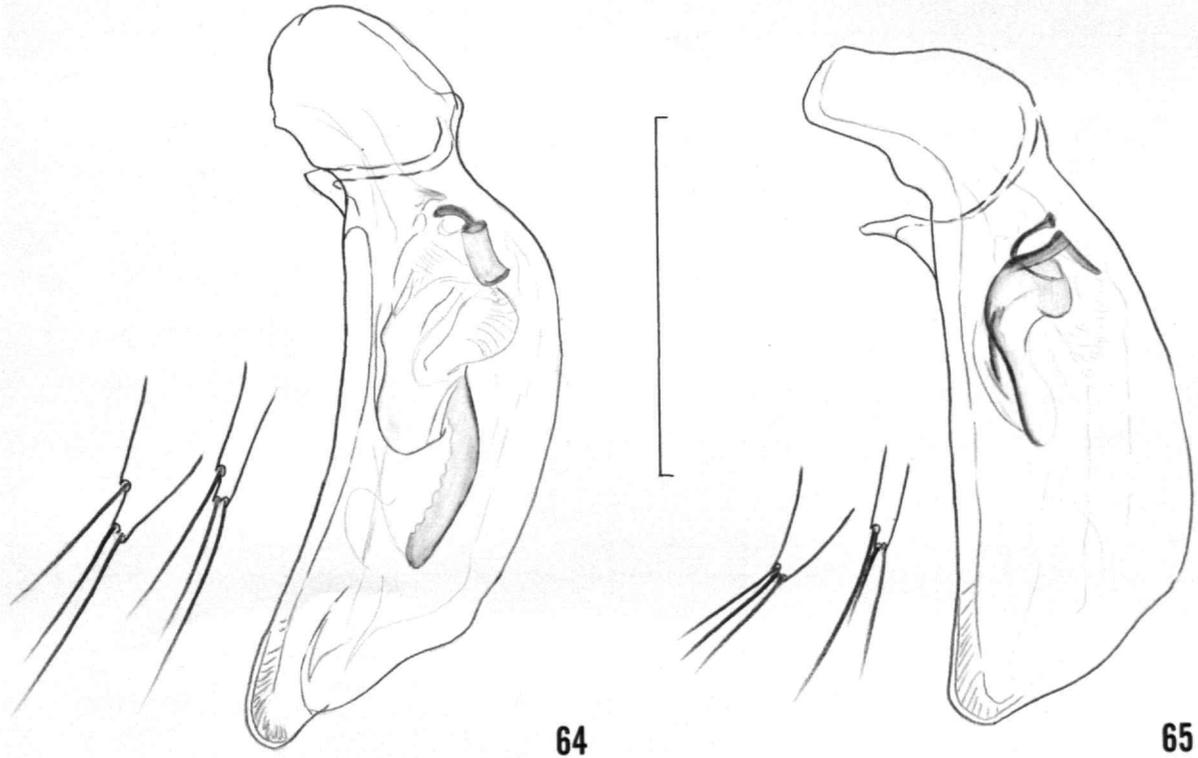
DIAGNOSIS.—The elytral chaetotaxy (Ed 6 in position a, Ed 3 located on a plane between setae Eo 3 and 4), moderately well impressed microreticulation on head and pronotum, nearly effaced from elytra, and punctate interneur 8 are distinctive in the genus.

DESCRIPTION.—**Form** (Figure 63): Broad and convex; head broad, short, and not as depressed as in *T. malayica* members, eyes moderately prominent.

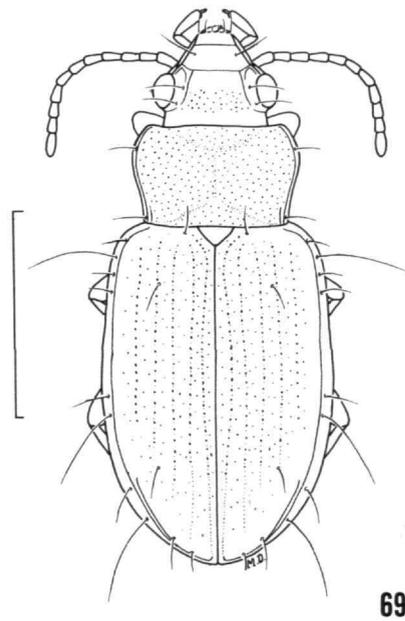
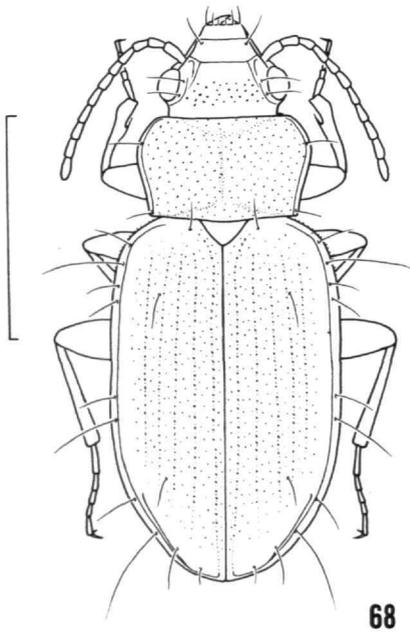
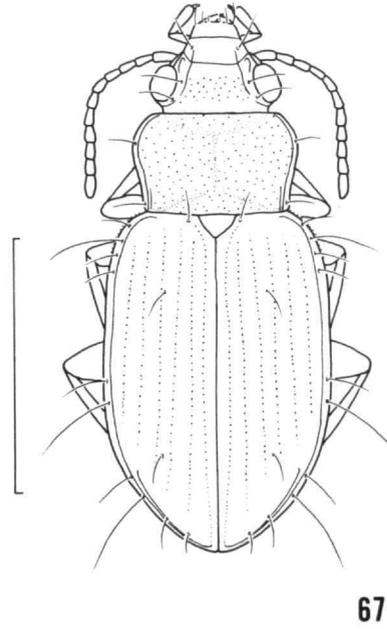
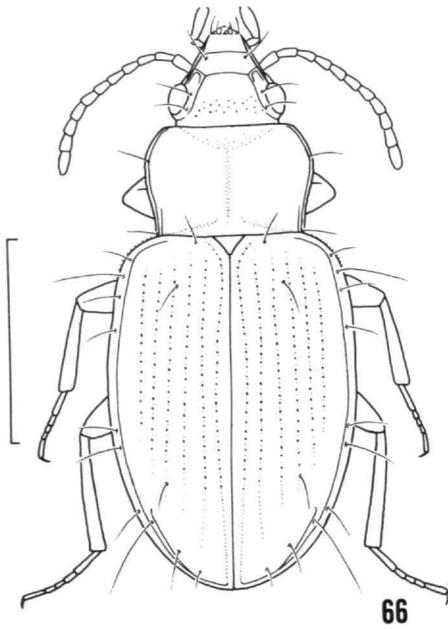
Color: Shiny rufousflavous, elytra more flavous than pronotum and head; appendages testaceous.

Head (Figure 63): Broad, short, and subconvex, wider across eyes than pronotum across anterior angles; frontal furrows well impressed and lateral carina well developed, not as strong as in *T. malayica* members; fovea surrounding anterior supraorbital seta more elongate than in *T. malayica* members; eyes moderately prominent.

Pronotum (Figure 63): Transverse, disc subconvex; sides almost straight or slightly sinuate be-



FIGURES 64-65.—Male genitalia, left lateral aspect and apices of parameres: 64, *T. malayica*, Singapore, Indonesia; 65, *T. barda*, Dobodura, New Guinea.



FIGURES 66-69.—Dorsal outline with details of *Tachyta* species: 66, *T. picina* male, Malvern, South Africa; 67, *T. subvirens* male, Mt. Coffee, Liberia, 68, *T. guineensis* female, 18.0 miles SW of Elizabethville, Republic of the Congo; 69, *T. pseudovirens* female, Belinga, Gabon.

fore slightly acute hind angles, margins narrowly reflexed; surface laterobasally strongly carinate, carina extended two-thirds the way to anterior lateral seta; basal transverse impression well engraved laterally, narrowly interrupted medially, interruption with deep longitudinal fovea; discal longitudinal impression deepened anteriorly, foveiform; anterior angles not produced.

Elytra (Figure 63): Proportionately much shorter, broader, and more convex than in *T. malayica* members; interneurs as in *T. malayica* members except interneur 8 strongly punctate, punctures longitudinally sulcate; chaetotaxy as in *T. malayica* members except seta Ed 3 located on a plane between setae Ed 3 and 4, thus placed more caudal than in *T. malayica* members; otherwise as in *T. malayica* members.

Microsculpture: Lightly engraved transverse meshes on head and pronotum; less impressed and less tendency to form meshes on elytra, more nearly isodiametric on head.

Genitalia: Male (Figure 65) with internal sac of median lobe more darkly pigmented distally than in any other species (1 examined); female as in *T. falli* (1 examined).

Size: Length, 2.04 to 2.20 mm; width, 0.96 to 1.02 mm, 3 specimens measured.

NATURAL HISTORY.—The type-series, all collected by Darlington, is composed of 5 specimens: 4 collected in "Mar.-July," the other in "Dec. '43-Jan. '44." The March-July specimens are less fully pigmented than that of December-January, and I believe they are slightly teneral.

DISTRIBUTION (Figure 61).—The range of this species is poorly known; specimens were found in two places in Papua, New Guinea.

The *picina* group

Members of the *picina* group are characterized by a unique elongated dorsal sclerite in the male endophallus and by the elytral chaetotaxy. All members are strongly microsculptured dorsally. One species from Hispaniola has members with elytral spots, a characteristic found elsewhere only in *Tachyta* members from the Oriental Region. The nature of the color pattern is quite different, however, and in *T. hispaniolae*, the spots are more similar to those found on the elytra of some *Tachytenis* members found in the Neotropical Region.

One species has members that were found under bark of dead trees and by sifting in the forest; the others' habitats are unknown.

This group is represented by four species having a broadly disjunct range including central and southern Africa and one Caribbean island. One species of the group (*T. picina*) was introduced into Madagascar by man.

11. *Tachyta picina* (Boheman)

FIGURES 66, 70, 87

Bembidium picinum Boheman, 1848:229 [type in SRM, not seen by me; type-locality: "Caffraria orientalie"].—Basilewsky, 1952:176.

Tachys vesus Peringuey, 1908:294 [type not seen by me, in the South African Museum according to Basilewsky, 1952:188; type-locality: Natal, Africa].—Basilewsky, 1952:188.

Tachyta picina (Boheman), Basilewsky, 1952:176.

DIAGNOSIS.—The ovate elytra, rufous coloration, and testaceous appendages are highly distinctive in the genus.

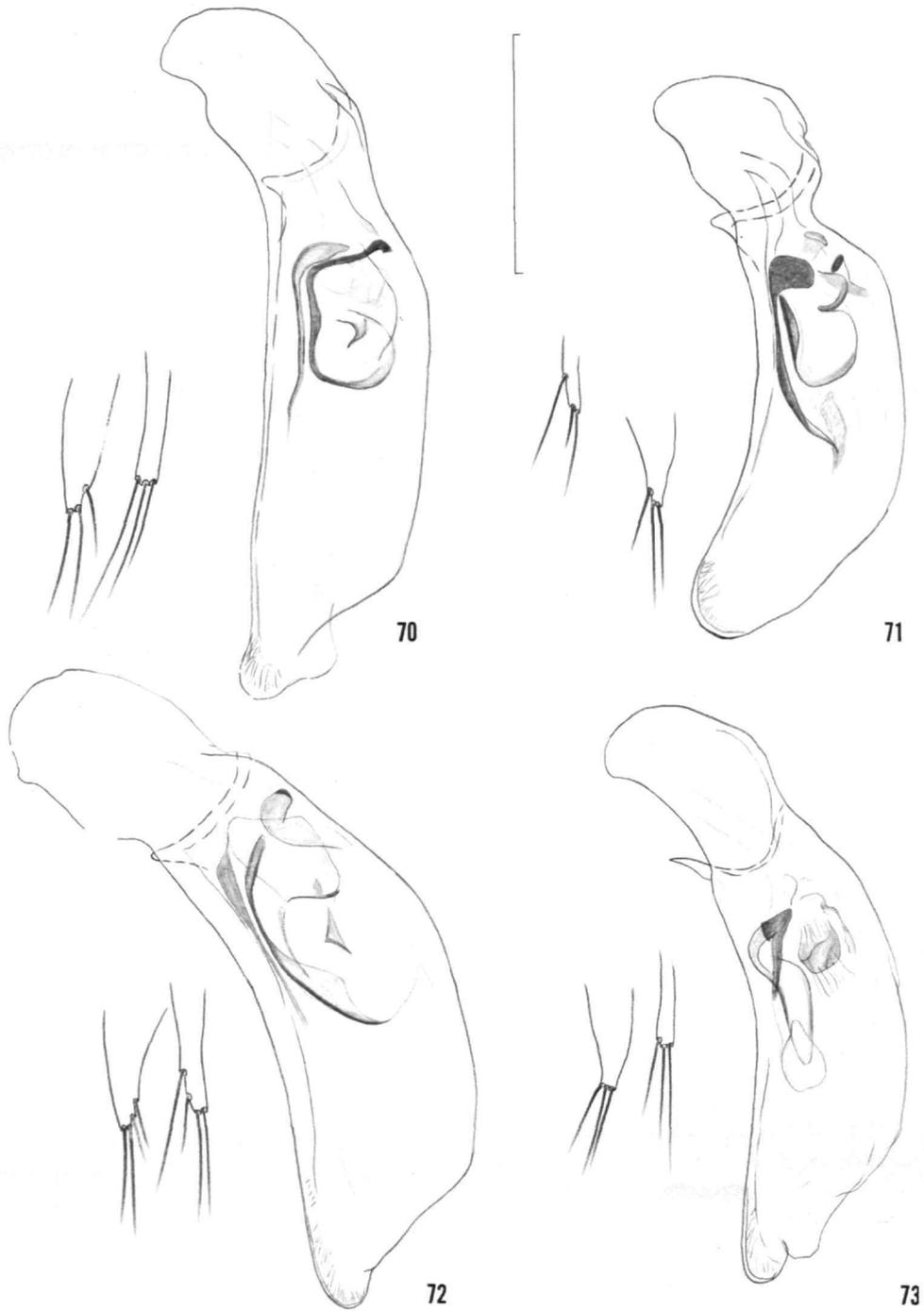
DESCRIPTION.—*Form* (Figure 66): Moderately elongate and narrow, convex; head moderately broad and convex.

Color: Shiny rufous throughout; appendages testaceous.

Head (Figure 66): Moderately broad, equal across eyes to width of pronotum across anterior angles; frontal furrows deeply impressed and abruptly limited laterally by well-developed carina; outer carina members absent but ridge over eyes prominent; front between eyes convex, sparsely punctulate; eyes large and moderately prominent.

Pronotum (Figure 66): Moderately transverse, disc convex; sides moderately sinuate posteriorly, margins narrowly reflexed, less so anteriorly; surface laterobasally strongly carinate, carina extended about one-third the way to anterior lateral seta; hind angle about 90°, basal transverse impression deeply engraved to median line; anterior angles not produced.

Elytra (Figure 66): Sutural interneur striate-punctate, entire, punctures small; interneurs 2 to 5 less impressed, more strongly punctulate, and abbreviated at about apical third, 2 usually longer and 5 shorter, outer interneurs effaced; interneur 8 entire, sulcate, less impressed about basal third; humeral margin rounded to base of interneur 5, margin broadly reflexed and explanate from hu-



FIGURES 70-73.—Male genitalia, left lateral aspect, and apices of parameres: 70, *T. picina*, Malvern, South Africa; 71, *T. subvirens*, M'Vandi, Gabon; 72, *T. hispaniolae*, south of Santiago, Dominican Republic; 73, *T. pseudovirens*, Belinga, Gabon.

merus to plica, edge finely setose behind humerus; chaetotaxy as in *T. nana* except Ed 6 in position b, that is in fourth interneur, and Ed 3 on same plane with seta Eo 4; plica well developed and visible externally.

Microsculpture: Head with coarsely engraved isodiametric reticulation; pronotum and elytra with shallowly engraved transverse lines sometimes connected longitudinally to form elongate meshes.

Genitalia: Male (Figure 70) with internal sac of median lobe darkly pigmented; ventral rod narrow and elongate, dorsal rod long and C-shaped; phallus nearly straight (1 examined). Female not studied.

Size: Length, 2.72 mm; width, 12.0 mm, 1 specimen measured.

DISTRIBUTION (Figure 87).—The range of this species is confined to southern Africa, from South Africa north to Mozambique and introduced by man in Madagascar. The record by de Miré (1964) of Tchad must refer to an undescribed species or mislabeled specimen.

12. *Tachyta subvirens* Chaudoir

FIGURES 67, 71, 74–79, 87

Tachyta subvirens Chaudoir, 1878:193 [lectotype, sex undetermined, here selected in MNHP; type-locality: Zanzibar, Africa].

DIAGNOSIS.—The elytral chaetotaxy (Ed 6 in position b, Ed 3 located on a plane between Eo 3 and 4), lateral channels of the pronotum, and deeply sulcate median line of the pronotum are distinctive from all species in the genus except *T. guineensis*, the members of which have large coarse punctures on the frons and pronotum and have the elytra with coarsely engraved isodiametric reticulations.

DESCRIPTION.—*Form* (Figure 67): Moderately elongate, broad and depressed; head broad with very prominent eyes.

Color: Shiny piceous throughout; appendages darkly infuscated.

Head (Figure 75): Broad and subconvex, equal across eyes to width of pronotum across anterior angles; frontal furrows moderately well impressed, lateral carinae well developed, anterior supra-

orbital seta situated in shallow trough; front between eyes finely and sparsely punctulate, punctulae loosely grouped in a transverse band; eyes very prominent. Mentum (Figure 74) deeply sulcate anteriorly, buccal fissure externally incomplete, impressed only medially; submentum with shallow median sulcus.

Pronotum (Figure 76): Transverse, disc subdepressed at middle, convex laterally; sides slightly sinuate posteriorly, margins broadly reflexed and sulcate from base to anterior angles, surface laterobasally strongly carinate; hind angles acute; basal transverse impression well engraved laterally, narrowly interrupted medially, and confluent with deeply sulcate median line; anterior angles not at all produced.

Elytra (Figure 67): Sutural interneur entire and deeply impressed throughout, interneurs 2 to 4 deeply impressed and ended about apical third, interneurs 5 and 6 finely impressed and ended at apical third, interneur 7 nearly effaced, interneur 8 entire and deeply sulcate throughout; humeral margin rounded to base of interneur 5, margin broadly reflexed and explanate from humerus to plica, edge very finely setulose throughout its length; chaetotaxy as in *T. picina* members; plica well developed and visible externally.

Microsculpture (Figures 77–79): Moderately coarsely engraved on head and pronotum and consisting of nearly isodiametric reticulations, partially arranged in rows on the pronotal disc; elytra with more finely engraved transverse lines, which have a tendency to form transverse meshes.

Genitalia: Male (Figure 71) with internal sac darkly pigmented and with ventral rod elongate and basally expanded, dorsal rod short, C-sclerite well developed; phallus with apex broadly rounded (4 examined). Female as in *T. falli* (8 examined).

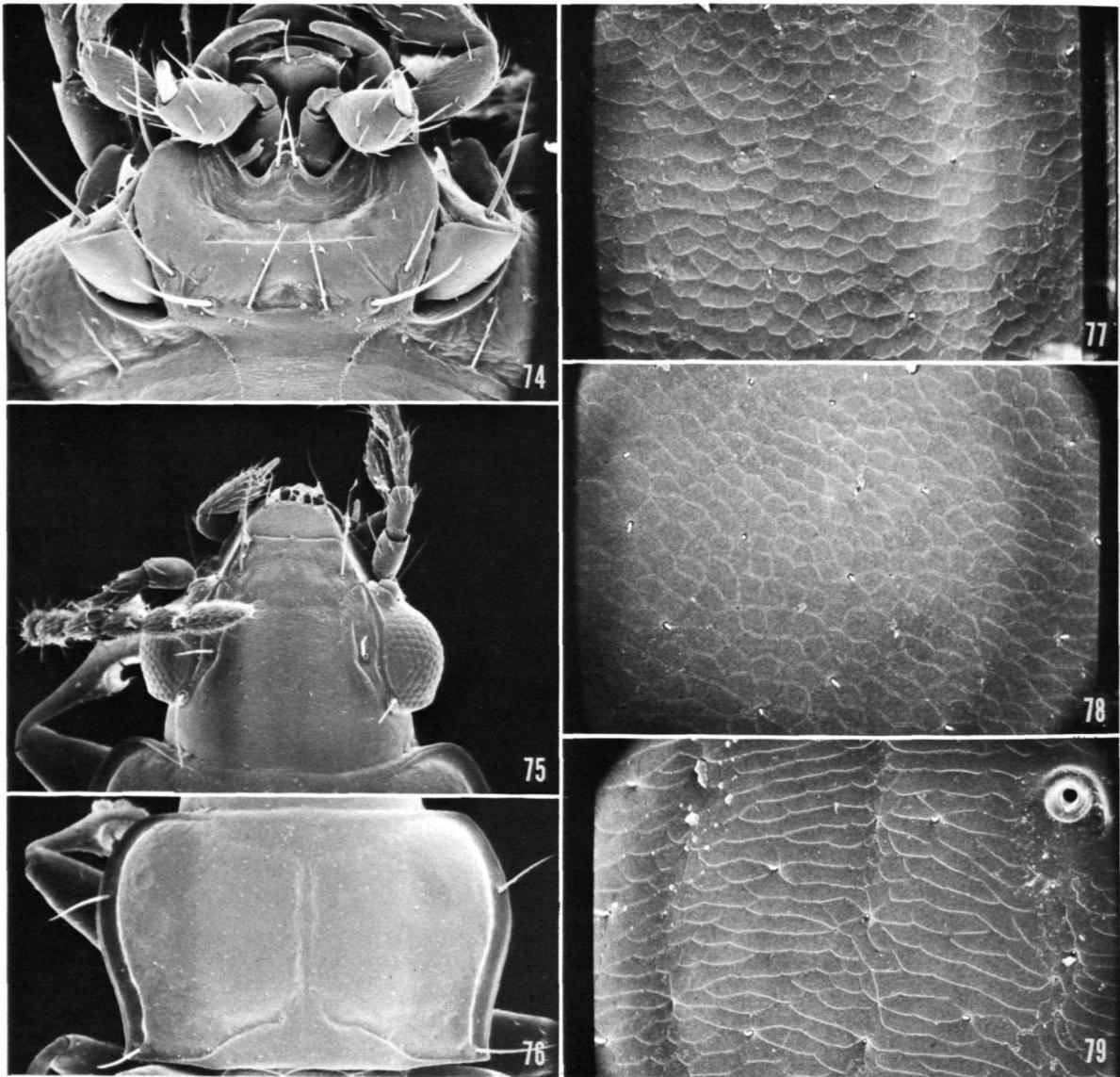
Size: Length, 2.16 to 2.44 mm; width, 0.98 to 1.12 mm, 8 specimens measured.

VARIATION.—In long series of specimens from Gabon, I noted very little variation except in color; this is apparently due to the age of the specimen.

NATURAL HISTORY.—Coiffait (in litt.) states that these beetles were found under bark of dead trees in the forest, by sifting in the forest, and flying to light in the rain or when dry. He found specimens

in January, February, March, and May, but found no teneral ones. I have two specimens found "in unidentified log. West Africa," which was intercepted at New York in 1938.

DISTRIBUTION (Figure 87).—This species is widespread in west and central Africa adjacent to the equator from western Congo Republic north to Liberia and east to Central African Republic.



FIGURES 74-79.—*T. subvirens*, male, M'Vandi, Gabon: 74, mentum $\times 185$; 75, head $\times 92$; 76, pronotum $\times 92$; 77, microreticulation of left frons $\times 462$; 78, same of left pronotum $\times 462$; 79, same of left elytron $\times 462$.

13. *Tachyta guineensis* Alluaud

FIGURES 68, 87

Tachyta guineensis Alluaud, 1933:8 [de Miré (1964) indicates "type et 8 paratypes," but Alluaud did not originally designate a holotype and no subsequent records establish a lectotype; therefore this remains to be done; location of the 9 specimens mentioned by de Miré is not stated by him; however, Basilewsky (1952) stated the "paratypes" are in MRAC; not seen by me; type-locality: Ivory Coast, Africa].

DIAGNOSIS.—The coarse isodiametric reticulation of the dorsal surface and its granular appearance together with the coarse punctures of the head and pronotum are distinctive in the genus.

DESCRIPTION.—*Form* (Figure 68): Elongate, more so than in *T. subvirens* members and with broader head, eyes very prominent.

Color: Shiny piceous throughout, appendages darkly infuscated.

Head: Very broad across eyes, equal in width to pronotum across anterior angles; frontal furrows moderately well impressed, lateral carina well developed, anterior supraorbital seta situated in a deep elongate fovea; front between eyes subconvex and coarsely punctate, punctures arranged in transverse band; eyes large in diameter and very prominent.

Pronotum: Moderately transverse, disc subdepressed at middle, strongly convex anterolaterally; sides sinuate posteriorly, margins broadly reflexed and sulcate from base to anterior angles, surface laterobasally strongly carinate, carina extended nearly halfway to anterior lateral seta; hind angle about 90°; basal transverse impression well engraved laterally, narrowly interrupted medially and confluent with deeply sulcate median line; anterior angles not at all produced.

Elytra: Sutural interneur entire and deeply impressed throughout, interneurs 2 to 5 moderately impressed and ended about apical third, interneur 6 and 7 finely impressed basally and effaced apically, interneur 8 entire and shallowly sulcate throughout; humeral margin rounded to base of interneur 5, margin broadly reflexed and explanate from humerus to plica, edge very finely setulose throughout its length; chaetotaxy as in *T. picina* members; plica well developed and visible externally.

Microsculpture: Very coarsely engraved and

granulate on head, pronotum, and elytra, and consisting of isodiametric reticulations, partially arranged in rows on pronotal disc.

Genitalia: Not studied because of insufficient material.

Size: Length, 2.62 mm; width, 1.08 mm, 1 specimen measured.

DISTRIBUTION (Figure 87).—The range of this species extends from southern Congo Republic north to the Ivory Coast along the west coast of Africa.

14. *Tachyta hispaniolae* (Darlington), new combination

FIGURES 1, 72, 80–86, 88

Tachys hispaniolae Darlington, 1934:77 [holotype, female, MCZ; type-locality: Grande Riviere, Haiti].

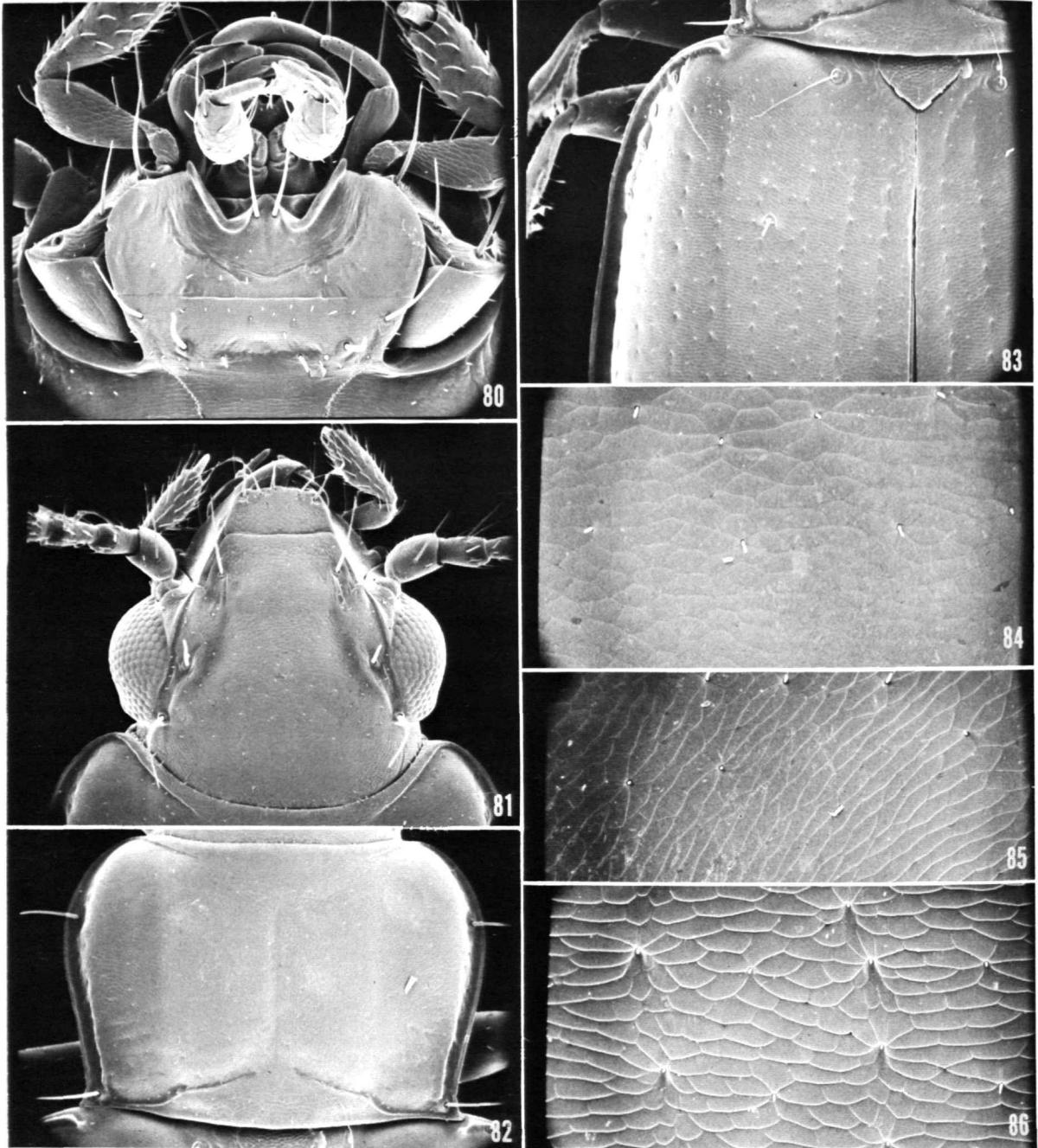
DIAGNOSIS.—The strong microreticulation of the dorsal surface and the pale elytral spots are distinctive in the genus.

DESCRIPTION.—*Form* (Figure 1): Elongate, broad, and subconvex; head broad and subconvex with very prominent eyes.

Color: Shiny rufous with testaceous labrum and elytral spots, one spot at apical third of each elytron; appendages testaceous; apex and sides of elytra in some specimens dark rufous.

Head (Figure 81): Broad and subconvex, equal across eyes to width of pronotum across anterior angles; frontal furrows shallow and poorly defined, lateral carina moderately well developed, fovea surrounding base of anterior supraorbital seta very shallow; front between eyes finely and sparsely punctulate, punctulae not arranged in transverse band; eyes large and very prominent. Mentum (Figure 80) deeply sulcate anteriorly, buccal fissure complete; submentum with shallow median sulcus.

Pronotum (Figure 82): Transverse, disc subconvex, laterally more strongly convex; sides abruptly sinuate near hind angles, margins moderately broadly reflexed and sulcate from hind angle to anterior lateral seta, less so to anterior angle, surface laterobasally carinate, carina short and not well developed; hind angles acute, denticulate; basal transverse impression well engraved laterally, narrowly interrupted medially; median



FIGURES 80-86.—*T. hispaniolae* female, south of Santiago, Dominican Republic: 80, mouthparts $\times 185$; 81, head $\times 92$; 82, pronotum $\times 92$; 83, left elytral base and humerus $\times 92$; 84, microreticulation of left frons $\times 462$; 85, same of left pronotum $\times 462$; 86, same of left elytron $\times 462$.

longitudinal line finely impressed; anterior angles not at all produced.

Elytra (Figure 83): Sutural interneur entire, striate-punctate, and moderately deeply impressed throughout, interneurs 2 to 7 less or not striate but moderately strongly punctate, the lateral ones less so, interneur 8 entire and sulcate-punctate throughout its length; humeral margin rounded to base of interneur 5, margin broadly reflexed and explanate from humerus to plica, edge setulose behind humerus; chaetotaxy as in *T. picina* members except Ed 3 located on same plane as Eo 4; plica well developed and visible externally.

Microsculpture (Figures 84–86): Well-impressed transversely arranged meshes, more nearly isodiametric on head, much less so on pronotum and almost scaly on elytra.

Genitalia: Male (Figure 72) with internal sac moderately darkly pigmented, with ventral rod of medium length, dorsal rod elongate and shallowly C-shaped, and C-sclerite large; phallus with apex attenuate (1 examined); female as in *T. falli* (2 examined).

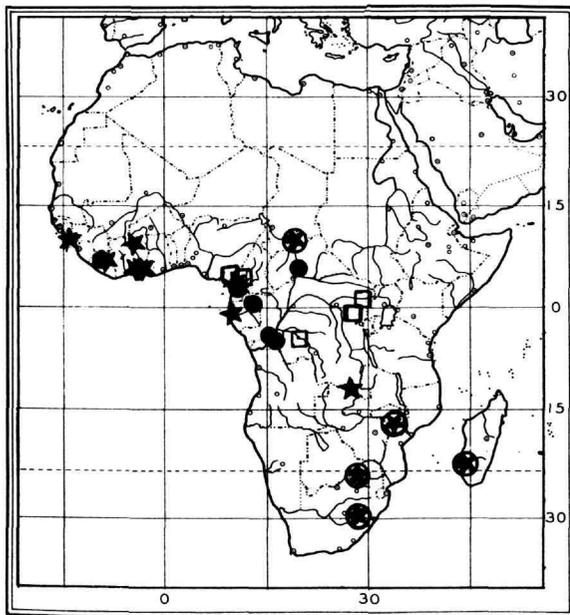


FIGURE 87.—Distribution map of *T. picina* (circled stars), *T. subvirens* (circles), *T. guineensis* (stars), *T. pseudovirens* (squares).

Size: Length, 2.56 to 2.76 mm; width, 1.12 to 1.16 mm, 2 specimens measured.

VARIATION.—See color, above.

NATURAL HISTORY.—Darlington found these beetles in June in the foothills of the central Cordillera of the Dominican Republic.

DISTRIBUTION (Figure 88).—These beetles are found only on the Greater Antillian island of Hispaniola, both in Haiti and the Dominican Republic.

The *pseudovirens* group

The single member of this group is very close to the preceding species, but lacks the elongate ventral sclerite of the male genitalia. In this species, the endophallic sclerite is short and medial. In addition, the pronotal carinae are very short and the median line is finely impressed.

Members of this monotypic group are found under bark of dead trees in a small area of western Africa.

15. *Tachyta pseudovirens* de Miré

FIGURES 69, 73, 87, 89–95

Tachyta pseudovirens de Miré, 1964:96 [holotype, sex unknown, probably in MRAC, not seen by me; type-locality: San Kuru, Congo, Africa].

DIAGNOSIS.—The dark coloration, short pronotal carinae, finely impressed median pronotal line, and elytral chaetotaxy (Ed 6 in position b, i.e., in the fourth interneur) are distinctive in the genus.

DESCRIPTION.—*Form* (Figure 69): Moderately elongate, broad, and depressed; head broad and convex with very prominent eyes.

Color: Piceous throughout; appendages darkly infuscated.

Head (Figure 90): Broad, frons convex, width across eyes equal to width of pronotum across anterior angles; frontal furrows well impressed and limited laterally by two well-developed carinae, anterior supraorbital seta thus in deep trough; front with scattered punctulae not arranged into definite transverse band; eyes very prominent. Mouthparts (Figure 89) with mentum deeply sulcate anteriorly and buccal fissure complete, impressed from side to side.

Pronotum (Figure 91): Very broadly transverse

and short, disc depressed at middle, subconvex laterally; sides moderately sinuate posteriorly, margins very narrowly beaded, moderately reflexed; surface laterobasally with short carina extended less than halfway to anterior lateral seta; hind angles slightly acute; basal transverse impression well impressed laterally, shallowly impressed medially and there confluent with narrow, and shallowly impressed median longitudinal line; anterior angles not produced.

Elytra (Figure 92): Sutural interneur striate, feebly punctulate, and well impressed, entire; interneurs 2 to 4 striate, feebly punctulate, moderately well impressed, and ended near apical third of elytron; lateral interneurs almost effaced, except 8 entire and feebly sulcate throughout; humeral margin rounded to base of interneur 5, margin broadly reflexed and explanate from humerus to plica, edge finely setulose; chaetotaxy as in *T. nana* except Ed 6 in position b, i.e., in the fourth interneur and Ed 3 located on place between Eo 3 and 4; plica well developed and visible externally.

Microsculpture (Figures 93–95): Coarsely engraved on head and pronotum, less so on elytra; nearly isodiametric reticulations on head and pronotum and with less tendency to form meshes on elytra.

Genitalia: Male (Figure 73) with internal sac of median lobe darkly pigmented and with no trace of the "C" sclerite (2 examined); female as in *T. falli* (1 examined).

Size: Length, 2.62 to 2.72 mm; width, 1.12 to 1.20 mm, 3 specimens measured.

VARIATION.—The specimens available to me are remarkably homogeneous except that color varies according to age of the individual.

NATURAL HISTORY.—Coiffait (in litt.) indicated that in Gabon specimens of this species were acquired at light and from under bark of dead trees in January and February. I have seen all of these specimens and none was teneral.

DISTRIBUTION (Figure 87).—The range of this species apparently is restricted to a small area in western Africa adjacent to the equator, from Cameroon through Gabon to Congo.

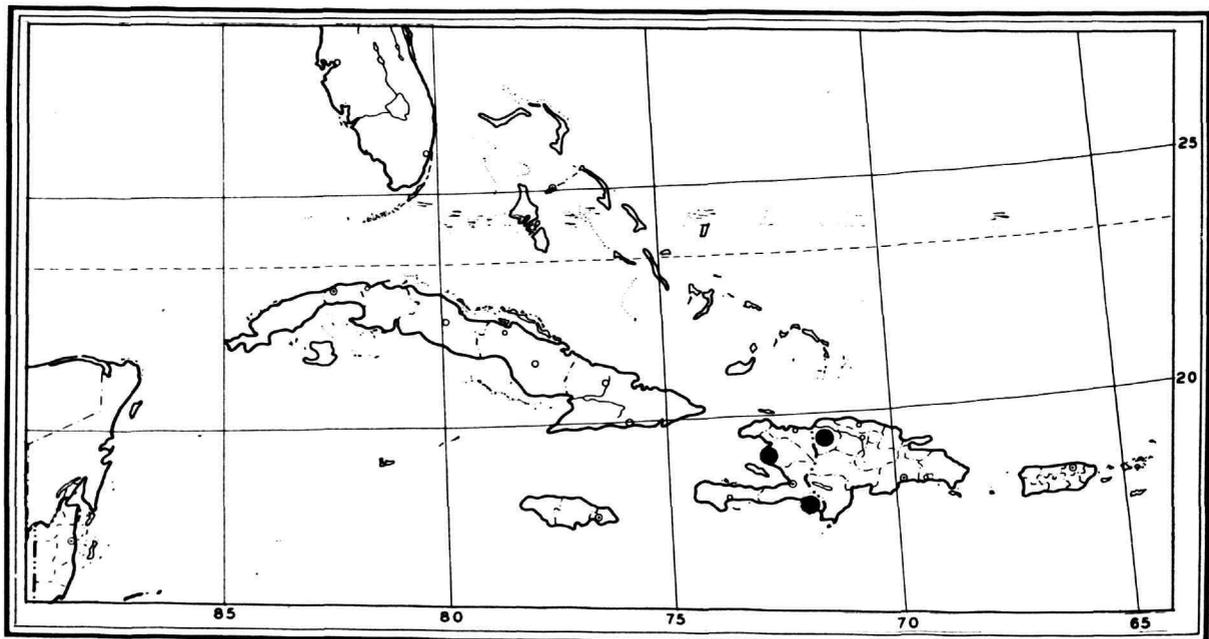
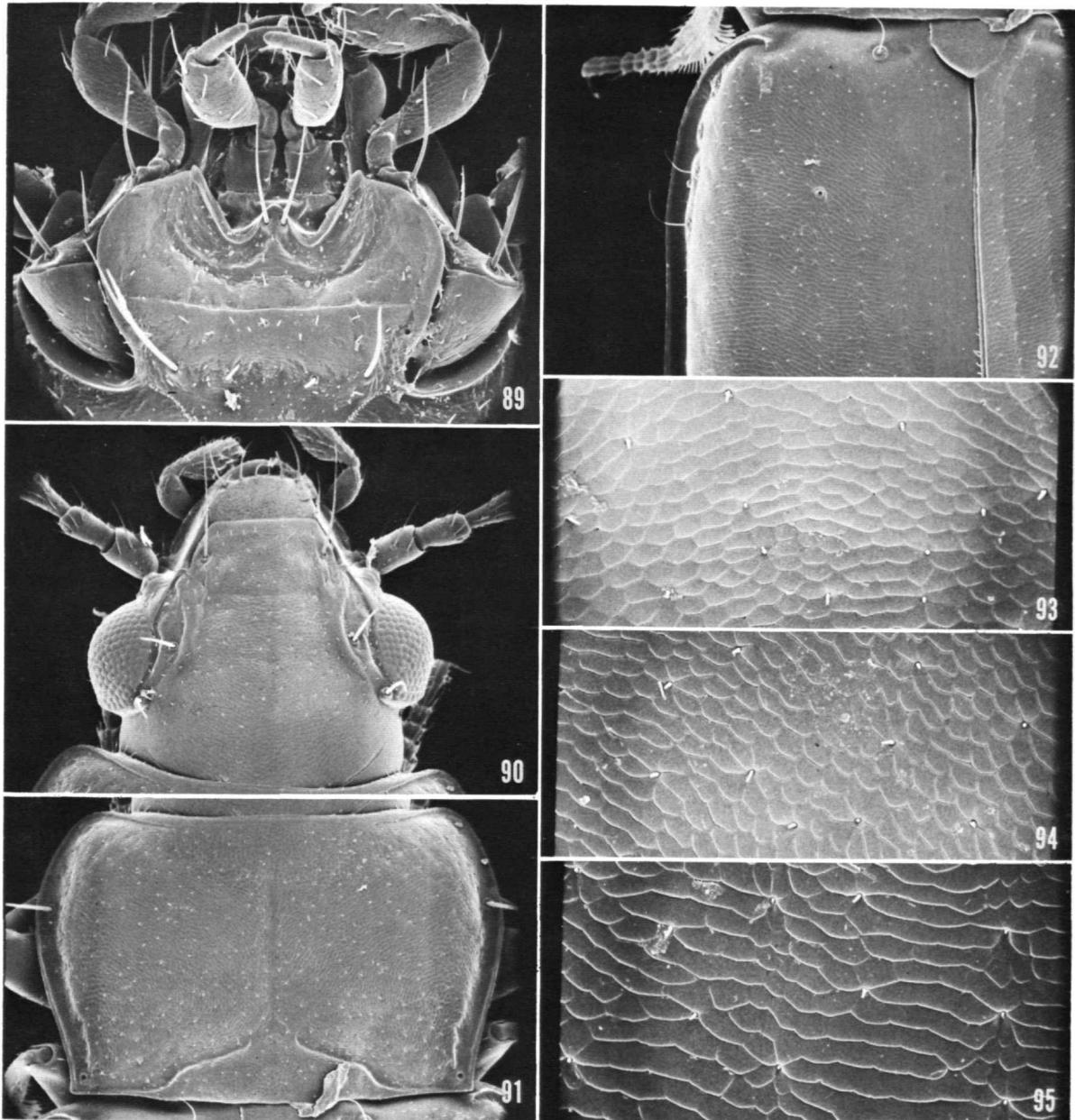


FIGURE 88.—Distribution map of *T. hispaniolae*.



FIGURES 89-95.—*T. pseudovirens* male, Belinga, Gabon: 89, mouthparts $\times 185$; 90, head $\times 92$; 91, pronotum $\times 92$; 92, left elytral base and humerus $\times 92$; 93, microreticulation of left frons $\times 462$; 94, same of left pronotum $\times 462$; 95, same of left elytron $\times 462$.

The *falli* group

Members of the *falli* group are characterized by their complex endophallus and elytral chaetotaxy. Members of both species are strongly microsculptured dorsally.

Both species occur under bark of logs and standing dead trees. *Tachyta falli* is probably restricted to conifers, but *T. angulata* is also found under bark of *Acer* and *Populus* spp.

Presently representing this group are two species with complimentary ranges. *Tachyta falli* is distributed throughout the Pacific Northwest, while *T. angulata* is found throughout most of the rest of North America (except the southeast) south to mid-Mexico.

16. *Tachyta falli* (Hayward)

FIGURES 96, 99, 101–111

Tachys falli Hayward, 1900:199 [lectotype, male, MCZ, desig-

nated by Erwin, 1974b:150, type-locality: Siskiyou County, California].

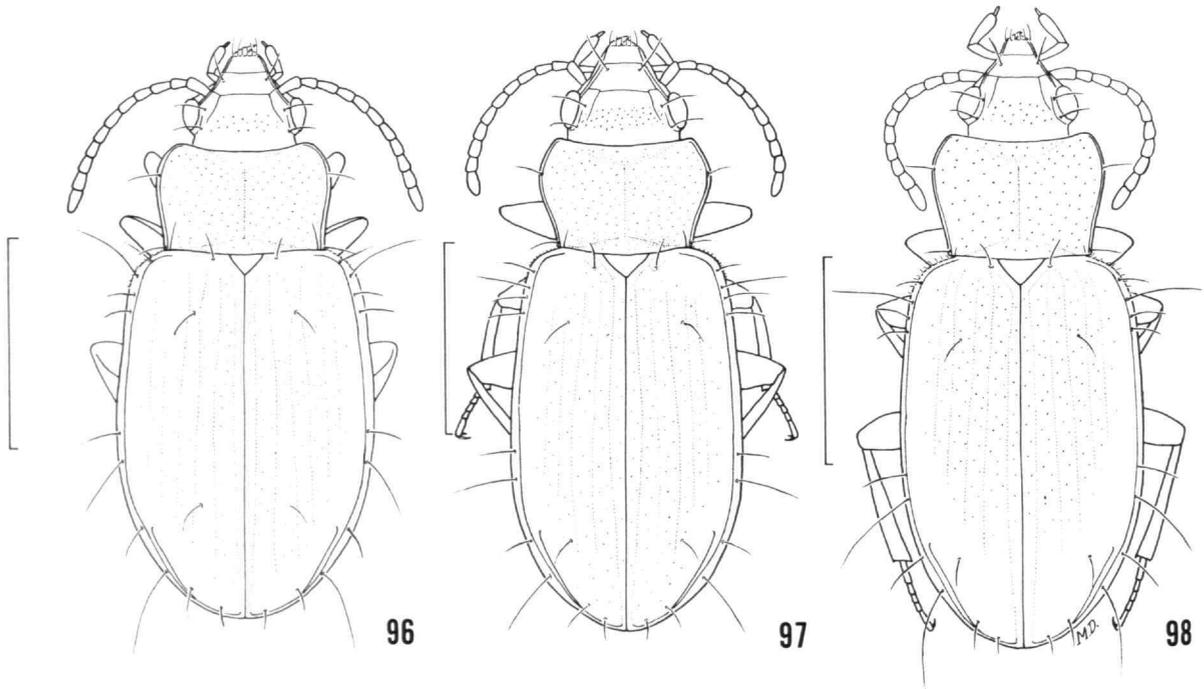
Tachyta falli (Hayward), Erwin, 1974b:150.

DIAGNOSIS.—The elytral chaetotaxy (Ed 6 in position a, Ed 3 located on a plane slightly behind Eo 4), shallowly rugose elytral surface and constriction of elytral interval 4 at Ed 3 are distinctive in the genus.

DESCRIPTION.—*Form* (Figure 96): Very broad, elongate and depressed; head broad and only slightly convex with small, moderately prominent eyes.

Color: Moderately shiny rufopiceous or piceous, elytral usually paler than head and pronotum; appendages flavotestaceous, penultimate article of maxillary palp infuscated.

Head (Figure 102): Broad and only slightly convex, slightly narrower across eyes than width of pronotum across anterior angles; frontal furrows very shallow and poorly defined, lateral carina low and not well developed, anterior supraorbital seta



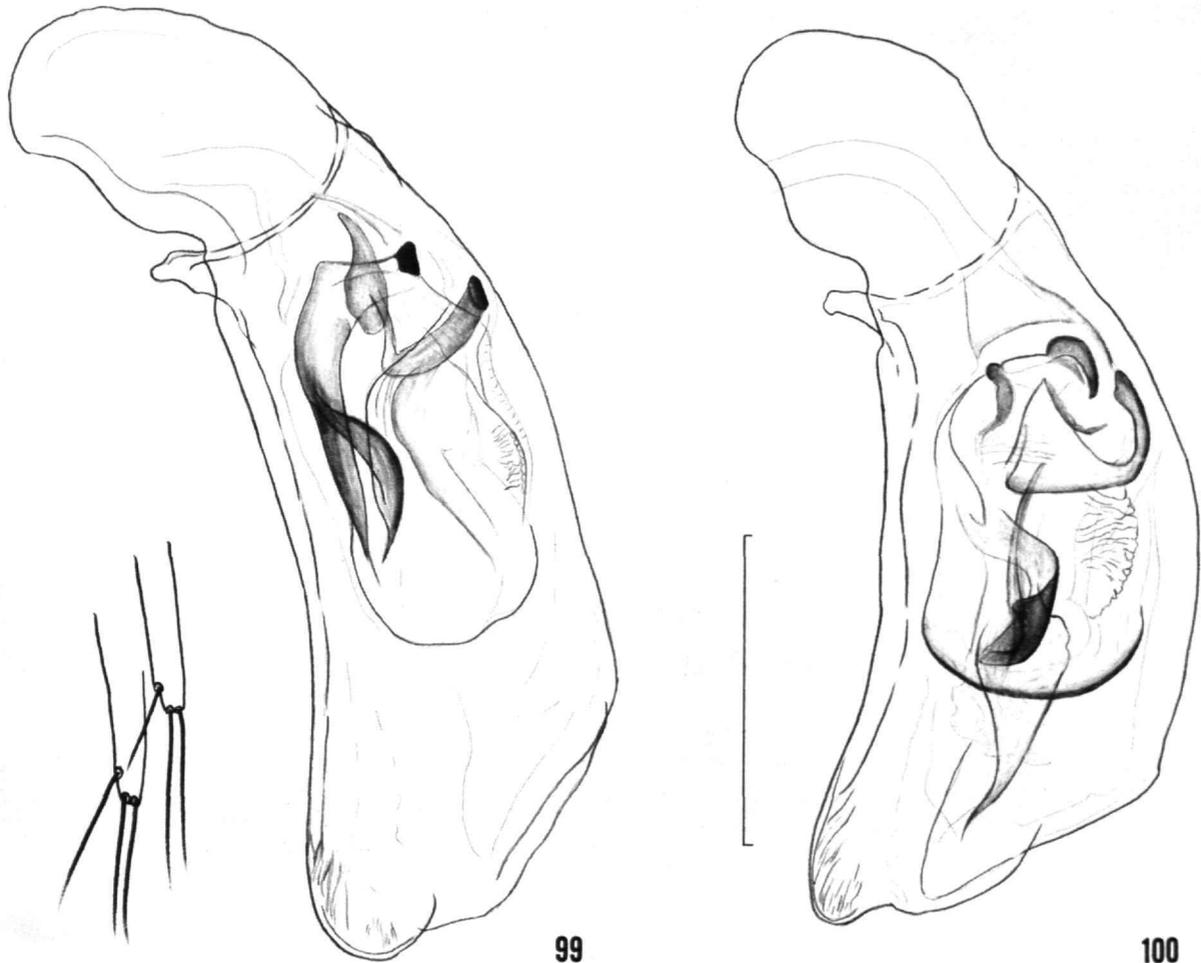
FIGURES 96–98.—Dorsal outline with details of *Tachyta* species: 96, *T. falli* male, Garibaldi Park, British Columbia; 97, *T. angulata* male, Cerro Potosi, Mexico; 98, *T. parvicornis* female, 16.1 miles south of Hannagan Meadows, Arizona.

located in deep fovea; front between eyes sparsely and finely punctulate, punctulae not arranged in transverse band but more or less grouped mesad to carina between supraorbital setae; eyes small and moderately prominent. Mentum (Figure 101) less sulcate than in *T. subvirens* members, with buccal fissure complete, and submentum with very small and shallow sulcus.

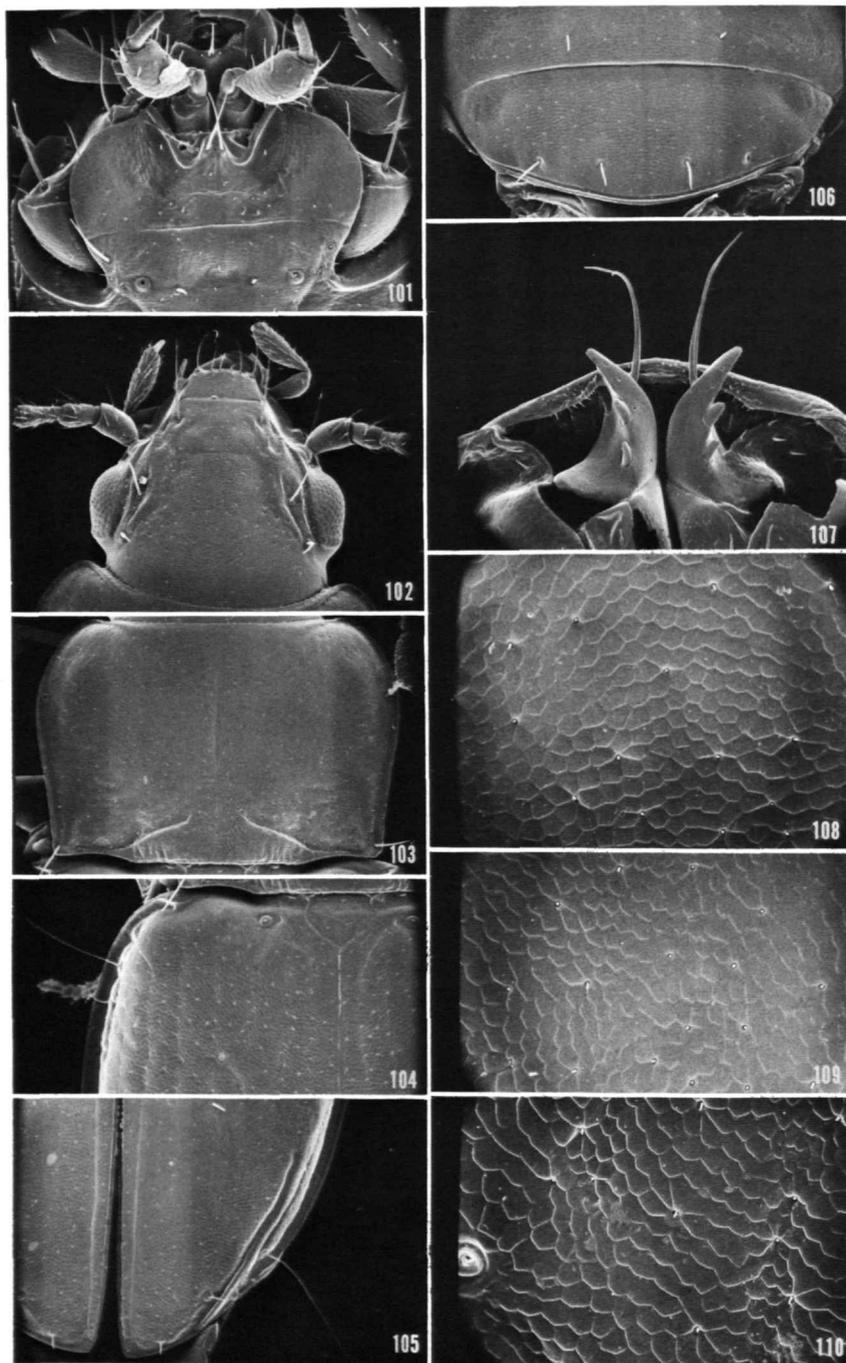
Pronotum (Figure 103): Transverse, disc flat medially and only slightly convex laterally; sides straight or slightly sinuate posteriorly, margins narrowly beaded, not reflexed, surface laterobasally strongly carinate, carina short; hind angles

about 90°; basal transverse impression well engraved laterally, broadly interrupted medially, and not confluent with strongly impressed median line; anterior angles moderately prominent, not produced.

Elytra (Figures 104, 105): Sutural interneur entire, striate and well impressed throughout, interneurs 2 to 6 moderately well impressed and ended at about apical third, interneur 7 effaced, interneur 8 sulcate anteriorly and posteriorly, effaced at middle; humeral margin rounded to base of interneur 5, margin broadly reflexed and explanate from humerus to plica, edge finely setulose



FIGURES 99-100.—Male genitalia, left lateral aspect and apices of parameres: 99, *T. falli*, Russell Valley, California; 100, *T. angulata*, 20.0 miles west of El Salto, Mexico.



FIGURES 101-110.—*T. falli*, Butt Valley Reservoir, California: 101, male mentum $\times 185$; 102, male head $\times 92$; 103, male pronotum $\times 92$; 104, male left elytral base and humerus $\times 92$; 105, female elytral apices $\times 78$; 106, female sternum VI $\times 107$; 107, female styli $\times 296$; 108, male microreticulation of left frons $\times 462$; 109, same of left pronotum $\times 462$; 110, same of left elytron $\times 462$.

behind humerus; chaetotaxy as in *T. nana*; plica well developed and visible externally.

Microsculpture (Figures 108–110): Well impressed, nearly isodiametric microreticulation over entire dorsal surface, meshes mostly forming transverse rows.

Genitalia (Figures 99, 107): Male (Figure 99) with internal sac complex, phallus with apex attenuate (5 examined); female (Figure 106, 107) (5 examined).

Size: Length, 2.60 to 3.24 mm; width, 1.10 to 1.44 mm, 8 specimens measured.

VARIATION.—The color as discussed above varies with age of the specimen. In addition, the shape of the pronotum varies in degree of sinuation posterolaterally, from straight to moderately sinuate. In the latter type, the beetles resemble *T.*

nana kirbyi members and are often mixed in collections. However, the roughened elytra and constricted fourth interval are distinctive.

NATURAL HISTORY.—Adults have been found from April to September; teneral adults were found in July and August. It is quite likely that hibernation takes place in the adult stage. Larvae can be found probably in early summer. Elevation record indicates an altitudinal range from near sea level in the California Coast Range to 2300 m in the Sierra Nevada. Many specimens were found under bark of *Pinus ponderosa* and *Abies magnifica* by my wife and me at 2150 m elevation near Chester, California. These beetles were also found under bark of *Pseudotsuga menziesii* in British Columbia (Lindroth, 1966) and “In rotten Balsam log” (label on specimen from Vancouver Island, British Columbia). This “Balsam log” was probably *Abies balsamea*.

DISTRIBUTION (Figure 111).—The range of this species is confined to the Pacific Northwest from southwestern British Columbia south to Fresno and Tulare counties, California, and east to Idaho. The species is known from the Coast Ranges, Cascades, and Sierra Nevada.

17. *Tachyta angulata* Casey

FIGURES 97, 100, 112–121

Tachyta angulata Casey, 1918:216 [lectotype, male, USNM, designated by Erwin, 1974b:150; type-locality: Bayfield, Wisconsin].

DIAGNOSIS.—The flat frontal area, abruptly sinuate sides of the pronotum, and elongate elytra make these beetles the most distinctive of the genus.

DESCRIPTION.—**Form** (Figure 97): Very elongate and narrow, strongly depressed; head broad and flat with small but prominent eyes.

Color: Dull piceous or almost black in some fully matured specimens; appendages flavous except distal antennal articles, which are infuscated.

Head (Figure 113): Very broad and flat, slightly narrower across eyes than pronotum across anterior angles; frontal furrows very shallow and poorly delimited medially, lateral carina low and not well developed, anterior supraorbital seta in shallow fovea; front between eyes with scattered punctulae, punctulae not arranged in transverse

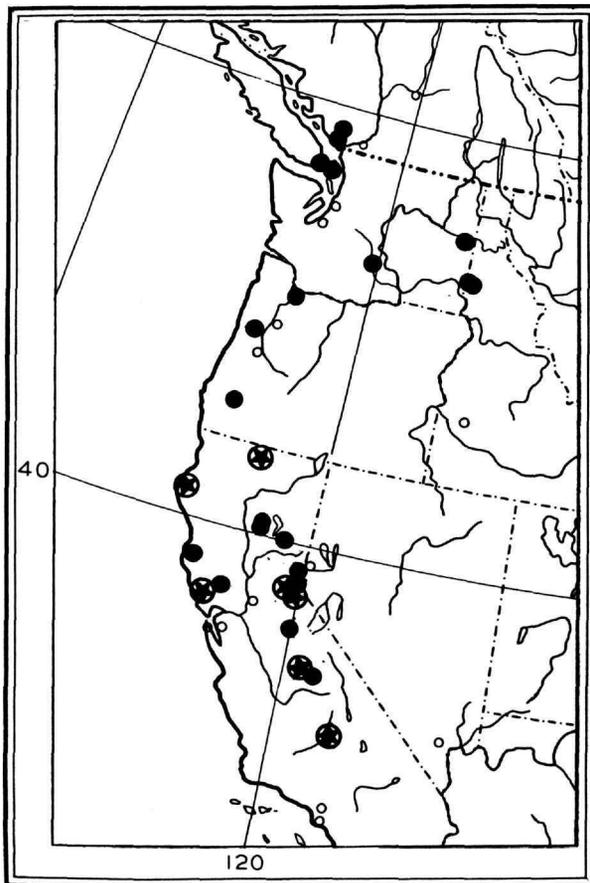
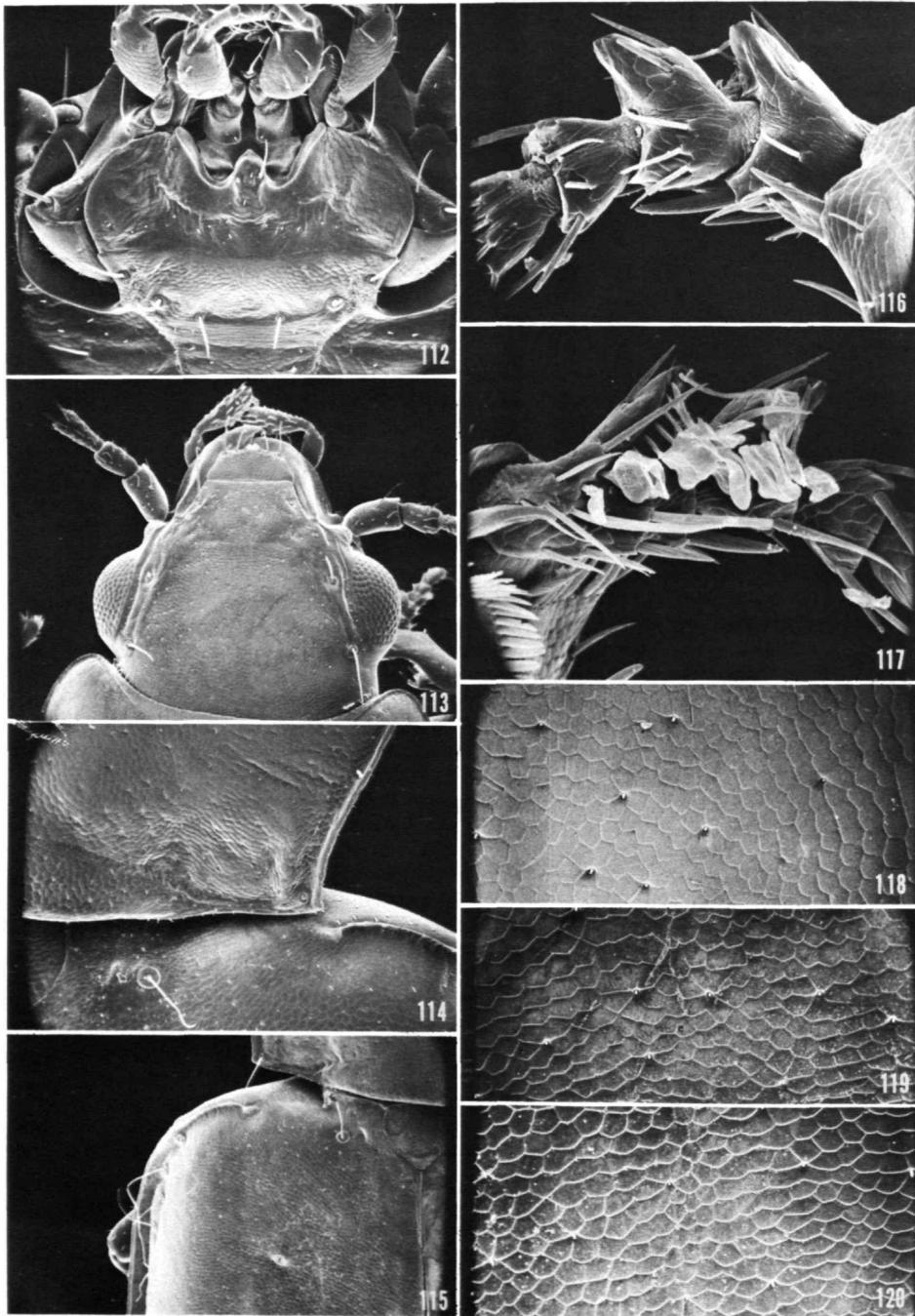


FIGURE 111.—Distribution map of *T. falli*.



FIGURES 112-120.—*T. angulata* male, Dosquet, Quebec, Canada: 112, mentum $\times 185$; 113, head $\times 92$; 114, pronotum, right hind angle $\times 185$; 115, left elytral base and humerus $\times 92$; 116, anterior tarsi, dorsal aspect $\times 462$; 117, same, ventral aspect $\times 462$; 118, microreticulation of left frons $\times 462$; 119, same of left pronotum $\times 462$; 120, same of left elytron $\times 462$.

band; eyes small and prominent. Mouthparts (Figure 112).

Pronotum (Figure 114): Narrow and more cordiform than in *T. falli* members, with disc very depressed medially and only slightly convex laterally; sides convergent posteriorly and abruptly sinuate just before hind angles, margins narrowly beaded, not reflexed, surface laterobasally with well-developed carina, carina short; hind angles slightly acute; basal transverse impression well impressed laterally, broadly interrupted medially and

not confluent with median line; anterior angles prominent, not produced. Male anterior tarsi (Figure 116, 117).

Elytra (Figure 115): Sutural interneur entire, striate, and lightly impressed throughout, interneurs 2 to 5 striate and feebly impressed, ended about apical third, lateral interneurs effaced, interneur 8 sulcate anteriorly and posteriorly, almost or completely effaced at middle; humeral margin rounded to base of interneur 5, margin broadly reflexed and explanate from humerus to

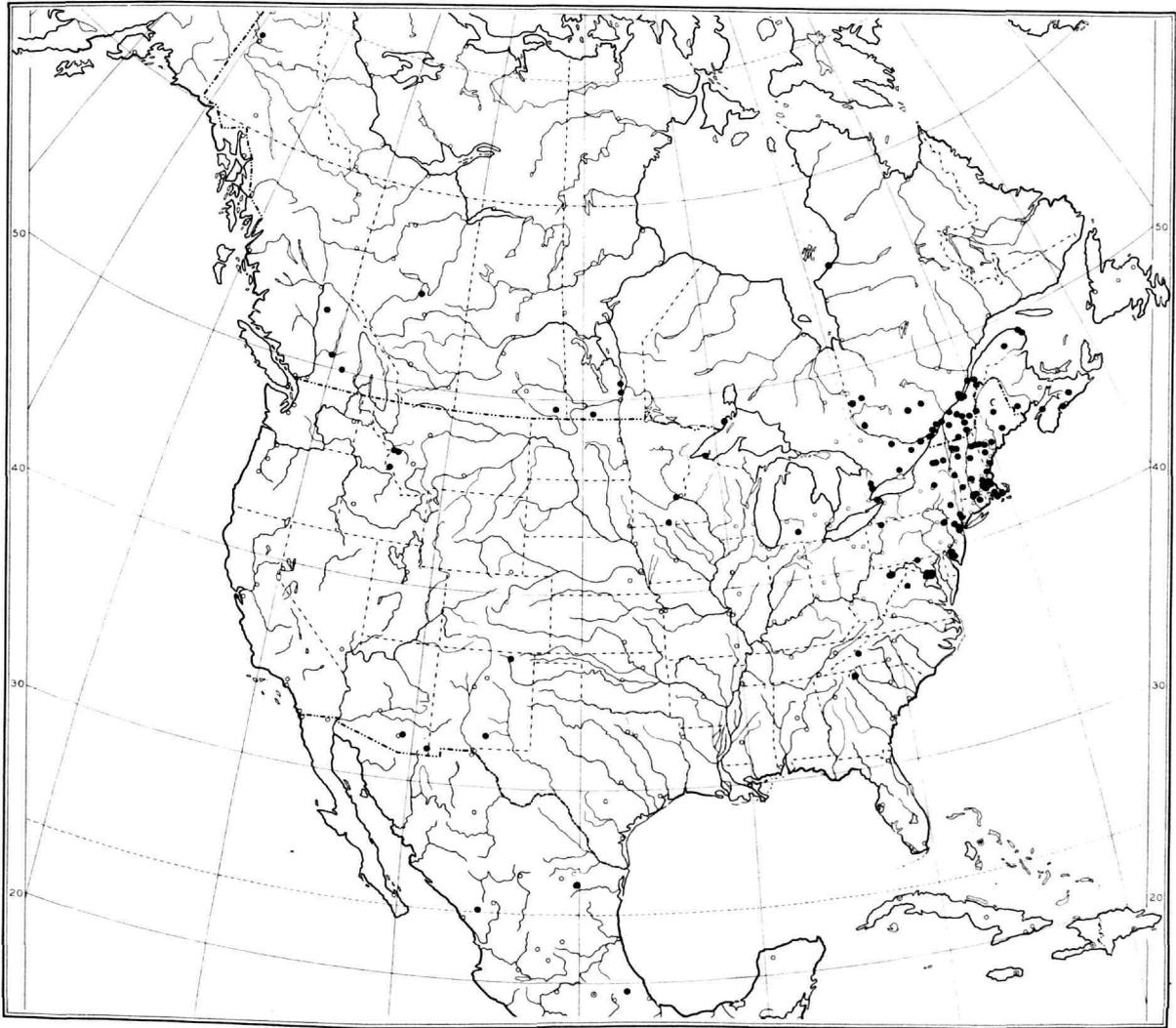


FIGURE 121.—Distribution map of *T. angulata*.

plica, edge finely setulose behind humerus; chaetotaxy as in *T. nana* members except Ed 3 position unstable (see below); plica well developed and visible externally.

Microsculpture (Figures 118–120): Well impressed, almost perfectly isodiametric microreticulation over entire dorsal surface, meshes mostly forming transverse rows.

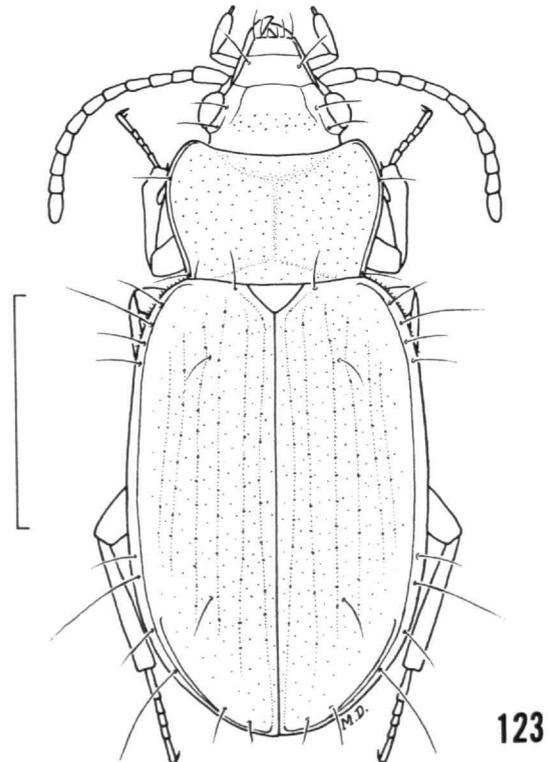
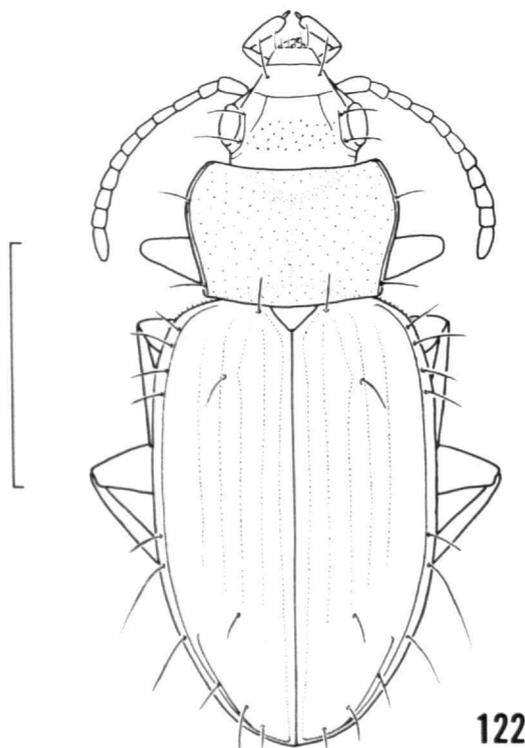
Genitalia (Figure 100): Male internal sac complex, phallus with broadly rounded apex (7 examined); female as in *T. falli* members (10 examined).

Size: Length, 2.60 to 3.10 mm; width, 1.04 to 1.40 mm, 8 specimens measured.

VARIATION.—The color varies with the age of the specimen. The position of Ed 3 varies from anterior of Eo 4 to posterior of Eo 4, and Ed 3's of each elytron vary with respect to each other. The elytral interneurs are more deeply impressed in the Mexican specimens.

NATURAL HISTORY.—Adults have been found from February to November; teneral adults were found in August. It is likely that hibernation takes place in the adult stage and that larvae can be found in early summer. Elevation records indicate an altitudinal range from near sea level in the north to about 3700 m in Mexico. Lindroth (1966) indicates that specimens were found under bark of *Pseudotsuga menziesii*. I have seen specimen labels which indicate that the attached specimens were found under bark of *Betula lutea* (New York), *Populus* sp. (British Columbia), and *Acer* sp. (Maryland). One specimen from Quebec was found in "Berlese sample ex lining of deserted beaver lodge," and it is likely that the specimen came from under bark of one of the beaver's trees.

DISTRIBUTION (Figure 121).—The range of this species is vast and extends from Nova Scotia west to Yukon and British Columbia and south to Veracruz, Mexico. The species is known from both



FIGURES 122-123.—Dorsal outline with details of *Tachyta* species: 122, *T. nana inornata* female, Edgewood, Maryland; 123, *T. nana kirbyi* female, Olympia, Washington.

the Sierra Madre Oriental and Sierra Madre Occidental in Mexico.

The *nana* group

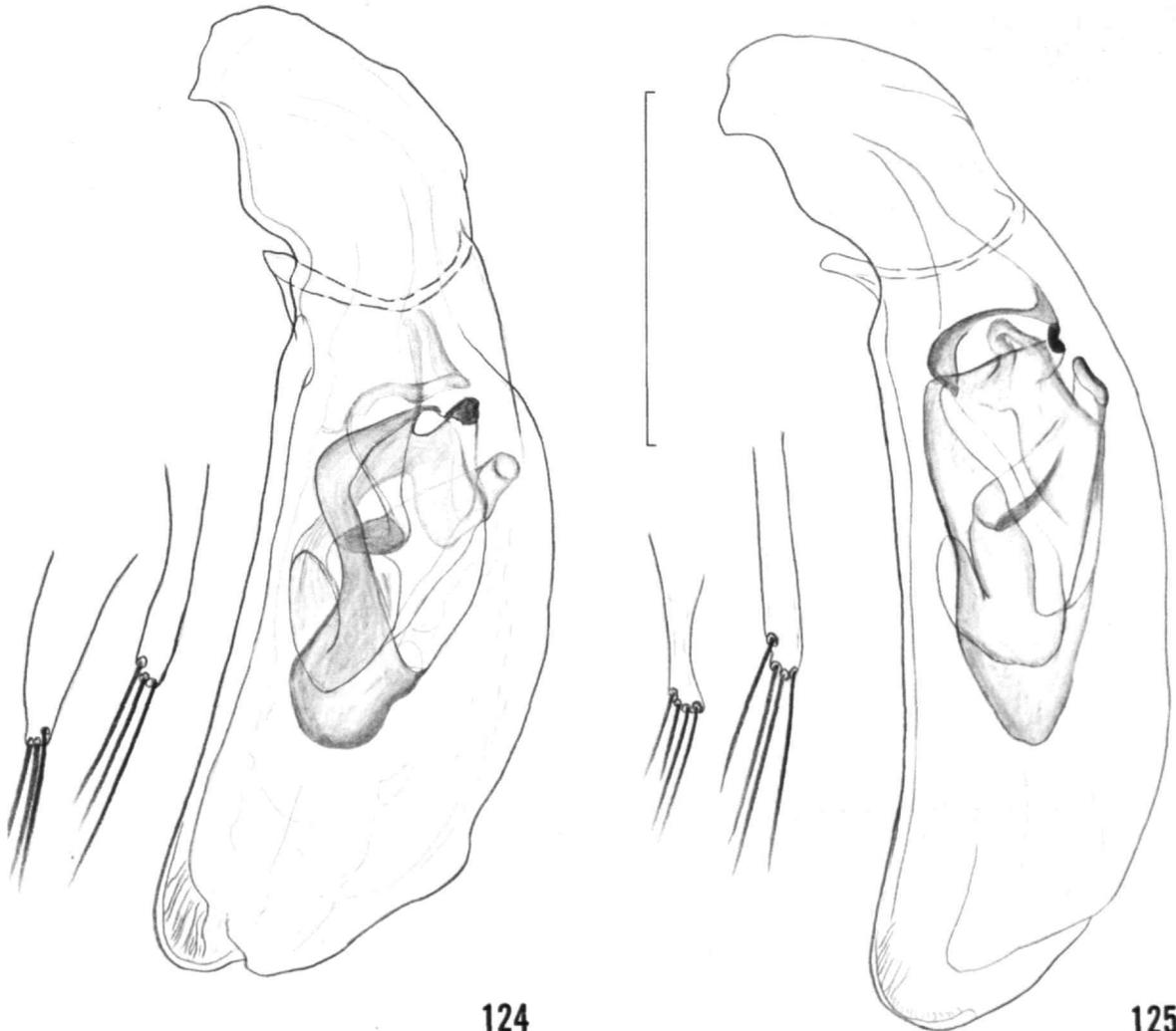
Members of the *nana* group are characterized by their complex and highly similar endophalli and elytral chaetotaxy. Members of both species are strongly microsculptured dorsally. One species is polytypic and widely distributed; the second species is only in the southern and eastern United States.

Both species occur under bark of conifers; *T. nana* also occurs under bark of hardwoods.

The combined range of the two species in this group can be described as Holarctic.

18. *Tachyta nana* (Gyllenhal)

This polytypic species is composed of three geographic races here ranked as subspecies. One of these, the nominate, is Palearctic in distribution. I have seen so few specimens of this form that only a few comments can be made at this time. In general, the nominate subspecies members are narrow and subconvex and the pronotum always has a rudimentary carina or tuberculate area laterobasally. This form occurs in Japan, Siberia,



FIGURES 124-125.—Male genitalia, left lateral aspect and apices of parameres: 124, *T. nana kirbyi*, Nominique, Quebec, Canada; 125, *T. parvicornis*, Black Hills, South Dakota.

and throughout Europe (specimens seen by me). I have seen one specimen from southern China which corresponds perfectly with *T. nana kirbyi* of northern North America, even in male genitalia. Until more specimens are discovered which prove otherwise, I regard this form as *T. n. kirbyi* (discussion follows).

A second subspecies, *T. nana inornata*, is Nearctic and Neotropical in distribution, ranging from 50°N latitude south to Belize and Guatemala. This form has members which are narrow and subconvex as in the nominate form, but which have neither the carina (not even the rudiment) nor a roughened area laterobasally on the pronotum. In two areas, western Montana and western Washington, this form occurs with *T. n. kirbyi* and apparently the two intergrade. Intergrade specimens are intermediate in broadness and flatness and have a roughened area laterobasally on the pronotum. In no case, however, did I observe even a rudimentary carina on the pronotum as in the nominate subspecies.

The third subspecies, *T. nana kirbyi*, is northern in distribution, except for more southern scattered localities in the Rocky Mountains or its outliers. As mentioned above, I have seen one specimen from the south of China. Members of this subspecies are very broad and depressed and have a well-developed carina laterobasally on the pronotum.

All of these forms have identical male genitalia. For this reason, I have here ranked the forms as subspecies. However, a careful analysis of many specimens from the area of overlap in North America should be undertaken. Specimens are not presently available for this kind of study. We need to obtain many additional specimens, host tree documentation, and perhaps life-cycle information in order to determine interbreeding capabilities, degree of intergradation of forms, and whether or not we are dealing with species or subspecies.

18a. *Tachyta nana nana* (Gyllenhal)

FIGURES 126, 136

Bembidium nanum Gyllenhal, 1810:30 [lectotype not seen by me, male, UMU, designated by Lindroth, 1966:436; type-locality: Sweden].

Tachyta nana (Gyllenhal).—Schaum, 1860:746.—Bates, 1882:137.

Carabus quadristriatus Illiger, 1798:188 [type(s) not seen; type-locality: "Prussia"; synonymy from Andrewes, 1925:486].

Elaphrus minimus Duftschmidt, 1812:205 [type(s) not seen; type-locality: "Austria"; synonymy from Andrewes, 1925:486].

Tachyta laticollis Motschulsky, 1846:8 [type(s) not seen; type-locality: "Caucasus"; synonymy from Andrewes, 1925:486].

DIAGNOSIS.—As presently understood, this is the only Palearctic form of the genus. See key for diagnostic characteristics.

DESCRIPTION.—Moderately elongate, narrow, and subconvex; head small and narrow across eyes.

Color: Forebody piceous, elytra rufopiceous; appendages more brunneus; surface shiny.

Head: Across eyes equal to width of pronotum across anterior angles; frontal furrows (as in Figure 128) shallow and delimited laterally by two carinae, one narrow carina extended from clypeus to posterior supraorbital seta and adjacent to eye, the other carina extended from posterior supraorbital seta upon clypeus with short interruption at frontoclypeal suture, front between eyes finely and sparsely punctulate; eyes moderately sized, setulose, and prominent. Mouthparts (as in Figure 127).

Pronotum (Figure 136): Transverse (as in Figure 129); disc subconvex; sides sinuate posteriorly, margins narrowly beaded, not reflexed; surface laterobasally with rudimentary longitudinal carina; basal transverse impression well engraved laterally, interrupted medially; anterior angles slightly prominent.

Elytra: Sutural interneur striate and well impressed, entire; interneurs 2 to 4 moderately well impressed and ended at posterior third, 5 to 7 very feebly impressed and ended at middle, 8 interrupted at middle and sulcate posteriorly, sulcate-foveate anteriorly; humeral margin rounded to base of interneur 5, margin broadly reflexed and explanate from humerus to plica, edge finely setulose; chaetotaxy formula: Eo—1a, 2b, 3a, 4e, 5a, 6a, 7, 8a, and Ed—1, 3b, 6a, 7b, 8; plica well developed and visible externally.

Microsculpture (as in Figures 132–134): Moderately coarsely engraved, nearly isodiametric meshes variously stretched into transverse rows or longitudinal rows, the latter especially on disc of pronotum.

Genitalia: Male (as in Figure 124) (2 examined); female as in *T. falli* (2 examined).

Size: Length, 2.80 to 3.04 mm; width, 1.16 to 1.28 mm, 2 specimens measured.

VARIATION.—I have seen too few specimens to assess variation.

NATURAL HISTORY.—Lindroth (1945) has given a detailed account of the ecology and biology of this subspecies. He indicates that members of this subspecies occur under the bark of *Pinus silvestris*, *Quercus robur*, *Alnus incana*, *Populus tremula*, *Fagus* spp., and *Fraxinus* spp. The larva and pupa were described by Perris (1862). In Europe, hibernation takes place in the adult stage (Lindroth, 1966).

DISTRIBUTION (Figure 126).—Palearctic—I have seen specimens from Europe, Siberia, and Japan. Lindroth (1945) also cites North Africa, Iran, and Asia Minor.

18b. *Tachyta nana inornata* (Say)

FIGURES 122, 127–135, 137

Bembidium inornatum Say, 1823:87 [neotype, male, MCZ, designated by Lindroth and Freitag, 1969:339; type-locality: Asheville, North Carolina as designated by Lindroth, 1966:436].—Hayward, 1900:233.

Tachyta nana inornatum Say.—Lindroth, 1953:176.

Tachyta picipes Kirby, 1837:56 [lectotype, female, BMNH, designated by Erwin, 1974b:151; type-locality: "British America, latitude 54°"].—LeConte, 1848:471.

Tachys rivularis Motschulsky, 1846:8 [lectotype, female, MMM, designated by Erwin, 1974b:151; type-locality: California as noted by Erwin, 1974b:151].—Hayward, 1900:233.

Tachyta collaris Casey, 1918:218 [lectotype, male, USNM, designated by Erwin, 1974b:151; type-locality: Washington (state)].—Lindroth, 1966:436.

Tachyta californica Casey, 1918:219 [lectotype, female, USNM, designated by Erwin, 1974b:151; type-locality: Humboldt County, California].—Lindroth, 1966:437.

Tachyta debilicollis Casey, 1918:219 [lectotype, male, USNM, designated by Erwin, 1974b:151; type-locality: Catskill Mountains, New York].—Lindroth, 1966:437.

Tachyta arizonica Casey, 1918:219 [lectotype, male, USNM, designated by Erwin, 1974b:151; type-locality: Arizona].—Erwin, 1974b:151.

DIAGNOSIS.—The lack of a carina laterobasally on the pronotum and the effaced middle of interneur 8 on the elytron are distinctive in the North and Middle American fauna.

DESCRIPTION.—*Form* (Figure 122): Moderately elongate, narrow, and subconvex; head small and narrow across eyes.

Color: Various, see below.

Head (Figure 128): Across eyes equal to width

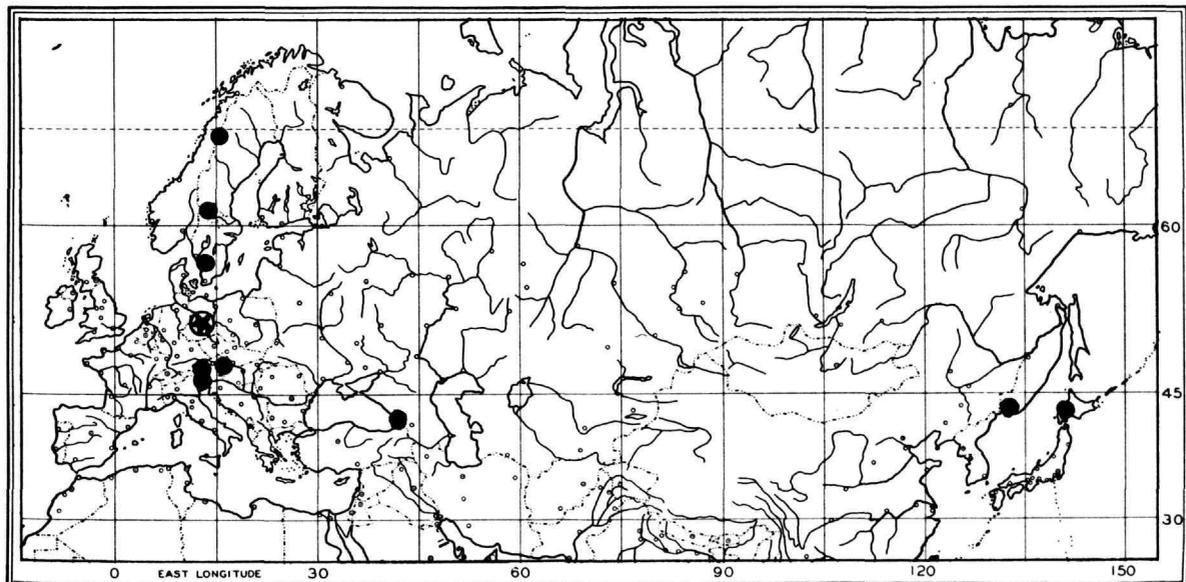
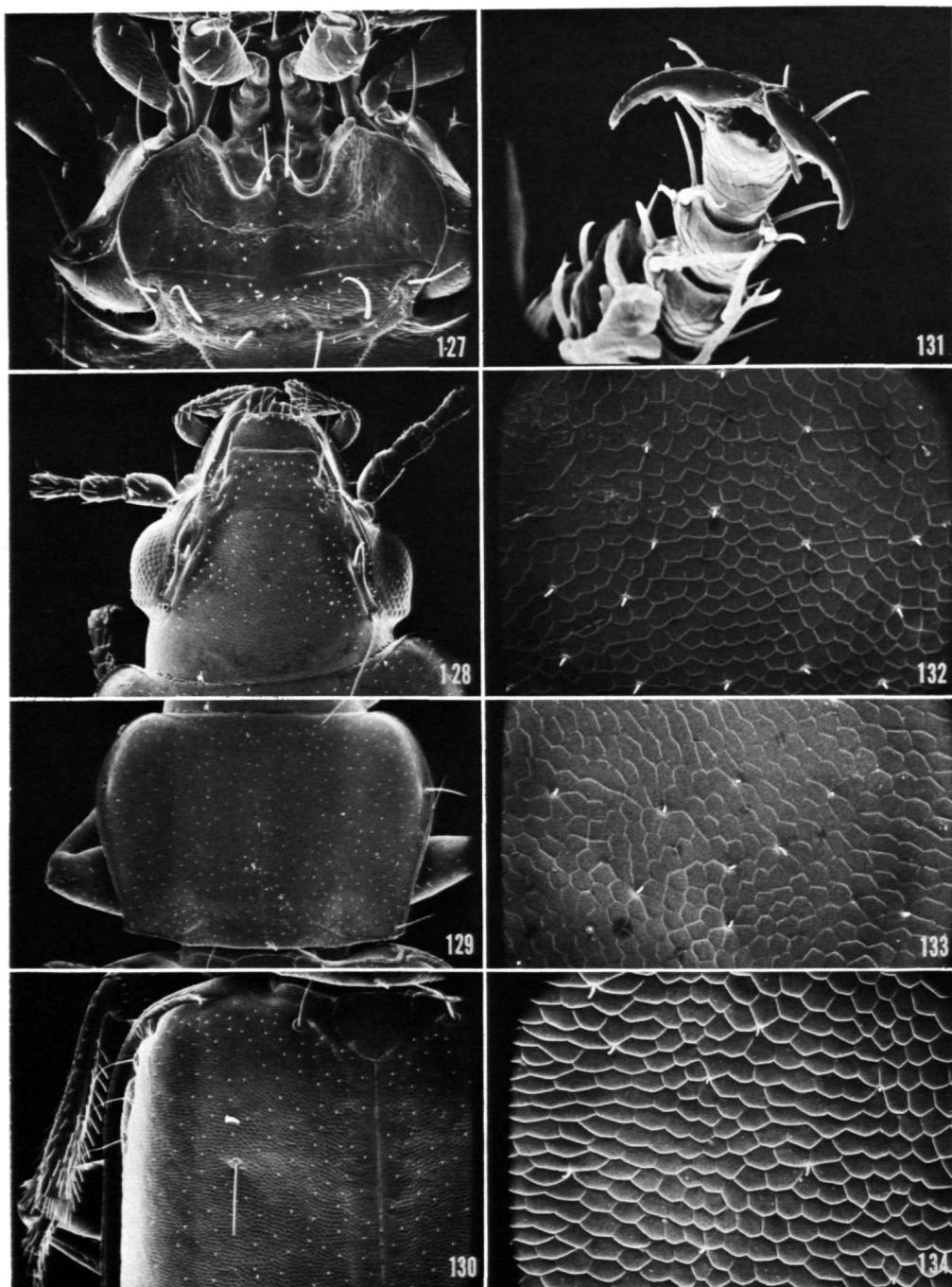


FIGURE 126.—Distribution map of *T. nana nana*.



FIGURES 127-134.—*T. nana inornata* male, Edgewood, Maryland: 127, mentum $\times 185$; 128, head $\times 92$; 129, pronotum $\times 74$; 130, left elytral base and humerus $\times 92$; 131, claws, anterior tarsus $\times 462$; 132, microreticulation of left frons $\times 462$; 133, same of left pronotum $\times 462$; 134, same of left elytron $\times 462$.

of pronotum across anterior angles; frontal furrows (Figure 128) moderately well impressed and limited laterally by two carinae extended from frontoclypeal margin to behind eye, carinae narrowed posteriorly and arranged as in *T. nana nana*; front between eyes finely and moderately densely punctulate; eyes slightly smaller than *T. nana nana* or *T. nana kirbyi*, setulose, and prominent. Mouthparts (Figure 127).

Pronotum (Figure 129): Transverse, disc subconvex; sides slightly sinuate posteriorly, margins narrowly beaded, not reflexed; surface laterobasally without a carina or rudiment of one; basal transverse impression well engraved laterally, in-

terrupted or not medially; anterior angles slightly prominent.

Elytra (Figure 130): Sutural interneur striate and well impressed, entire; interneurs 2 to 4 very shallowly impressed and ended just behind middle, lateral interneurs effaced or nearly so, 8 interrupted at middle and sulcate posteriorly, sulcate-foveate anteriorly; humeral margin rounded to base of interneur 5, margin broadly reflexed and explanate from humerus to plica, edge finely setulose; chaetotaxy as in nominate form; plica well developed.

Microsculpture (Figures 132-134): As in nominate form.

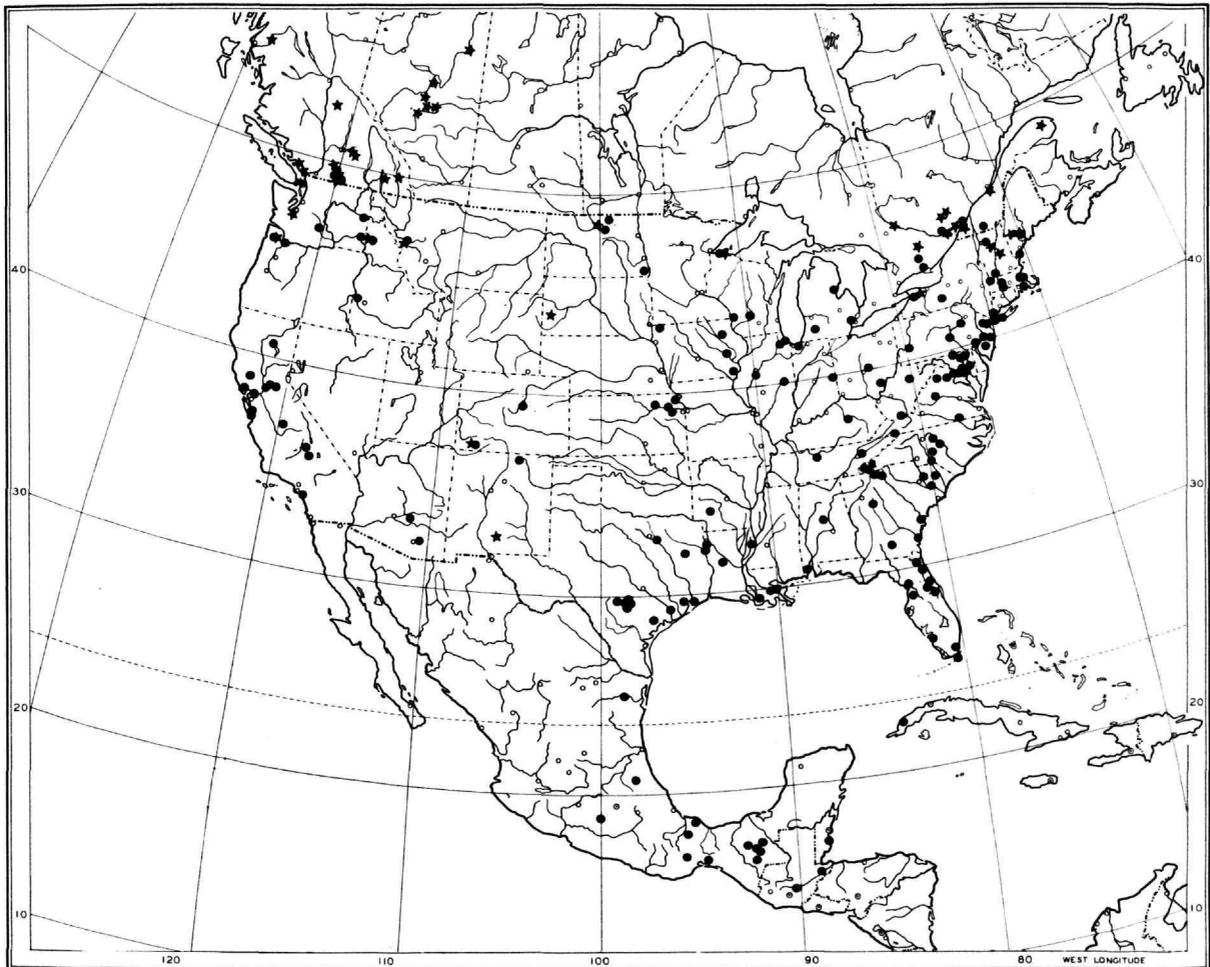


FIGURE 135.—Distribution map of *T. nana inornata* (circles) and *T. nana kirbyi* (stars).

Genitalia (as in Figure 124): Male as in the nominate form (6 examined); female as in *T. falli* (5 examined).

Size: Length, 2.28 to 3.16 mm; width, 0.96 to 1.34 mm, 5 specimens measured.

VARIATION.—Color variation is quite pronounced in this form, and I think this may be due to prolonged pigment deposition after emergence. In regard to appendage color, there seems to be some geographic correlation with melanistic appendages occurring in North Carolina and California and dark rufopiceous forms occurring elsewhere. In addition to color variation, the interneurs of the elytra appear to be more deeply impressed in some individuals within population samples.

NATURAL HISTORY.—Adults have been found in all months of the year; teneral adults were found in June and August. Therefore it is quite likely that hibernation takes place in the adult stage. Larvae can be found probably in early summer, at least in the eastern United States. Elevation records indicate an altitudinal range from sea level to 2150 m. Many specimen labels indicate the beetles were found under bark, but few labels state what species of tree. Those doing so have used common names, for example pine, oak, fir, elm. Grant Gaumer and I found several individuals under bark of a fallen and sun-parched hackberry, *Celtis laevigata*, in Texas. My wife, LaVerne, and I found individuals under fir bark, *Abies magnifica*, at 2150 m elevation near Chester, California. It is quite likely that members of this subspecies are able to live under the bark of many tree species. This would partially account for the very wide geographic range.

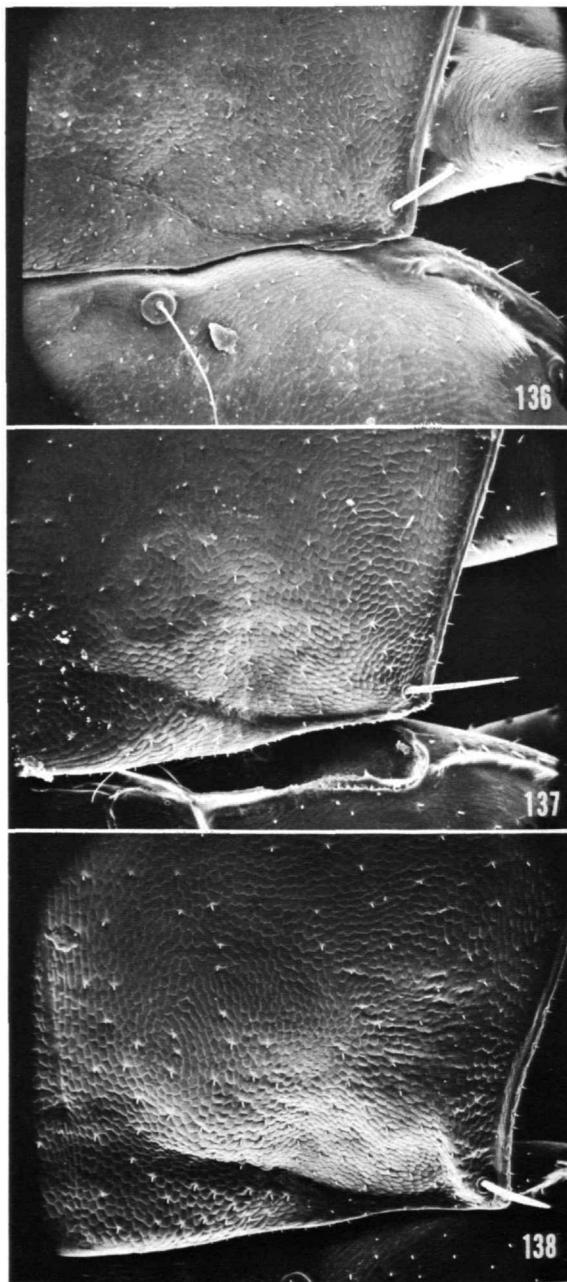
DISTRIBUTION (Figure 135).—The range of this subspecies extends from southern British Columbia and Quebec south to Belize and Guatemala.

18c. *Tachyta nana kirbyi* Casey, new status

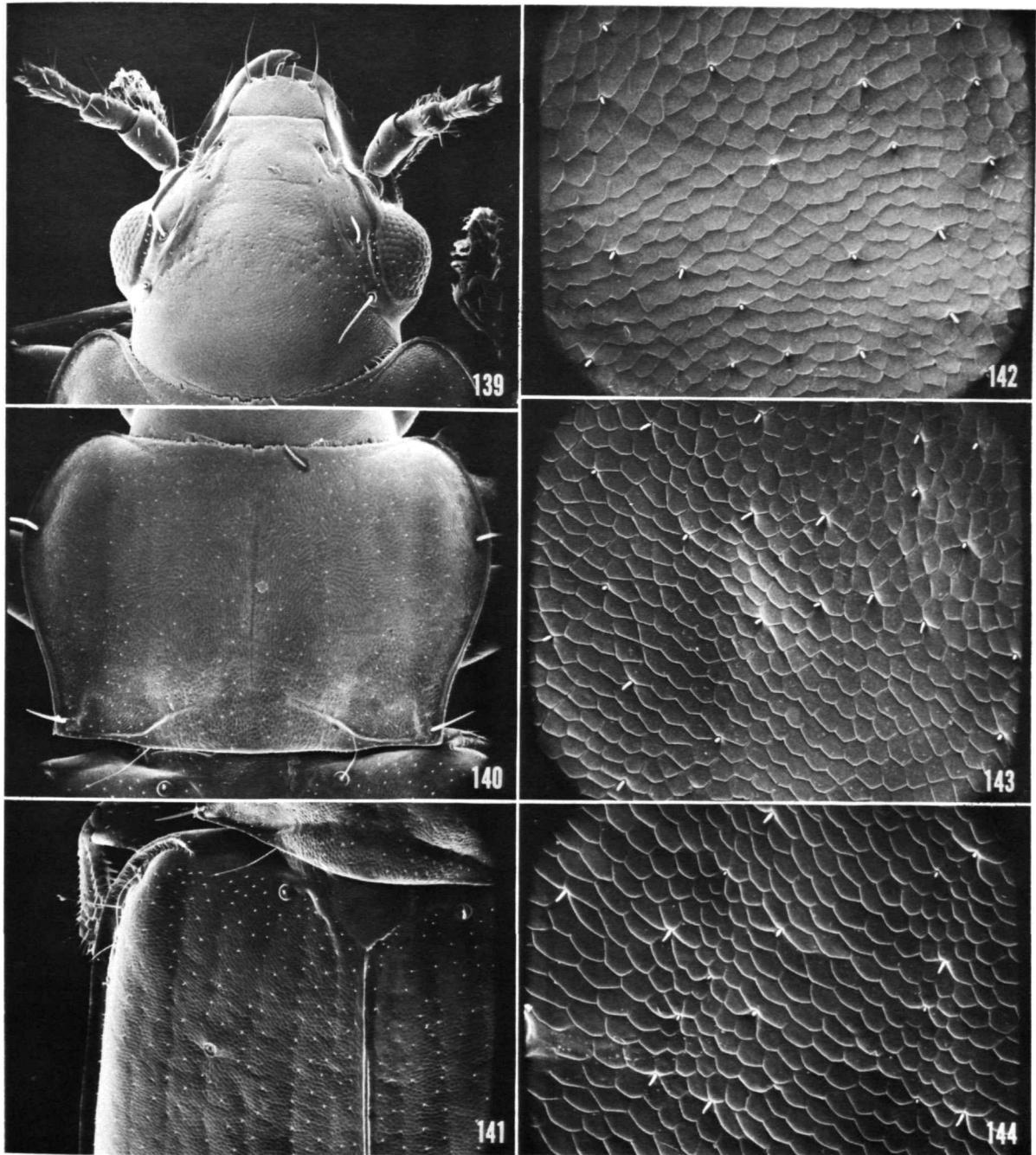
FIGURES 123, 124, 135, 138–144

Tachyta kirbyi Casey, 1918:216 [lectotype, male, USNM, designated by Erwin, 1974b:151; type-locality: Duluth, Minnesota].

DIAGNOSIS.—The incomplete eighth interneur, broadly depressed body, and well-developed carina at the pronotal hind angle are distinctive character states.



FIGURES 136–138.—Pronotum, right hind angle $\times 185$: 136, *T. nana nana* male, Negoi, Austria; 137, *T. nana inornata* male, Edgewood, Maryland; 138, *T. nana kirbyi* male, George Lake, Alberta, Canada.



FIGURES 139-144.—*T. nana kirbyi* male, George Lake, Alberta, Canada: 139, head $\times 92$; 140, pronotum $\times 92$; 141, left elytral base and humerus $\times 92$; 142, microreticulation of left frons $\times 462$; 143, same of left pronotum $\times 462$; 144, same of left elytron $\times 462$.

DESCRIPTION.—*Form* (Figure 123): Elongate, broad, and depressed; head broad and subdepressed. Pronotum transverse, sides slightly sinuate basally; elytra with slightly arcuate sides, widest about apical third.

Color: Dull piceous, appendages slightly paler; elytral suture usually also paler.

Head (Figure 139): Across eyes equal to width of pronotum across anterior angles; frontal furrows (Figure 139) moderately well impressed and limited laterally by two carinae as in *T. n. inornata* except ridge between carinae broader especially between supraorbital setae and more convex and smoother just anterior to first supraorbital seta; front between eyes finely and moderately densely punctulate, punctulae more grouped into transverse band than in members of other subspecies, center often with small fovea; eyes more prominent than in members of other subspecies.

Pronotum (Figures 138, 140): Broadly transverse, disc more or less flat although not as depressed as in *T. angulata* members; sides slightly sinuate posteriorly, margins narrowly beaded, slightly reflexed; surface laterobasally with a carina (Figure 138); hind angles slightly acute; basal transverse impression well engraved laterally, broadly interrupted medially; anterior angles prominent.

Elytra (Figure 141): Sutural interneur striate and well impressed, entire; interneurs 2 to 6 moderately well impressed and effaced in apical third or so, 7 effaced, 8 interrupted at middle and sulcate posteriorly, sulcate-foveate anteriorly; humeral margin rounded to base of interneur 5, margin broadly reflexed and explanate from humerus to plica, edge finely setulose; chaetotaxy as in nominate form; plica well developed.

Microsculpture (Figures 142–144): As in nominate form.

Genitalia (Figure 124): Male endophallus complexly sclerotized, apex (in repose) broadly rounded (6 examined); female as in *T. falli* (5 examined).

Size: Length, 2.70 to 3.28 mm; width, 1.16 to 1.36 mm, 8 specimens measured.

VARIATION.—Members of this form are remarkably constant throughout a rather large range.

NATURAL HISTORY.—Adults have been found in January (China only), and March through Oc-

tober; one teneral specimen was collected in August, in British Columbia. It is likely that hibernation takes place in the adult stage, and therefore larvae should be found in mid-summer. Elevation records indicate an altitudinal range from sea level to 1220 m. Tree host records recorded on labels are *Pinus ponderosa*, *Abies balsamea*, *Picea glauca*, and *Pseudotsuga menziesii*. The specimens recorded from *Picea* were collected at George Lake, Alberta, by my wife and me. The tree was downed near the road cut and was exposed to direct sun. The bark was very dry and easily flaked off the parched wood.

DISTRIBUTION (Figure 135).—The range of this subspecies extends from Quebec (Gaspé Peninsula) to southern Alaska (Lindroth, 1966) and south along the Rocky Mountains to New Mexico.

19. *Tachyta parvicornis* Notman

FIGURES 98, 125, 145–156

Tachyta parvicornis Notman, 1922:100 [holotype, male, in FDAG, not seen by me; type-locality: St. Petersburg, Florida].

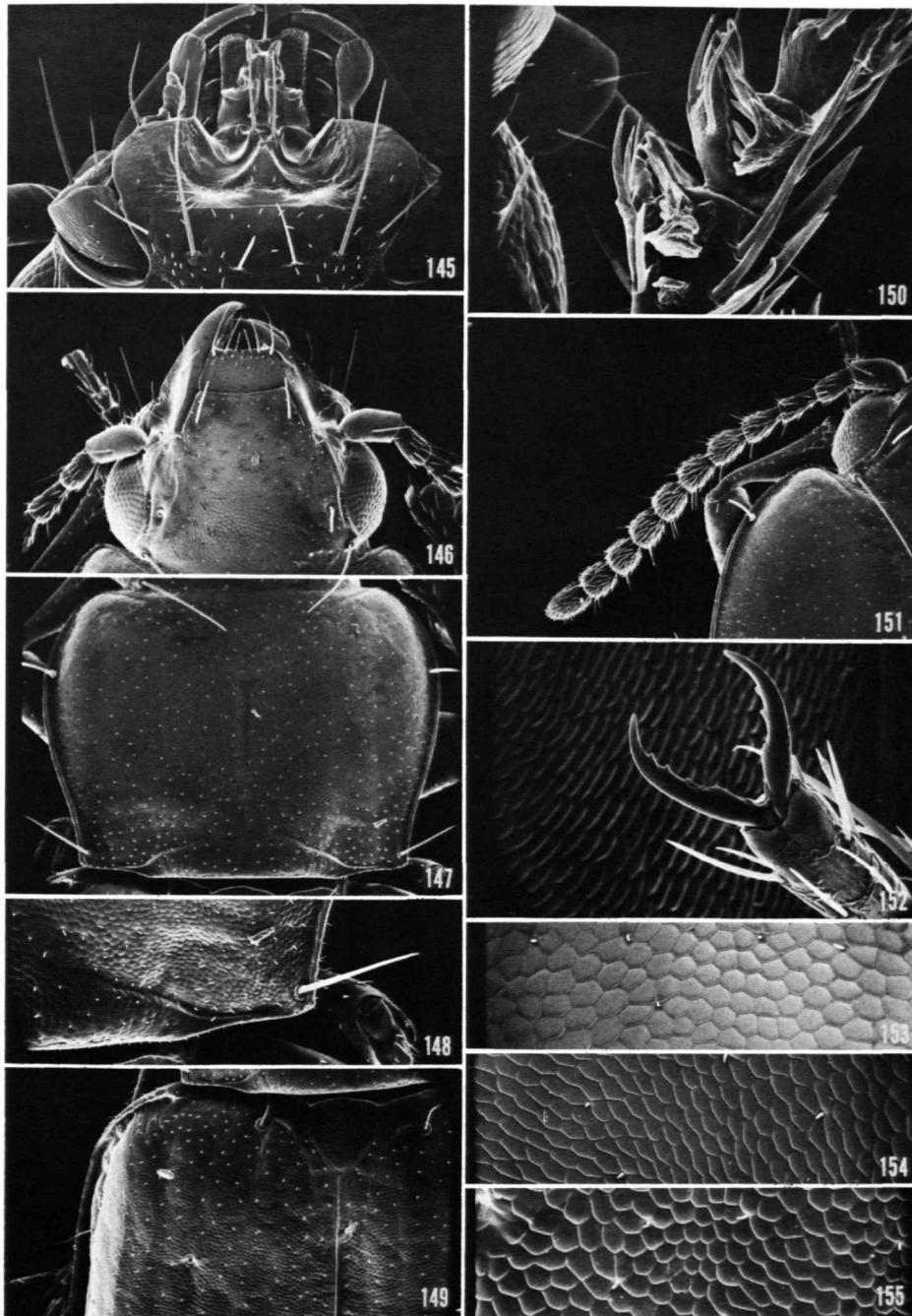
DIAGNOSIS.—This species is the only one in North America whose members have an entire interneur 8.

DESCRIPTION.—*Form* (Figure 98): Similar to members of *T. nana inornata* except still narrower and slightly more convex; pronotum almost quadrate, elytra moderately elongate and distinctly parallel-sided.

Color: Moderately shiny rufopiceous or piceous; appendages flavous or flavopiceous.

Head (Figure 146): Proportionately as in members of *T. nana inornata*; frontal furrows much less impressed and raised area around anterior supraorbital seta less pronounced than in members of *T. nana inornata*; front between eyes without well-defined punctulate belt; eyes prominent, slightly larger than *T. nana* members, and setulose. Mouthparts (Figure 145). Antenna (Figure 151).

Pronotum (Figures 147, 148): Narrow and nearly quadrate, disc subconvex; sides slightly sinuate posteriorly with slightly obtuse hind angles; surface laterobasally without carina or rudiment of one; basal transverse impression well engraved laterally, interrupted broadly at middle; anterior angles not produced, margin nearly trun-



FIGURES 145-155.—*T. parvicornis* male, 16.1 miles south of Hannagan Meadows, Arizona: 145, mouthparts $\times 185$; 146, head $\times 92$; 147, pronotum $\times 92$; 148, pronotum, right hind angle $\times 185$; 149, left elytral base and humerus $\times 92$; 150, anterior tarsi, ventral aspect $\times 462$; 151, left antenna, dorsal aspect $\times 85$; 152, claws, posterior tarsus $\times 462$; 153, microreticulation of left frons $\times 462$; 154, same of left pronotum $\times 462$; 155, same of left elytron.

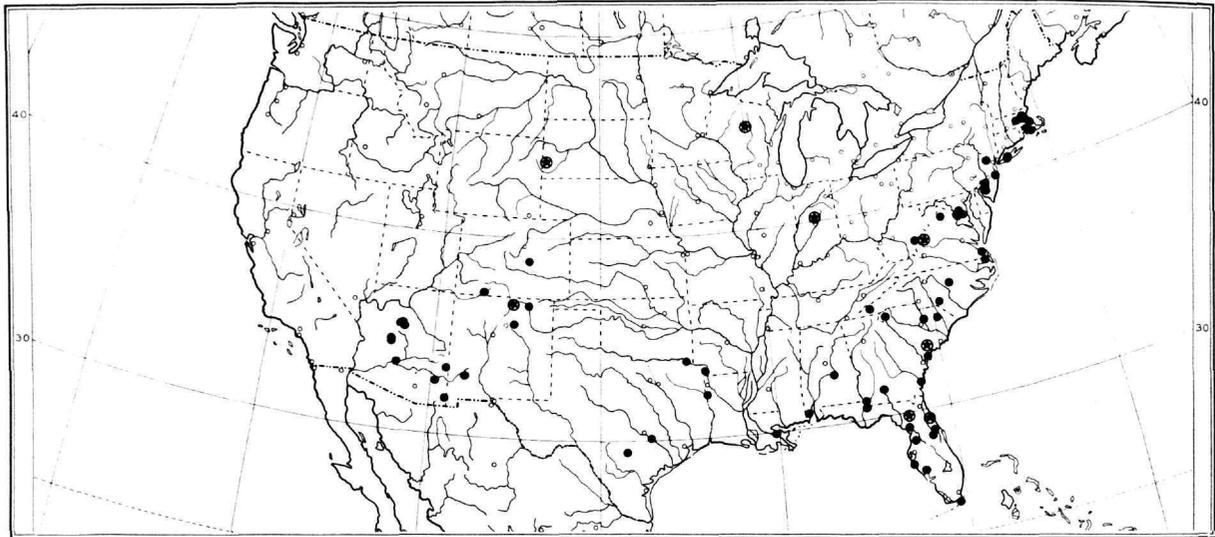


FIGURE 156.—Distribution map of *T. parvicornis*.

cate. Male anterior tarsi (Figure 150), posterior tarsal claws (Figure 152).

Elytra (Figure 149): Sutural interneur striate and well impressed, entire; interneurs 2 to 4 moderately well impressed and ended just behind middle, lateral interneurs effaced or nearly so, 8 entire and sulcate throughout its length; humeral margin rounded to base of interneur 5, margin narrowly reflexed and narrowly explanate from humerus to plica, edge setulose, setae longer than in any other North American form; chaetotaxy as in *T. nana* members; plica well developed.

Microsculpture (Figures 153–155): As in members of *T. nana*, except meshes of pronotum slightly more elongate and less complete.

Genitalia (Figure 125): Male endophallus similar to those of *T. nana* members except distal sclerotization more narrowly rounded (4 examined); female as in *T. falli* (5 examined).

Size: Length, 2.34 to 2.82 mm; width, 0.96 to 1.18 mm, 8 specimens measured.

VARIATION.—Color variation is as described for *T. nana inornata*. In *T. parvicornis* the more melanistic forms occur in Arizona, the more rufinistic ones in Florida.

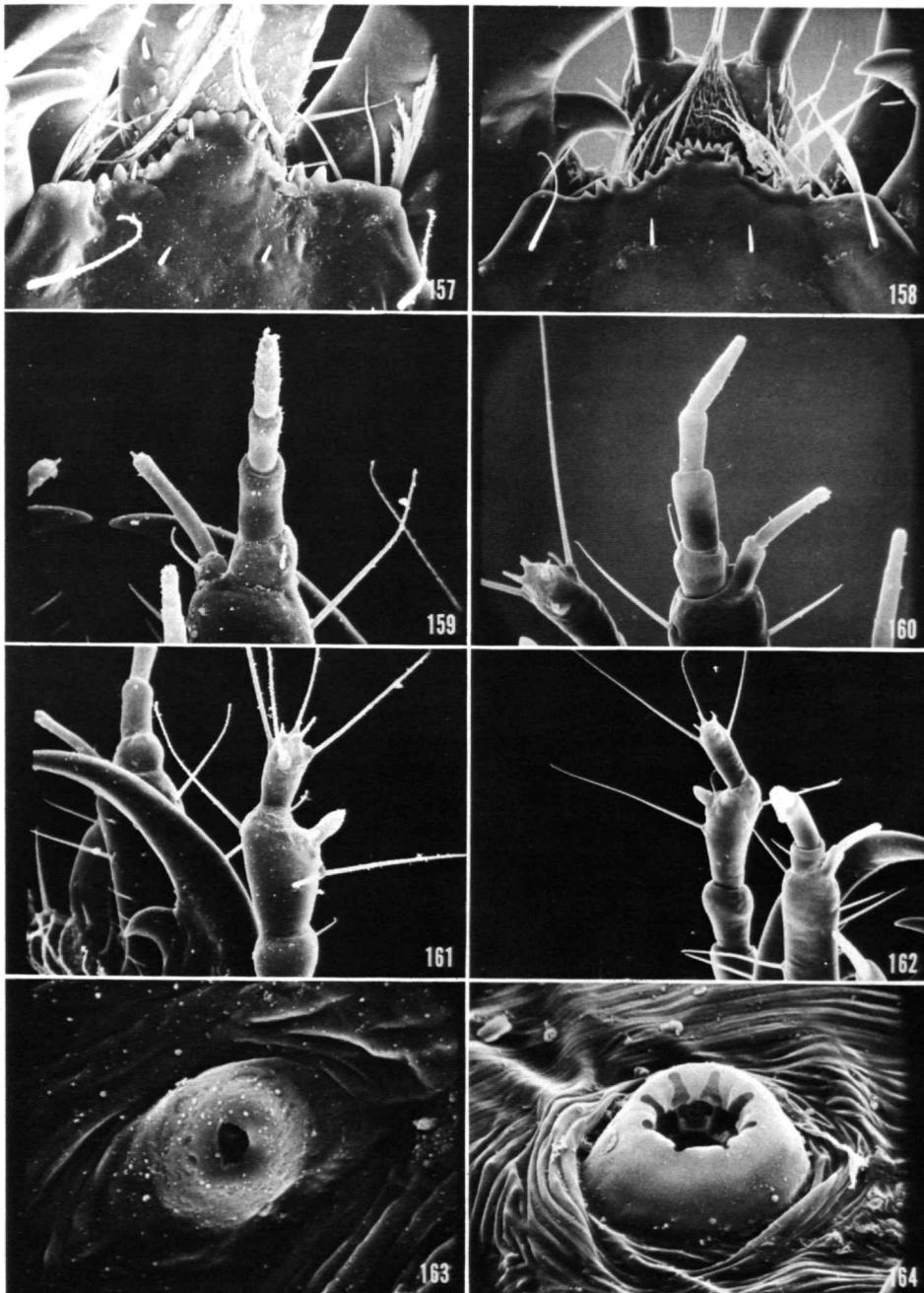
NATURAL HISTORY.—Adults have been found in all months except November; teneral specimens were found in April, May, June, July, and Sep-

tember. It is possible that hibernation takes place in various stages in this species. Elevation records indicate an altitudinal range from sea level to 2300 m. Many specimens have labels indicating the beetles were found under pine bark; only one gives a specific host, *Pinus rigida*.

DISTRIBUTION (Figure 156).—The range of this species extends from Massachusetts and Wisconsin south to Florida and west to South Dakota and Arizona.

The Larval Stages of *Tachyta* and *Tachymenis* Species

Perris (1862) first described the larval and pupal stages of *Tachyta nana nana*. Unfortunately, the illustrations do not show character states that are useful at the subtribal level. Gardner (1938) described the larval stage of *Tachyta umbrosa*; again the illustrations, while better than those of Perris, do not show adequately the necessary character states. Van Emden (1942) restudied these papers and larvae of the same species plus larvae of genus *Tachymenis* (see below and his page 63). Van Emden's illustrations are well prepared and useful for comparative purposes, although only *T. nana nana* is illustrated. In addition, Van Emden did not recognize the genera *Tachyta* and



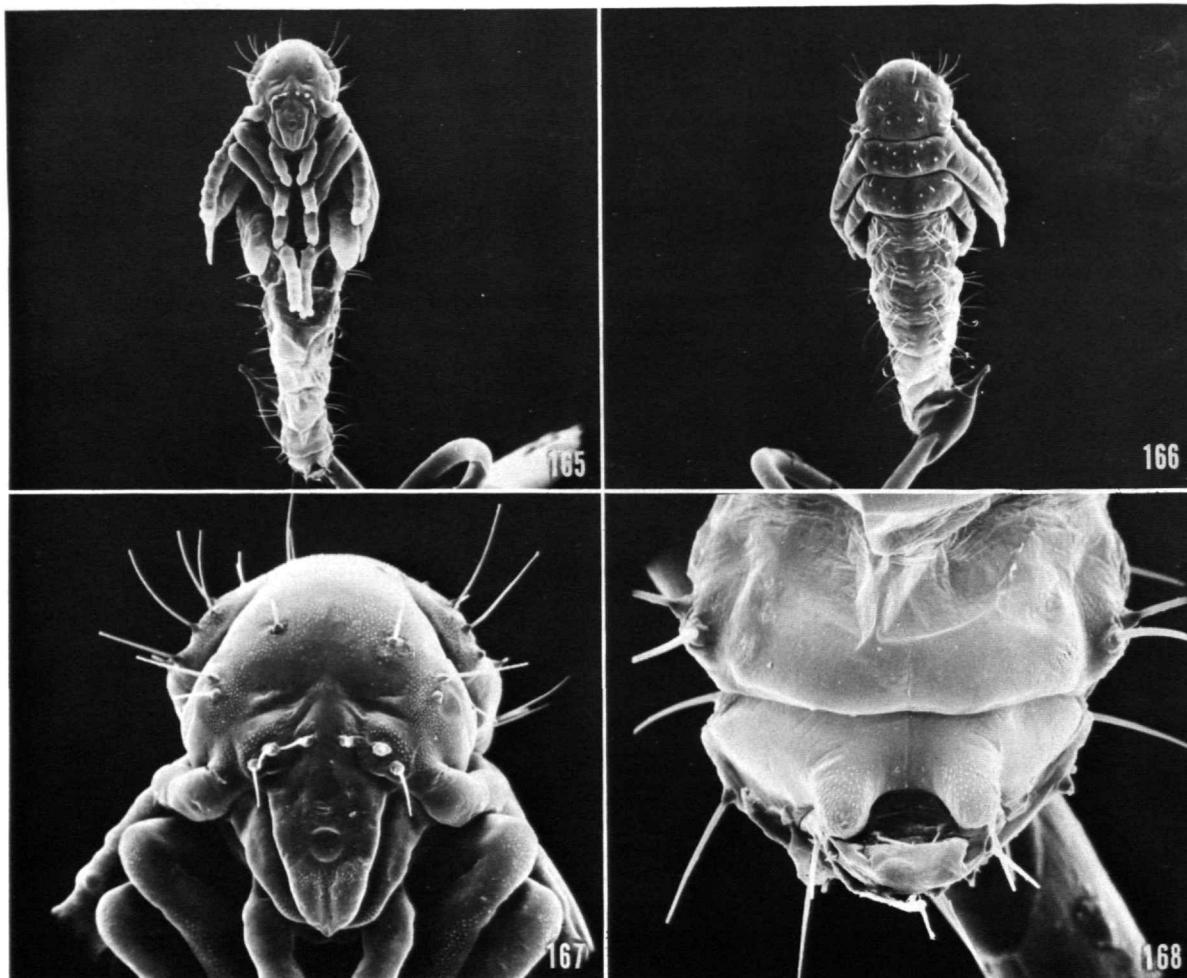
FIGURES 157-164.—Nasale, dorsal aspect: 157, *Tachymensis* sp., Chiapas, Mexico, $\times 611$; 158, *Tachyta nana inornata*, Chiapas, Mexico, $\times 274$. Maxilla, dorsal aspect of apex: 159, right of *Tachymensis* sp., Chiapas, Mexico, $\times 540$; 160, left of *Tachyta nana inornata*, Chiapas, Mexico, $\times 296$. Antenna: 161, dorsal aspect of *Tachymensis* sp., Chiapas, Mexico, $\times 370$; 162, ventral oblique aspect of *Tachyta nana inornata*, Chiapas, Mexico, $\times 185$. Abdominal spiracle: 163, segment VII, *Tachymensis* sp., Chiapas, Mexico, $\times 2664$; segment I, *Tachyta nana inornata*, Chiapas, Mexico, $\times 1332$.

Tachymenis as different, thus did not point out the numerous character state differences.

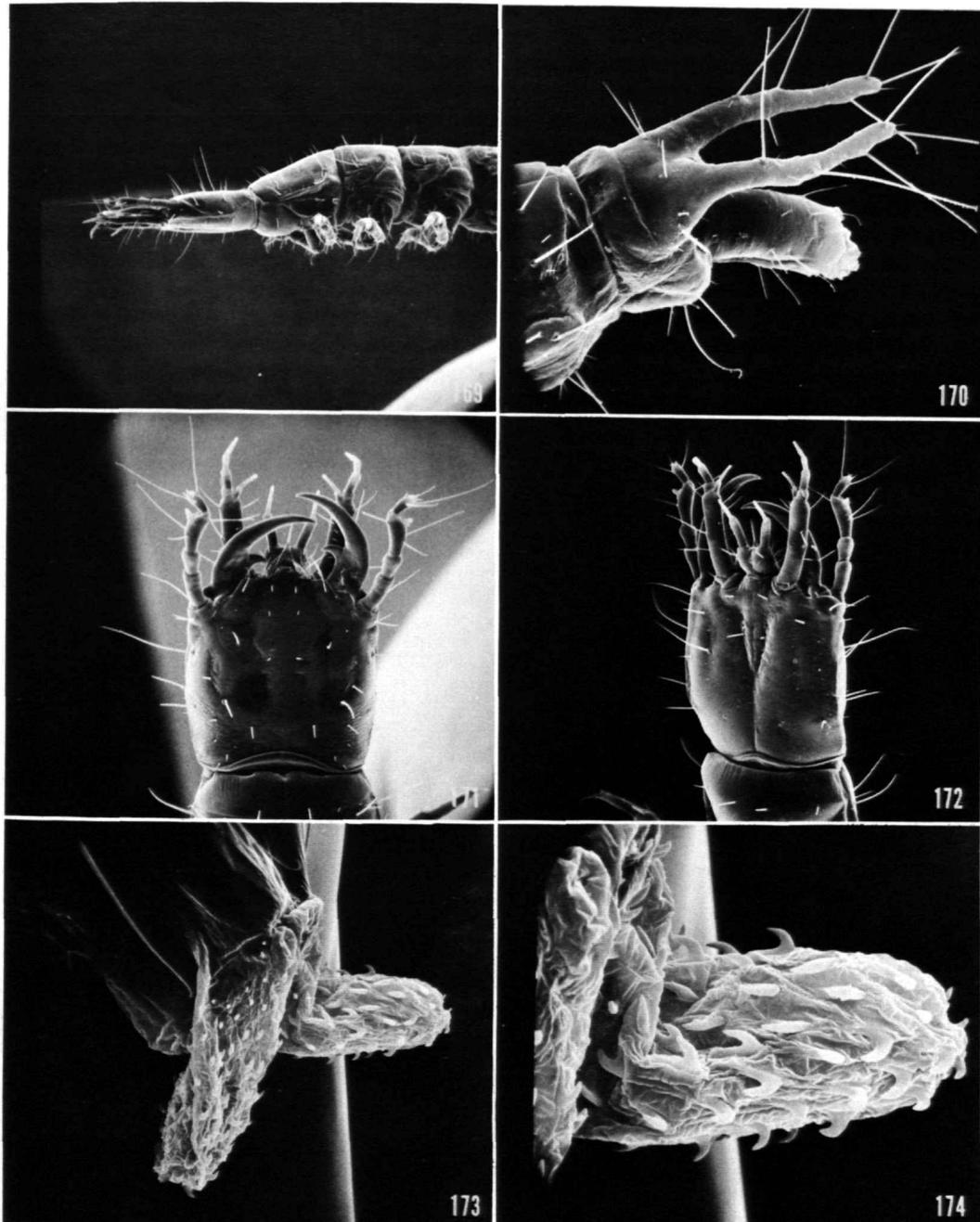
It is not within the scope of this paper to present detailed descriptions of larvae, particularly because not enough material is available for careful study of variation. However, appropriate illustrations and summaries of character state differences might allow field recognition and a basis for future work.

In the New World, only species of three genera of Tachyina will normally be found under bark, namely *Xystosomus*, *Tachymenis*, and *Tachyta*. The larval stages of *Xystosomus* are unknown un-

less Van Emden's "Mioptachys?" is *Xystosomus*. Van Emden (1942:63) noted one specimen of this from Costa Rica, at Hamburg Farm along the Rio Reventazon. The group "Mioptachys" are wingless *Tachymenis* and only occur at high altitudes from Mexico to Guatemala; Hamburg Farm is much farther south and is near sea level. Furthermore, Van Emden characterizes this specimen as having its mandibular cutting edge denticulate. As described later, neither *Tachyta* nor *Tachymenis* have denticulate mandibles. It is possible that the larva Van Emden had was one of the six *Xystosomus* species (*Xystosomus gruti*, *X. ampliatus*, *X.*



FIGURES 165-168.—Pupa, female, *Tachyta nana inornata*, Chiapas, Mexico: 165, ventral aspect $\times 21$; 166, dorsal aspect $\times 21$; 167, head, ventral aspect, $\times 74$; 168, abdominal apex, $\times 163$.



FIGURES 169-174.—Larval morphology of Tachyina: 169, head and thorax of *Tachyta nana inornata*, Chiapas, Mexico, left lateral aspect, $\times 30$; 170, terminal segments and urogomphi of *Tachymenis* sp., Chiapas, Mexico, left oblique aspect, $\times 141$; 171, head, dorsal aspect of *Tachyta nana inornata*, Chiapas, Mexico, $\times 63$; 172, head, ventral oblique aspect of *Tachyta nana inornata*, Chiapas, Mexico, $\times 59$; 173, apex of pygopod with two protrusible sacs, left lateral aspect of *Tachyta nana inornata*, Chiapas, Mexico, $\times 278$; 174, same $\times 814$.

anterocostis, *X. sublaevis*, *X. elaphrinus*, or *X. microtretus*) found at Hamburg Farm or in adjacent lowland Costa Rica (Erwin, 1973).

D. R. Whitehead and I collected a single larva from under bark of a branch of a fallen tree on Barro Colorado Island, Canal Zone, in 1974. This specimen has many characteristics of the Bembidiini and keys to this in Van Emden (1942). However, the head capsule and cephalic appendages are so different from *Tachyta* and *Tachymenis*, and other described Tachyina, that I almost hesitate to assign it to the Bembidiina. However, it has one character state common to Bembidiini that I find in no other carabid larval illustrations and that is the small seta dorsad on the tarsus. This seta is at the basal third in Bembidiina and at the middle in Tachyina. Our single specimen fits the condition of Tachyina. Furthermore, there is no other Bembidiine living on the island that might be found under bark. It is possible that our specimen is *Xystosomus* (*X. gruti* or *X. nigropalpis*). I have included characters of both this specimen and that of Van Emden's in the following key to larvae.

Van Emden (1942:63) cites an additional specimen from Hamburg Farm, "under loose bark of *Virola warburgi*, F. Nevermann leg" and gives the name as *Tachys* (*Tachyta*) sp. It is quite likely

that this specimen belongs to the genus *Tachymenis* (included in the *Tachyta* concept of Bates, 1882) and hence keys to Van Emden's "subgenus *Tachyta* Kirby." The New World southern limit of true *Tachyta* is Belize and Guatemala, while *Tachymenis* are extremely common in Costa Rica (at least 6 species). Thus Van Emden's concepts of Tachyina larvae are to be used with caution since they are based on mixed genera.

I have compared larval specimens of *T. nana inornata* from Mexico with illustrations of *T. nana nana* from Germany (Van Emden, 1942) and *T. umbrosus* from India (Gardner, 1938) and can find no differences. Some problems are that the illustrations do not show the correct character states nor are they at high enough magnification. Further investigations of larval stages of *Tachyta* species should be made.

In addition to the illustrations supplementing the key, I provide additional scanning electron micrographs (Figures 169-174) of character states held in common by the two genera broadly characterized above. These illustrations should aid students of Tachyina larvae and promote the study of carabid larvae in general. Techniques such as critical point drying and electron scanning, when combined, should add great depth to the study of carabid larvae.

Tentative Key to Larvae of New World Tachyina Found under Bark or in Decaying Wood

1. Cutting edge of mandible denticulate,¹ or if not denticulate, then antenna with 3 articles and nasale asymmetric²? *Xystosomus* Schaum
Cutting edge of mandible not denticulate, antenna with 4 articles, nasale symmetric 2
- 2 (1). Nasale (Figure 157) medially with short, broad, and obtusely rounded teeth, not ridged between apical setae; spiracle (Figure 163) with entrance more or less round, margin unevenly jagged; maxilla with basal article of outer lobe (Figure 159) very short, shorter than basal article of adjacent palpus; antennae (Figure 161) short and robust; head capsule elongate and narrow, tapering posteriorly and without hind angles *Tachymenis* Motschulsky
Nasale (Figure 158) medially with acute teeth and secondary ridge between anterior setae; spiracle (Figure 164) with entrance perfectly round, margin symmetrically notched and appearing star shaped; maxilla with basal article of outer lobe (Figure 160) long, longer than basal article of adjacent palpus; antennae long and narrow (Figure 162); head capsule quadrate, hind angles well developed *Tachyta* Kirby

¹ Character based on Van Emden's (1942) "Mioptachys" of Hamburg Farm, Costa Rica (see text).

² Characters based on a single larva found under bark by Erwin and Whitehead on Barro Colorado Island, Canal Zone, in 1974 (see text).

Natural History

Most species of *Tachyta* are associated with the process of wood decay. Members live under bark of dead trees, which are either standing or fallen. Larvae and adults are also found in burrows of wood-boring insects and in cracks in the wood. One species, which occurs only in New Guinea, has members which run on foliage or epiphytes (Darlington, 1962) rather than on wood. The habits and exact habitat of the immature stages of this foliage runner are unknown. Lindroth (1945) summarized the ecology of *Tachyta n. nana* and indicated that these beetles eat adults and larvae of scolytid bark beetles and Collembola.

The altitudinal range of *Tachyta* is from sea level to about 3700 meters and the latitudinal range is from about 13°S in Australia to 69°N in Norway. At least two species within *Tachyta* (*T. acuticollis* and *T. philipi*) show altitudinal complementarity.

The ecological range, in the sense of general communities, is from boreal forest to tropical lowland forest and tropical upland forest, the latter in the Old World only. In the New World, the range of only one species of *Tachyta* extends as far south as Belize and Guatemala, perhaps because members of *Tachymenis*, another underbark group, outcompete *Tachyta* members. *Tachymenis* species are found only in the New World, ranging from Argentina north to Mexico, with only one species extended into the United States and Canada. The ranges of the two groups thus are almost perfectly complementary and are generally similar to *Pericompus-Elaphropus* in the same area (Erwin, 1974a).

Teneral adult material was available for study; thus, there is some indication of when larvae and pupae may be found in the forest. Members of the *coracina* group can be found in the adult stage throughout the year; teneral adults in this group were found in the periods March to July and August to November, perhaps indicating bivoltine life histories. Members of *T. umbrosa* (*umbrosa* group) were found in the adult stage in all months of the year; tenerals were found in several months distributed throughout the year, perhaps indicating a constant breeding cycle. Members of the *falli* and *nana* groups, both typical holarctic elements, overwinter in the adult stage in the logs, emerge

in spring for dispersal flights and oviposit in early summer; teneral adults were repeatedly found in August; thus, larvae and pupae would be present in the fauna in early summer. Two exceptions to this general scenario are *T. nana inornata* in Mexico and *T. parvicornis* in the southern United States, which apparently have extended the larval stage to as early as April, undoubtedly due to the milder southern winters.

Dispersal of *Tachyta* is by flight (see Lindroth, 1945) (I have also caught *T. nana inornata* in flight) and probably by rafting on logs. Both *T. subvirens* and *T. falli* have been found in transported logs. *Tachyta hispanolae*, a member of the *picina* group, is known only from Hispaniola in the Caribbean while its relatives and ancestral stock are strictly African. Transatlantic connections between Africa and the Caribbean are also known in several other carabid groups, e.g., *Perileptus*, *Lymnastis*, *Sphaerotachys*, *Halocoryza* (Darlington, 1957; Erwin, ms; Whitehead, 1966). Carabid beetles are known to fly or be swept through the air up to 100 miles and still be capable of flight to a light trap at the end of their journey (Erwin, unpublished data). It is highly possible this mode of transport was used by some of the small African carabids during the millions of years after Africa and South America split apart and after the permanent existence of Caribbean island. Which mode, by air or by floating log, was used by *T. hispaniolae* is debatable but the important thing is that either mode is highly plausible. It is especially interesting that of all the World's *Tachyta* species only some present African species are known to fly to lights commonly (Coiffait, in litt.).

Evolutionary and Zoogeographic Considerations

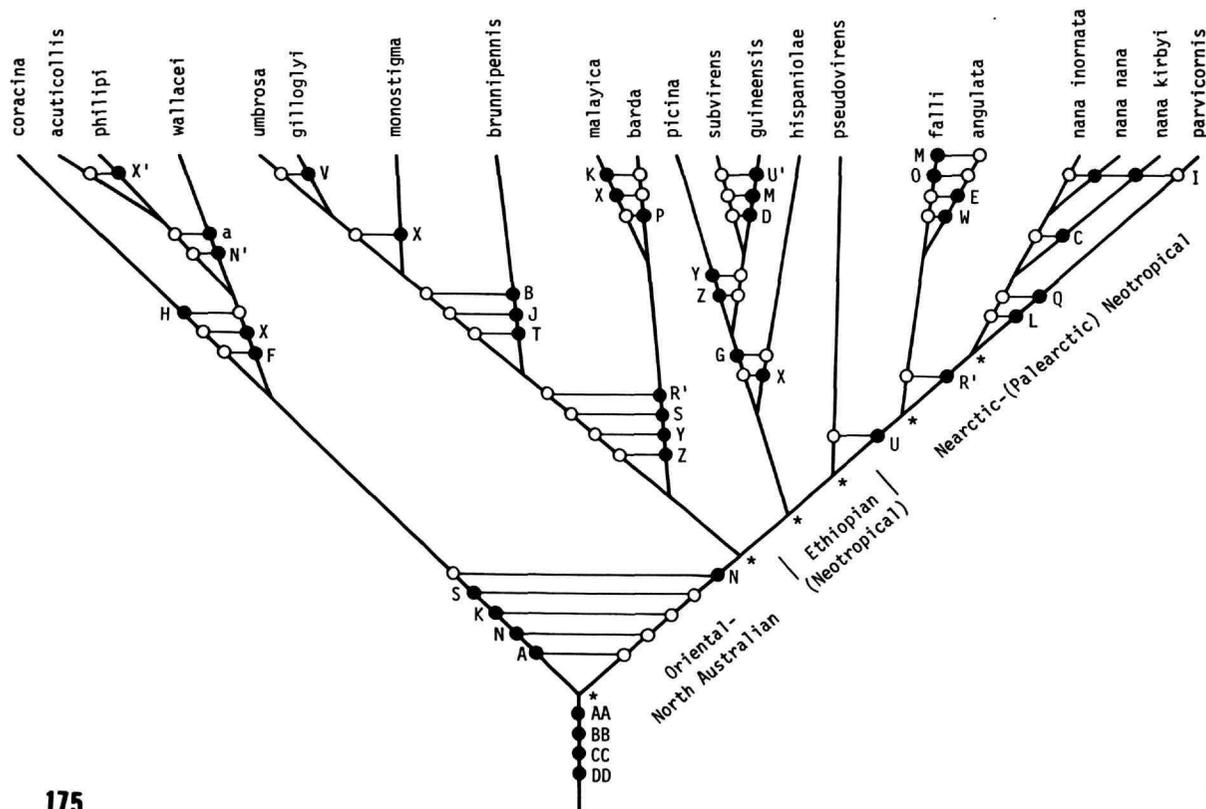
Tachyta are a group of second-level derived Tachyina. This level is defined by the presence of an oblique anterior tibial apex and nonfoveate mentum associated with normal mouthparts. This level is in contradistinction to first-level, which is defined by truncate anterior tibial apex and nonfoveate mentum, and third-level, which has oblique anterior tibial apex and foveate mentum. The closest relatives of *Tachyta* are thus found in the *Elaphropus* lineages, although previous authors placed them with *Tachymenis*.

Tachymenis are a group of first-level *Tachyina* and only convergent, in some respects, to *Tachyta*. Both occur in logs and under bark and probably have acquired similar adaptations for living there.

The male genitalia of *Tachyta* species, particularly the sclerites of the internal sac, demonstrate a transformation series or morphocline. The *coracina* and *umbrosa* group members have a poorly sclerotized internal sac with small independent sclerites. At the other end of the cline, *nana* and *falli* group members have an extremely complex internal sac with twisted sclerites and folds. The simple condition is found in most *Tachyina*, particularly throughout *Elaphropus* and its allies. Objectively (Erwin 1970:172), I regard the simple condition as plesiomorphic, and therefore the

morphocline can be read in the direction of simple to complex. This direction of development can be directly correlated with geographic distribution. The simple condition occurs in *Tachyta* members in the southern Oriental Region and northern Australian Region, an intermediate condition occurs in Africa, and the complex condition occurs in North America.

The Oriental-Australian Region has more diversity and species than any other single area. The results of two major radiations are represented in this area (I have ranked these as two subgenera), whereas there is only one of these two groups elsewhere in the world. Therefore, I suggest that the center of origin of *Tachyta* was the southern Oriental Region.



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FIGURE 175.—Hypothetical phylogeny for the subgenera and species of *Tachyta*, based on the character states outlined in Tables 1 and 2. (Solid circles represent apomorphic states; open circles represent plesiomorphic states; hatched circle represents an intermediate stage of a transformation series (morphocline); asterisks designate branching points based on male genitalic morphocline described in text.)

In this region, the basal stock split from some *Elaphropus* lineage and became the regional underbark Tachyina. Subsequent radiation resulted in the *coracina* group and an *umbrosa*-like stock. The *coracina* stock had a minor radiation in New Guinea and the Oriental Region, resulting in only four known species. One of these, *T. wallacei*, has apparently moved into another adaptive zone as a leaf runner or dweller in mossy epiphytes. This mode of life is similar to that proposed for the extinct Tachyina lineage represented in Baltic Amber, *Tarsitachys* (Erwin, 1971), but I doubt any real relationship between the two. All species of the *coracina* group have members with reduced or no elytral interneurs and no dorsal microsculpture (except scutellum and labrum). In addition, three species (*T. acuticollis*, *philipi*, and *wallacei*) have members with reflexed pronotal sides, a character state convergent with New World *Tachymenis* species.

Also in the Oriental Region, the *umbrosa*-like stock underwent minor radiation resulting in six known species. An early stock of this lineage invaded Australia, resulting in only one species in the far north, and another stock invaded Africa. This latter generalized *T. umbrosa*-like ancestor dispersed to southern Africa and underwent speciation. From this small radiation in Africa, two invasions of North America occurred, one very early to the southern mainland and one later to the West Indies.

The stock which reached the West Indies came late and still shows great similarities with certain African species. This island invasion resulted in the extant *T. hispaniolae*.

The stock which reached the mainland from

TABLE 1.—Objectively determined plesiomorphic and apomorphic conditions of some character states in the *Tachyta* ancestral lineage

Character	Character state	
	Plesiomorphic (0)	Apomorphic (●)
Elytron		
AA. Recurrent groove .	short, medial, curved	long, lateral, straight
BB. Seta Ed 3	position a	position b
CC. Seta Ed 6	position a	position b
Legs		
DD. Tarsal claws	smooth	denticulate

tropical Africa was very likely adapted to at least subtropical conditions. Since it survived, it probably reached the mainland in the subtropical south, somewhere along the southern Atlantic coast of the United States or south to Belize, Central America. Present distribution shows both extant Nearctic groups to extend south as far as southern Mexico; one of these groups goes to Belize. Limited radiation occurred in this African stock, resulting in these two lineages. The stock of

TABLE 2.—Subjectively determined plesiomorphic and apomorphic conditions of some character states in *Tachyta* species (prime (') means regressive apomorphic trend, thus similar to or resembling plesiomorphic condition found in ancestral stock or other lineage)

Character	Character state	
	Plesiomorphic (0)	Apomorphic (●)
Head		
A. Frontal furrows.....	shallow	deep, contoured, extended onto clypeus
B. Frontal microsetae...	small, peglike	long, filiform
C. Frontal punctulae....	scattered	arranged in transverse row
D. Frontal punctulae....	shallow	deep
E. Front.....	convex	depressed
Pronotum		
F. Margins.....	beaded, evenly curved to disc	reflexed
G. Median line.....	finely engraved	deeply and broadly sulcate
H. Hind angles.....	acute	obtuse
I. Hind angle carina....	present	absent
J. Discal microsetae....	small, peglike	long, filiform
K. Microsculpture.....	present	absent or mostly effaced
Elytron		
L. Humeral margin.....	microsetose	macrosetose
M. Discal surface.....	smooth	rugose
N. Interneurs 1 to 7....	present	absent
N' Interneurs 1 to 7....	absent	poorly developed, striate-punctate
O. Interneurs 3 and 4...	straight	unicatenate
P. Interneur 8.....	absent or striate	punctate
Q. Interneur 8.....	interrupted at middle	entire, sulcate
R' Seta Ed 6.....	position b	position a
S. Microsculpture.....	present	absent or effaced
T. Microsculpture.....	flat reticulation	imbricate
U. Microsculpture.....	transverse	isodiametric
U' Microsculpture.....	isodiametric	granulate
V. Microsculpture.....	transverse open	transverse mesh
Form		
W. General body.....	subconvex	depressed
Color		
X. Elytron.....	concolorous	spotted
X' Elytron.....	spotted twice	spotted once
Y. Body.....	piceous to black	rufous
Z. Appendages.....	rufous to black	testaceous
Ecology		
a. Habitat.....	wood associate	foliage associate

one lineage became widespread and eventually speciated, forming a Pacific coast-Rocky Mountains and East vicariant pair. The stock of the second lineage speciated, likewise forming a vicariant pair except these two were the north-south vicariants, *T. nana* and *T. parvicornis*. *Tachyta nana* was extremely successful penetrating the North Temperate Zone and has reached the Palearctic Region via Beringia. *Tachyta nana* shows geographic variation, the three forms of which I regard as subspecies. The presence of mid- to late-Tertiary fossil material (Matthews, 1974 and in litt.) of *T. angulata* or its ancestral stock on Banks Island, N.W.T., Canada (74°N), indicates that transarctic migration might have occurred in members of the *falli-nana* groups in order to establish *T. nana nana* in the Palearctic Region. Also the present tolerance of high latitudes by the *falli-nana* groups shows that these beetles might have crossed the Behring Land Bridge at a time of more or less continuous forest. The stocks of both lineages radiating on the American Continent moved south, as well as north, but in the south were unable to overcome the competition of a dominant group of underbark Tachyina, the *Tachymenis*. The *Tachymenis*, although on an earlier evolutionary level than *Tachyta*, arose and radiated in the New World Tropics and are today only found there. There are well over 100 species known, and they are extremely common under bark of most trees in the tropics. They are aggressive predators and I suggest they eat eggs laid under bark where *Tachyta* females oviposit. (In a study of competition, this is the first area of limitation I would suggest for investigation.) Secondly, *Tachymenis* members are very small and perhaps

the tight bark of tropical hardwoods allows them better access than larger *Tachyta* members. *Tachyta* members occur under the looser bark of conifers and softer-wooded deciduous trees in the north (*Betula*, *Populus*, *Acer*, *Celtis*). (This is the second area of limitation I would investigate.)

In sum, I considered the relationships based on synapomorphy (Table 1, 2, Figure 175), the genitalia morphocline, the geographic distribution of the species, and in part the ecological ranges of related groups. I believe that *Tachyta* arose from the *Elaphropus* ancestral lineages sometime after the separation of the major continents, perhaps in the mid to late Cretaceous (timing based on estimates by Erwin, 1970), but before Australia reached its present position. The absence of diversity on Australia supports this hypothesis and generally the distribution of *Tachyta* species in the Oriental-Australian Regions fits the "multiple movements" hypothesis of Darlington (1971:220), wherein many Oriental stocks moved and are moving southward across Indonesia through New Guinea to Australia. Movement of the Oriental stock to Africa probably occurred through India, and was interrupted by the later aridness of the Persian Gulf area. Movements of the African stocks probably occurred across the Atlantic when the continents were much closer than they are now; the trip(s) was made by rafting or possibly by flight. After radiation on the North American Continent and adaptation to cold temperate conditions, the Behring Land Bridge was crossed by one species. Subsequent closing of the Bridge in the Pleistocene allowed *T. nana* to accumulate geographic differences reflected in my subspecies ranking.

Appendix: Material Examined

1. *Tachyta coracina* (Putzeys)

Map: Figure 15.

Specimens examined: 81.

Republic of Viet Nam: Hoa Binh, August (BMNH).

Sarawak (MCZ).

Philippines: Leyte: "wooded hills of cent. Leyte," January (MCZ, USNM). Luzon: Dingalan Bay, June-August (MCZ, USNM); "Mt. Makiling, Laguna," September (USNM, MCZ); "Mabatobato, Camarines," May (CAS). Mindanao: "E. slope Mt. Apo, Todaya, Davao Province," 2800 ft. November

(MCZ); "E. slope Mt. McKinley, Davao Province," 3300 ft., September (MCZ). Palawan: Puerto Princesa, Bacungan, March (FMNH, MCZ, USNM).

Sulawesi (Celebes): Tjamba, August-September (USNM).

Malaysia: Penang Hill, 100 m, June (CAS).

Djawa (Java): Megamendg (USNM); Pekalongan (MCZ); Songbanteng (MCZ).

Morotai Island: September (MCZ, USNM).

New Guinea: Irian: Hollandia, May (MCZ). Territory of New Guinea: Stephansort, Astrolabe Bay (HNM); Wum, Upper Jimmi Valley, 840 m, July (BMNH).

Thailand: "20 mi. SE. Chantaburi, 75M," August (CAS, USNM); Khao-Yai National Park, 750 m, July (CAS, USNM); "E. slope, Doi Sutep, 260 m, July (CAS).

2. *Tachyta acuticollis* (Putzeys)

Map: Figure 29.

Specimens examined: 36.

Philippines: Luzon: Laguna Province, Los Baños, October (MCZ).

Morotai Island: September (MCZ).

New Guinea: Irian: Sansapor, August (MCZ); Maffin Bay, August, September (CAS, MCZ, USNM). Territory of New Guinea: "Bubia, 13 km. nw. Lae," March (MCZ); "lower Busu R. Huon Pen.," May (MCZ, USNM). Sattelberg, Huon Gulf (MCZ); Wau, 1100 m, September (MCZ). Papua: Dobodura, March-July (MCZ, USNM); Oro Bay December-January (MCZ, USNM); 'Bisianumu, nr. Sogeri, 500 m," March (MCZ); Joangeng, 500 m, April (MCZ). For additional localities, see Darlington (1962).

3. *Tachyta philipi*, new species

Map: Figure 29.

Specimens examined: 6.

New Guinea: Irian: "Sibil Valley, Star Mts., 1245 m," October-November (MCZ, USNM); Territory of New Guinea: Okapa, August (MCZ, USNM).

Additional material: Specimens labelled as "*Tachys acuticollis* P. det. Darl. '68" in the Bishop Museum, Hawaii and in Dr. R. W. Hornabrook's collection, New Guinea.

4. *Tachyta wallacei* Andrewes

Map: Figure 29.

Specimens examined: 4.

New Guinea: Irian: Hollandia, July-September (MCZ). Territory of New Guinea: "lower Busu R., Huon Peninsula, May (USNM). Papua: Dobodura, March-July (MCZ, USNM).

Additional material: Darlington (1962, 1971) lists additional localities and location of specimens. These are plotted on my map, Figure 29.

5. *Tachyta umbrosa* (Motschulsky)

Map: Figure 43.

Specimens examined: 276.

Sri Lanka (Ceylon): Northwestern Province: Rajakadaluwa, January (MHNG). Sabaragamuwa Province: Deerwood Kuruwita, 6.0 miles NNW Ratnapura, February (UML, USNM). Uva Province: Inginiyagala, February (MNHG).

Ryu Kyus Islands: Okinawa: Chizuka, July to September (USNM).

Iriomote Jima: Mt. Ushiku-mori, March (MCZ, USNM).

Taiwan: Klapan, December (MCZ).

Philippines: Leyete: San Jose, 1.0 miles north near Leberanan River, January (FMNH, MCZ, USNM); "Plains of NE Leyete," November-January (MCZ, USNM); "wooded hills of cent. Leyete," January (MCZ, USNM). Luzon: "Alabang, Rizal Province, December," (USNM); "Los Baños, Laguna, 500-1000 m," May (FMNH, MCZ, USNM); "Central plains of Luzon, February-September" (MCZ, USNM); Dingalan Bay, June-August (MCZ, USNM); Mt. Makiling, Laguna, January, June, September, October, November (CAS, MCZ, USNM); Baguio, April (USNM); "SE Bataan" July-August (MCZ, USNM). Mindanao: "E. slope Mt. McKinley, Davao Province, 3000', September" (FMNH, MCZ, USNM); "Caburan, Caburan, Davao Province, sea level, January," (FMNH, MCZ, USNM); "Todaya, E. slope Mt. Apo, Davao Province, 2800', October," (FMNH, USNM); "Kabasalan, Zamboanga, April," (CAS); Tambanan, Zamboanga, June (MCZ). Mindoro: San Jose, September (CAS, MCZ, USNM). Palawan: "Bacungan, Pto. Princesa, Palawan Province, March" (FMNH, MCZ, USNM).

Morotai Island: September (MCZ, USNM).

Kalimantan (Borneo): Mjoberg (MCZ); Telok Ayer (MCZ, USNM).

Malaysia (Sarawak): (MCZ).

Sumatra: "Indrapoura" (MCZ); Tebing Tinggi, June (MCZ).

Djawa (Java): Djatiwekas (MCZ); Popoh (MCZ); Roban, May (MCZ).

New Guinea: Irian: Maffin Bay, August, September (CAS, MCZ, USNM). Territory of New Guinea: Bougainville, November (USNM). "Saidor: Gabumi Vill., Finisterre Range, June," (MCZ); "Wau, Morobe Distr. Mt. Missim, 1100 m, August," (MCZ); "Torricelli Mts., Sugoitei Vill., 900 m, February," (MCZ); Wau, 1050 m, September (MCZ); "lower Busu R., Huon Pen., May," ((MCZ); Stephansort, Huon Peninsula (MCZ). Papua: Dobodura, March-July (MCZ, USNM); Oro Bay, December-January (MCZ, USNM).

British Solomon Islands: Florida (USNM); Malaita Auki (USNM); Auki (USNM); Wainoni (USNM).

6. *Tachyta gilloglyi*, new species

Map: Figure 43.

Specimens examined: 4.

Republic of South Viet Nam: Cam Rahn Bay, Tiger Lake, June (USNM).

7. *Tachyta monostigma* (Andrewes)

Map: Figure 43.

Specimens examined: 0.

8. *Tachyta brunnipennis* (MacLeay)

Map: Figure 61.

Specimens examined: 24.

Australia: Queensland: North Cape York Peninsula, Lock-

erbie (CSIRO, MZC, USNM); "W. of Ravenshoe, Atherton Tab., ca. 3000', February" (MCZ, USNM); Bamaga (MCZ); Port Darwin (BMNH).

9. *Tachyta malayica* (Andrewes)

Map: Figure 61.
Specimens examined: 3.
Malaysia: Singapore (BMNH, MCZ).
Additional material: Andrewes (1925) cites Penang and Java.

10. *Tachyta barda* (Darlington)

Map: Figure 61.
Specimens examined: 5.
New Guinea: Papua: Dobodura, March–July (MCZ, USNM); Oro Bay, near Dobodura, December–January (MCZ).

11. *Tachyta picina* (Boheman)

Map: Figure 87.
Specimens examined: 1.
Africa: Republic of South Africa: Natal: Malvern (BMNH).
Additional material: Basilewsky (1968a) cites Ampandradava, Madagascar. Bruneau de Miré (1964) cites several localities in
Mozambique: Nova Choupanga, Inhacoro (Tambara), Mtondo; Basoutoland; Tchad: Fort–Archambault.

12. *Tachyta subvirens* Chaudoir

Map: Figure 87.
Specimens examined: 98.
Africa: Cameroon: Lolodorf (MCZ). Gabon: Belinga, January to May (MHNP, MCZ, USNM); Makokou, March (MHNP, USNM). Liberia: Mt. Coffee, March (USNM).
Additional material: Bruneau de Miré (1964) cites several localities in Africa: Congo: Brazzaville. Republic of the Congo: Leopoldville, Maniema. Central African Republic: Fort Sibut.

13. *Tachyta guineensis* Alluaud

Map: Figure 87.
Specimens examined: 1.
Africa: Republic of the Congo: 18.0 mi. SW of Elisabethville, November (BMNH).
Additional material: Basilewsky (1968b) cites several localities in the Ivory Coast: Bingerville, June, October, and November; Divo, September; Man, August; Ferkessédougou, May. Bruneau de Miré (1964) cites several African localities: Ivory Coast: Assinie, Danane; Cameroon: Eseka, Edea; Gabon: forêt de Conkuati, Ngomo, Lambaréné; Republic of Guinea: Cabo San Juan.

14. *Tachyta hispaniolae* (Darlington)

Map: Figure 88.
Specimens examined: 6.
Caribbean: Dominican Republic: "ft hills Cord. Cent. S. of Santiago, June" (MCZ). Haiti: Grande Riviere (MCZ, USNM); St. Marc (MCZ, USNM).

15. *Tachyta pseudovirens* de Miré

Map: Figure 87.
Specimens examined: 11.
Africa: Gabon: Belinga, January, February (MHNP, USNM).
Additional material: Bruneau de Miré (1964) cites several African localities: Republic of Congo: Sankuru, Ituri, Maniéma; Cameroon: Pont du Nkam; Gabon: Libouga-Mayumba.

16. *Tachyta falli* (Hayward)

Map: Figure 111.
Specimens examined: 157.
Canada: British Columbia: Grouse Mountain, September (MCZ); Royal Oak, May (CNC); near Squamish, Diamond Head Trail, 3200', Garibaldi Park, August (CNC); Vancouver Island, September (MCZ); Vancouver, April (MCZ).
United States: California: Eldorado Co., June (MCZ); Fresno Co., Huntington Lake, July (CAS); Humboldt Co. (CAS); Fieldbrook, May (USNM); Lassen Co., Facht, August (CAS); Lassen National Park, August (CAS); Manzanita Lake, 5800', July (FMNH); Madera Co., SW foot of Madera Peak, 7550', August (CAS); Mendocino Co., Boardtree Camp, August (CAS); Jumpoff Creek, August (CAS); West Willits, December (CAS); Napa Co., Calistoga, June (CAS); Nevada Co., Russell Valley, June (CAS); Truckee, 5800', August (MCZ, USNM); Placer Co., Bear River–Bowman Lake, August (CAS); Plumas Co., Butt Valley Reservoir, 4000', July (CAS); near Chester, Benner Creek, May, July, August (USNM); near Chester, Last Chance Creek, June (USNM); Siskiyou Co., August (MCZ, USNM); Sisson, July (MCZ, USNM); Sonoma Co., December (USNM); Tulare Co., May, September (FMNH, MCZ); Tuolumne Co., Dodge Ridge, July, August (CAS); Long Barn, August (CAS); N of Pine Crest, Niagara Creek, June (CAS); Pine Crest, August (CAS); Strawberry, August, September (CAS); County Unknown, Tallac, July (MCZ); Tallac, Lake Tahoe, July (MCZ, USNM). Idaho: Latah Co., Moscow, Mountains, June (USNM); Troy, August (USNM). Oregon: Benton Co., West Philomath, Mary's Peak, May (CNC); Douglas Co., Glendale, September (USNM); Hood River Co., Mount Hood, July (MCZ); Multnomah Co., Portland, May (USNM); County Unknown, Bohemia, August (USNM). Washington: San Juan Co., Orcas Island, July (USNM); Spokane Co., Spokane, May (USNM); Yakima Co., Yakima City, July (USNM).

17. *Tachyta angulata* Casey

Map: Figure 121.

Specimens examined: 282.

Canada: Alberta: Flatbush, April, May (UASM). British Columbia: Kamloops, May (MCZ); "Keithly" (MCZ); Vernon (USNM). Manitoba: Husavick, June (CNC); Stockton, 2 mi. W, May (CNC); "To.7 RE//E," July (CNC); Victoria Beach, May (CNC). New Brunswick: Fredericton, July (CNC). Nova Scotia: Portapique, July (MCZ); Port Medway, July (MCZ); Weymouth, April, August (MCZ). Ontario: Algonquin Provincial Park, August (USNM); Brimley, September (MCZ); Ottawa, May (CNC); Port Author, July (MCZ); Toronto, June (MCZ). Quebec: Ayers Cliff, July (ALAR); Becancourt, August (CCHA); Berthierville, May, June, October (U Mon); Cloridorme, July (ALAR); Dosquet, June (CCHA); Gaspé County, June (CNC); Great Whale River, June (CNC); Ile-aux-Coudres, June (ALAR); Joliette, July (U Mon); Lake William, September (CCHA); Lac d'Alembert, May (ALAR); Lake Memphremagog, June (USNM); Laniel, August (CNC); Lauzon, June (U Mon); Masham, near Mud Lake, 4 mi. W, October (MCZ); Mount Albert, 600', July (CNC); Mount Lyall, June (ALAR, CNC); Nominique, August (U Mon); Noranda, June (U Mon); Orleans Islands, April, June (CCHA, USNM); Parc du Mont Tremblant, June (U Mon); Port-au-Saumon, July (ALAR); Pointe-du-Lac, May, June (CCHA); Quebec, May (CCHA); Rigaud, May, June (ALAR, U Mon); Saint-Catherine, July (CCHA); Saint-Fidèle-de-Mont-Murray, July (USNM); Sainte-Foy, May (CCHA); Saint-Etienne, September (CCHA); Saint-Emile de Quebec, May, August (ALAR); Saint-Gérard Magella, October (CCHA); Saint-Jérôme, June (U Mon); Saint-Léon-de-Standon, Dorch, May (CCHA). Saskatchewan: "Kenosee," June (CNC). Yukon Territory: Dawson, 58.0 mi. N, Gravel Lake, 2050', August (CNC).

United States: Arizona: Cochise Co., Chiricahua Mountains, June (USNM); Pima Co., Mount Lemmon, July (CAS). Connecticut: Tolland Co., Storrs, April (USNM). District of Columbia: Brookland, November (USNM); Washington, D.C., August, November (USNM). Maine: Cumberland Co., Sebago, October (MCZ); Kennebec Co., Winthrop, September (MCZ); Oxford Co., Bethel, June, July (MCZ); Paris, June (MCZ); Penobscot Co., Orono, May (MCZ); Piscataquis Co., Mount Katahdin, June, August (MCZ, USNM); York Co., Kennebunk, June (MCZ); County Unknown, King and Bartlett Lake, August (MCZ); Wessataquick River, June (MCZ). Maryland: Garrett Co., Oakland, May (USNM); Montgomery and Prince Georges Cos., Takoma Park, March (USNM); Prince Georges Co., College Park, April (CNC); Washington Co., South Mountains, October (USNM). Massachusetts: Barnstable Co., Sagamore, June (MCZ); Berkshire Co., Williamstown, May (MCZ); Bristol Co., Berkley, July (MCZ); Dartmouth, June, August, October (MCZ); Hampden Co., Longmeadow, August (U Mon); Springfield, May (USNM); Wilbraham, April (USNM); Middlesex Co., Arlington, April (MCZ); Burlington, May (MCZ); Cambridge (MCZ); Sherborn, April (CNC); Tyngsboro (MCZ); Wayland, April (MCZ); Weston, January (MCZ); Norfolk Co. (MCZ); Blue

Hills, near Braintree (UASM); Suffolk Co., Boston, April (MCZ, USNM); Worcester Co., Berlin (MCZ). Michigan: Kalamazoo Co., Galesburg (MCZ). Minnesota: Faribault Co., Little Winnebegosish, June (KWCO); Hennepin Co., Minneapolis, October (USNM). Montana: Missoula Co., Missoula (USNM); Powell Co., Nigger Hill (USNM); Ravalli Co., Sula, June (USNM). New Jersey: Camden Co., Clementon, May (MCZ); Essex Co., South Orange, December (USNM); Gloucester Co., Glassboro, April (USNM); Malaga, June (USNM); Morris Co., Boonton, February (USNM); Union Co., Elizabeth (USNM). New Hampshire: Carroll Co., White Mountains, "Glen," 1500' June (MCZ); Cheshire Co., Swanzy Pond, July (MCZ); Coos Co., Mount Washington, Lake of Clouds, June, July (MCZ); Mount Washington, August (CNC); Shelburne, July (MCZ); Grafton Co., Rumney, April, September (MCZ); Rockingham Co., Hampton, May (USNM); County Unknown: Three Mile Island, May (MCZ); Weyman, April (MCZ). New Mexico: Colfax Co., Koehler (USNM); Otero Co., Cloudcroft (USNM). New York: Dutchess Co., Peekskill (MCZ); Essex Co., North Ella, October (MCZ); Franklin Co., Adirondack Mts., 2000', Chateaugay Lake, August, September (MCZ); Herkimer Co., Newport (MCZ); Orange Co., West Point, March, April, May, June (MCZ); Saint Lawrence Co., Cranberry Lake, July (USNM); Ulster Co., Oliveria, July (USNM); Washington Co., West Hebron (MCZ). North Carolina: Buncombe Co., Mount Mitchell, June (USNM); County Unknown: Mount Pisgah, September (MCZ). Oregon: (USNM). Pennsylvania: (CNC); Monroe Co., Pocono Lake, August (USNM); Warren Co., Bear Lake (USNM). South Carolina: Oconee and Pickens Cos., Clemson College, March (USNM). Vermont: Chittenden Co., Winooski, September (CCHA); Lamoille Co., Stowe, top of Mount Mansfield, "38-4300'," June (ALAR); Washington Co., Berlin (USNM). Virginia: (MCZ, USNM); Fairfax Co., Falls Church, April (USNM); Page Co., Skyland, September (MCZ). Wisconsin: Bayfield Co., Bayfield (USNM). West Virginia: Preston Co., Aurora, August (MCZ).

Mexico: Durango: El Salto, 20 mi. W, 10 mi. W, July (CNC); Nuevo Leon: Galeana, 22.2 mi. NW, Cerrade Potosi, 10,300', 10500'-11780', 12000', May, July, October (CNC, UASM, USNM); Veracruz: Cofre de Perote, north slope, 10 mi. S Las Vigas, 9600', August (UASM).

18a. *Tachyta nana nana* (Gyllenhal)

Map: Figure 126.

Specimens examined: 23.

Sweden: Dalarna: Ottander (UML); Uppland: Ringselle (UML); Skåne (UML).

Austria: Gössl (MCZ); Millstatt (MCZ); Negoi (MCZ); Wien (MCZ).

Germany: "Nied.-Oest" Weschselburg (MCZ).

USSR: "Abkhazia, nr. Zamzlu River, Caucasus" (USNM). Siberia: Okeanskaya, August (USNM).

Japan: (BMNH). Hokkaido: 5.0 mi. w. Sapporo, September (USNM).

Additional material: Kryzhanovskiy (1970) indicates this

species occurs in forest areas in the USSR from the south of the taiga to the southern borders, is absent from the steppes and deserts in central USSR, and is also found in Turkey, northern Iran, the Mongolian People's Republic, northern China, northwest Africa, and Japan.

18b. *Tachyta nana inornata* (Say)

Map: Figure 135.

Specimens examined: 947.

Canada: British Columbia: Peachland, August (CNC); Summerland, October (CNC, MCZ); 2.3 mi. E Vaseaux Lake near Oliver, May (UASM). Ontario: St. Ola, April (CNC); Toronto, September (MCZ); Trenton, April (CNC). Quebec: Hull, June (CNC); Knowlton, June, July (CNC); Montreal (CNC, MCZ); St. Armand, August (U Mon).

United States: Alabama: Jefferson Co., Birmingham, May (CMNH); Mobile Co., Mobile, January, June (MCZ). Arizona: Gila Co., Globe, June (MCZ); Pima Co.; Sta. Catalina Mts., January (CAS, USNM). Arkansas: (USNM); Pike Co., Delight, April (FMNH). California: Contra Costa Co., Mt. Diablo, March (USNM); El Dorado Co., Pleasant Valley, October (MCZ); Kern Co., Alder Creek Campgrd. West slope Greenhorn Mts., March (CAS); Lake Co., (CAS); Madera Co., Bass Lake, June (MCZ); Orange Co., Laguna, August (MCZ); Plumas Co., Chester, 6 mi. NW, along Benner Creek, June (USNM); Sacramento Co., Folsom, August (MCZ, USNM); Michigan Bar, February, May (CAS); Santa Clara Co., Gilroy Hot Springs, May (CAS); Santa Cruz Co., Glenwood Road, April (USNM); Santa Cruz, February (CAS); Sonoma Co., December (USNM); Tulare Co., Kaweah (CNC, MCZ); County Unknown, Sisson, July (MCZ); Stewarts Pt. (MCZ, USNM). Colorado: Arapahoe Co., Littleton, June (MCZ); La Plata Co., vicinity Durango, August (MCZ). District of Columbia: April (USNM); Anacostia, March (USNM); Rock Creek, December (USNM); Woodridge, March (USNM). Florida: Calhoun Co., Clarksville, March (CNC); Dade Co., Key Largo (MCZ, USNM); Miami, March, April (MCZ); Timms Hamock, February (MCZ); Duval Co., Jacksonville (USNM); Hernando Co., Croom, June (MCZ); Levy Co., Waccasassa River Gulf Hamock, March, April (CNC, USNM); Orange Co., Lake Mary (MCZ); Winter Park, January (MCZ); Palm Co., Palm Beach, January (USNM); Pasco Co., Moon Lake, April (CNC); Putnam Co., Palatka, February (MCZ); Sarasota Co., Sarasota, February, March (MCZ); Volusia Co., Edgewater, March (MCZ); Enterprise, May, September, October, November (MCZ, USNM); County unknown, Fort Barrancas, March (MCZ). Georgia: Baldwin Co., Milledgeville, April (USNM); Chatham Co., Savannah, March (CNC); Glynn Co., St. Simons Isl., July (MCZ); Rabun Co., Clatyon, July (USNM); Tift Co., Tifton (MCZ). Idaho: Canyon Co., Pærma, March (USNM); Latah Co., Troy, August (MCZ, USNM). Illinois: Champaign Co., March (CNC); Urbana, March (MCZ, USNM); Cook Co., Willow Springs, June (CMNH); Kane Co., Aurora, April (CMNH); Tazewell Co., Pekin, October (MCZ); County unknown, "Witchert," Octo-

ber (CMNH). Indiana: Porter Co., Dune Acres (CMNH); Wayne Co., Richmond, July (CAS); County unknown, South McAlester, June (USNM); Vinita, June (USNM). Iowa: (MCZ); Buchanan Co., Independence, December (MCZ); Dickinson Co., Lake Okoboji, July (USNM); Henry Co., Mt. Pleasant, February, April (MCZ); Johnson Co., Iowa City, March, April, October (MCZ, USNM). Kansas: Doniphan Co., Wathena, August (USNM); Douglas Co., Lawrence, March, April (CNC, MCZ, USNM); Riley Co., May (USNM); Shawnee Co., Topeka, March (USNM). Kentucky: Fayette Co., Raven Run Kentucky River, August (CMNH). Louisiana: Desota Parish, Frierson, April (USNM); Logansport, June (USNM); Jefferson Parish, Harahan, July (MCZ); New Orleans (USNM); Madison Parish, Tallulah, February (MCZ); Rapides Parish, Alexandria, 10 mi. SW, March (CNC); St. Martin Parish, Morgan City (MCZ, USNM); Parish Unknown, Vowell's Mill, October (USNM). Maine: Kennebec Co., Monmouth, June (MCZ); York Co., Kennebunk, June (MCZ). Maryland: Arundel Co., Annapolis, April (USNM); Baltimore Co., Baltimore, March, April (USNM); Towson, November (USNM); Dorchester Co., Cambridge, November (USNM); Harford Co., Edgewood, August, September (USNM); Montgomery Co., June, September (USNM); Cabin John Bridge, April (USNM); Glen Echo, July (USNM); Plummer's Isl., April (USNM); Silver Springs, April (USNM); Prince Georges Co., Beltsville, February, March, September (RDGO, USNM); Takoma Park, May (CAS); Washington Co., Clear Spring, April (USNM). Massachusetts: Berkshire Co., Williamstown, May (MCZ); Bristol Co., Swansea, September (MCZ); Hampden Co., Chicopee (MCZ); Springfield (MCZ); Middlesex Co., Cambridge (MCZ); Norfolk Co., Blue Hills, March (MCZ); Weymouth, April (MCZ); Suffolk Co., Brookline (MCZ). Michigan: Arenac Co., Saganing, October (MCZ); Kalamazoo Co., Galesburg (MCZ); Wayne Co., Detroit (MCZ). Missouri: Central Missouri (USNM). Montana: (MCZ); Missoula Co., Missoula (USNM); County unknown, Assiniboine Mts., April (USNM). New Jersey: (MCZ); Bergen Co., Fort Lee, April (MCZ, USNM); Hillsdale, August (MCZ); Palisades, May (MCZ, USNM); Burlington Co., Mt. Misery, April (USNM); Camden Co., Camden, February (MCZ); Grenloch, October (MCZ); Essex Co., Montclair (MCZ); Gloucester Co., Glassboro, May (MCZ); Morris Co., Boonton, March (MCZ, USNM); Denville, March (MCZ); Split Rock Lake, April (MCZ). New Mexico: Taos Co., San Juan Valley, August (MCZ). New York: (MCZ); Bronx Borough, Bronx, August (USNM); Brooklyn Co., Brooklyn, May (USNM); Erie Co., Buffalo (USNM); New York Co., Long Island, Flatbush, April (USNM); Orange Co., West Point, April, May, June (USNM); Suffolk Co., Long Island, Wyandanch, April (USNM); Tompkins Co., Ithaca (USNM). North Carolina: (MCZ, USNM); Buncombe Co., Asheville, August (MCZ); Durham Co., Durham (KWC); Macon Co., Highlands, May (CNC); Moore Co., Southern Pines, April, December (USNM); Pasquotank Co., Elizabeth City, December (USNM); Robeson Co., Lumberton, February (CNC); Spain Co., Bryson City, August (MCZ); Wake Co., Raleigh, February, September, October, November (CNC); County

unknown, Mt. Pisgah, September (MCZ). North Dakota: Benson Co., Pleasant Lake, October (RDGo, USNM); Richland Co., May (RDGo); Rolette Co., March (RDGo). Ohio: Athens Co., Athens, April, October (USNM); Licking Co., Newark (USNM). Oregon: (MCZ, USNM); Multnomah Co., Portland (USNM); Washington Co., Dilley (USNM). Pennsylvania: (CNC, USNM); Allegheny Co., Pittsburgh, November (MCZ); Cumberland Co., Enola, April (MCZ); Delaware Co., April (MCZ); Castle Rock, April, May (MCZ); Luzerne Co., Wyoming, September (MCZ); Montgomery Co., Limerick (MCZ). South Carolina: Clarendon Co., Summerton, March (USNM); Florence Co., Florence, April (USNM); Kershaw Co., Camden, March (MCZ); Oconee Co., Clemson, March (CNC, USNM). Tennessee: Central Tennessee, April (USNM); Davidson Co., Nashville (USNM); Knox Co., Knoxville, May, December (CNC). Texas: (MCZ, USNM); Bexar Co., San Antonio, January (MCZ); Blanco Co., Cypress Mills, March (USNM); Chambers Co., Anahuac, July (USNM); Cherokee Co., Jacksonville, October (USNM); Comal Co., (USNM); Dallas Co., Dallas, January, March, May (MCZ, USNM); Harris Co., May (MCZ); Kendall Co., Boerne, October (USNM); Kerr Co., Kerrville, April (CNC); Travis Co., Austin, December (CAS); Victoria Co., Victoria, February (USNM); Wharton Co., Wharton, December (USNM). Vermont: Lamoille Co., Mt. Mansfield, July (MCZ); Windham Co., Brattleboro (USNM). Virginia: Alexandria City, May (USNM); Arlington Co., Rosslyn (USNM); Fairfax Co., Dead Run, April (USNM); Difficult Run, May (USNM); Dunn Loring, December (USNM); Falls Church, July, August, November (USNM); Great Falls, February, September (MCZ, USNM); Mt. Vernon, June (USNM); Fauquier Co., Belvoir, December (USNM); Lee Co., Pennington Gap (USNM); Mecklenburg Co., Roanoke River, Route 1, August (MCZ); Nelson Co., July (USNM); Warren Co., Linden, 5 mi. N, March (MDRU); Linden, 9 mi. N, March (USNM); County Unknown, Ft. Lee, July (USNM); Peach Grove Hill, February (USNM); Skyland, September (MCZ). Washington: Klickitat Co., Klickitat, July (USNM); Spokane Co., Spokane, July (USNM, MCZ); Whitman Co., Pullman, April (USNM); Yakima Co., Yakima, July (USNM); County unknown, Wenass, July (USNM). West Virginia: Lewis Co., Weston, October (USNM); Greenbrier Co., White Sulphur Springs, May (MCZ). Wisconsin: (MCZ); Bayfield Co., Bayfield, August (USNM); Sauk Co., September (USNM); Vernon Co., Coon Valley, September (USNM).

Mexico: Chiapas: Bochil, 4 mi. N, May (CNC); Comitán, 15.6 mi. W, on Rte. 190, August–September (UASM); Las Cruces, 16.3 mi. SW, August (UASM, USNM); Ocasingo, 13.9 mi. S, June (UASM); Ocasingo, 40.7 mi. S, June (UASM); Palenque, 7.1 mi. SW, May (UASM, USNM); Pueblo Nuevo Sol, 3.9 mi. S, 5400' August (MCZ, USNM); San Cristobal de las Casas, 7 mi. E., on Rte. 190 July (RTBE); Teopisca, 7 mi. SW, on Hwy. 24, May (CNC). Colima: SE slope of Mt. Colima, December (CAS). Hidalgo: Tlanchinol, 2.5 mi. N, 5200', July (MCZ, USNM); Mexico: Temescaltepec, 7.0 mi. SW, 6000', September (MCZ, USNM); Nuevo Leon: Santa Rosa Canyon, Linares, 14.8 mi. W, on Rte. 60, July (USAM).

Oaxaca: El Camaron, 8.4 mi. E, on Rte. 190, July, August (UASM, USNM); Loma Benita, March (USNM). Veracruz: El Bastanal, near Coyame in San Andres Mts., September (UASM, USNM).

Caribbean: Cuba: Pinar del Rio: Viñales, February (USNM).

Central America: Belize: Toledo Dist., September (MCZ). Guatemala: Izabal Dept: Los Amates (MCZ); Zacapa Dept: Jabali, south slope of Sierra de las Minas, north of Cabãnas, July (FMNH).

18c. *Tachyta nana kirbyi* Casey

Map: Figure 135.

Specimens examined: 163.

Canada: Alberta: Bilby, April (CAS), Edmonton, May (MCZ); near Flatbush, May (USAM); George Lake, May (USNM); McMurray, July (CNC); North Sasta River, Junction R. 39, May, June (UASM); Lake Wabamun, near Seba Beach, October (UASM). British Columbia: Allar Lake (CNC); Armstrong, April (MCZ); Aspen Grove, May (MCZ); Camal Flats, August (MCZ); Enderby, April (MCZ); Fife, 5 mi. E, June (CNC); Foulder, June (CNC); Kaslo Creek, June (USNM); Kootenay River, 17 mi. N Kimberley, August (UASM); Oliver, May (CNC); Oliver, 25 mi. NW, June (CNC); Orofino Mt., near Oliver, June (CNC); Quesnel, August (CNC, ALAR); Squamish, August (CNC); Terrace, September (MCZ); Vancouver Island (MCZ); Vancouver, Stanley Park, May (CNC). Ontario: Algonquin Park, August (USNM); Brimley, September (MCZ); Ottawa, October (CNC); Timagami, August (USNM). Quebec: "Gaspé Co.," July (CNC); Lauzon, June (U Mon); Montreal, May, June (U Mon); Nominigue, July, August (U Mon); Parc du Mont Tremblant, June (U Mon); Pt.-aux-Saumons, June (ALAR); Rigaud, May, August (U Mon); "Riv. Pierre Potn.," June (CCHA); Saint-Beatrix, August (U Mon); Temiscaming, May (ALAR).

United States: Colorado: La Plata Co., Durango, July (MCZ). Idaho: Latah Co., Moscow, June (USNM). Maine: Kennebec Co., Monmouth, June (MCZ); Winthrop, September (MCZ); Oxford Co., Bethel, July (MCZ). Massachusetts: "Nor. Co.," (MCZ); Montana: (USNM); Missoula Co., Missoula (USNM). New Hampshire: Grafton Co., Rumney, June, July, August (MCZ); County unknown, Glen House, June, August (MCZ). New Mexico: Otero Co., Cloudcroft (USNM). New York: Genesee Co., "No. Elba," October (MCZ); North Dakota: Bottineau Co., Bottineau, May (RDGO). Oregon: Washington Co., Dilley (USNM); County unknown, Republic, September (USNM). South Dakota: Pennington Co., Sheridan Lake, June (KWCO). Vermont: Washington Co., Berlin (USNM). Washington: (UASM); San Juan Co., Orcas Isl., June (MCZ, USNM); Thurston Co., Olympia, March, June (MCZ, USNM). Wisconsin: Bayfield Co., Bayfield, July (MCZ); County unknown, Bachwing Bay, Lake Superior (USNM).

Peoples Republic of China: Liaoning: Fuxian, Shaowa, January (MCZ).

19. *Tachyta parvicornis* Notman

Map: Figure 156.

Specimens examined: 238.

United States: Alabama: Mobile Co., Mobile, June (MCZ); Montgomery Co., Montgomery, February (USNM). Arizona: (USNM); Cochise Co., Portal, 5 mi. W, June-July (USNM); Coconino Co., Flagstaff (USNM); Mormon Lake, June (CAS); Williams, May, June (MCZ, USNM); Graham Co., Graham Mts., September (CAS); Greenlee Co., Hannagan Meadows, 16.1 mi. S, US 666, September (UASM, USNM); Maricopa Co., Phoenix (MCZ); Yavapai Co., Prescott, June, July (MCZ); Walnut, July (USNM); County unknown, Bright Angel Camp, July (USNM). Arkansas: Miller Co., Fouke, March (USNM). Colorado: Archuleta Co., Pagosa Springs, August (MCZ); El Paso Co., Colorado Springs, June (MCZ). District of Columbia: September (USNM). Florida: Alachua Co., January (CNC); Charlotte Co., "Ch. Hbr." Charlotte Harbor (MCZ); Dade Co., Key Largo (USNM); Flagler Co., March (USNM); Gadsden Co., Chattahoochee, April (CNC); Hernando Co., Croom, June (MCZ); Levy Co., Waccasass River, Gulf Hammock, March (USNM); Orange Co., Winter Park (MCZ); Sarasota Co., Sarasota, February (MCZ); Volusia Co., Enterprise, December (USNM); County unknown, Fort Barrancas, March (USNM). Georgia: Decatur Co., Spring Creek, June (USNM); Glynn Co., Saint Simons Isl., July (MCZ); Tift Co., Tifton (MCZ). Indiana: County unknown, Mineral Springs, January, February (USNM). Louisiana: DeSoto Parish, Logansport, March, June, August (USNM); Orleans Parish, New Orleans (USNM). Maryland: Prince Georges Co., Patuxent Refuge, Bowie, January (USNM). Massachusetts: Bristol Co., Dartmouth, June (MCZ); West-

port, June (USNM); Middlesex Co., Cambridge (USNM); Framingham, May (MCZ); Plymouth Co., June (USNM); Hanson, August (MCZ); Suffolk Co., Dorchester, April, October (MCZ); Worcester Co., Berlin, July (MCZ). New Jersey: Burlington Co., Riverton, April, May (USNM); Gloucester Co., Grenlock, July (USNM); Malaga, September (USNM); Monmouth Co., Asbury Park, September (MCZ); Passaic Co., Newfoundland, June (USNM). New Mexico: (MCZ); Colfax Co., Mts. near Raton, September (USNM); Grant Co., Silver City, 16.4 mi. N, Trout Creek, June (USNM); San Miguel Co., Las Vegas, March (USNM); Taos Co., San Juan Valley, August (MCZ). New York: Nassau Co., Long Island, Massapeque, April (USNM); Suffolk Co., Long Island, Wyandanch, April (USNM). North Carolina: (USNM); Buncombe Co., "Biltmore," August (USNM); Moore Co., Southern Pines, March (USNM); Pasquotank Co., Elizabeth City, 2.5 mi. SE, December (USNM); Wake Co., Raleigh, February, March, November (CNC). South Carolina: Beaufort Co., Fort Fremont, April (USNM); Colleton Co., Confederate Estates, December (USNM); Florence Co., Florence, February (USNM); Kershaw Co., Camden, June (MCZ); Oconee Co., Clemson, March (CNC). South Dakota: County unknown, Black Hills, June, September (CMNH, USNM). Texas: (MCZ); Bastrop Co., Bastrop State Park, April (CNC); Bexar Co., San Antonio, December (MCZ); Red River Co., Jct. Hwy. 37 and Red River (USNM). Virginia: Arlington, Four Mile Run, April (USNM); Fairfax Co., Falls Church, April (USNM); Nelson Co. (USNM); Norfolk Co., Norfolk, Ocean View, September (USNM); Warren Co., Linden, 5 mi. N, July (USNM). West Virginia: Greenbrier Co., White Sulphur Springs, July (USNM). Wisconsin: (USNM).

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