

THE ANTS OF POLYNESIA (Hymenoptera: Formicidae)

By Edward O. Wilson and Robert W. Taylor¹

BIOLOGICAL LABORATORIES, HARVARD UNIVERSITY
CAMBRIDGE, MASSACHUSETTS, U.S.A.

Abstract: All of the known Polynesian species are reviewed, including those newly discovered in several extensive, hitherto unstudied collections made during the past 30 years. Also, the ecological results of a field trip to Samoa in 1962 are presented. A total of 83 species is recorded, of which 34 are "tramp" elements (introduced by modern human commerce from various parts of the tropics), 16 are endemics in western Polynesia, 27 are elements continuously distributed from Melanesia which may be native to part or all of their Polynesian range, and 6 are of uncertain zoogeographic status. The New Zealand fauna, containing 31 species, is reviewed separately in an Appendix. Nine endemic Polynesian species are described as new: *Strumigenys mailei*, *Pheidole aana*, *P. atua*, *Vollenhovia pacifica*, *Rogeria exsulans*, *Adelomyrmex samoanus*, *Camponotus navigator*, *C. rotumanus*, *Polyrhachis rotumana*. All of these, except the last two, are from the Samoan Islands. Few if any ant species are native to the islands east of Rotuma, Samoa, Tonga, and New Zealand. This part of Polynesia has been populated by tramp species, which today present evidences of an approach to an equilibrium species density. The tramp species also show signs of some competitive replacement as well as of considerable population fluctuation. The available information on the histories and ecology of individual species is considered with special reference to these phenomena.

In the following account we wish to describe a fauna in the conventional taxonomic sense. It is also our aim to put down enough locality records to comprise a first chapter in what is certain to be a rapidly moving historical sequence. The ants of Polynesia are unusual in that nearly half of the species have been introduced into the Pacific by modern human commerce within the period of intrusion by European civilization, spanning no more than 400 years. East of Rotuma, Samoa, Tonga, and New Zealand there are apparently no naturally occurring ant species at all; the introduced "tramp" species play an increasingly dominant role as one moves progressively to the Society Islands, Tuamotu Islands, Marquesas, and, finally, Hawaii. Such a newly assembled fauna can logically be expected to be in a state of flux. The situation is exceptionally interesting from the viewpoints of the ecologist and evolutionist, and for this reason we have undertaken to describe it as thoroughly as possible. Elsewhere (Wilson & Taylor 1967) we have described some of the more interesting theoretical implications of the distributions. The New Zealand fauna has recently been reviewed by Brown (1958) and later authors (see Taylor 1961),

1. Present address of Taylor: Division of Entomology, C. S. I. R. O., Canberra, A. C. T., Australia.

and will not be covered in detail here. In the appendix we have provided a synopsis of the New Zealand species, adding some additional information that has come to light since Brown's paper. The New Zealand fauna, especially its native component, is very different from that of the rest of Polynesia and can conveniently be treated as a separate unit.

HISTORY OF TAXONOMIC STUDIES

The first collections of Polynesian ants were made in Samoa, Tonga, and the Ellice Islands in the 1860's and were described by Gustav Mayr (1866, 1870). They included several common Samoan endemics, such as *Ectomomyrmex insulanus* and *Vollenhovia samoensis* as well as many of the tramp and widespread Indo-Australian species that occur in western Polynesia today. Carlo Emery (1899, 1914a) added a few additional species from Samoa and Hawaii collected by Schauinsland and Silvestri. In 1899 Auguste Forel described the extensive collections made for Perkins' *Fauna Hawaiiensis*. In this first monograph of the ant fauna of a Polynesian archipelago, the largely homovectant character of the Hawaiian species was made evident. In 1928 Felix Santschi published a thorough study of the Samoan ants based on the collections made by P. A. Buxton and G. H. E. Hopkins during the London School of Hygiene and Tropical Medicine Expedition. In the same year L. Evelyn Cheesman published, in collaboration with W. C. Crawley, an account of her collections from the Society Islands and Marquesas. William M. Wheeler, the most prolific author on the Polynesian ants, began his studies in 1908 with a report of a small collection from the Society Islands. In 1932 he added more complete records from the Society Islands and described the large collections assembled by A. M. Adamson and E. P. Mumford in the Marquesas during 1929-30. Shortly thereafter Wheeler commenced work on the collections of the B. P. Bishop Museum in Honolulu, producing a spate of descriptions and species lists until his death in 1937. Wheeler was fortunate to acquire the remarkably thorough collections gathered by E. C. Zimmerman during the Mangarevan Expedition of 1934. Employing the sweep net, Zimmerman had sampled the faunas of many islands which had never before been investigated, from Rapa to Bora Bora and Henderson. Wheeler also reported on the extensive collections being accumulated in Hawaii by resident entomologists there. In the past four decades many entomologists, including F. X. Williams, R. H. Van Zwaluwenburg, O. H. Swezey, E. C. Zimmerman, E. H. Bryan, Jr., M. R. Smith, and others, have paid varying degrees of attention to the Hawaiian ants, especially those of economic importance, and have published a great deal of useful information, mostly in articles in the *Proceedings of the Hawaiian Entomological Society*.

In 1940 O. H. Swezey and E. C. Zimmerman collected ants intensively on Samoa. T. E. Woodward added excellent Berlese funnel and hand collections in 1956, during a collect-

Fig. 1. The major islands of the Western Samoan group, upper *Savai'i*, lower *Upolu*. The following localities are indicated—on SAVAI'I: Alagaogao 2; Aopo 9; Asau 5; Faga 24; Falealupo 1; Gagaifoumauga 6; Ga'utaivai 16; Letui 11; Lotogo 3; Manase 13; Matautu 14; Matega 7; Mt. Matafa 20; Mt. Olomanu 21; Palauli 22; Papa 17; Patamea 18; Puapua 23; Safune 12; Salailua 8; Salelologa 26; Samalaeulu 19; Sili 15; Taga 10; Tuasivi 25; Vaisala 4. On UPOLU: Afiamalu 40; Aleisa 29; Apia 34; Fagaloa Bay 54; Faleapuna 51; Falevao 52; Fasitoouta 27; Lake Lanoto'o 33; Laili'i 46; Le Mafa 53; Malololelei 39; Matautu 35; Moata'a 42; Poutasi 48; Sa'agafou 45; Salani 50; Saluafata 47; Satalo 49; Sliding Rock 32; Tanumalala 28; Tapatapao 31; Ti'avea 55; Togitogiga 41; Utumapu 44; Vaea 37; Vaiala 36; Vailima 38; Vaipoto 30; Vivase 43.

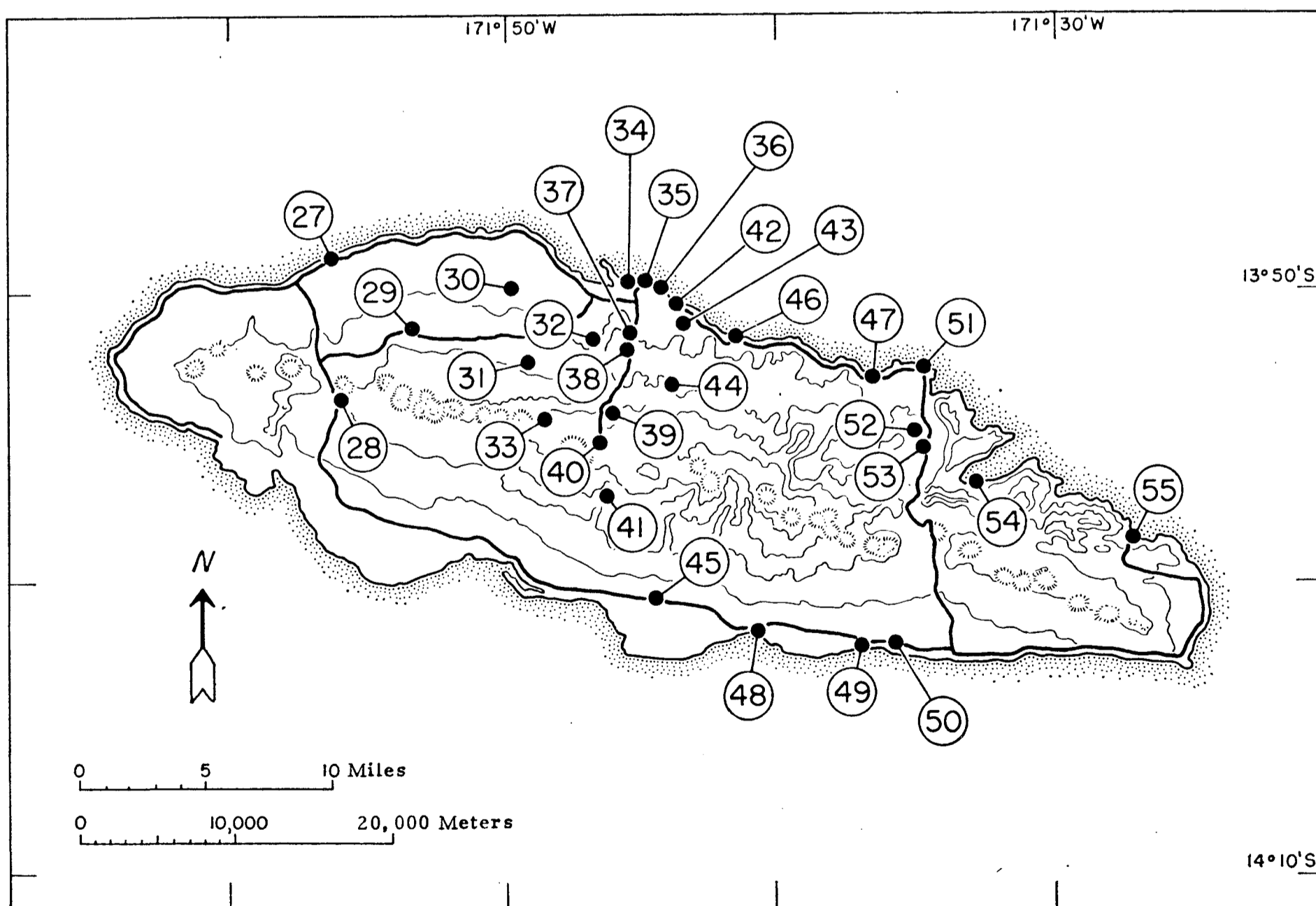
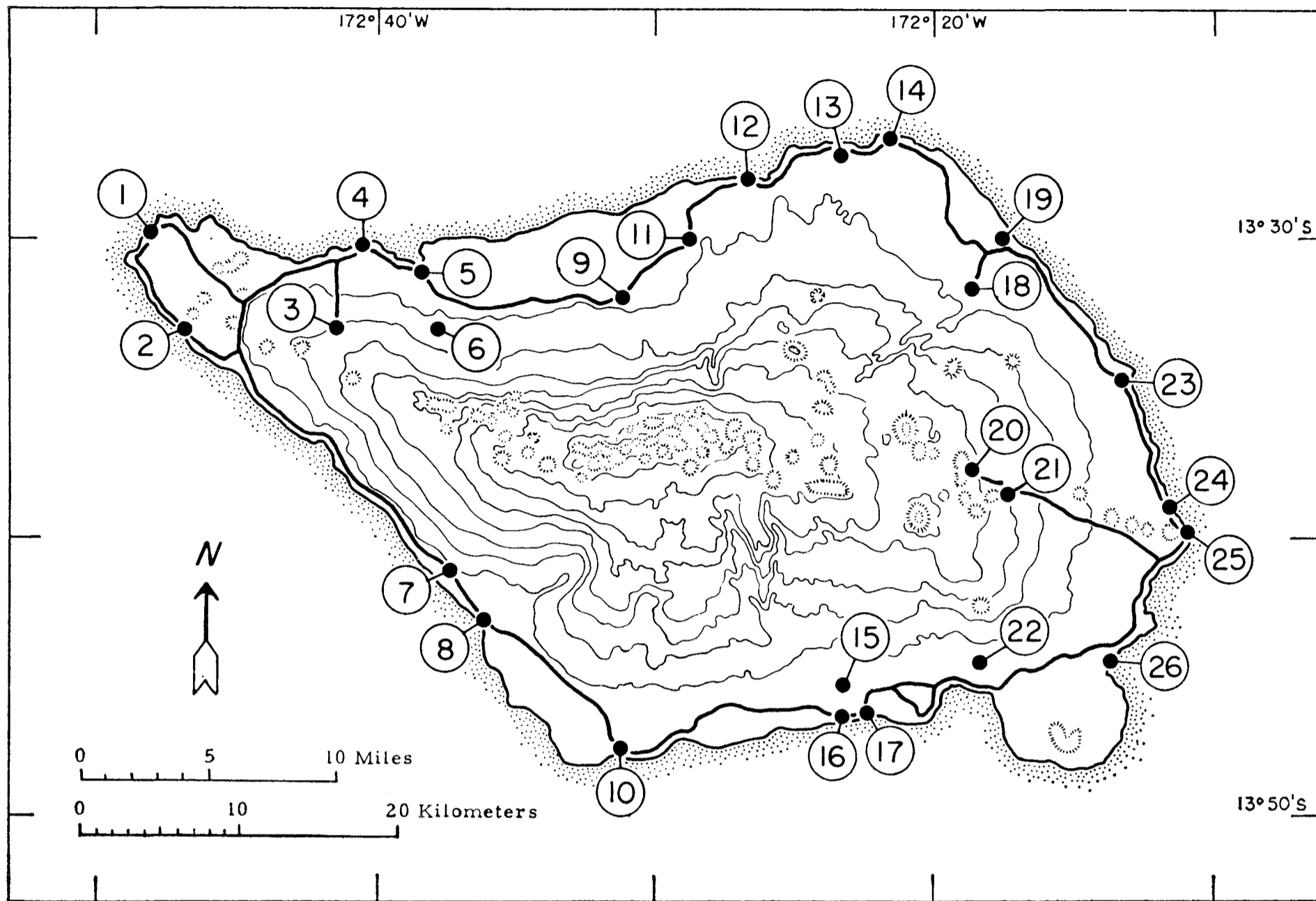


Fig. 1.

ing tour in association with R. A. Cumber, then resident entomologist at Upolu. This new, unstudied material provided the stimulus for our own work. We soon realized the crucial need to obtain a detailed picture of Samoa, since that archipelago contains the largest number of probable native species of any Polynesian archipelago and has undoubtedly served as a principal source for insular faunulae to the east. Accordingly, in 1962 R. W. Taylor and his wife, Wendy, made a 5-week visit to Savai'i, Tutuila, and Upolu to obtain more thorough collections and gather ecological information. The success of these studies owes much to the assistance of G. Ettershank, then Entomologist to the Western Samoa Dept. of Agriculture. The Taylors visited many localities in all major habitats on Upolu and Tutuila, most of the time being spent working from a mountain cabin at Afiamalu in the center of Upolu. Taylor and Ettershank together covered Savai'i in an intensive 4-day program, during which almost all major roads were traversed with frequent collection stops. The interior of Savai'i could be entered at only 2 points, but lower elevation habitats were heavily sampled. Thanks to the cooperation of Dr G. Keys, then director of Apia Observatory, it was possible to operate a number of electrically powered Berlese funnels at Afiamalu, and additional funnels were run in Ettershank's laboratory. Following the Taylors' visit Ettershank continued intensive Berlese funnelling for several months, providing us with many valuable records, especially from Savai'i and Tutuila.

At the conclusion of the Samoan field studies we felt confident that a nearly complete faunal list could be made for the Samoan Islands. At the same time J. L. Gressitt turned over to us new collections accumulated in the Bishop Museum from other parts of Polynesia, including Rotuma, Tonga, the Danger Islands, Tokelau Islands, and Society Islands. Also, I. E. Efford made available the collection of ants made during the University of British Columbia Medical Expedition to Easter Island in 1965.

In the present account an attempt has been made to record *all* collections of Polynesian ants, old and new, because of the possibility they provide of revealing short-term historical changes in the faunulae. For the same reason we have given either the date of capture or else a literature citation that will fix the approximate date of capture of most specimens collected on the islands. For economy, the following symbols relating to literature records are employed throughout:

*

An asterisk before a locality means a literature record in one or more of the publications by W. M. Wheeler. Thus:

* SOCIETY IS. means that all the ensuing records under the Society Is. are based on Wheeler's authority; *Arne means that Arne in particular is based on Wheeler; Papenoo Valley (1916; *1935) means that only the 1935 record is based on Wheeler. We have "spot-checked" many of Wheeler's determinations and become familiar with his species concepts. In case of dubious records we have either verified Wheeler's determinations or quoted them with qualification.

**

A double asterisk before a locality means a literature record from Samoa by Santschi. Although we have not verified all of Santschi's determinations, we believe our knowledge of the Samoan fauna is sufficient to evaluate their reliability in most cases.

A basic reference collection, including voucher series for many of our Samoan records as well as the holotypes of the new species, has been deposited in the Museum of Comparative Zoology, Harvard University. A second comprehensive collection, including

duplicate paratypes, will be placed in the B. P. Bishop Museum. A third collection, including paratypes and the bulk of the alcoholic material, and hence most of the voucher series of Taylor's records, will go to the Australian National Insect Collection at Entomology Division, C. S. I. R. O., Canberra, Australia.

ZOOGEOGRAPHIC ANALYSIS

A classification of the 83 known Polynesian species according to origin is given in Table 1. The composition of the faunulae of the better known islands is given in Table 2. In order to provide a crude measure of the degree of sampling, the number of persons who have made substantial collections on each of the islands is also given in Table 2. From these data, together with a consideration of distributions of individual species detailed later in the taxonomic part, the following generalizations have been drawn.

(1) It is apparent that prior to the coming of man, few if any native species ranged east of New Zealand, Rotuma, Samoa, and Tonga. No certain endemics are known to occur in Polynesia east of these islands. Five species which prior to 1950 were considered to be endemic, namely *Ponera swezeyi* (Wheeler), *Cerapachys silvestrii* Wheeler, *Epitritus wheeleri* Donisthorpe, *Monomorium rapaense* Wheeler, and *Plagiolepis mactavishi* Wheeler, have been synonymized with species that occur elsewhere within or outside Polynesia. Four others, *Amblyopone zwaluwenburgi* (Williams) and *Hypoponera zwaluwenburgi* (Wheeler) of Hawaii, *Smithistruma mumfordi* (Wheeler) of the Marquesas Islands, and *Oligomyrmex tahitiensis* Wheeler of Tahiti, are still unknown elsewhere; but their endemic status is cast into doubt by the fact that they belong to notoriously poorly collected and taxonomically little known genera. Moreover, *O. tahitiensis* was described only from the sexual castes and cannot even be compared with most of the other Indo-Australian members of the genus, which are known only from the worker caste. Also, despite a plethora of subspecific and varietal names applied in the past literature to populations of species now living in the central and eastern Pacific, we have discovered only a single example of true geographic variation within these populations. The case is furthermore a relatively trivial one: the propodeal spines of workers and soldiers in samples of *Pheidole umbonata* Mayr from the Society Islands and Marquesas are slightly thicker, and the body color darker, than in similar samples from Samoa.

Table 1. A Classification of the Polynesian Ant Species According to Origin.

1. Endemic to one or more Polynesian archipelagoes:

Ectomyrmex insulanus, *Ponera loi*, *P. woodwardi*, *Strumigenys mailei*, *Pheidole aana*, *P. atua*, *Vollenhovia pacifica*, *V. samoensis*, *Rogeria exsulans*, *Adelomyrmex samoanus*, *Camponotus navigator*, *C. rotumanus*, *C. flavolimbatus*, *C. conicus*, *C. nigrifrons*, *Polyrhachis rotumana*.

2. Continuously distributed from Indo-Australian area into Polynesia:

Prionopelta kraepelini, *Platythyrea parallela*, *Ponera incerta*, *P. tenuis*, *Hypoconera confinis*, *H. punctatissima*, *Cryptopone testacea*, *Odontomachus simillimus*, *Anochetus graeffei*, *Eurhopalothrix procera*, *Smithistruma dubia*, *Strumigenys szalayi*, *Pheidole fervens*, *P. oceanica*, *P. umbonata*, *P. sexspinosa*, *Solenopsis papuana*, *Oligomyrmex atomus*, *Monomorium talpa*, *Tetramorium pacificum*, *T. tonganum*, *Rogeria sublevinodis*, *Iridomyrmex anceps*, *Tapinoma minutum*, *Technomyrmex albipes*, *Paratrechina minutula*, *Camponotus chloroticus*.

3. "Tramp species": certainly distributed by recent human commerce:

Hypoconerops opaciceps, *Trachymesopus stigma*, *Leptogenys maxilloso*, *Syscia silvestrii*, *Trichoscapa membranifera*, *Strumigenys godeffroyi*, *S. lewisi*, *S. rogeri*, *Quadristruma emmae*, *Pheidole megacephala*, *Solenopsis geminata*, *Monomorium destructor*, *M. latinode*, *M. floricola*, *M. fossulatum*, *M. minutum*, *M. pharaonis*, *Triglyphothrix striatidens*, *Tetramorium caespitum*, *T. guineense*, *T. simillimum*, *Cardiocondyla emeryi*, *C. nuda*, *C. wroughtoni*, *Iridomyrmex humilis*, *Tapinoma melanocephalum*, *Anoplolepis longipes*, *Plagiolepis alluaudi*, *P. exigua*, *Paratrechina bourbonica*, *P. vaga*, *P. longicornis*, *Brachymyrmex obscurior*, *Camponotus variegatus*.

4. "Tramp species" intercepted in quarantine at Honolulu but not yet established in Polynesia:

Brachyponera solitaria, *Tetramorium caespitum*, *Wasmannia auropunctata*.

5. Uncertain status:

Amblyopone zwaluwenburgi, *Ponera swezeyi*, *Hypoconerops zwaluwenburgi*, *Smithistruma mumfordi*, *Oligomyrmex tahitiensis*, *Chelaner antarcticum*.

Table 2. Partition of the Faunulae of Individual Polynesian Islands According to Origin.

Archipelago or Island	Area in sq. miles	No. of collectors	No. of genera	No. of species				Total
				Endemic	Continuous Indo-Austral.	Tramp	Uncertain	
Samoa (1938-62)	1209	5	29	12	23	23	1	59
1. Savai'i	703	5	21	5	15	17	1	38
2. Upolu	430	5	29	11	22	22	1	56
3. Tutuila	52	5	18	3	16	14	1	34
Tokelau Islands	1	1	9	0	5	7	0	12
4. Fakaofu (1924)	1	1	9	0	5	7	0	12
Danger Islands	3	1	7	0	2	6	0	8
5. Motu Kotawa	0.5	1	6	0	2	5	0	7
Society Islands (1906-34)	650	3	16	0	10	19	1	30
6. Bora Bora (1925-34)	10±2	3	5	0	1	6	0	7
7. Mehetia	1	3	2	0	2	1	0	3
8. Huahine	25±2	3	4	0	2	4	0	6
9. Moorea (1906-34)	51	3	10	0	5	11	0	16
10. Raiatea (1925-34)	60±5	3	12	0	5	10	0	15
11. Tahiti (1925-34)	402	3	16	0	11	16	1	28
Austral Islands	115	1	12	0	6	14	0	20
12. Rimatara	5	1	7	0	4	6	0	10
13. Raivavae	12±4	1	9	0	5	8	0	13
14. Maria I. (N-E Islet)		1	6	0	0	6	0	6
15. Rapa	13±2	1	6	0	2	5	1	8
Gambier Islands (1934)	12	1	11	0	3	9	0	12
16. Mangareva	7	1	7	0	2	7	0	9
Marquesas (1920-29)	480	2	11	0	5	15	1	21
17. Eiao	20	2	8	0	1	7	0	8
18. Hatutu	7	2	3	0	0	3	0	3
19. Ua Pu	40±10	2	3	0	0	4	1	5
20. Ua Huka	30	2	8	0	3	11	0	14
21. Hiva Oa	125	2	7	0	3	6	0	9

Archipelago or Island	Area in sq. miles	No. of collectors	No. of genera	No. of species				Total
				Endem-ic	Continuous Indo-Austral.	Tramp	Uncer-tain	
22. Tahuata	20	2	7	0	1	8	0	9
23. Nuku Hiva	125	2	7	0	1	7	1	9
24. Fatu Hiva	30	2	7	0	5	8	0	13
25. Mohotane	5	2	5	0	1	6	0	7
26. Pitcairn Island (1934)	2	1	6	0	1	5	0	6
27. Henderson Island (1934)	1	1	6	0	1	5	0	6
28. Flint Island (1934)	1	1	5	0	0	6	0	6
Hawaii (1920-62)	6438	5+	21	0	5	29	2	36
29. Hawaii	4030	—	12	0	0	16	0	16
30. Maui	728	—	9	0	0	13	0	13
31. Molokai	260	—	10	0	2	10	0	12
32. Oahu	604	—	19	0	4	28	2	34
33. Kauai	555	—	8	0	1	11	0	12
34. Nihoa	0.5	—	5	0	0	5	0	5
35. French Frigate Shoals	1	—	3	0	0	3	0	3
36. Laysan	1	—	7	0	0	9	0	9
37. Wake	3	—	3	0	0	4	0	4
38. Midway	2	—	9	0	1	10	0	11
39. Kure (Ocean)	18	—	4	0	1	3	0	4
Solomons (1916)	—	1	—	—	—	—	—	—
40. Florida	120	1	19	7	18	2	0	27
41. Malapaina	30±5	1	23	10	18	3	0	31
42. Ugi	30±5	1	24	10	21	4	0	35
43. Malaita	2500	1	32	23	29	5	0	57
44. San Cristoval	1600	1	33	18	31	4	0	53
45. Santa Ysable	1500	1	36	14	38	4	0	56

About 20 Indo-Australian ant species range to some point east of Rotuma, Samoa, and Tonga. Yet these too might easily have been transported into outer Polynesia by man. *Iridomyrmex anceps* (Roger), for example, one of the most widespread of the dolichoderines, was unknown until recent years from east of the Solomon Islands. In 1955 it was collected on Aitutaki, in the Cook Islands, and in 1956 at Nandi, the international airport community of Fiji. Intensive collecting has not yet revealed its presence in the intermediately situated Samoan islands. The case for its establishment on Aitutaki through human commerce is therefore strong. Several other of the Indo-Australian elements in the central and eastern Pacific are certainly known to be tramp species, having been established in the New World as well. Three others—*Odontomachus simillimus* Fr. Smith, *Tetramorium pacificum* Mayr, and *Pheidole fervens* Fr. Smith—have been intercepted at quarantine stations in Hawaii (see Appendix I), and the last 2 have been taken in quarantine in New Zealand (R. W. Taylor, unpublished mss.).

(2) The native species of western Polynesia are drawn almost exclusively from the Indo-Australian area. Almost all of the endemics have close relatives in Australia or Melanesia, mostly the latter. The single exception is *Rogeria exsulans* Wilson & Taylor, a small secretive ant belonging to a group which is otherwise known only from the Neotropical Region.

(3) No one island contains all of the 34 tramp species known to occur in Polynesia, and most contain less than one-fourth of them. Several lines of evidence suggest that the species densities have stabilized. Competitive replacement has probably played some role in the stabilization. At least it has apparently limited the number of species of *Pheidole*, *Cardiocondyla*, and *Paratrechina* occurring in individual islands. Distributions of 2 or 3 species within these genera tend to be complementary. The clearest example involves the large, aggressive species of *Pheidole*. *P. fervens*, a widespread Indo-Australian species, is unknown from Samoa at the present time but is a dominant ant in the Society Islands. *P. megacephala*, a pantropical species of African origin, well known for its competitive interactions with other ant species, has the reverse distribution: it is dominant on Upolu (Samoa) but is rare or absent in the Society Islands. *P. oceanica*, another Indo-Australian element, replaces *megacephala* on Savai'i (Samoa) and occurs on Upolu only on the western side facing Savai'i; it is furthermore relatively uncommon in the Society Islands. Elsewhere in Polynesia the complementarity among the 3 species is maintained. *Fervens* occurs on Tonga and Pitcairn; it is occasional in the Marquesas and unknown from Hawaii. *Megacephala* is absent from Tonga and Pitcairn but is dominant on the Marquesas and Hawaii.

GLOSSARY OF SPECIAL TERMS AND MEASUREMENTS

Details of external anatomy of an ant worker are shown in Figure 2. The following terms, which are used in the taxonomic part, either are not found in the ordinary entomological glossary or else require special definition with reference to our study.

Basal face (of propodeum). Dorsal surface of propodeum.

CI. Cephalic index. $(HW \times 100) / HL$.

Declivitous face (of propodeum). Posterior face of propodeum, extending to petiolar junction.

EHB. Collected by E. H. Bryan, Jr.

ECZ. Collected by E. C. Zimmerman.

GE. Collected by G. Ettershank.

HL. Head length. As conventionally used in myrmecology, the maximum distance, taken along the midline between the points of intersection of the midline with the lines drawn perpendicular to the midline, that touch the anteriormost and posteriormost parts of the head exclusive of the mandibles (the posteriormost and anteriormost points need not be on the midline).

HW. Head width. When the head is viewed full face, the maximum width taken perpendicular to the midline. This measurement is made across the eyes in the male but above or below the eyes (if these break the profile) in the queen and worker.

Mesosoma. The alitrunk, or middle tagma, including the thorax and propodeum together.

Microreticulum. A very fine reticulum in the cuticular sculpturing, where the reticular diameters are on the order of 0.01 mm. This is one particular form of the microsculpture generically referred to as "shagreening" by many authors.

NK. Collected by N. L. H. Krauss.

OHS. Collected by O. H. Swezey.

Propodeal junction. Line of junction of the basal and declivitous faces (*q. v.*).

RWT. Collected by R. W. Taylor.

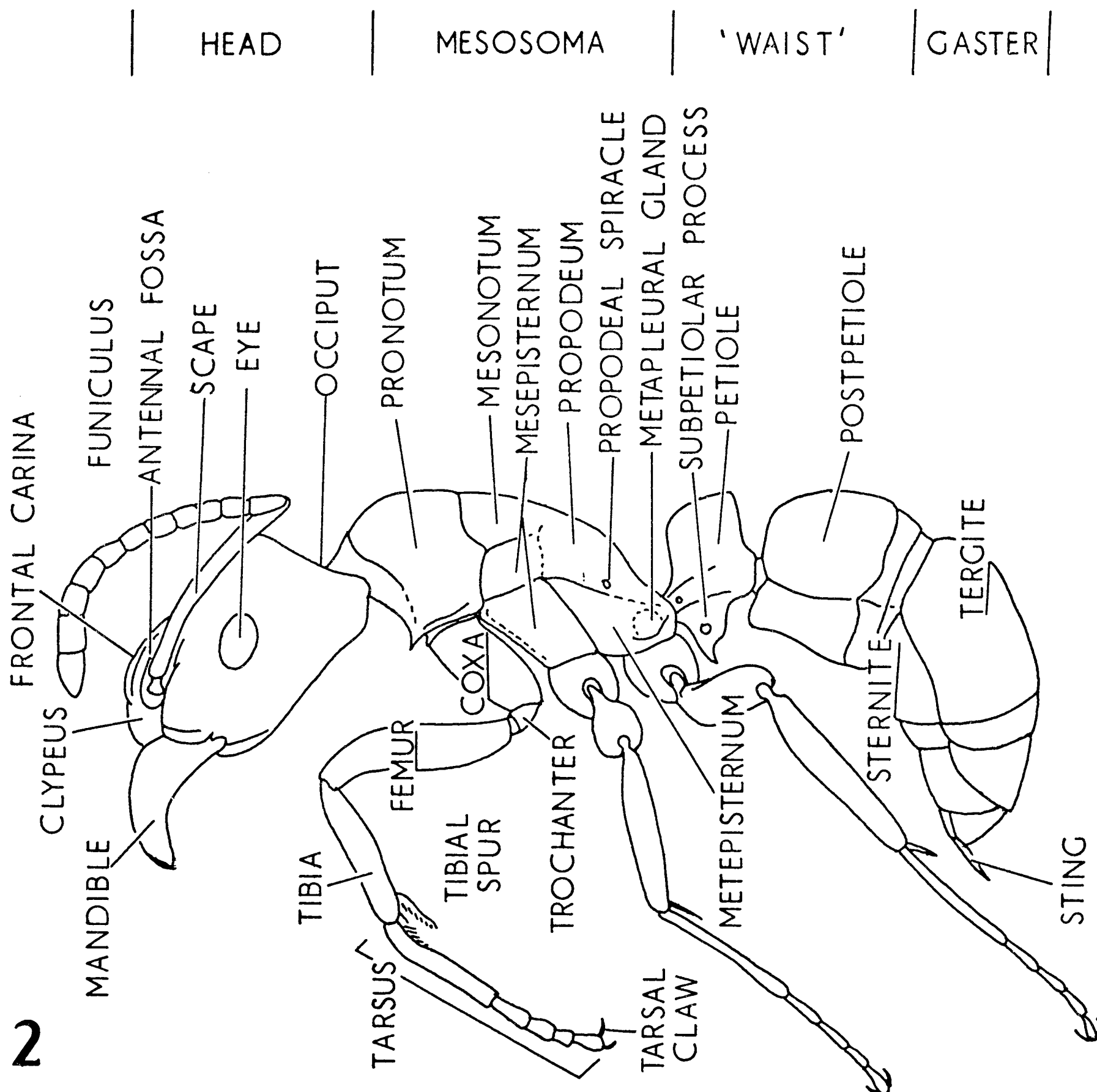


Fig. 2. *Rhytidoponera metallica* (Fr. Smith), worker from Sydney, Australia; labelled to demonstrate the major terminology used in this study.

SI. Scape index = $(SL \times 100) / HW$.

SL. Scape length. The maximum length of this appendage that can be taken.

Subopaque. Four arbitrary degrees in the spectrum of "shininess" are recognized: shining, feebly shining, subopaque, opaque. The first and last are self-explanatory, and the middle 2 are meant to be (subjectively) 2 equidistant intermediate steps. Thus subopaque means mostly opaque but with a few points of reflection under ordinary reflected light.

TEW. Collected by T. E. Woodward.

Acknowledgments: We are indebted to our colleague William L. Brown, Jr., who with characteristic generosity supplied much vital information from his notebooks on the Ponerinae and Dacetini. We are also very grateful to George Ettershank and Thomas E. Woodward, who turned over their Samoan collections, together with valuable ecological notes; to J. L. Gressitt, who made possible the loan of the Bishop Museum collections; to George Hunt, who in preparing for a field trip to Polynesia tested our keys and descriptions;

to Jonathan Reiskind for information on the taxonomy of *Cardiocondyla*; to Mr and Mrs W. Lidgard and the officials of the Apia Observatory for assistance rendered to Taylor during his visit to Samoa; and to I. E. Efford for the gift of his collection of Easter Island ants. Dr and Mrs Ettershank provided generous aid in many ways during the Samoan trip. The research has been supported by Grant No. GB 1634 from the U. S. National Science Foundation. The Samoan field studies were part of an extensive 5-month study tour which also included Fiji, Australia and New Guinea. This was carried out by Taylor under the auspices of the Committee on Evolutionary Biology, Harvard University; the Bache Fund Committee, American Academy of Arts and Sciences; and the Society of Sigma Xi-RESA.

KEY TO SUBFAMILIES OF POLYNESIAN ANTS, BASED ON WORKERS

1. Gaster attached to mesosoma (alitrunk) by a "waist" consisting of 2, more or less reduced and nodiform segments 2
 Gaster attached to mesosoma by a "waist" consisting of a single segment, which may be nodiform, erect or inclined scale-like, or even prostrate and more or less hidden by overhanging gaster 3
2. Pygidium flattened at apex, the flattened part bordered with denticles arranged in rows on each side; underside of head with a strong carina on each side running forward from posterior corner; frontal carinae closely approximated and vertical, so that the antennal insertions are exposed when head is examined in facial view **Cerapachyinae** (*Syscia silvestrii*)
 Pygidium simple; no distinct carinae on underside of head extending forward from posterior corners; frontal carinae usually horizontal, obscuring antennal insertions in facial view..... **Myrmicinae**
3. Sting well developed and functional, usually extended and visible in dead specimens **Ponerinae**
 Sting absent, or vestigial and not extensible 4
4. Seventh sternite rolled into a short ventro-apical cone with a round orifice (with or without a coronula of tiny hairs) that serves as a nozzle for a defensive acid spray; not to be confused with cloacal orifice, which is more dorsal and normally hidden.....**Formicinae**
 Gastric apex lacking such a spray-ejecting cone; defensive secretion a viscous fluid, ejected through a slit-like orifice..... **Dolichoderinae**

KEY TO POLYNESIAN ANTS OF SUBFAMILY PONERINAE, BASED ON WORKERS

1. Head of bizarre form illustrated in figs. 19 and 20, with mandibles linear and inserted near its midline 2
 Head differently shaped, with mandibles inserted at its anterior corners..... 3
- 2 (1). Large sized (HW about 2 mm) dark reddish-brown species with petiolar apex drawn into an acute conical spine (fig. 19) **Odontomachus simillimus**
 Smaller (HW about 1 mm) golden brown species with petiolar summit a narrow transverse ridge (fig. 20)..... **Anochetus graeffei**
- 3 (1). Petiole depressed, articulated over its whole posterior surface with postpetiole (fig. 4) 4

- Articulation between petiole and postpetiole narrow, petiole usually with a distinct transverse posterior face (e. g., fig. 6) 5
- 4 (3). Mandibles short, closing tightly against clypeus, their apical borders distinct and occupied by 3 large teeth, of which the middle is shortest; basal border of mandible edentate (fig. 4)..... **Prionopelta kraepelini**
Mandibles linear, strongly projecting beyond clypeus when closed, their inner borders armed with a number of bipartite teeth (fig. 3).. **Amblyopone zwaluwenburgi**
- 5 (3). Mandibles falcate, very slender and strongly curved, lacking distinct teeth; when closed there is an extensive gap (with an area much greater than that of mandibles themselves) between their inner borders and anterior clypeal border (fig. 18); pretarsal claws pectinate..... **Leptogenys maxillosa**
Mandibles differently shaped, usually triangular, and with distinct teeth; when closed there is little if any gap between them and clypeus; pretarsal claws simple, or with a single median tooth..... 6
- 6 (5). Head, mesosoma and node very roughly punctate-rugose, dorsal aspects of postpetiolar and 1st gastric tergites densely and finely arched-striate; entire body with strong greenish or purplish metallic reflections; inferior margins of pronotum each armed with a strong acute tooth..... **Rhytidoponera metallica**
Sculpturation unlike that described above, dorsal aspects of postpetiole and 1st gastric segments never striate; color ranging from black to pale yellowish brown, without metallic reflections; inferior pronotal margins rounded ... 7
- 7 (6). Petiolar node distinctly longer than broad in dorsal view; body almost entirely lacking erect hairs—none break its dorsal outline except at gastric apex; pretarsal claws each with a distinct median tooth **Platythyrea parallela**
Petiolar node usually distinctly broader than long in dorsal view, occasionally almost as long as broad; body with abundant erect or suberect hairs breaking its dorsal outline; pretarsal claws simple, lacking a median tooth..... 8
- 8 (7). Declivitous face of propodeum and posterior face of node heavily striate, striae usually transverse, though sometimes partly longitudinal on upper parts of node; mesepisternum divided by a transverse suture into anepisternal and katepisternal plates..... **Ectomomyrmex insulanus**
Declivitous face of propodeum and posterior face of node smooth and shining, at most with a few transverse striae on their lower parts; mesepisternum entire, not divided by a horizontal suture..... 9
- 9 (8). Mandible elongate triangular, the angle between its posterior and masticatory borders obtuse, approximating 120°. Masticatory border with 5 or 6 distinct strong teeth (figs. 7, 8) 10
Mandible broadly triangular, the angle between its posterior and masticatory borders approximating 90°. Masticatory border with more numerous small teeth or minute denticles (e. g., fig. 9)..... 11
- 10 (9). Small (HW < 0.5 mm) pale brown species, entirely lacking compound eyes; antenna bearing a distinctly 4-segmented club..... **Cryptopone testacea**
Larger (HW > 1 mm) dark brown species, with small but distinct compound eyes and lacking a distinctly segmented antennal club..... **Trachymesopus stigma**
- 11 (9). Clypeus with a small but distinct anteriorly directed conical median tooth (figs. 10, 13) 12

- Clypeus lacking an erect median tooth, its mesal surface often carinate, but carina never extended apically as a tooth 13
- 12 (11). Scapes long, when laid back along head they clearly surpass median occipital border by a distance equal to 1-1.5× their maximum thickness; scape index 98-100; mesometanotal suture not represented on mesosomal dorsum as a sharply incised line, though it may be represented as a shallow obtuse concavity which does not break the underlying puncturation..... **Ponera woodwardi**
- Scapes shorter, when laid back along head they barely attain median occipital border, or fail to do so by up to 0.5× their maximum thickness; scape index 84-91; mesometanotal suture clearly incised on mesosomal dorsum as a sharp line, which interrupts the underlying puncturation..... **Ponera loi**
- 13 (11). Compound eyes completely lacking; subpetiolar process without a fenestra (fig. 17); antennal club indistinctly 5-segmented**Hypoponera zwaluwenburgi**
- Compound eyes present, though often represented by a single minute facet; subpetiolar process with or without an elliptical anterior fenestra (figs. 9, 14); antennal club usually segmentally undifferentiated or distinctly 4-segmented; in cases where it is indistinctly 5-segmented the subpetiolar process is fenestrate 14
- 14 (13). Subpetiolar process with an elliptical anterior fenestra and a pair of bilateral posteroventral denticles (figs. 9, 13); compound eyes consisting of 1 or rarely 2 facets; maxillary palpi 2-segmented; larvae when present with 3 pairs of "doorknob-shaped" tubercles on abdominal dorsum 15
- Subpetiolar process a simple lobe-like structure without a fenestra or postero-lateral denticles (figs. 15, 17); compound eyes usually with more than 3 facets; maxillary palpi 1-segmented, larvae with 2 pairs of dorsal abdominal "doorknob" tubercles..... 17
- 15 (14). Mesometanotal suture lacking on mesosomal dorsum; antennal club distinctly 4-segmented; pupae naked, lacking cocoons **Ponera tenuis**
- Mesometanotal suture distinctly incised on mesosomal dorsum; antennal club indistinctly 5-segmented; pupae when present enclosed in yellowish cocoons...16
- 16 (15). Larger medium brown species (HW 0.30-0.45 mm) with relatively broad head, its maximum width 0.78-0.84× its median length **Ponera incerta**
- Smaller pale yellowish-brown species (HW 0.32-0.33 mm) with relatively narrow head, its maximum width 0.76-0.78× its median length..... **Ponera swezeyi**
- 17 (14). Antennal scapes short; when laid back along head they fail to attain median occipital border by a distance greater than their maximum diameter
..... **Hypoponera punctatissima**
- Antennal scapes longer, clearly attaining or surpassing median occipital border...18
- 18 (17). Dorsum of pronotum strongly shining and lacking puncturation; mesepisternum almost completely outlined by a fine raised carina (fig. 14); petiolar node in side view distinctly narrowed dorsally **Hypoponera confinis**
- Dorsum of pronotum dully shining, with a close cover of very fine punctures; mesepisternum not outlined by a carina; anterior and posterior faces of petiolar node in side view almost parallel..... **Hypoponera opaciceps**

KEY TO POLYNESIAN ANTS OF SUBFAMILY MYRMICINAE, BASED ON WORKERS

1. Antennae with 7 segments or less; head cordate in front view and often bearing 2 or more conspicuous scale-like hairs; postpetiole commonly (but not always) with bunches of whitish, spongiform material..... 2
- Antennae with at least 8 segments; except in large-headed soldier caste of *Pheidole*, in which the head is somewhat cordate, the head in front view is always subrectangular to elliptical; scale-like hairs not present on head and spongiform appendage never developed on postpetiole.....11
- 2 (1). Mandibles short, thick and serially dentate; when fully closed, engaging along their entire masticatory margins and leaving no appreciable interspace 3
- Mandibles linear, elongate, with only 3 or 4 spiniform teeth at or near their apices; when closed, only these teeth engage, and a broad open space is framed between mandibular shafts (*Dacetini part.*) 6
- 3 (2). Eyes large, dorsolaterally placed, and conspicuous when head viewed directly from front; large, $HW > 1.2$ mm; dark brown **Eurhopalothrix procera**
- Eyes very small, laterally placed, and not visible when head viewed directly from front; $HW < 0.8$ mm; light to medium reddish brown (*Dacetini part.*) ... 4
- 4 (3). Mandibles short-triangular, with distinct, transverse basal borders; hairs of dorsum of head proper limited to a single erect short clavate pair on vertex **Trichoscapa membranifera**
- Mandibles long-triangular, without transverse basal borders; vertex and occiput with more than 1 pair of specialized erect spatulate or clavate hairs (8 in undamaged specimens), along with a ground pilosity of subreclinate spatulate hairs (genus *Smithistruma*) 5
- 5 (4). Smaller species, $HL < 0.60$ mm; diagonal length of mesosoma in side view < 0.65 mm.....**Smithistruma dubia**
- Larger species, $HL > 0.60$ mm; diagonal length of mesosoma in side view > 0.65 mm..... **Smithistruma mumfordi**
- 6 (2). Antennal funiculus with only 3 distinct segments (small species with strongly bowed mandibles; head covered with large-orbicular squamiform hairs) ...
.....**Quadristruma emmae**
- Antennal funiculus with 5 distinct segments, of which the 2nd and 3rd are small (genus *Strumigenys*) 7
- 7 (6). Mandible with 2 preapical teeth (*i. e.*, teeth near apex other than apical fork)
..... **Strumigenys rogeri**
- Mandible with a single preapical tooth 8
- 8 (7). Sides of head abruptly indented at large convex eyes, which are oriented more or less anteriorly; antennal scrobes obsolescent, scapes curving to fit sides of head in repose; larger form, $HW > 0.53$ mm (Samoa, originating in Melanesia) **Strumigenys szalayi**
- Sides of head not abruptly indented at eyes, and eyes oriented primarily to sides; antennal scrobes well developed and receiving folded antennae in repose; smaller forms, $HW < 0.53$ mm..... 9
- 9 (8). Mesosoma, especially pronotum, with very abundant long subreclinate or arching fine hairs, giving dorsum a woolly appearance; also a few long flagellate

- hairs.....**Strumigenys godeffroyi**
 Mesosoma with only a few long, erect hairs and sparse, short subreclinate under-pilosity..... 10
- 10 (9). Rear face of propodeum bearing spongiform lamellae; 1st gastric segment bearing, just posterior to postpetiolar spongiform appendage, a dense fringe of long, reclinate, posteriorly directed hairs (known from Hawaii only) ...
 **Strumigenys lewisi**
 Lacking spongiform lamellae and fringe of hairs described above (Samoa only) **Strumigenys mailei**
- 11 (1). Antenna 9-segmented, including a robust 2-segmented club longer than entire remainder of funiculus; propodeum bluntly dentate..... 12
 Antenna 10-, 11-, 12-segmented; if terminal club is very large and 2-jointed, then propodeum is unarmed 13
- 12 (11). A very small species; HW of minor worker only about 0.28 mm, that of soldier only about 0.46 mm (Samoa).....**Oligomyrmex atomus**
 A larger species; HW of unknown worker castes perhaps 2× as great as in *atomus* (known only from sexual castes from Tahiti) ... **Oligomyrmex tahitiensis**
- 13 (11). Antenna 10-segmented, with a distinct 2-segmented club.....14
 Antenna 11- or 12-segmented, with a distinct 1- or 3-segmented club, or else terminal joints not forming a distinct club..... 15
- 14 (13). Workers markedly polymorphic, the smallest with HW not less than 0.50 mm; eyes containing more than 30 ommatidia..... **Solenopsis geminata**
 Workers monomorphic, with HW not exceeding 0.35 mm; eyes containing less than 10 ommatidia.....**Solenopsis papuana**
- 15 (13). Anterior clypeal border bearing 4 conspicuous teeth; a large recurved accessory tooth present near base of mandible and well behind masticatory border; antennal club 1-segmented; small, robust, heavily sculptured, dark brown (Samoa)..... **Adelomyrmex samoanus**
 Anterior clypeal border with at most 2 teeth; accessory, basal tooth lacking on mandible; antennal club either 3-segmented or not distinct from remainder of funiculus 16
- 16 (15). Petiole subtended by a smooth, very flat, ventrally rounded, translucent flange about as broad as depth of anterior peduncle of petiole; slender, heavily sculptured species (Samoa only)..... 17
 Petiole at most subtended by a small thin knob placed at anteriormost part of ventral surface of anterior peduncle.....18
- 17 (16). Body blackish brown; propodeum unarmed **Vollenhovia pacifica**
 Body brownish yellow; propodeum bearing small but distinct right-angular teeth..... **Vollenhovia samoensis**
- 18 (16). Frontal lobes fused with median 1/3 or 1/4 of clypeus, which forms a distinct shelf raised sharply from lateral portions of clypeus..... 19
 Frontal lobes clearly demarcated from clypeus in front; center of clypeus not conspicuously raised as a separate element from remainder of sclerite 23
- 19 (18). Body very densely covered with long silvery hairs, many of which are bifid or trifid **Triglyphothrix striatidens**
 Body pilosity sparse to moderately abundant; hairs never divided 20

- 20 (19). HW < 0.65 mm; body nearly uniformly light reddish brown 21
 HW > 0.70 mm; abdomen (gaster) very dark brown; remainder of body dark
 brown or light reddish brown..... 22
- 21 (20). Body hairs sparse, thick and blunt; posteroventral propodeal flange right-angu-
 lar; anterior peduncle of petiole about as thick as long... **Tetramorium simillimum**
 Body hairs abundant, slender and acute; posterior propodeal flange drawn
 into an acute tooth; anterior peduncle of petiole much longer than thick
 **Tetramorium tonganum**
- 22 (20). Body nearly uniformly blackish brown; length of propodeal spine much
 greater than thickness of anterior peduncle of petiole ... **Tetramorium pacificum**
 Body, except for abdomen (gaster) light reddish brown; length of propo-
 deal spine roughly same as thickness of anterior peduncle of petiole.....
 **Tetramorium guineense**
- 23 (22). Propodeum either smoothly rounded or, at most, armed with a pair of blunt
 processes forming angles of not less than 90°; clypeus bicarinate (*Monomo-*
rium).....24
 Propodeum armed with a pair of acute teeth or spines; clypeus not bicari-
 nate 31
- 24 (23). Eyes small, no more than 0.03 mm in greatest diameter and containing only
 2-4 ommatidia 25
 Eyes moderate in size, at least 0.06 mm in greatest diameter and containing
 more than 10 ommatidia 26
- 25 (24). Mesopleuron shagreened and opaque; paired propodeal angles about 100° ...
 **Monomorium fossulatum**
 Mesopleuron smooth and shining; propodeal angles about 140°... **Monomorium talpa**
- 26 (24). Antennal club not distinctly 3-segmented; robust species with HW > 0.65 mm
 (Rapa I. only)..... **Chelaner antarcticus**
 Antennal club distinctly 3-segmented; HW < 0.60 mm..... 27
- 27 (26). Body entirely shagreened and opaque..... **Monomorium pharaonis**
 Body mostly or entirely smooth and shining 28
- 28 (27). Polymorphic, HW of smallest worker > 0.40 mm; terminal antennal segment
 about as long as next 2 together.....29
 Monomorphic, HW of largest worker < 0.35 mm; terminal antennal segment
 distinctly longer than next 2 together 30
- 29 (28). Seen from directly above, postpetiolar node is 1.4× broader than long; in
 side view postpetiolar node appears conspicuously larger than petiolar node
 **Monomorium latinode**
 Seen from directly above, postpetiolar node is 1.1×-1.2× broader than long;
 in side view postpetiolar node appears approximately equal in size to pe-
 tiolar node **Monomorium destructor**
- 30 (28). Mesosoma (alitrunk) and pedicel clear yellow or at most light brownish yel-
 low, contrasting with dark reddish brown head and abdomen (gaster);
 seen from side, entire petiole, including peduncle, about 1.5× longer than
 deep..... **Monomorium floricola**
 Body rather evenly dark reddish brown to blackish brown; seen from side
 entire petiole only about as long as deep **Monomorium minutum**

- 31 (23). Mesonotum and pronotum armed with pairs of well developed spines
 **Pheidole sexspinosa**
 Mesonotum and pronotum unarmed 32
- 32 (31). Seen from directly above, postpetiole nearly 2× as broad as petiole; dorsum
 of body devoid of standing hairs; small (HW about 0.4 mm), slender, mo-
 nomorphic species.....33
 Seen from directly above, postpetiole is at most 1.3× broader than petiole;
 dorsum of body bearing numerous standing hairs..... 35
- 33 (32). Mesometanotal groove absent or very weak.....**Cardiocondyla nuda**
 Mesometanotal groove distinct, especially in side view 34
- 34 (33). Profile of mesonotum sloping gradually back towards mesometanotal groove;
 propodeal spines short and stout..... **Cardiocondyla emeryi**
 Mesonotal profile declining abruptly at mesometanotal groove; propodeal
 spines moderately long and prominent **Cardiocondyla wroughtoni**
- 35 (32). Monomorphic; pronotum coarsely rugoreticulate; scapes in repose not reach-
 ing occipital border..... 36
 Dimorphic; pronotum of small-headed minor worker either smooth and shin-
 ing or finely "shagreened"; scapes of minor worker in repose exceeding oc-
 cipital border..... 37
- 36 (35). Propodeal spiracle as wide as spine is long, or wider; subpetiolar process ab-
 sent **Rogeria sublevinodis**
 Propodeal spiracle only 1/2 as wide as spine is long, or less; flange-like sub-
 petiolar process present **Rogeria exsulans**
- 37 (35). HW of *minor worker* about 0.4 mm, that of *soldier* about 0.8 mm; both castes
 concolorous light reddish yellow **Pheidole umbonata**
 HW of *minor worker* 0.5 mm or greater, that of *soldier* 1.1 mm or greater;
 both castes light to dark reddish brown 38
- 38 (37). Occiput of *soldier* smooth and shining. *Minor worker* with mesosoma either
 entirely shagreened and opaque, or mesonotum nearly flat in side view,
 forming a smooth posterior continuation of curve of pronotum 39
 Occiput of *soldier* rugoreticulate and opaque. *Minor worker* with at least
 parts of pronotum, mesopleura, and sides of propodeum smooth and at least
 feebly shining; also, mesonotum strongly convex in side view..... 40
- 39 (38). When head of *soldier* is viewed in full face, rugae are seen to cover approx-
 imately anterior 3/4 of surface exclusive of mandibles; pronotum of *mi-
 nor worker* entirely smooth and shining (distributed throughout Polynesia)
 **Pheidole megacephala**
 When head of *soldier* is viewed in full face, rugae are seen to cover only
 about 1/2 of surface exclusive of mandibles; pronotum of *minor worker*
 covered with transverse rugae (Samoa only).....**Pheidole aana**
- 40 (38). In *soldier*, when head is viewed from side the frontal region (between ends
 of frontal carinae and occiput) is seen to be distinctly concave; pronotum
 of *minor worker* covered with transverse rugae (Samoa only)..... **Pheidole atua**
 Frontal region of *soldier* in side view convex; most of pronotal surface com-
 pletely smooth (widespread in Polynesia).....41
- 41 (40). In *soldier*, area between antennal insertion and eye longitudinally rugose; pro-

- podeal spine of *minor worker* distinctly longer than greatest width of propodeal spiracle **Pheidole oceanica**
 In *soldier*, area between antennal insertion and eye rugoreticulate; propodeal spine of *minor worker* only about as long as greatest width of propodeal spiracle **Pheidole fervens**

KEY TO POLYNESIAN ANTS OF SUBFAMILIES

DOLICHODERINAE AND FORMICINAE, BASED ON WORKERS

1. Petiole armed with 2 large, laterally directed horn-like spines; monomorphic, medium-sized, black (Rotuma only).....**Polyrhachis rotumana**
 Petiole either unarmed or else bearing a single median tooth-like protuberance ... 2
- 2 (1). Antenna 9-segmented; small, robust, brown.....**Brachymyrmex obscurior**
 Antenna 11- or 12-segmented..... 3
- 3 (2). Juncture of dorsal and basal faces of propodeum of workers (or *minor workers* if workers are polymorphic) drawn into an acute tooth-like protuberance; medium-sized species..... 4
 Juncture of dorsal and basal faces of propodeum of *minor workers* rounded or at most obtusely angulate.....5
- 4 (3). Petiolar node armed with a posterior median tooth-like protuberance (Tonga only).....**Camponotus conicus**
 Petiolar node unarmed (Samoa only)..... **Camponotus flavolimbatus**
- 5 (3). Polymorphic; medium-sized to large, HW (exclusive of compound eyes) of smallest worker >0.80 mm.....6
 Monomorphic; small to medium-sized, HW of largest worker not >0.75 mm.....10
- 6 (5). Head and mesosoma clear yellow..... 7
 Head and mesosoma medium to dark reddish brown or darker..... 8
- 7 (6). Abdominal (gastric) tergites brownish yellow, their posterior margins slightly and gradually infuscated (Samoa, Tonga, Rotuma, Danger, Ellice).....
**Camponotus chloroticus**
 Posterior margins of abdominal tergites marked by subtriangular, medium brown infuscations sharply marked off from anterior parts, which are clear yellow (Hawaii only)..... **Camponotus variegatus**
- 8 (6). Basal face of propodeum strongly concave; posterior margins of abdominal (gastric) tergites whitish, contrasting strongly with golden-brown anterior portions (Rotuma only) **Camponotus rotumanus**
 Basal face of propodeum straight or convex; abdominal tergites concolorous blackish brown (Samoa and Tonga) 9
- 9 (8). Mesosoma clear reddish yellow; dorsal face of propodeum flat in side view; only 2 or 3 standing hairs breaking entire mesosomal profile (Tonga).....
 **Camponotus nigrifrons**
 Mesosoma medium to dark reddish brown; dorsal face of propodeum convex; over 10 standing hairs breaking mesosomal profile (Samoa).....
 **Camponotus navigator**
- 10 (5). Antenna 11-segmented; minute, robust, yellow formicine ants with almost completely hairless mesosoma and large abdomen (gaster) distinctly longer than mesosoma in undistended state (*Plagiolepis*)..... 11

- Antenna 12-segmented; not combining all of other characters cited above..... 12
- 11 (10). Scape exceeds occipital corner by less than length of 1st funicular segment (Hawaii only) **Plagiolepis exigua**
 Scape exceeds occipital corner by at least length of 1st 2 funicular segments combined (widespread and common in eastern and southern Polynesia as well as in Hawaii) **Plagiolepis alluaudi**
- 12 (10). Minute, HW approximately 0.40 mm, with mesosoma (alitrunk) completely devoid of standing hairs 13
 Either much larger (HW > 0.60 mm), *or else* mesosoma bears numerous standing hairs..... 14
- 13 (12). Head blackish brown, contrasting sharply with light brownish yellow antennae and gaster; petiolar node rudimentary; antennal scape surpassing occipital corner by distinctly more than length of the 1st funicular segment...
 **Tapinoma melanocephalum**
 Body concolorous light brown; petiolar node inconspicuous but well developed; antennal scape surpassing occipital corner by distinctly less than length of 1st funicular segment.....**Tapinoma minutum**
- 14 (12). Body extremely thin and elongate; antennal scape at least 1.5× as long as head including closed mandibles..... 15
 Body of "average" to somewhat robust proportions; antennal scape not more than 1.5× as long as head including closed mandibles 16
- 15 (14). Dorsum of mesosoma almost completely devoid of standing pilosity; color yellow; mesonotum viewed from side weakly concave..... **Anoplolepis longipes**
 Dorsum of mesosoma bearing numerous long, erect hairs; color grayish brown with occasional weak purplish reflections; mesonotum viewed from side weakly convex **Paratrechina longicornis**
- 16 (14). Mesosoma devoid of standing pilosity (Hawaii only).....**Iridomyrmex humilis**
 Mesosoma bearing at least several prominent standing hairs.....17
- 17 (16). Anterior clypeal border emarginate 18
 Anterior clypeal border whole and convex..... 19
- 18 (17). Petiolar node well developed; mesosoma feebly shining.....**Iridomyrmex anceps**
 Petiolar node rudimentary; mesosoma densely shagreened and opaque
 **Technomyrmex albipes**
- 19 (17). HW not > 0.40 mm.....**Paratrechina minutula**
 HW > 0.50 mm 20
- 20 (19). HW of great majority of workers in most nest series 0.45–0.62 mm; body usually light to medium reddish brown; in case the workers are intermediate in the preceding 2 characters to *bourbonica* (below) the ♂♂ can be distinguished by the outer margins of the parameres being entire.....
 **Paratrechina vaga**
 HW of great majority of workers in most nest series 0.65–0.72 mm; body usually dark brown; outer margins of ♂ parameres excised.....
 **Paratrechina bourbonica**

Subfamily PONERINAE

Amblyopone zwaluwenburgi (Williams) Fig. 3.

Stigmatomma (*Fulakora*) *zwaluwenburgi* Williams, 1946, Proc. Hawn. Ent. Soc. **12**: 639, worker (Type locality: Honolulu, Oahu).

Amblyopone zwaluwenburgi: Brown, 1960, Bull. Mus. Comp. Zool. Harv., **122** (4): 213.

DISTRIBUTION: HAWAII: *Oahu*, known only from the type material.

In his recent revision of the world Amblyoponini, Brown (1960) states: "*A. zwaluwenburgi* is a minute species (under 2 mm total length) that was found in the soil of a sugar cane field at the Hawaiian Sugar Planters Association Experiment Station, Honolulu. I think it is likely that the species has been introduced into Hawaii from Melanesia or the East Indies." We concur in this opinion.

Like the smaller species of the genus *Ponera*, the *celata* group of *Amblyopone*, to which *zwaluwenburgi* belongs, consists of tiny cryptobiotic species which are especially difficult to collect. As in the case of the Hawaiian "endemic" *Ponera swezeyi*, recently recorded from Samoa, future collecting will probably unearth *Amblyopone zwaluwenburgi* outside Hawaii, either in Samoa or in the chief faunal source areas west of Polynesia.

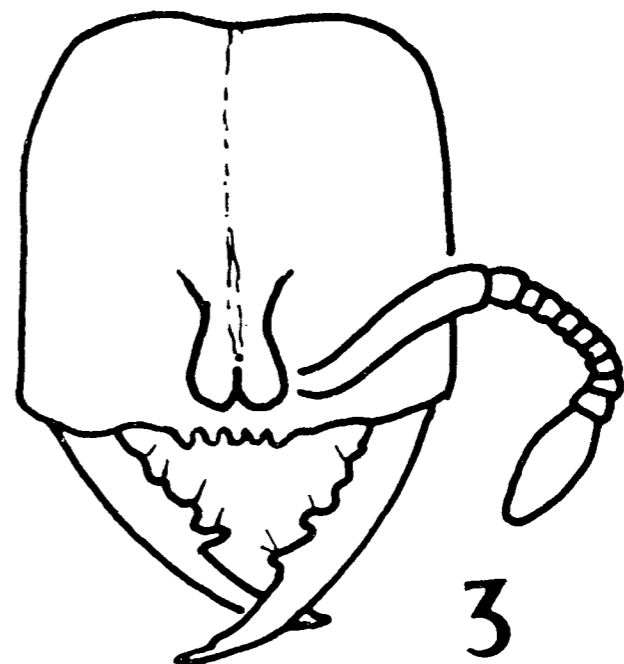


Fig. 3. *Amblyopone zwaluwenburgi* (Williams), type worker from Honolulu, Oahu. (After Williams, 1946.)

Prionopelta kraepelini Forel Fig. 4.

Prionopelta kraepelini Forel, 1905, Mitt. Mus. Hamburg **22**: 3, worker, queen.

DISTRIBUTION: SAMOA: *Upolu*: Apia, winged greens, 31.III.1962 (RWT acc. 2305); 4.IV.1962 (GE acc. 27). Vaivase, winged queens, 8.III.1962; 27.III.1962 (W. Lidgard).

These 4 series, collected at light, compare well with queens in the MCZ collection from the Philippines. They are somewhat larger (HW 0.45 vs. 0.40 mm in the single measurable Philippine specimen) but are still easily distinguishable from the much larger (HW ca. 0.65 mm) species *majuscula* Emery of New Guinea. *P. kraepelini* is very close to *P. opaca* Emery of New Guinea and Micronesia; indeed the two may be synonymous (Brown

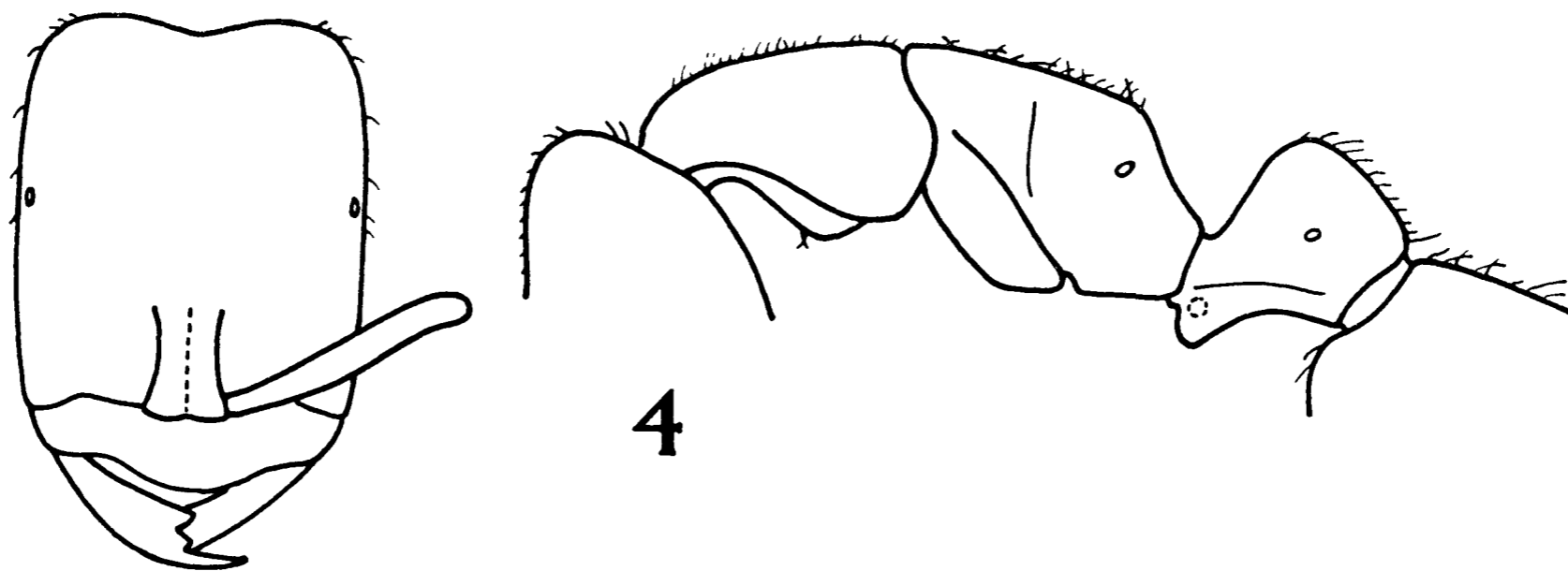


Fig. 4. *Prionopelta kraepelini* Forel, worker from Micronesia.

1960: 220). *Kraepelini* is distinguished by its weakly sculptured and partly shining body surface; *opaca* is densely, coarsely punctate and almost completely opaque.

The genus *Prionopelta* was previously unknown from the Pacific E of New Guinea and Micronesia. Moreover, *P. kraepelini* is evidently abundant on certain islands in Micronesia, but has never been collected on New Guinea. Its distribution is thus peripheral to that of *opaca*. These considerations, plus the fact that *P. kraepelini* is known only from a limited area in the environs of Apia, lead us to conjecture that it has been introduced into Samoa in recent times by human commerce.

Platythyrea parallela (Fr. Smith) Fig. 5.

Ponera parallela Fr. Smith, 1859, J. Linn. Soc., Zool. 3: 143, worker (Type locality: Aru).

Platythyrea parallela: Wilson, 1958, Bull. Mus. Comp. Zool. Harv. 118 (3): 151, synonymy, distribution.

Platythyrea pusilla var. *pacifica* Santschi, 1928, Insects of Samoa 5 (1): 43, worker. Type locality: Apia, 500 m, Upolu, Samoa. **New Synonymy.**

DISTRIBUTION: **SAMOA: *Upolu*: Apia (*pacifica* type series, collected in 1927). SOCIETY IS.: *Tahiti*: Patutua, 1925; Tautira, 1925 (Cheesman & Crawley 1928).

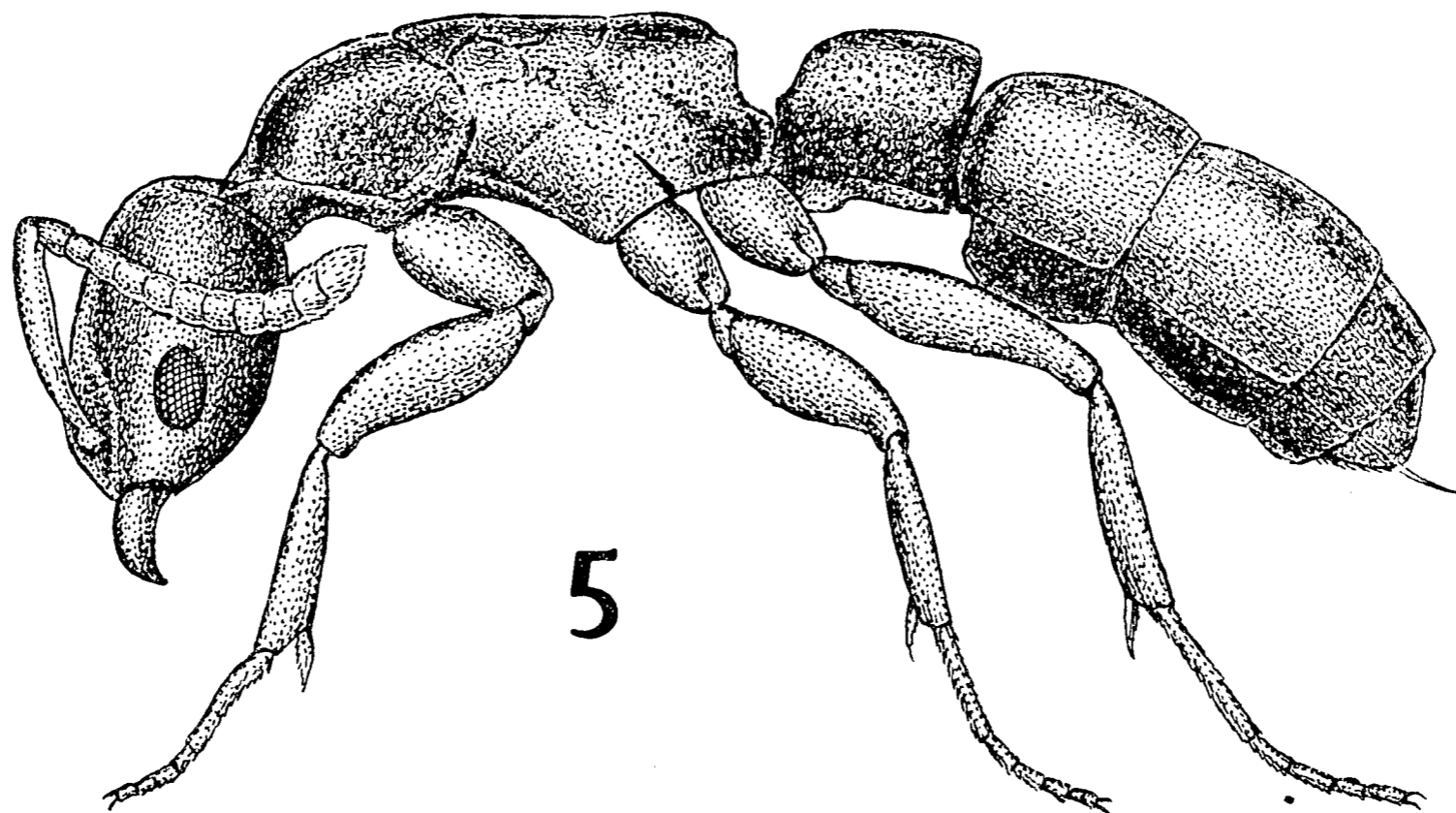


Fig. 5. *Platythyrea parallela* (Fr. Smith), worker from lower Busu River, New Guinea.

Platythyrea parallela ranges more or less continuously from tropical Asia to Samoa, apparently by-passing Fiji and New Caledonia. The species must be quite rare in Polynesia. Only 3 collections have been made, despite the fact that the workers are conspicuous and partially arboreal in their foraging habits, rendering them especially easy to capture in sweep nets. All of the records given above were made during 1925-1927. It is probably significant that no additional specimens were taken by Swezey and Zimmerman or Woodward, during their collection tours in 1938-40 and 1956 respectively, or by the Taylors and Ettershank during 1962. It is reasonable to conjecture that the species is now extinct in the Samoan islands.

Rhytidoponera metallica (Fr. Smith) Fig. 2.

See Brown (1958) for current synonymy.

DISTRIBUTION: Throughout Australia except far north; New Zealand, introduced (Taylor 1961); Samoa (Mayr 1876).

Mayr based his Samoan record on specimens in the collection of the Godeffroy Museum of Hamburg. If the labelling was correct in the first place, the Samoan *metallica* population was undoubtedly introduced from Australia, and was probably ephemeral in nature; no additional collections have been made in the intervening 90 years.

***Ectomomyrmex insulanus* (Mayr) Fig. 6.**

Ponera insulana Mayr, 1876, J. Mus. Godeffroy, Hamburg **12**: 87, worker (Type locality: Samoa).

DISTRIBUTION: SAMOA: *Savai'i*: Aopo, 170 m, rain forest, berlesate, leaf mold and soil (RWT acc. 597). Gagaifoumauga, rain forest, berlesate, moss and bark from rotting log (GE acc. 55). Lotogo, 350 m, rain forest, strays under stone, in rotting log, and under epiphyte 35 m from ground on *Ficus* tree (RWT accs. 455, 459, 473). Mt. Olomanu, rain forest, berlesates, moss and soil from rotting logs (GE accs. 58, 59). Samalaeulu, coastal rain forest, berlesate, leaf mold and soil (RWT acc. 596). *Upolu*: Afiamalu, 700 m, VI.1940 (ECZ)—including winged queen, 8.VI.1940; disturbed rain forest, leaf mold and ground moss (RWT acc. 2324, GE accs. 46, 48); disturbed rain forest and adjacent *Taro* patch, claustral queens under stones 9–12.III. (RWT accs. 219, 266, 282), colonies from soil under stones (RWT accs. 245, 273, 317, 327) or rotting logs (RWT accs 220, 316, 599). Malololelei Road, 650 m, ♂, 18.VI.1940 (ECZ). Tiavi, 700 m (ECZ)

This species is known only from Samoa where it was first collected in 1870. All re-

records are from Savai'i and Upolu. The existence of an apparently endemic *Ectomomyrmex* on Samoa is a remarkable fact in itself, since no other member of the genus ranges E of the Solomon Is. *E. insulanus* is most closely approached within the genus by *simillimus* (Donisthorpe) of New Guinea and *aequalis* Mann of the Solomons, which species are evidently cognate derivatives of a previously widespread Melanesian stock. *E. insulanus* differs from both of the above species as follows. *Size*: *insulanus* is larger; the entire series cited above ranges in HW 1.32–1.39 mm, as opposed to 1.17–1.27

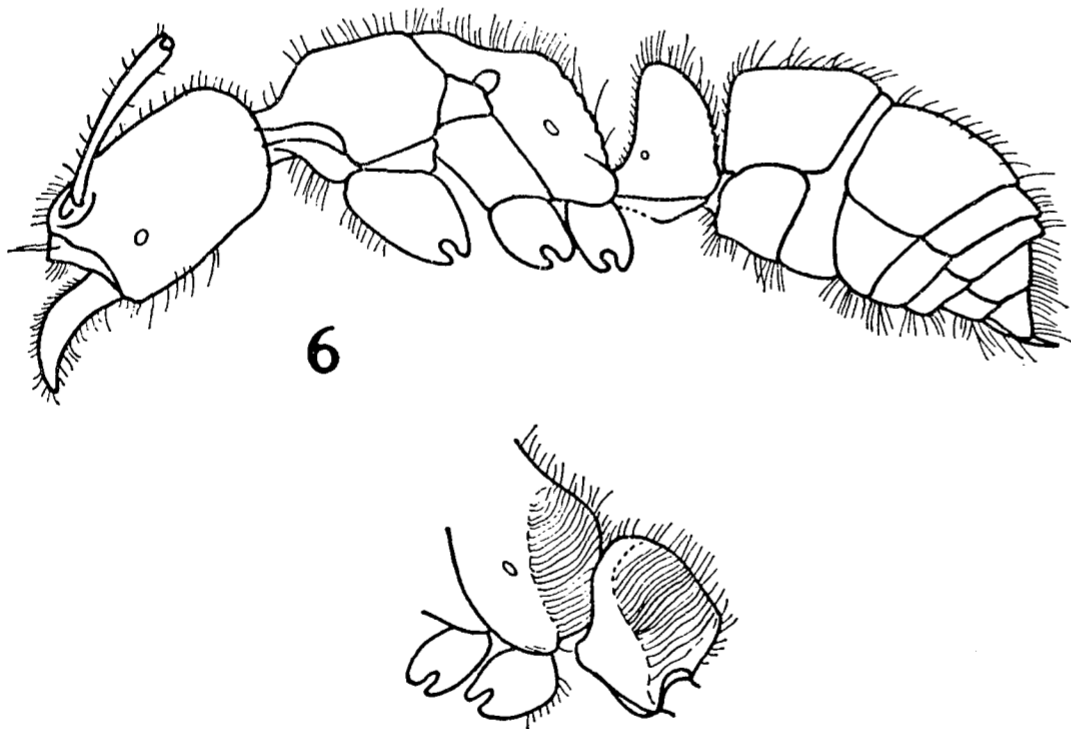


Fig. 6. *Ectomomyrmex insulanus* (Mayr), worker from Afiamalu, Upolu.

mm in 2 series of *aequalis* and 1.14 mm in 1 series of *simillimus* measured. *Sculpturing*: costulation and striation is everywhere more weakly developed; *insulanus* workers can be recognized immediately by the fact that the 2nd gastric tergite is weakly punctate, whereas in all related species the tergite is strongly punctate-striate with its surface opaque.

E. insulanus shows considerable variation within single nest series in the orientation of the striation on the posterior face of the node. At one extreme the striae are entirely transverse, while at the other extreme the upper parts of the sculptured area bear predom-

inantly longitudinal striae.

The preferred nesting site at Afiamalu appeared to be in the soil under logs or (more frequently) stones. Nests collected during March by the Taylors contained many pupae and a few large larvae; occasional callow workers were also observed.

Trachymesopus stigma (Fabricius) Fig. 7.

Euponera (*Trachymesopus*) *stigma* var. *quadridentata*.: Emery, 1911, Gen. Insect. **118**: 85.—
Wheeler, 1935, Occ. Pap. Bishop Mus. **11** (11): 12.

Euponera (*Trachyponera*) *stigma* v. *quadridentata*: Santschi, 1928, Insects of Samoa **5** (1): 43.

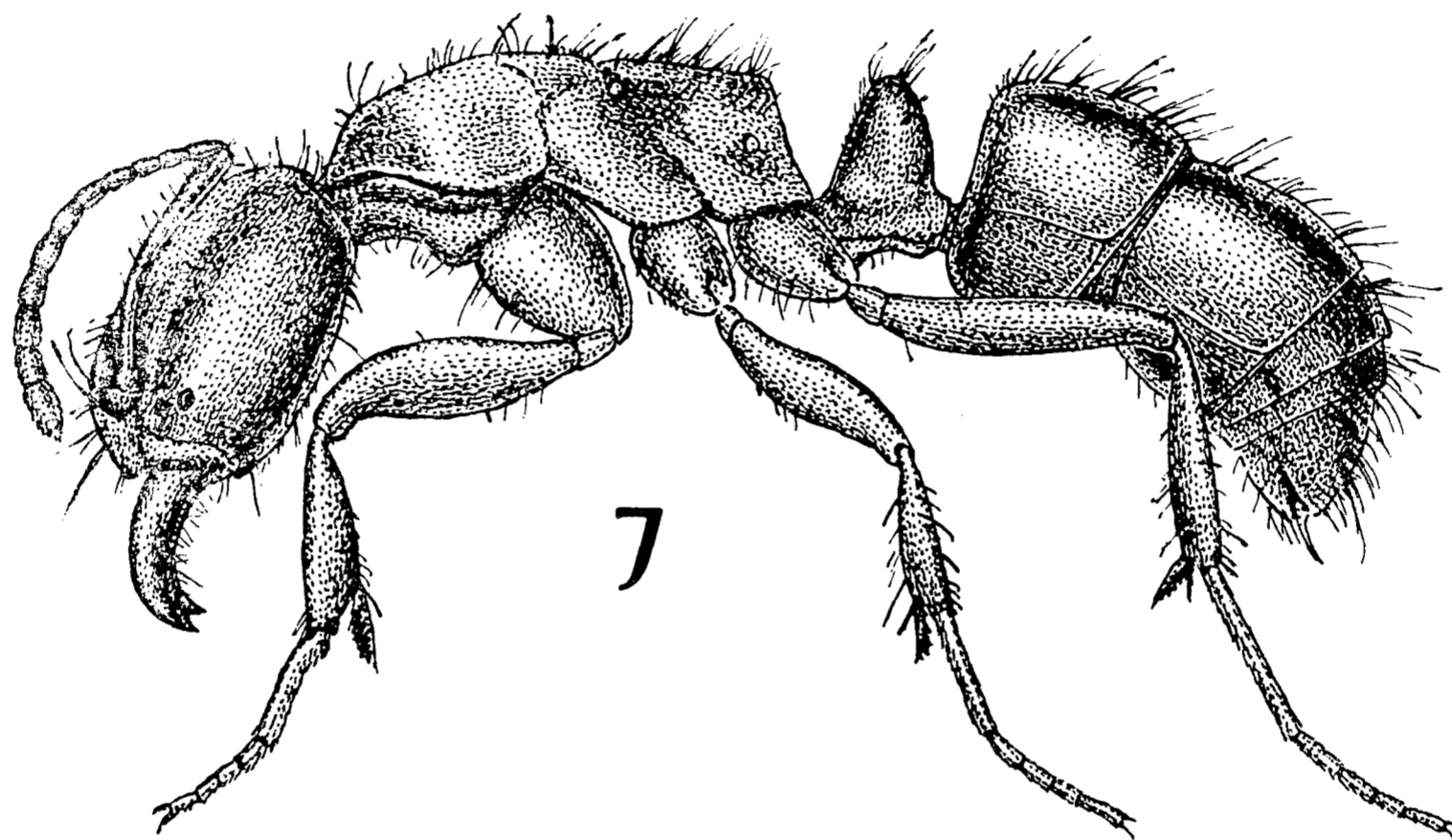


Fig. 7. *Trachymesopus stigma* (Fabricius), worker from Malololelei Road, Upolu.

Trachymesopus stigma: Wilson, 1958, Bull. Mus. Comp. Zool., Harv. **119** (4): 355, synonymy, distribution; 1959, Evolution **13** (1): 128, fig. 2, distribution, ecology.

DISTRIBUTION: SAMOA: *Savai'i* **Fagamolo (1923). **Safune (1924). *Upolu*: Apia, 300 m (H. Swale). Malololelei Road, 500-600 m, ♂♂, 18.VII and 8.VIII.1940 (OHS, ECZ). *Tutuila*: **Afone Trail (1923). **Center of island (1923). Fagatoga, 300 m, ♂♂, beating shrubbery, 25-28.VIII.1940 (OHS, ECZ). **Pago Pago (1923, 1924). *Manua*: *Ta'u*: winged queen, 20.II.1926 (A. F. Judd).

This is one of the most widespread of all ponerine ants. In the New World it ranges from southern Florida through the Antilles and Central America to southern Brazil. In the Old World it is found continuously from southern China to the Caroline Is., northern Queensland, and throughout Melanesia (except New Caledonia) to Samoa. Although widely distributed on Samoa, it is evidently scarce there, being known chiefly from occasional collections of winged queens and males. *T. stigma* may indeed be extinct on Samoa since it has not been collected since 1940, in spite of the efforts of Woodward, the Taylors, and Ettershank.

Cryptopone testacea (Emery) Fig. 8.

Cryptopone testacea: Wilson, 1958, Bull. Mus. Comp. Zool. Harv. **119** (4): 360, distribution, ecology.

DISTRIBUTION: SAMOA: *Upolu*: Afiamalu, 700 m, partly cleared rain forest, strays under moss on logs (RWT accs. 222, 345); berlesate of ground moss, alate ♀, 9.IV.1962 (GE acc. 53).

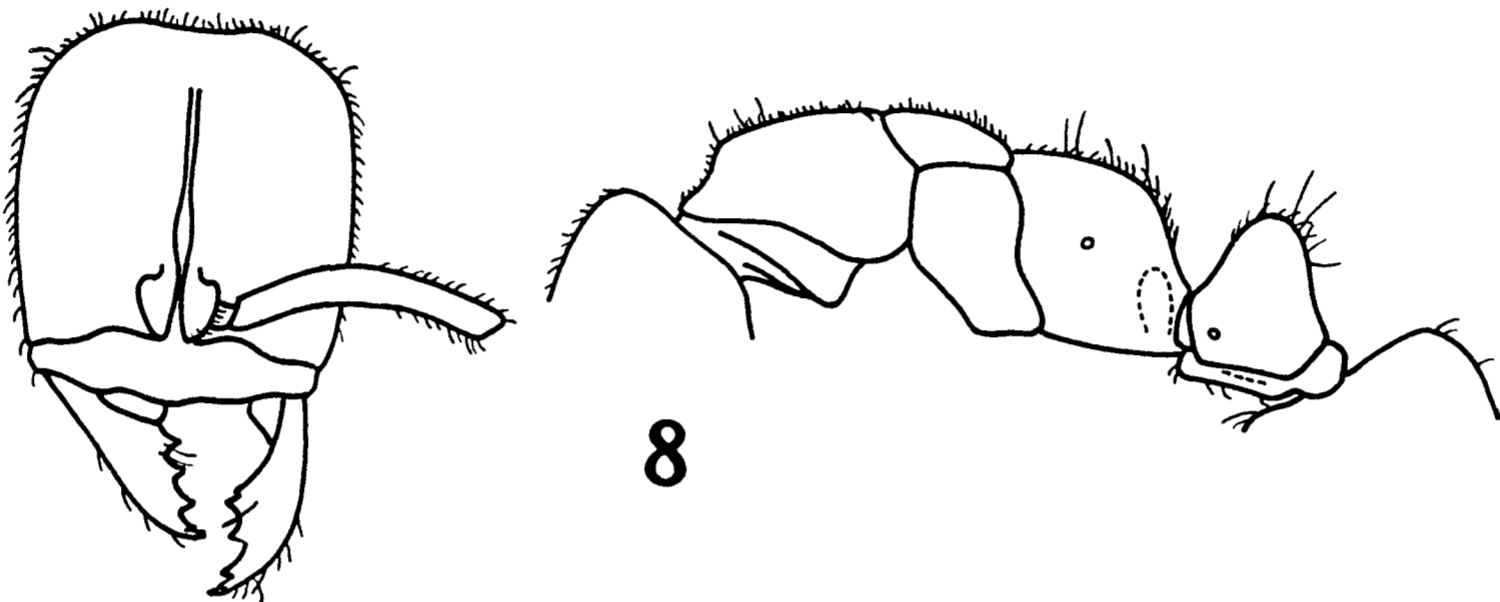


Fig. 8. *Cryptopone testacea* (Emery), worker from Afiamalu, Upolu.

The relationship and distribution of this small cryptobiotic ponerine have been discussed at length by Wilson (1958). It is by far the most widely dispersed *Cryptopone* species, ranging continuously, and with no marked geographical variation, from Ceylon through Indonesia and Melanesia as far east as the Solomon Is. It has also been collected on Ponape, in Micronesia, but so far is unknown from Fiji or the New Hebrides. This species is probably not native to Samoa. It was found in the company of predominantly introduced species and was never encountered in undisturbed forest.

Ponera incerta (Wheeler) Fig. 9.

Pseudocryptopone incerta Wheeler, 1933, Amer. Mus. Novit. **672**: 18, fig. 7, worker, ♀ (Type locality: Depok, Java).

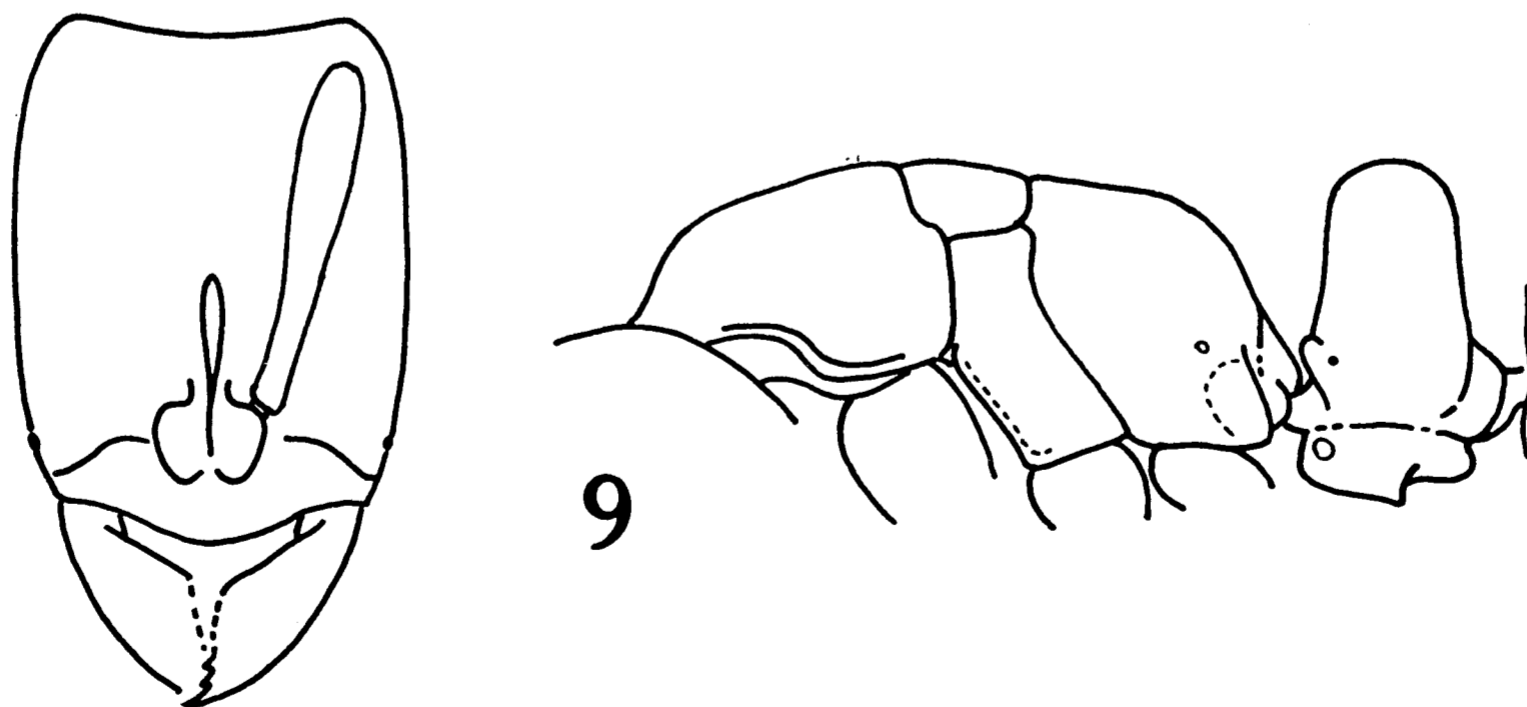


Fig. 9. *Ponera incerta* (Wheeler), worker from Poentjak, Java. (After Taylor, 1967.)

Ponera incerta: Wilson, 1957, Bull. Mus. Comp. Zool., Harv. **116** (6) : 384.

Ponera ratardorum Wilson, 1957, Bull. Mus. Comp. Zool., Harv. **116** (6) : 369, worker (Type locality: St. Pauls, Baining Mts., New Britain).

DISTRIBUTION: Detailed synonymy and collection records of this species are given by Taylor (1967). *P. incerta* is known from Java, Yap I. (Carolines), New Britain, Espiritu Santo (New Hebrides), and Santa Cruz and Guadalcanal (Solomons). In Polynesia it is apparently restricted to Samoa, where it has been collected in abundance in rain forest on *Savai'i*, *Upolu* and *Tutuila*. Taylor (*loc. cit.*) reports an apparent case of competitive displacement between this species and the rather similar *P. tenuis*, observed during 1962 in disturbed rain forest at Afiamalu (Upolu). The 2 species have apparently partitioned the environment such that *incerta* was abundant nesting under moss on the ground or logs, while *tenuis* was significantly more abundant than *incerta* in moss on tree trunks, and almost wholly limited to the latter arboreal habitat. This apparent displacement was not observed at other localities, and may have been precipitated by the fact that both species were maintaining extremely dense populations at the Afiamalu site. Certain other native and exotic ant species were unusually abundant at the same place.

***Ponera loi* Taylor** Fig. 10.

Ponera loi Taylor, 1967, Pac. Ins. Mon. **13** : 60, worker, ♀ (Type locality: Afiamalu, Upolu, Samoa).

DISTRIBUTION: SAMOA: This species is known only from *Upolu*, where it was taken in the vicinity of Afiamalu by Zimmerman in the 1940's and by the Taylors in 1962. Detailed collection records are given by Taylor (1967). *P. loi* is a member of the *P. taipingensis* species group which includes 4 other species: *taipingensis* Forel (Malaya), *syscena* Wilson (New Guinea), *colaensis* Mann (Fiji), and *woodwardi* Taylor (Upolu, Samoa). Among these forms *syscena* is the species most similar to *loi*. It is notable that *loi* was taken much more frequently than the sympatric *woodwardi* by Zimmerman, while the reverse was the case in the Taylor collections. It is possible that the relative abundance of these 2 species has changed over the last 20 years (Taylor 1967).

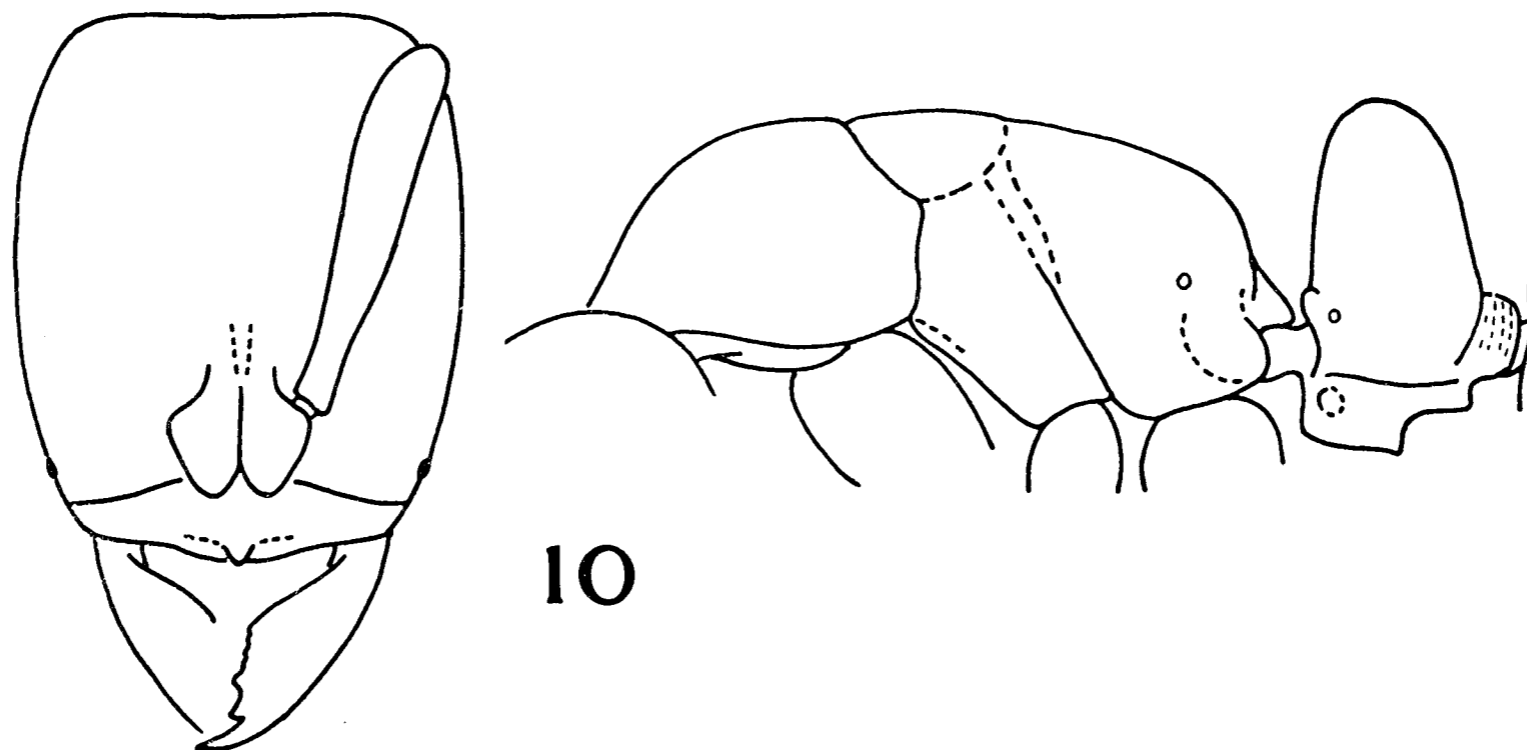


Fig. 10. *Ponera loi* Taylor, holotype worker from Afiamalu, Upolu. (After Taylor, 1967.)

Ponera swezeyi (Wheeler) Fig. 11.

Pseudocryptopone swezeyi Wheeler, 1933, Amer. Mus. Novit. **672**: 16-17, fig. 6, worker, queen (Type locality: vicinity of Honolulu, Hawaii).

Ponera swezeyi: Wilson, 1957, Bull. Mus. Comp. Zool., Harv. **116**: 370.

DISTRIBUTION: SAMOA: Taylor (1967) gives detailed listings of all known collections. *P. swezeyi* is present on all 3 main islands: *Savai'i*, *Upolu* and *Tutuila*. The species was first collected on Upolu and Tutuila by Woodward in 1956. HAWAII: All known records are from *Oahu*, where the earliest known collections date to 1933 (see Taylor *loc. cit.*).

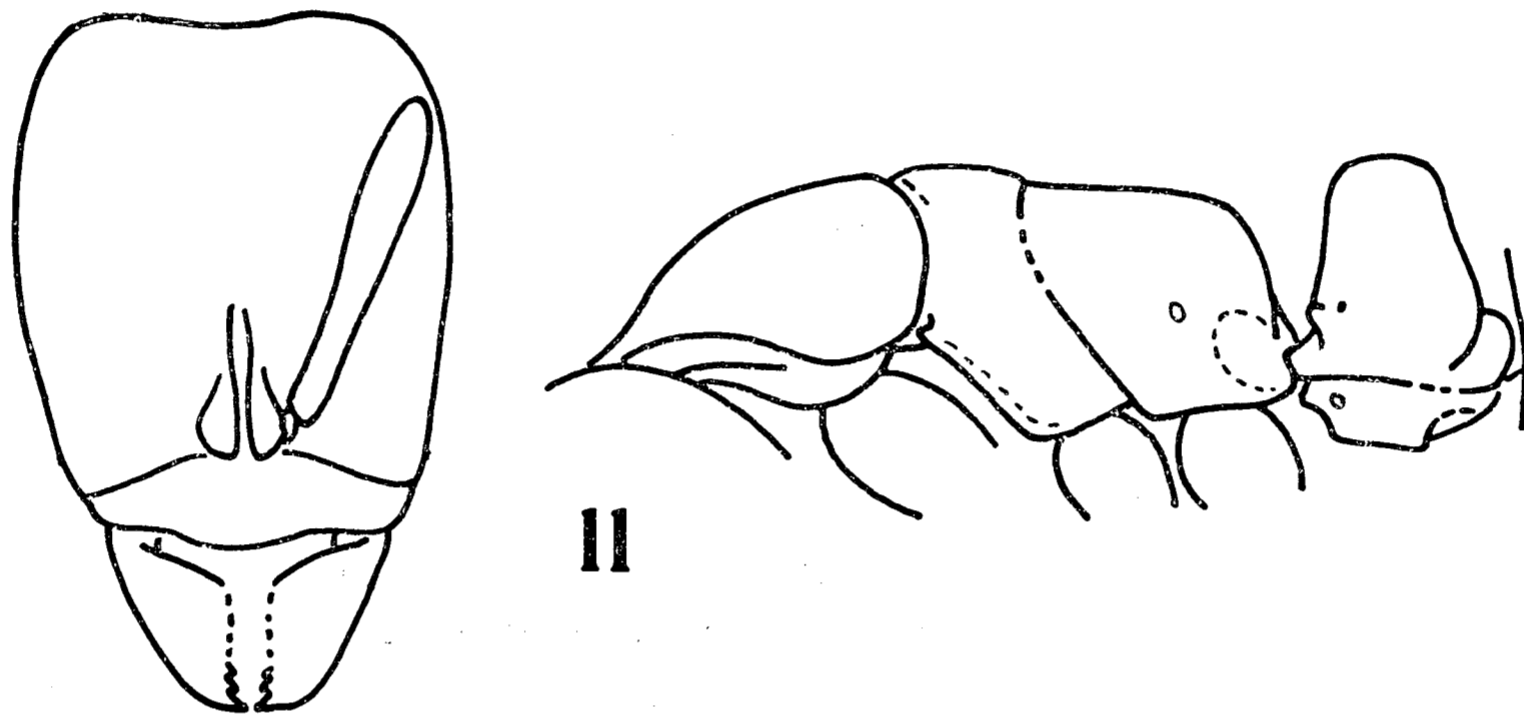


Fig. 11. *Ponera swezeyi* (Wheeler), syntype worker from near Honolulu, Oahu (After Taylor 1967.)

The discovery in 1956 of *P. swezeyi* on Samoa robbed it of its apparent endemic status in the Hawaiian fauna. The Hawaiian records were all made from the soil of cultivated and fallow sugar cane fields. Taylor (1967), gives no firm statement as to the likelihood that this species is native on Samoa, but points out that its predilection to soil nesting rather than rotting logs (as usual in *Ponera*) may have increased the likelihood of its dispersal by man.

Ponera tenuis (Emery) Fig. 12.

Cryptopone tenuis Emery 1900, Természetr. Füz. **23**: 321-322, pl. 8, figs. 21, 22, worker (Original localities: Lemien and Tamara I., New Guinea).

Pseudocryptopone tenuis: Wheeler, 1933, Amer. Mus. Novit. **672**: 13-14.

Ponera tenuis: Wilson, 1957, Bull. Mus. Comp. Zool., Harv. **116** (6): 373, fig. 2.

DISTRIBUTION: SAMOA: Known only from *Savai'i* and *Upolu*. *P. tenuis* was first taken in Samoa, on Upolu, by Woodward in 1956. The first Savai'i records were made in 1962 by Taylor and Ettershank. Detailed collection records are given by Taylor (1967).

Outside of Samoa this species is known only from several localities in NE New Guinea; its occurrence in eastern Melanesia can be reasonably predicted. *P. tenuis* is widespread in rain forest at all elevations on Savai'i and Upolu. It is peculiar in *Ponera* as the only species which is known to lack pupal cocoons (Taylor *loc. cit.*).

Some aspects of the biology of this species, relative to the sympatric *P. incerta*, have

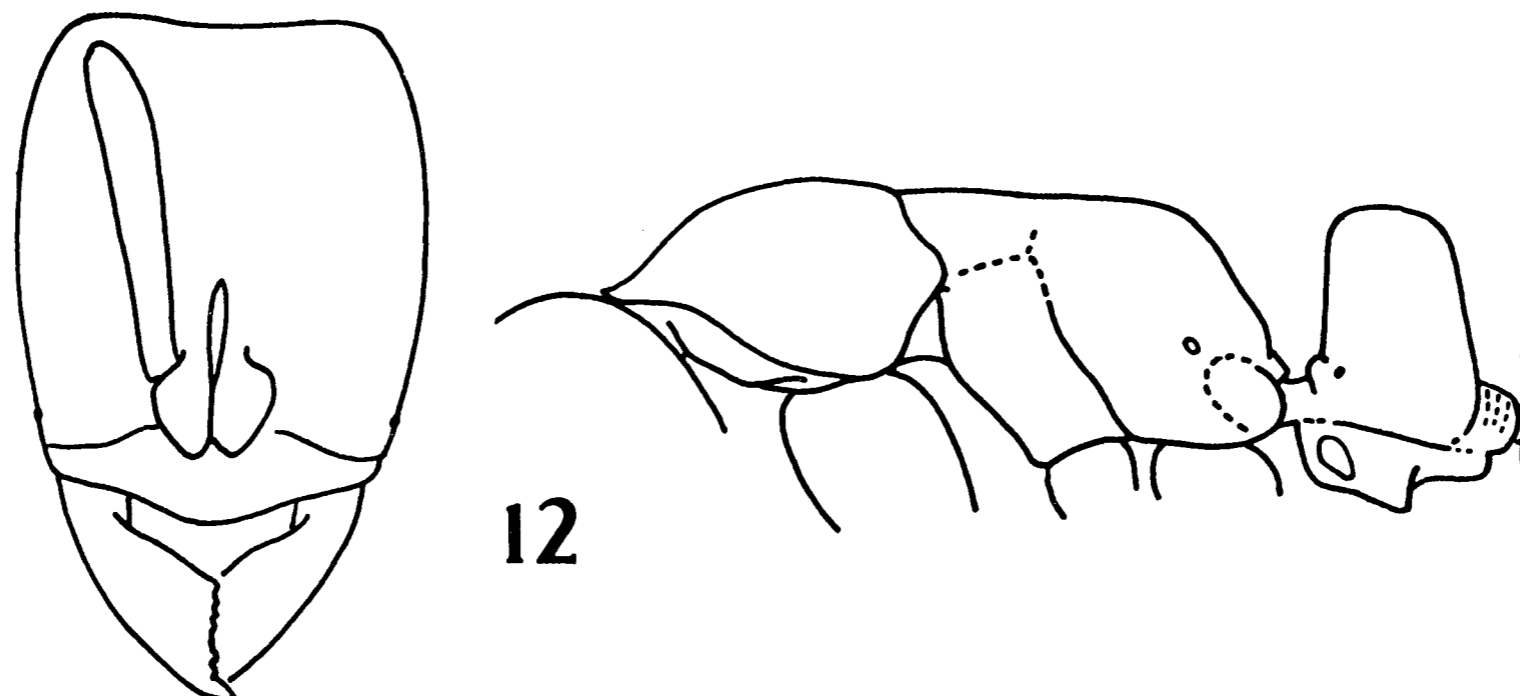


Fig. 12. *Ponera tenuis* (Emery), worker from Afiamalu, Upolu.

already been described under the latter species.

Ponera woodwardi Taylor Fig. 13.

Ponera woodwardi Taylor, 1967, Pac. Ins. Mon. 13: 62.

DISTRIBUTION: SAMOA: *Upolu* [see Taylor (1966) for detailed records].

This species, like the somewhat similar and related *P. loi*, is known only from the vicinity of Afiamalu, in the center of Upolu. It was taken extensively at this locality by the Taylors, in disturbed and virgin rain forest, nesting in logs or under moss on tree trunks. It was not encountered elsewhere on the island, and may have been replaced by the introduced *Hypoponera confinis* at lower elevations. It seems likely that *P. woodwardi*, along with *P. loi*, is a Samoan endemic.

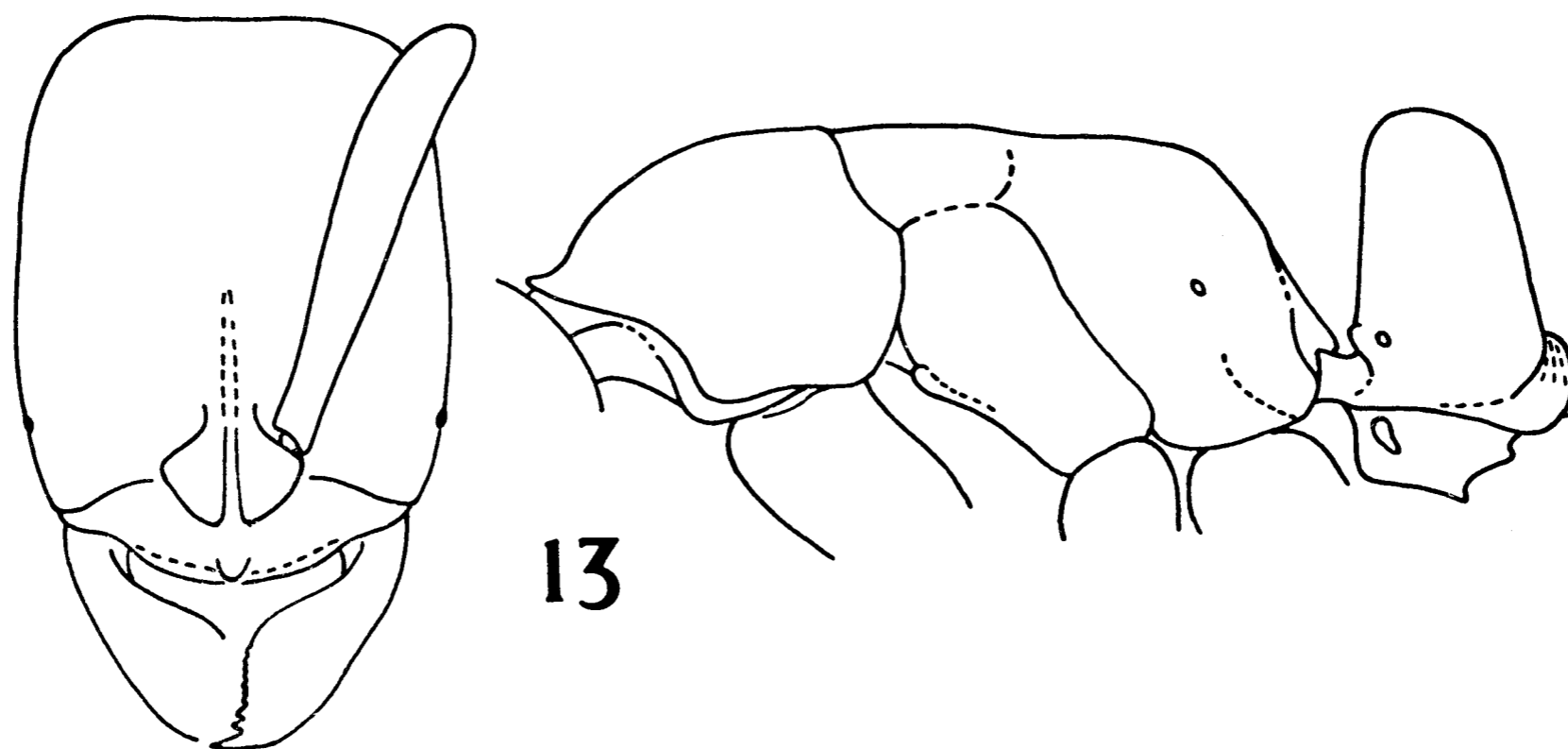


Fig. 13. *Ponera woodwardi* Taylor, holotype worker from Afiamalu, Upolu. (After Taylor, 1967).

Hypoponera confinis (Roger), New Combination Fig. 14.

Ponera confinis Roger, 1860, Berl. Ent. Zs. 4: 284, worker (Type locality: Ceylon).

Ponera trigona convexiuscula var *nautarum* Santschi, 1920, Bull. Soc. Vaud. Sci. Nat. 53:

180, worker, queen (Type locality: Apia, Samoa). **New Synonymy.**

Ponera trigona opacior: Wheeler, 1923, Nat. Hist. Juan Fernandez & Easter I. 3: 317.

DISTRIBUTION: SAMOA: *Savai'i*: Alagaogao, ca. 100 m, several colonies from moss covered rotting logs in banana and cocoa plantations 20.III.1962 (RWT accs. 413-414, 419-422). Asau, ca. 170 m, disturbed lowland rain forest, nests from rotting logs, 22.III.1962 (RWT accs. 493-497, 499). Gagaifoumauga, rain forest, nest in rotting log, 14.V.1962 (GE). Lotogo, ca. 340 m, rain forest, colony in rotting log, 21.III.1962 (RWT acc. 452). Matega, ca. 65 m, banana clearing at edge of rain forest, colonies under moss and bark on rotting logs, 20.III.1962 (RWT accs. 394, 403, 405, 408). Mt. Matafa, ca. 700 m, rain forest, nests from rotting logs and under small epiphytes on tree trunks, strays from leaf mold, 23.III.1962 (RWT accs. 520, 527-529, 532, 536, 540-543, 546). *Upolu*: Afiamalu, 700 m, beating, 1940 (ECZ). Apia, *nautarum* nidotypes, ca. 1920 (H. Swale); **1927. Fasitoufa, coconut plantation, nest under bark on rotting log, 29.III.1962 (RWT acc. 605). Mafa Pass, disturbed rain forest, strays in leaf mold, 29.III.1962 (RWT acc. 635). Matautu, berlesate of ground moss under *Ficus*, 2.II.1956 (TEW). Poutasi, rain forest, berlesate of leaf mold, 2.II.1956 (TEW). Sa'agafou, lowland rain forest, strays under moss on logs, 29.III.1962 (RWT acc. 609). Above Sulani Falls, rain forest, berlesate of ground moss, II.1956 (TEW). *Tutuila*: Pago Pago, workers and ♂♂, 6.VIII.1940 (ECZ); reservoir at Fangatanga, 1938 (ECZ); Mt. Pioa, 300 m, 1940 (OHS). TONGA: *Eua*: Ohonua, dealate queens, 1956 (NK). *SO-CIETY IS.: *Tahiti*: Papara Vall., 250 m, 1925 (record based on queens, requiring verification). *EASTER I.: ca. 1920.

H. confinis is a widespread species which is probably native throughout India, Ceylon, Indo-China, Indonesia and Melanesia, at least as far east as New Guinea. It is known from the New Hebrides but has not been reported from the Solomons or Fiji. The Polynesian populations are probably derived from propagules introduced by man.

This species was taken extensively by Taylor on Upolu and Savai'i, but was not encountered on Tutuila, either by Taylor or Ettershank. It was also notably absent from collections at Afiamalu in central Upolu where it may have been competitively excluded by the presence of *Ponera woodwardi* and *P. loi*, which seem to resemble it ecologically, and which were taken only in the Afiamalu area. Most colonies contained larvae, but only one cocoon-enclosed immature (a pharate pupa) was observed. Many of the workers taken in colonies were callow, and in several cases ♂♂ were present.

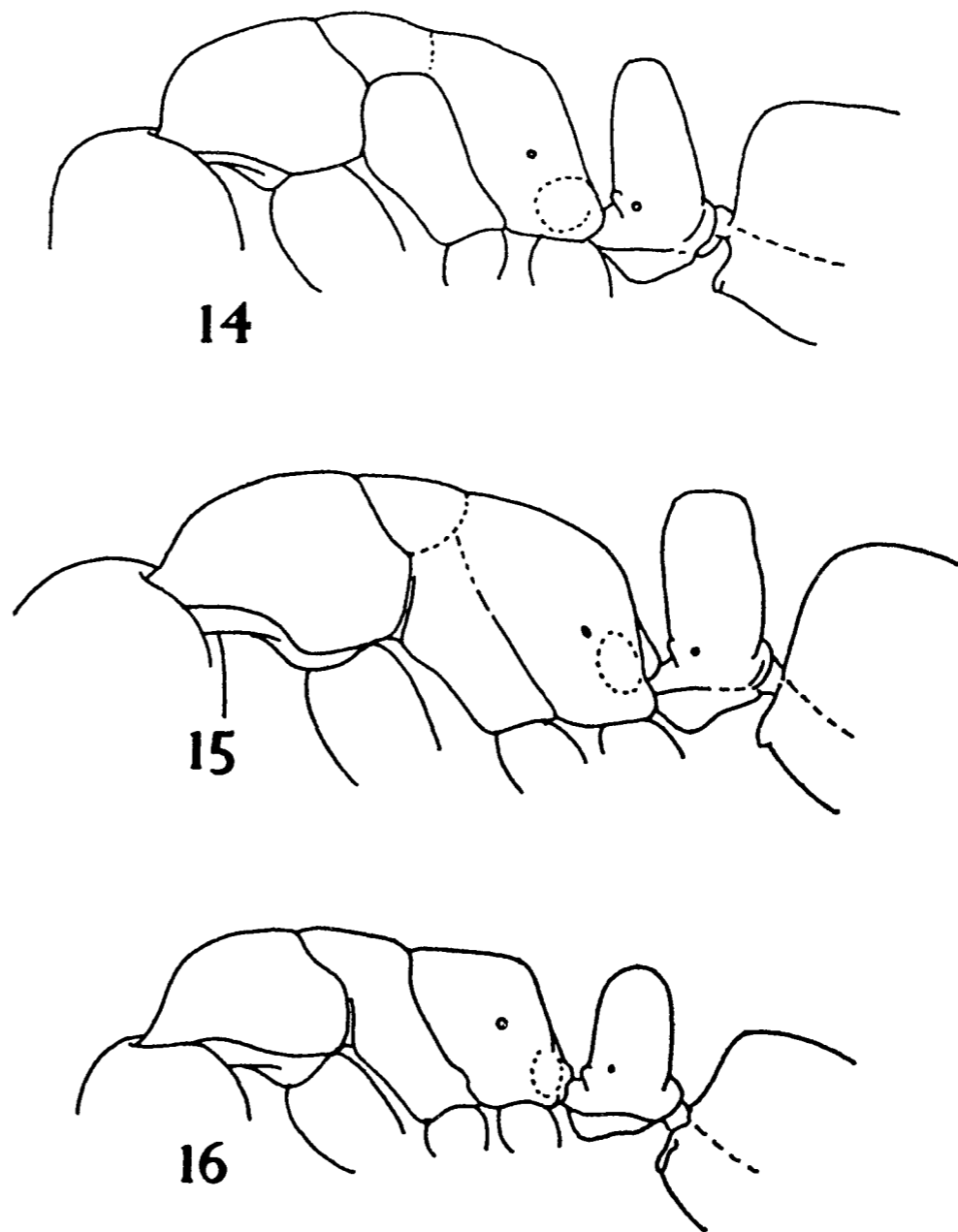


Fig. 14. *Hypoponera confinis* (Roger), worker from Apia, Upolu. Fig. 15. *Hypoponera opaciceps* (Mayr), worker from Oahu. Fig. 16. *Hypoponera punctatissima* (Roger), worker from Upolu. All drawn to the same scale.

Hypoponera opaciceps (Mayr) Fig. 15.

Ponera opaciceps Mayr, 1887, Verh. Zool.-bot. Ges. Wien **37**: 536, worker, queen (Type locality: Sta. Catharina Prov., Brazil).

Ponera perkinsi Forel, 1899, Fauna Hawaiiensis (Cambridge), p. 117, worker, queen, ♂ (Type locality: Hawaiian Is., in mountains, 650-1300 m). **New Synonymy**

Ponera andrei Emery, 1900, Természetr. Füz. **23**: 318, nota, pl. 8, fig. 47, worker (Type locality: Noumea, New Caledonia).

Hypoponera opaciceps: Taylor, 1967, Pac. Ins. Mon. **13**: 11.

DISTRIBUTION: SOCIETY IS.: **Tahiti*: Papara (1927); Maara (1926); Arihiri, Pare (1934); Blue Lagoon, Papeete (1934); Vallée de la Reine. *Moorea*: Cheesman & Crawley (1928) record *opaciceps* near Papeete in 1925. ***AUSTRAL IS.:** *Raivavae*: E. slope of Mt. Muanui, 150-200 m (1934). *Rapa*: numerous localities over island, from 0-500 m; collections by E. C. Zimmerman (Wheeler 1936). **MARQUESAS:** *Fatu Hiva* (Cheesman & Crawley, 1928) collection made in 1928. *Nuku Hiva* (*ibid.*). **Mohotane*, 300 m. **HAWAII:** Perkins (in Forel 1899) found this species "in the mountains on all the islands, generally from 2,000 to 4,000 feet." Wheeler (1934) records it from collections made in the 1920's and early 1930's from the following islands: *Oahu*, *Molokai*, *Maui*, *Hawaii*. Carter (1936) records a nuptial flight at Helemano, Oahu, on 1.VII.1935.

In the New World this species ranges more or less continuously from the southern United States to as far south as Montevideo, Uruguay. It is also widespread in the Old World, but here it is irregularly and often locally distributed, and generally scarcer (except for parts of Polynesia). We have studied material from Formosa, the Philippines, and New Caledonia (*andrei* type), as well as the Polynesian localities listed above. There is no apparently significant geographical variation in the worker caste over this vast range. On distributional evidence it appears that *opaciceps* has been introduced irregularly by commerce from the New World into the Old.

Like the following species, *P. punctatissima*, *opaciceps* produces ergatoid males. In this case, however, these are much less extremely worker-like, and normal winged males are also produced. The details of male production in the colonies, the behavior of the ergatoids, and the adaptive significance of this peculiar male dimorphism remain unstudied.

Hypoponera punctatissima (Roger) Fig. 16.

Ponera punctatissima Roger, 1859, Berl. Ent. Zs. **3**: 254, plate 7, fig. 7, worker, queen.

Ponera androgyna Roger, 1859, *Ibid.*, p. 254, ergatoid ♂.

Ponera punctatissima subsp. *schauinslandi* Emery, 1899, Zool. Jahrb. (Syst.) **12**: 439, queen (Type locality: Laysan I.; Syntype examined, Emery Coll.). **New Synonymy.**

Ponera gleadowi: Wilson, 1958, Bull. Mus. Comp. Zool., Harv. **119**: 328, taxonomy, distribution.—Taylor & Wilson, 1961, Psyche **68** (4): 137. [*Nec Ponera gleadowi*, Forel, 1895, Mem. Accad. Sci., Bologna **5** (5): 292.]

Hypoponera punctatissima: Taylor, 1967, Pac. Ins. Mon. **13**: 12.

DISTRIBUTION: SAMOA: *Savai'i*: Matega, 65 m, banana clearing, edge of rain forest, strays under bark, rotting log (RWT acc. 399). Mt. Matafa, 700 m, rain forest, strays in rotting tree stump (RWT acc. 546). *Upolu*: Afiamalu, 700 m, beating shrubbery, 1940 (ECZ); disturbed rain forest, tree moss berlesate, workers and ergatoid ♂ (RWT acc. 258). Falepuna, leaf litter, edge of swamp, 31.I.1956 (TEW). Lau'i'i, 17.I.1956 (TEW).

Safato, Taro clearing, edge of rain forest, colony in rotting log (RWT acc. 614). TONGA: *Eua*: Ohonua, 1956 (NK). KERMADEC IS.: *Raoul*, Meyer, records dated VI.1956 (Taylor & Wilson 1961). *AUSTRAL IS.: *Maria*: NE islet (1934). *Marotiri*: SE islet (1934). *Rapa*: Maitua, 200-230 m (1934). MARQUESAS: *Ua-Pu*: Summit of Kohepu (*mumfordi* syntypes; 1931). HAWAII: *H. punctatissima* apparently occurs throughout the islands. Forel first recorded it from Oahu and Kauai in 1899. In Wheeler's faunal list of Hawaiian ants (1934) it was recorded from Oahu, Hawaii, Maui, Molokai, French Frigates Shoal, Necker I., and Laysan I.; all of these records were accumulated during the late 1920's and early 1930's. We have been able to verify several of Wheeler's determinations of material from Oahu.

H. punctatissima is the nominate species of a taxonomically confused group, containing a large number of synonymous names. Recent unpublished studies by Taylor suggest that only two valid species, *punctatissima* and *gleadowi* Forel, are involved. *Gleadowi* is undoubtedly distinct from *punctatissima*, but the present concept of the latter could conceivably include 2 or even 3 valid species. This does not seem very likely, but more study material is needed for a final analysis, and until this is in hand the name *punctatissima* is tentatively applied to the Polynesian form. The various species synonymized under *gleadowi* by Wilson (1958) belong here, and should be provisionally transferred to the synonymy of *punctatissima* (these include: *P. kalakauae* Forel, *P. gleadowi* v. *decipiens* Forel, *P. mina* Wheeler, and *P. mumfordi*, Wheeler). The Polynesian material shows some variation, but only one species seems to be present in the islands.

H. punctatissima is virtually cosmopolitan in the warmer parts of the globe, and has undoubtedly been carried extensively and often by man. *Gleadowi* is almost as widespread, but it is presently unknown from the Papuan and Polynesian areas. Both species appear to be of Old World, probably African, origin. The known males of both are peculiar, highly worker-like ergatoids, and it appears that normal winged males are never produced (Forel originally described the *gleadowi* male as winged, but his specimens were not collected with the worker types; indeed, they were from the opposite side of the Indian sub-continent). Taylor (1967) has suggested that behavioral adaptations involving these males may have contributed to the remarkable abilities which these species must have for transport by man, and for successful establishment when introduced into new areas.

Though widespread, *punctatissima* is not especially abundant in Polynesia. It is encountered occasionally in rotting logs at forest fringes or in other disturbed but shaded situations. The colonies are very populous and often include large numbers of dealate females. Virtually nothing is known of the male behavior, a subject deserving much attention. This is the one ponerine ant that surpasses *Odontomachus simillimus* and *Hypoponera confinis* in the extent of its range in the Pacific.

***Hypoponera zwaluwenburgi* (Wheeler) Fig. 17.**

Pseudocryptopone zwaluwenburgi Wheeler, 1933, Amer. Mus. Novit. **672**: 14-16, fig. 5, worker (Type locality: Oahu).

Ponera zwaluwenburgi: Wilson, 1957, Bull. Mus. Comp. Zool. Harv. **116**: 375.

Hypoponera zwaluwenburgi: Taylor, 1967, Pac. Ins. Mon. **13**: 12.

DISTRIBUTION: HAWAII: *Oahu* (syntype workers). Wheeler (1933) also records this species from *Maui*.

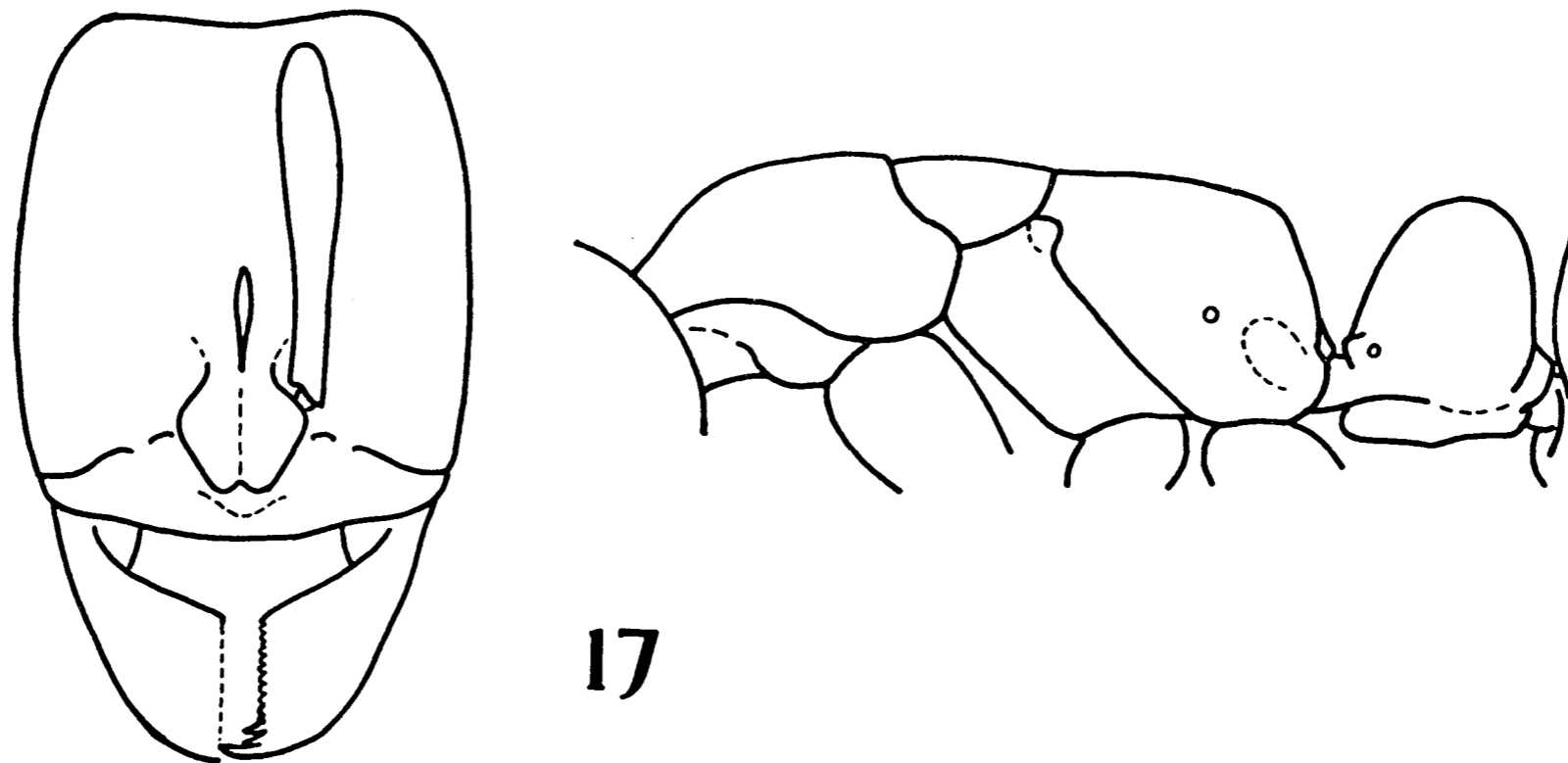


Fig. 17. *Hypoponera zwaluwenburgi* Wheeler, syntype worker from near Honolulu, Oahu.

This species is known only from a few worker specimens, and it is one of the few Hawaiian species which has not been collected elsewhere. Nonetheless we consider *zwaluwenburgi* to be a human introduction into Hawaii. Its general features are somewhat aberrant for *Hypoponera*, but its affinities almost certainly lie with sections of the African fauna. Its Hawaiian propagule probably originated in Africa.

Leptogenys falcigera Roger Fig. 18.

Leptogenys falcigera Roger, 1861, Berl. Ent. Zs. **5**: 42, worker (Type locality: Ceylon).

Leptogenys insularis Fr. Smith, 1897, J. Linn. Soc. Lond., Zool. **14**: 675, worker (Type locality: Hawaii). **New Synonymy.**

Leptogenys falcigera insularis: Wheeler, 1934, Occ. Pap. B. P. Bishop Mus. **10** (21): 11; 1935. *Ibid.*, **11** (11): 14.

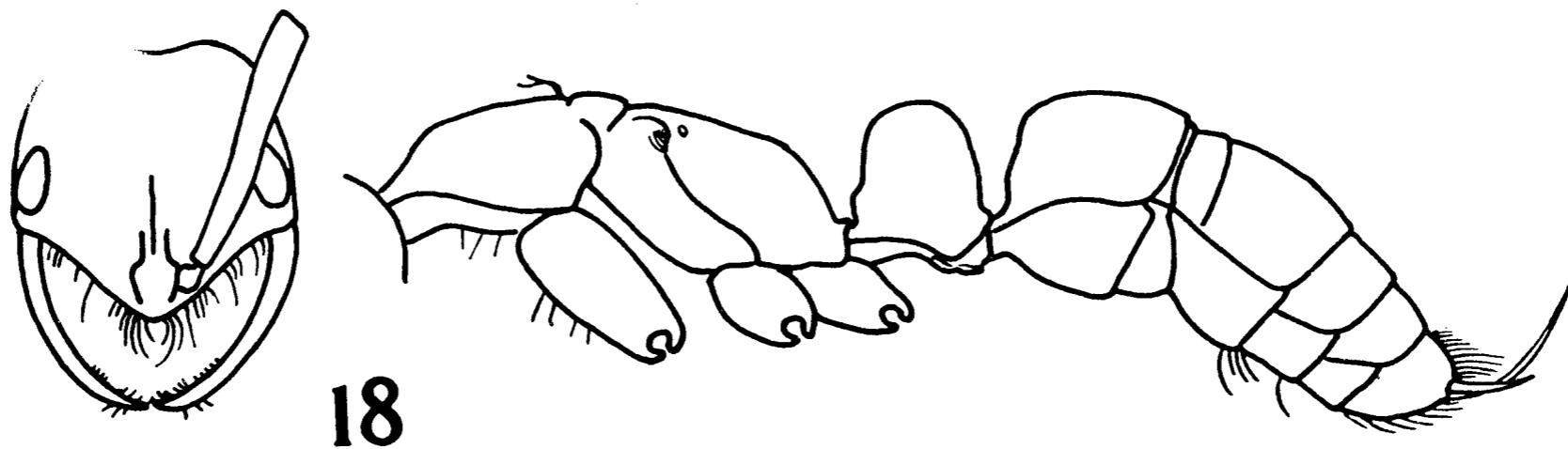


Fig. 18. *Leptogenys falcigera* Roger, worker from Oahu.

DISTRIBUTION: LINE IS.: *Washington*: "Coconut" (L. A. Whitney). **HAWAII**: Wheeler (1934) lists records from localities on *Kauai*, *Oahu*, *Molokai* and *Maui*.

L. falcigera is an African species which has undoubtedly been spread by commerce. W. L. Brown, Jr., has verified the above synonymy by direct comparison of type specimens. He also considered *maxillosa* Smith as a possible senior synonym of *falcigera*, but concluded that it represents a second widespread African-based tropical species, with *falcata* Roger as its junior synonym. According to Brown's notes *falcigera* workers have notice-

ably longer and broader petiolar nodes than those of *maxillosa*, and the males are less shining, more pruinose and more darkly colored. It is possible that the gap separating these forms may be bridged by future African accessions, but in the meantime it seems best to recognise them as two related species.

***Odontomachus simillimus* Fr. Smith** Fig. 19.

Odontomachus simillimus Fr. Smith, 1858, Cat. Hym. Brit. Mus. 6: 80, pl. 5, figs. 8, 9, queen (Original localities: Fiji Is., Ceylon).

Odontomachus haematodes: div. auct. (nec *Formica haematoda* Linné, 1758, Syst. Nat., 10th ed. 1: 582).

Odontomachus haematodus var. *fuscipennis* Forel, 1913, Zool. Jahrb. Syst. 36: 19, worker, queen, ♂ (Original localities: Peradeniya, Ceylon; Bahsoemboe, Sumatra).

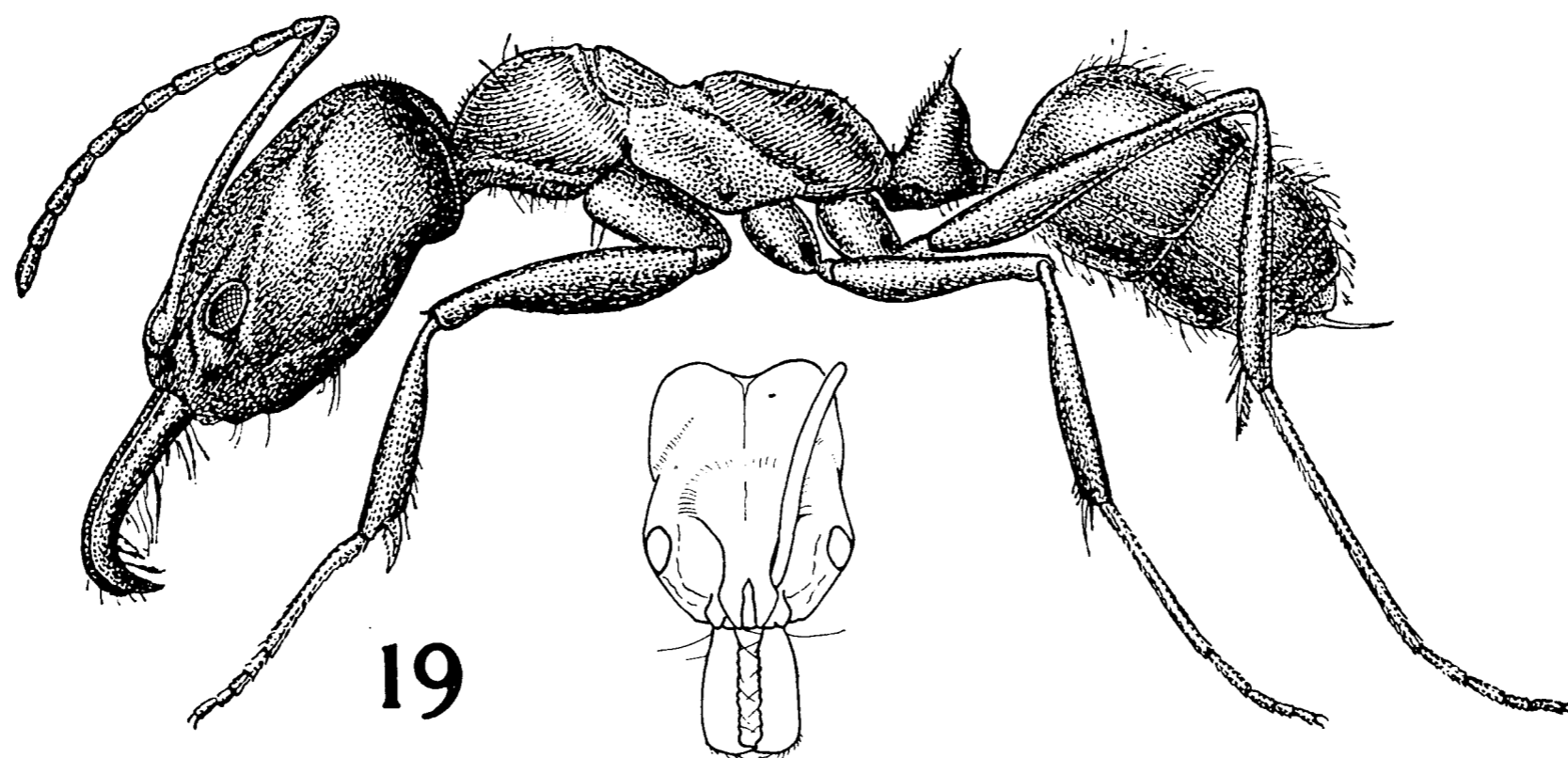


Fig. 19. *Odontomachus simillimus* Fr. Smith, worker from Papua.

DISTRIBUTION: ONTONG JAVA: Leuanua, ♂, 29.IX.1953 (J. D. Bradley). SAMOA: *Savai'i*: **Rain forest, 600–1200 m (1924). Asau, 170 m, disturbed lowland rain forest, strays from ground, rotting log and low foliage (RWT accs. 487, 501, 504). Aopo, 170 m, rain forest, berlesate of soil and leaf mold (RWT acc. 597). **Fagamolo (1915). Falealupo, rain forest, nest in hollow twig on ground (RWT acc. 444). Ga'utavai, coastal coconut plantation, strays from palm trunks (RWT accs. 455, 456, 474); strays on *Ficus* branches 35 m from ground level (RWT acc. 459). Matega, 65 m, banana clearing in rain forest, strays from moss and leaf mold on boulders (RWT acc. 390). Mt. Matafa, 700 m, rain forest, rotting log (RWT acc. 532). Mt. Matafa Road, 200 m, rain forest, nest under fallen epiphyte, strays from under bark rotten log (RWT accs. 363, 367). Mt. Olomanu, rain forest, berlesate of moss from rotting log (GE acc. S9). Palauli (NK, 1955). Papa, coastal banana plantation, strays under bark on dry dadap log (RWT acc. 376). Patamea (NK, 1955). Puapua (NK, 1955). Samalaeulu, coastal rain forest, strays under small trunk epiphytes from rotting log, and from berlesate of leaf mold and soil (RWT accs. 510, 519, 596). **Safune, lowlands to 300 m (1917). Sili (NK, 1955). *Upolu*: Afiamalu, 700 m (OHS, 1940); ♂♂ at light, 10.VIII.1940 (ECZ). Apia, **1925; 1940 (OHS); 1952 (J. L. Gressitt). Falepuna, berlesate of leaf litter, edge of swamp (TEW,

1956). **Leulumoega (1923). Mafa Pass, berlesate of soil and moss (TEW, 1956). Mafa Pass Road (NK, 1955). **Mulifanua (1923). Siumu (NK, 1955). Tapatapao, 300 m, under dead bark, 1955 (NK). Tanumalala, rain forest, berlesate of leaf mold (TEW). Tiavi, 700 m (OHS, 1940). Togitogiga, 400 m, rain forest, berlesate of leaf litter (GE accs. 56, 57). Utumapu (TEW, 1956). *Tutuila*: Amouli, 120-250 m, beating shrubbery, ♂, 2.VIII.1940 (ECZ); **1923. **Fagasa (1923). Fagatoga Trail, 1938 (ECZ); 1952 (C. P. Hoyt). **Leone Road (1921). Matafao Trail, 400 m, beating dead branches (ECZ, 1940). Mt. Piao, 300 m, 1940 (OHS). Between Oloava and Olomanu, 430 m, rain forest, berlesate, moss ex fallen log (GE acc. T15). Pago Pago, 100 m, 1910 (M. Emery, 1914). **Eastern end of island, 350 m (1918). *Manua*: Ta'u, **1923; 1926 (A. F. Judd). TONGA: *Tongatabu*: [W. Cottrell-Darmer, record in Emery (1914a)]. Nukualofa (NK, 1956). Haamonga (NK, 1956). *Vavau*: Neiafu (NK, 1956). Mangia (NK, 1956). ROTUMA: (All collections by H. St. John, 3-15.VIII.1938). Jarua. Kilinga, near Kongai, including ♂ collected 13.VIII. at Lulu Bay. Paho. Solmatiha. Soloroa. TOKELAU IS.: *Fakaofu*: 1924 (EHB). SOCIETY IS.: *Tahiti*: Fautaua Valley, 23 m, worker (date ?-in Wheeler 1936). Arihiri, Pare, ♂, 26.III.1934 (ECZ).

O. simillimus or a closely related species has been intercepted at the U. S. Dept. of Agric. Quarantine Station at Honolulu (Wheeler 1934a), but no member of the genus has become established in the Hawaiian Is.

As noted in Wilson's recent revision of the Melanesian Odontomachini (Wilson 1959), *O. simillimus* is a native Indo-Australian species distinct from the Neotropical *O. haematus*. It ranges continuously from Ceylon to Micronesia and inner Polynesia. Within this range it is one of the dominant ants, occurring in nearly every island and maintaining dense populations in a wide variety of habitats. Wheeler's 2 records of the species from Tahiti have not been verified during the present study. If *simillimus* does indeed occur on that island, it must be very rare. In fact, the population was almost certainly introduced by man from its native range in the western Pacific and possibly only very recently. It is significant that not a single collection was made by Miss Cheesman during intensive collecting on Tahiti in 1925, despite the fact that the ant is large and conspicuous and usually one of the first to be picked up by collectors.

O. simillimus shows no detectable geographic variation in any of the castes over its great range. It is most closely related to a group of Australian and Papuan species that includes *aciculatus* Fr. Smith, *aeneus* Emery, and *cephalotes* Fr. Smith.

***Anochetus graeffei* Mayr** Fig. 20.

Anochetus graeffei Mayr, 1870, Verh. Zool.-bot. Ges. Wien **20**: 961, worker (Type locality: Upolu, Samoa).—Wilson, 1959, Bull. Mus. Comp. Zool., Harv. **120**: 507, distribution, variation, biology.

Anochetus punctiventris subsp. *oceanicus* Emery, 1897, Termézettr. Füzet. **20**: 597, worker (Type locality: Friedrich-Wilhelmshafen, New Guinea).

DISTRIBUTION: SAMOA: *Savai'i*: Alagaogao, 100 m, banana plantation, strays from rotting wood fragments on ground (RWT acc. 417). *Upolu*: Afiamalu, 700 m, beating (ECZ, 1940). Matautu, from Berlese funnel sample of leaf mold (TEW, 1956), *Tutuila*: Alega, coastal Futu grove Berlese funnel sample (TEW, 1956). **Amouli (1923). Naval

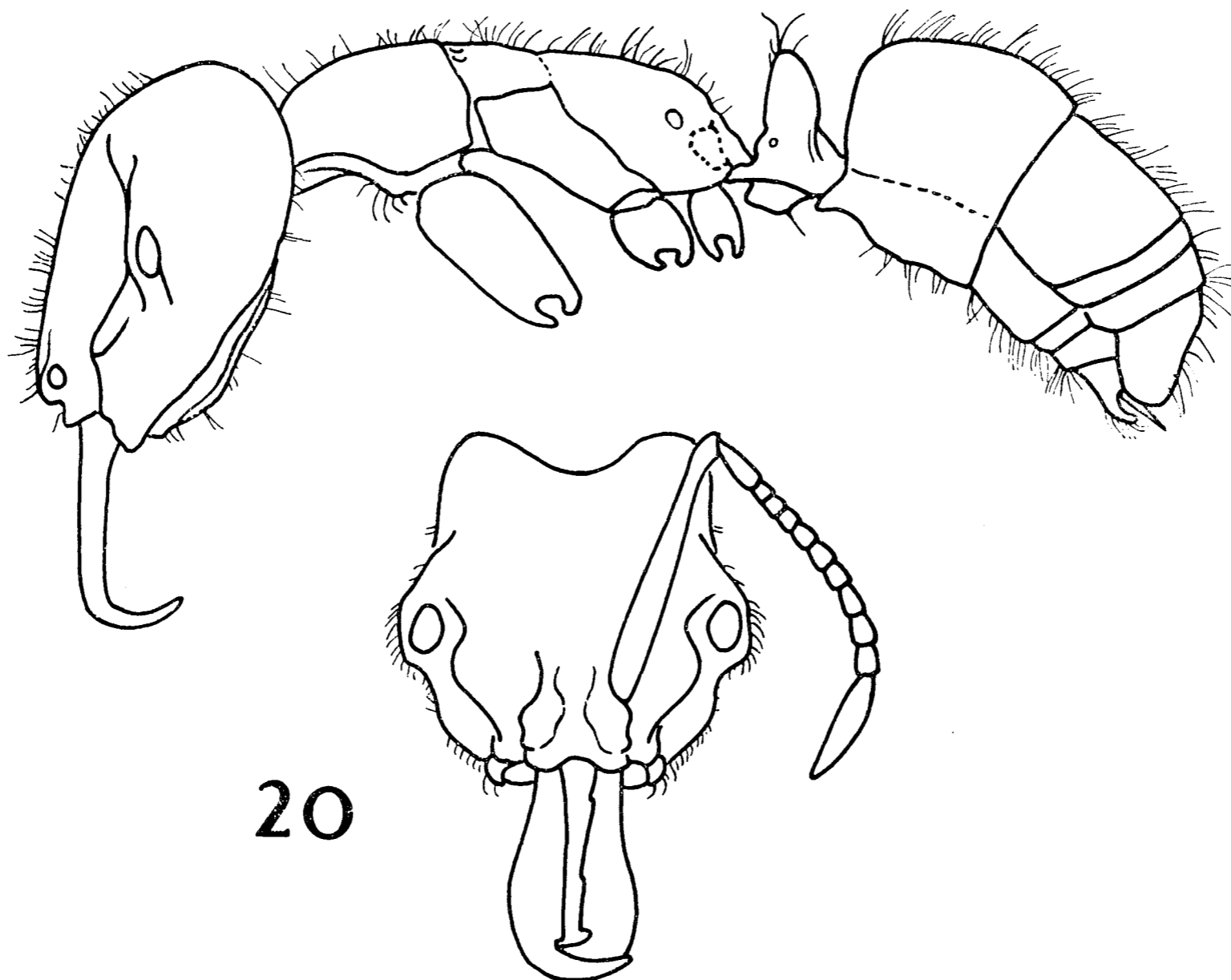


Fig. 20. *Anochetus graeffei* Mayr, worker from Afiamalu, Upolu.

Station, ♂♂, 15.VIII.1940 (OHS, ECZ). Utulei, 15 m (ECZ, 1940). *Manua Group: Ta'u* (1937). COOK IS.: *Rarotonga*, 1937 (C. E. Clarke).

A. graeffei ranges from SE Asia to Queensland, and eastward into Micronesia and the Cook Is. It is continuously distributed throughout Melanesia, including New Caledonia. Striking non-geographic variation is shown by the worker caste, in total size, petiole shape and sculpturation, especially that of the 1st gastric tergite (see Wilson 1959). The species is rather scarce in Samoa.

Subfamily CERAPACHYINAE

Syscia silvestrii Wheeler Fig. 21.

Cerapachys (*Syscia*) *silvestrii* Wheeler, 1909, Boll. Lab. Zool. Gen. Agrar. Portici 3: 269 (Type locality: Hilo, Hawaii).

Cerapachys (*Syscia*) *seini* Mann, 1931, J. Wash. Acad. Sci. 21: 440-441, worker (Type locality: Rio Piedras, Puerto Rico). **New Synonymy.**

DISTRIBUTION: SAMOA: *Upolu*: Lauli'i. Salea Puga. These 2 records, which include a large number of specimens, were both made by Woodward during January 1956. Both are from Berlese funnel samples. *S. silvestrii* was not taken by the Taylors or Ettershank, and no earlier records are known. HAWAII: *Hawaii*: Hilo

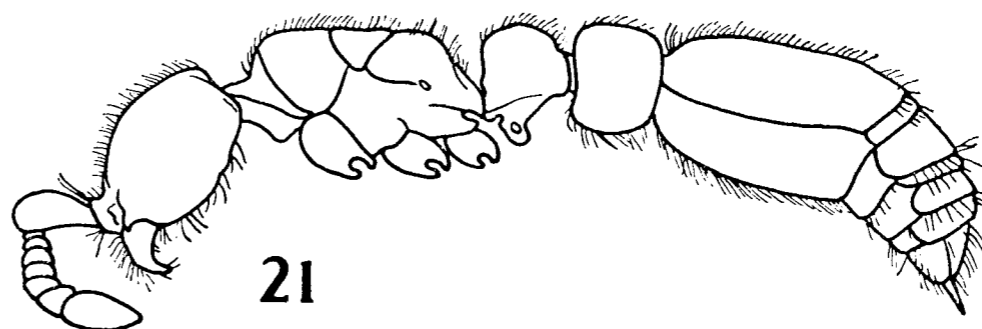


Fig. 21. *Syscia typhla* Roger, worker from Salea Puga, Upolu.

(type locality). *Oahu*: (R. H. Van Zwaluwenburg). Wheeler (1934) also recorded *silvestrii* from Honolulu.

S. silvestrii is probably a pantropical tramp species, although certainly one of the most inconspicuous and seldom collected of this class. Besides the Samoan, Hawaiian, and synonymic type material cited above we have seen workers from Okinawa (F. G. Werner) and Amlekhganj, Nepal (E. I. Coher). The series show very little variation in the characters of size, body form, and sculpturing that often provide diagnostic species-level taxonomic characters in *Syscia*. Considerable internidal variation does occur in the depth of pigmentation and shininess of interpunctural cuticle, but its significance is uncertain, since these are the features most likely to be modified by preservation.

Cerapachys (Syscia) sinensis Wheeler (1928, Boll. Lab. Zool. Gen. Agrar. Portici 22: 3, worker, Shanghai, China) is probably a synonym of *silvestrii*, but we are reluctant to formally propose this on the basis of the very few specimens available for comparison.

We have not seen the type of the related *S. typhla* Roger, originally described from Ceylon. It was examined recently by Dr W. L. Brown, Jr., who reports that *typhla* is a species distinct from *silvestrii*. It has a longer head, coarser sculpturation, and the postpetiole is relatively very long, being distinctly more than half as long as the 1st gastric segment. In other *Syscia* species the postpetiole is much less than half as long as gastric segment I; usually only about one third its length.

Subfamily MYRMICINAE

Eurhopalothrix procera (Emery) Fig. 22.

For complete current synonymy see Brown & Kempf (1960).

DISTRIBUTION: SAMOA: *Upolu*: Afiamalu, 700 m, beating, 1940 (ECZ); ground moss berlesates, disturbed rain forest, I.1956 (TEW); (RWT accs. 2316, 2321); tree moss berlesates, ca. 8 m from ground, disturbed rain forest, 9.IV.1962 (RWT acc. 580; GE acc. 44); strays ex small rotting wood fragments, disturbed rain forest (RWT accs. 274, 353); nest ex rotting log, disturbed rain forest, 19.III.1962 (RWT accs. 218, 227); nest ex rotting stump, rain forest, 16.III.1962 (RWT acc. 329). **Malololelei (1924, 1926). Tiavi, 700 m, under dead bark, 1940 (ECZ).

Brown & Kempf (1960) find this to be the most widely distributed and variable of the Indo-Australian *Eurhopalothrix*. It ranges from Sarawak and Koto Sho I. (Botel Tobago),

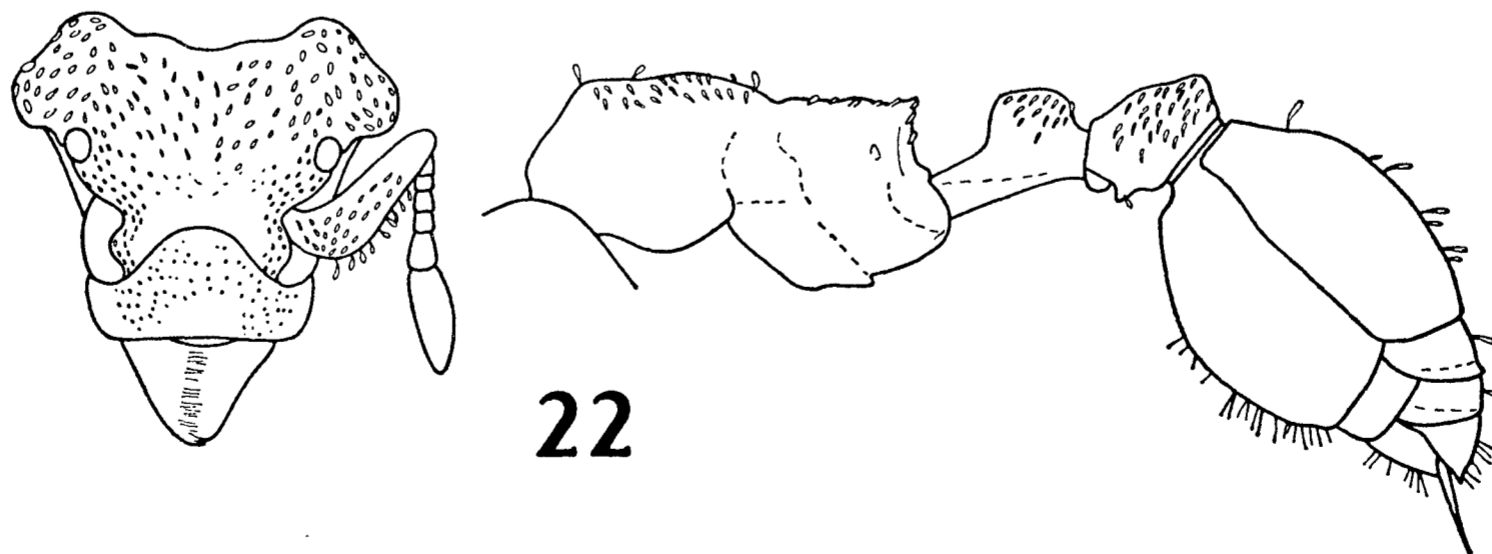


Fig. 22. *Eurhopalothrix procera* (Emery), worker from Afiamalu, Upolu (TEW).

SE of Formosa, through the Philippines and Moluccas to Cape York, Palau, Santa Cruz Is., and Samoa. Notable geographical variation occurs in size, coarseness and opacity of body sculpturing, and degree of reduction of pilosity. In general, samples from peripheral areas are larger, more coarsely sculptured, and have more complete pilosity than samples from the center of the range in New Guinea proper. The Samoan workers conform to this pattern, except that the sculpturing is reduced to an intermediate degree; in this latter character they resemble workers from Cape York. For further details, the Brown & Kempf revision should be consulted.

E. procera was present but not abundant at Afiamalu in 1962. Only 2 colonies were found, 1 in a rotting log and the other in a rotting tree stump in disturbed rain forest. Each contained alate forms of both sexes as well as several hundred workers, together with large numbers of larvae and pupae.

Trichoscapa membranifera Emery Fig. 24.

Strumigenys (Trichoscapa) membranifera Emery, 1869, Ann. Acad. Asp. Nat. Napoli 2: 24-25, pl. 1, worker.

Strumigenys (Cephaloxys) membranifera var. *williamsi* Wheeler, 1933, Proc. Hawn. Ent. Soc. 8: 275, fig. 1, worker (Type locality: near Olaa, Hawaii).

Trichoscapa membranifera: Brown, 1949, Mushi 20 (1): 6.

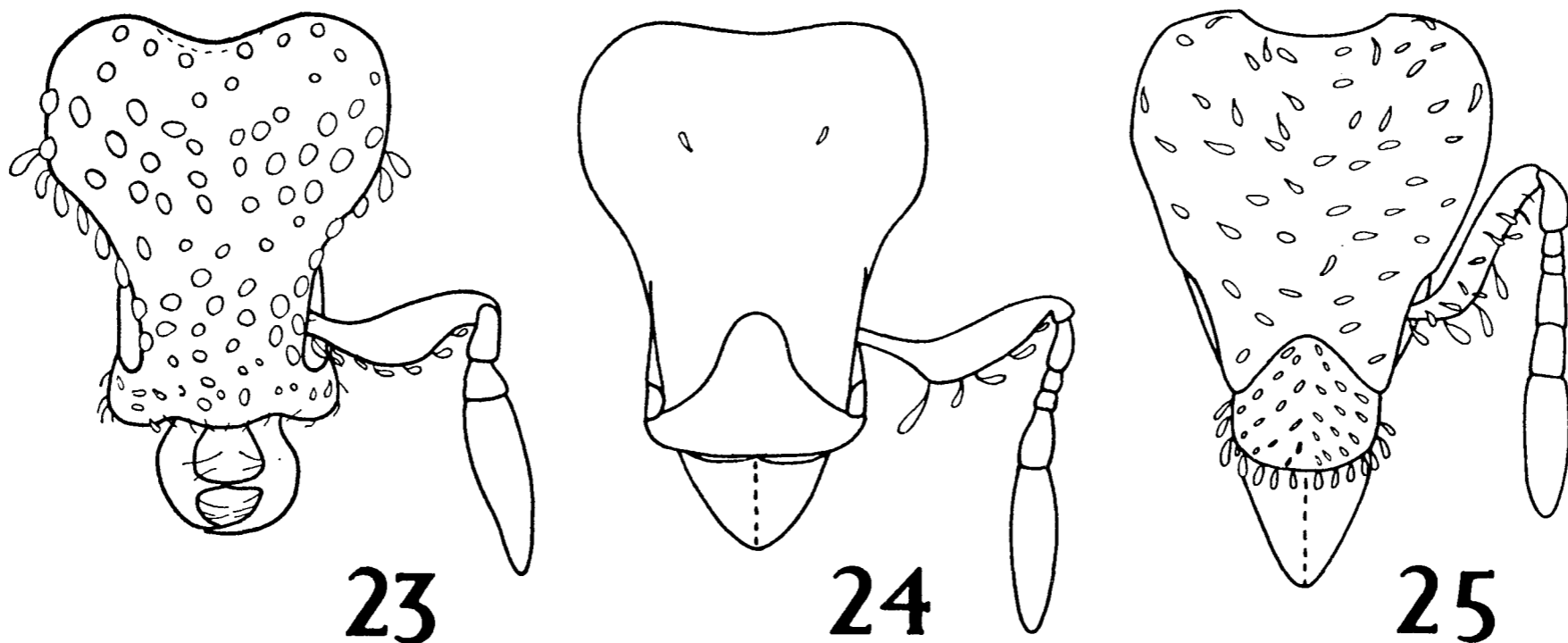


Fig. 23. *Quadristruma emmae* (Emery), worker from Lauli'i, Upolu (TEW). Fig. 24. *Trichoscapa membranifera* Emery, worker from Vaipoto, Upolu (TEW). Fig. 25. *Smithistruma dubia* Brown, worker from Lauli'i, Upolu (TEW).

DISTRIBUTION: SAMOA: *Upolu*: Apia, ♀ at light, 4-9.IV.1962 (GE). Vaipoto, Berlese funnel sample, leaf mold, rain forest, 9.I.1956 (TEW). HAWAII: *Hawaii*: off road to Puna, near Olaa (*williamsi* syntypes).

Brown (1949a) states that *T. membranifera* is probably of African origin. It has been spread by human commerce through a large part of the tropics and warm temperate zones, including such diverse areas as the Fiji Is., eastern China, West Indies and southeastern United States. The species has an ecological amplitude unusual for a dacetine, nesting in major habitats from dense woodland to dry, open cultivated fields. Wilson (1953) describes the feeding behavior of the workers; they are predaceous on a wide variety of small, soft-bodied arthropods.

Smithistruma dubia Brown Fig. 25.

Smithistruma (Smithistruma) dubia Brown, 1953, Amer. Midl. Nat. **50**: 122, pl. 1, fig. 13, worker, gynotype ♀. (Original localities: in Palau).

DISTRIBUTION: SAMOA: *Upolu*: Afiamalu, 700 m, berlesate of tree moss, 2 m above ground, 11.III.1962 (RWT acc. 262); berlesate, ground moss, disturbed rain forest, 9.IV.1962 (GE acc. 53). *Lauli'i*, berlesate, leaf litter and soil, rain forest, 8.I.1953 (TEW).

When Brown described this species it was listed only from the islands of Peleliu and Garakayo of the Micronesian Palau group. At that time it was suggested that *dubia* was probably a tramp, originating in the large Papuan or Indonesian land masses to the south and west. More recent Melanesian and Micronesian records published by Brown (1964) support this hypothesis. These records include the following: Caroline Is.: Truk, Ponape; NE New Guinea: Bubia, Lower Busu River; Papua: Bisianumu. In addition we have seen material from the Solomon Is. of Guadalcanal and Bellona, and from Reef I. in the Santa Cruz group (all collected by P. J. M. Greenslade). *S. dubia* has not been taken on the Fiji Is., but probably occurs there. There seems little doubt that this species is New Guinea-based, and it probably spreads by commerce.

Smithistruma mumfordi (Wheeler)

Strumigenys (Cephaloxys) inezi [!] subsp. *mumfordi* Wheeler, 1932, Bull. B. P. Bishop Mus. **95**: 160, worker [Type locality (by restriction of W. L. Brown, 1953, Amer. Midl. Nat., **50**: 124): Hakahetu Vall., Ua Pu, Marquesas].

Smithistruma mumfordi: Brown, 1953, Amer. Midl. Nat. **50**: 124.

DISTRIBUTION: MARQUESAS: *Ua Pu*: Hakahetu Vall., 800 m (A. M. Adamson). *Nuku Hiva*: Ooumu, 1300 m (Mumford & Adamson).

W. L. Brown, Jr. (1964) has recently redescribed a syntype of this species, and has been able to clarify some of the difficulties engendered by Wheeler's inadequate original description (see Brown 1954).

S. mumfordi is a member of the Oriental-Papuan *capitata* group, which contains at least 8 other species. In Brown's 1954 key to the group, it runs to the couplet including *pedunculata* Brown of the Philippines and *capitata* (Fr. Smith) of western New Guinea. It is close to these two species and also to *S. inezae* Forel, with which it could be synonymous. The species was probably introduced by man into the Marquesas from Indonesia or Melanesia.

No information is available on the feeding behavior of this or any other Polynesian species of *Smithistruma* or *Strumigenys*. Elsewhere these genera are predominantly predaceous on certain groups of collembolans and a few other small, soft-bodied arthropods (Brown & Wilson 1959).

Strumigenys godeffroyi Mayr Fig. 26.

Strumigenys godeffroyi Mayr, 1866, Sitz. Akad. Wiss. Wien **53**: 516, worker.—Brown, 1949, *Mushi* **20**: 17, synonymy; 1959, *Psyche* **65**: 81, distribution.

DISTRIBUTION: SAMOA: *Savai'i*: Gagaifoumauga, berlesate, moss and bark on rotten log, rain forest, 14.VI.1962 (GE acc. 55). Falealupo, several nests in rotten logs, rain forest, 20.III.1962 (RWT accs. 434, 435). Lotogo, 370 m, nests ex rotten logs, rain forest, 21.III.

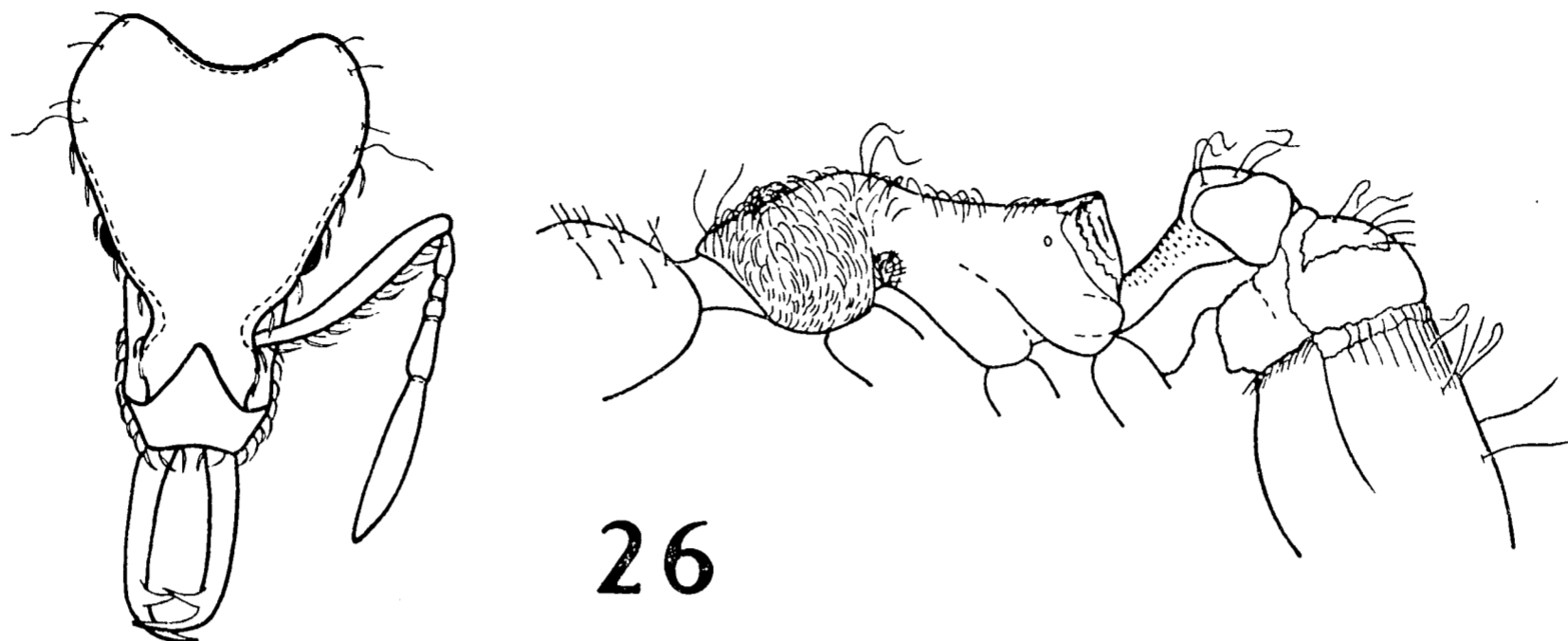


Fig. 26. *Strumigenys godeffroyi* Mayr, worker from Colonia, Ponape I., Caroline Islands.

1962 (RWT accs. 464, 465). Mt Matafa Road, 200 m, rain forest edge, strays under bark rotten log, 19.III.1962 (RWT acc. 365). *Upolu*: Afiamalu, 700 m, beating, 1940 (ECZ); berlesate, moss and ferns off trees, rain forest, 19.I.1956 (TEW); berlesate, moss on tree trunks 1–2 m above ground level, rain forest, 11.III.1962 (RWT acc. 262); nest ex rotten log, *Taro* patch, 16.III.1962 (RWT acc. 320); Apia (1924). *Lauli'i*, berlesate, leaf litter and soil, rain forest, 8.I.1956 (TEW). *Malololelei*, 650 m, berlesate, rain forest, 19.I.1956 (TEW). *Sinaele*, 500 m, beating, 1940 (ECZ). *Tanumalala*, 350 m, strays under moss on buttress roots and fallen branch (RWT accs. 606, 608). *Tapatapao*, 300 m, under dead bark, 1940 (ECZ). *Tiavi*, 700 m, rotting logs, 1940 (ECZ). *Utumapu*, 120 m, 17.I.1956 (TEW). This species was originally described from specimens originating from *Upolu* sometime before 1866. *Tutuila*: North of Aloau, 450 m, berlesate, moss ex logs, stunted forest, 13.VII.1962 (GE acc. T. 19). *Malaeimi*, berlesate, moss ex rotten logs, rain forest, 13.VII.1962 (GE acc. T. 22). *Matafao* trail, 400 m, beating dead branches, 1940 (ECZ). *Pago Pago*—*Matafao* Trail, 400 m, beating shrubbery, 1940 (ECZ). *Pago Pago*, north side 300 m, under dead bark, 1940 (ECZ). Between *Oloava* and *Olomanu*, 430 m, berlesate, moss ex rotten logs, rain forest, 13.VII.1962 (GE accs. T. 12, T. 15). SOCIETY IS.: *Tahiti*: *Papenoo* Vall., 8 km from sea, 300 m, 1929 (Adamson). AUSTRAL IS.: *Raivavae*: *Unurau* (1934). HAWAII: *Oahu*: *Poamoho*, *Koolau* Range, under rock at margin of wet forest, 27.VIII.1961 (C. H. Lindroth).

W. L. Brown, who has conducted a careful study of the Indo-Australian *Strumigenys*, considers that *godeffroyi* is a native of tropical southeastern Asia. It shows greater variability on Borneo and Sumatra than elsewhere, and the most closely related known species (*indagatrix* Wheeler, *juliae* Forel) coexist with it in the greater Sundas. The related species *lewisi* Cameron replaces *godeffroyi* in subtropical and warm temperate eastern Asia (Brown 1949a). *S. lewisi* also replaces it for the most part as an introduced species on Hawaii. Brown (ms., revision of Indo-Australian *Strumigenys*) states: "*godeffroyi* is widely distributed in even the most far-flung Pacific Island groups and in the East Indies, New Guinea, Solomons, tropical mainland of Asia, Philippines, northern Australia, and across the Indian Ocean as far as Madagascar, where it has apparently been carried by commerce. The great majority of the records from larger land-masses are littoral, showing that this ant is a strong transoceanic traveller, thriving in areas where the natural vegetation has been replaced by the tropicopolitan lowland flora associated with the works of man. Wheeler

(1937, *Treubia* **16**: 23) records that *godeffroyi* was found by Dammerman to have reestablished itself in Krakatoa by 1933." Except for more extensive variability of populations in the greater Sundas, the species appears to show no significant geographic variation over its extensive range (Brown 1949a).

***Strumigenys lewisi* Cameron** Fig. 27.

Strumigenys lewisi Cameron, 1887, Proc. Manchester Lit. Phi. Soc. **25**: 229, worker.—Brown, 1949, *Mushi* **20** (1): 16.

Strumigenys godeffroyi var. or subsp. *lewisi* of authors.

DISTRIBUTION: *HAWAII: *Oahu*: Palolo Vall. Manoa, 300 m, Waihii Falls, Manoa Vall.

This species is native to parts of China, Japan, Upper Burma and the Ryukyus, where it replaces the related species *godeffroyi* (q. v.). Brown (1949a) states that the species has been intercepted at U. S. Plant Quarantine Stations in ginger root and has reached various Pacific Is. (unspecified) "in shipments of timber and in the earth about living plants." Brown reported having collected several nests in the densely populated, irrigated plains around Chengtu, Szechuan Province, China.

S. lewisi closely resembles the much more abundant, widespread *godeffroyi*. As indicated by the accompanying figures, it is most readily separated by its much sparser pronotal pilosity.

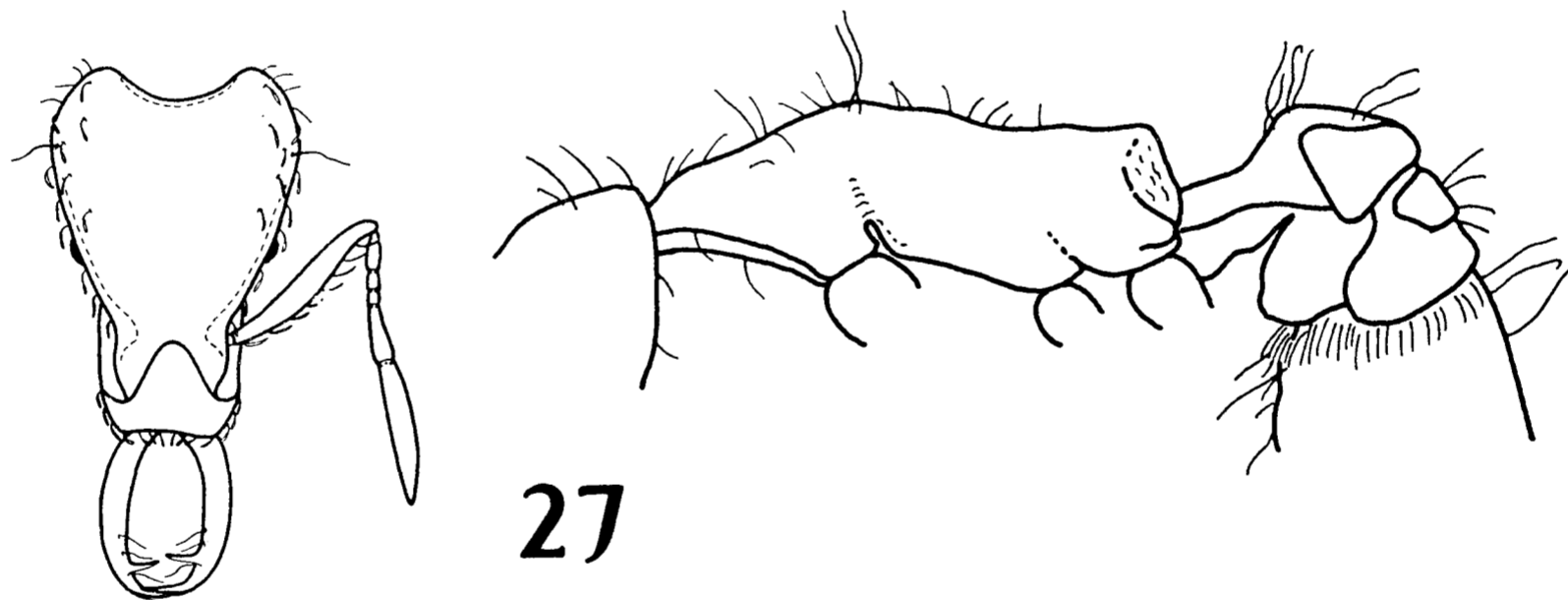


Fig. 27. *Strumigenys lewisi* Cameron, head of worker from Chengtu, Szechwan, China and body of worker from Shantung, China. Not drawn to the same scale.

***Strumigenys mailei* Wilson and Taylor, new species** Fig. 28.

DIAGNOSIS AND RELATIONSHIPS. Similar to *S. perplexa* (Fr. Smith) of Australia and New Guinea, differing by its larger size, distinctly more slender head, proportionately larger mandibles, more slender propodeal spines, projecting posterior rim of postpetiolar disk, and overall much sparser pilosity. One way it can be distinguished immediately from *perplexa* is that less than 10 standing hairs break the dorsal profile of the mesosoma, whereas in *perplexa* over 15 do. Another similar species, *S. dyak* Wheeler of Borneo, can be distinguished from *mailei* by its much deeper occipital concavity, by its smaller postpetiolar disk, and by its much longer, differently arranged mesosomal pilosity.

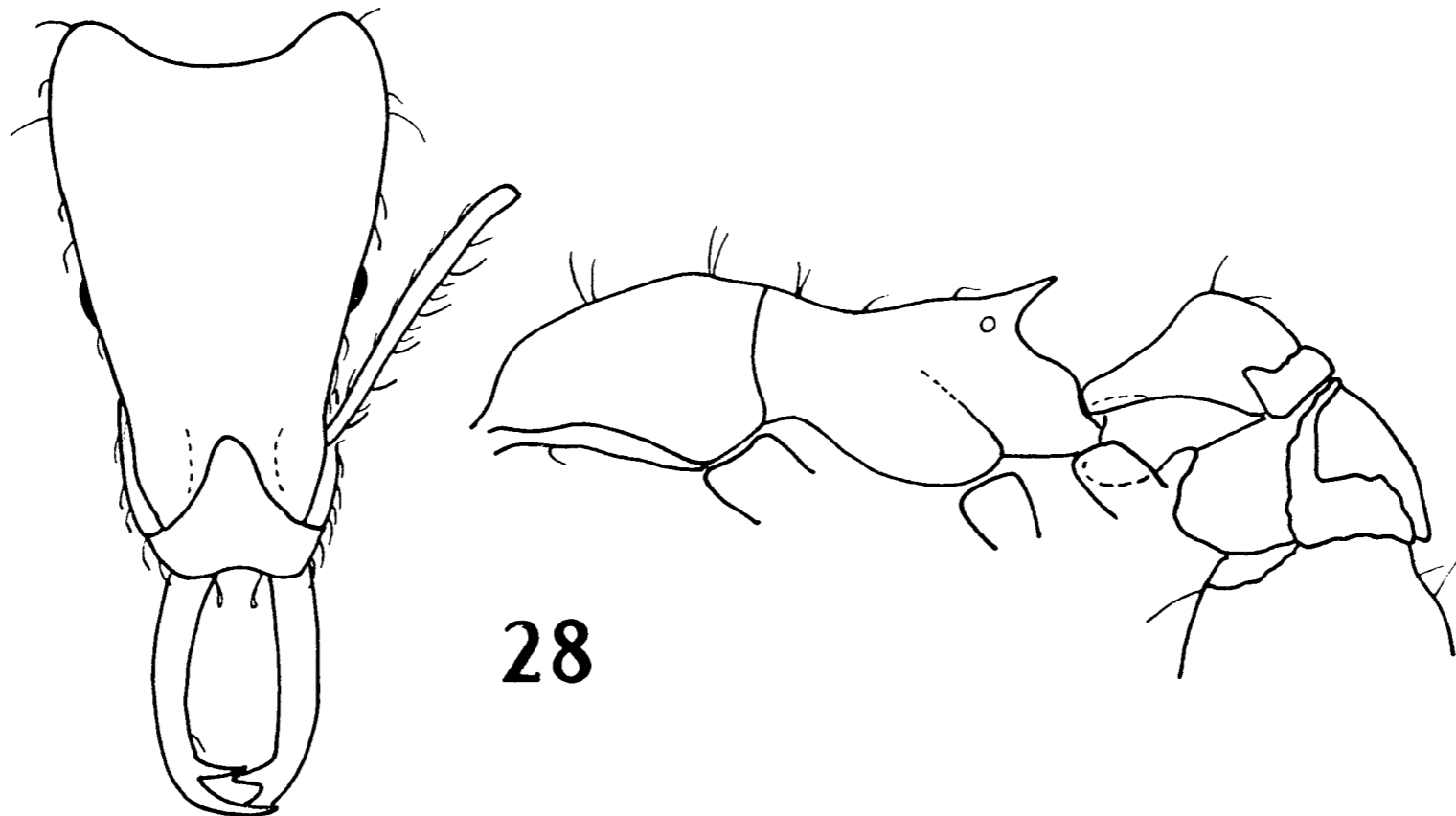


Fig. 28. *Strumigenys mailei* Wilson and Taylor, holotype worker.

Holotype worker (SAMOA): HW 0.49 mm; HL 0.75 mm, SL 0.45 mm, PW 0.31 mm, ML 0.34 mm. Body form and pilosity as shown in fig. 28. All of head, entire dorsum of mesosoma, and all of petiole densely "shagreened", *i. e.*, microreticulate with diameter of interreticular spaces about 0.01 mm; surface completely opaque in reflected light, almost all sides of mesosoma, exposed dorsal surface of postpetiole, and all of gaster, smooth and shining. Concolorous light reddish brown.

Paratype worker (FIJI): HW 0.49 mm, HL 0.73 mm, SL 0.43 mm, PW 0.31 mm, ML 0.31 mm. Fringing hairs of anterior clypeal border more numerous and flattened than in holotype. Shagreening covers side of pronotum as well as dorsum. The 2 short, curved hairs found on propodeal dorsum of holotype (see fig. 28) are lacking. Otherwise this specimen is nearly identical to the holotype.

MATERIAL EXAMINED: SAMOA: *Upolu*: Afiamalu, 700 m, rain forest, berlesate of moss on tree, 10-12 m from ground, 15.III.1962, holotype worker (RWT acc. 581). FIJI: *Viti Levu*: Navai Mill, near Nandarivatu, 800 m, 17.IX.1938 (E. C. Zimmerman).

The name is based, in apposition, on the Samoan word for "trap." It alludes to the remarkable, trap-like action of the mandibles of workers of this genus.

TYPE DEPOSITION: Holotype and paratype deposited in the Harvard University Museum of Comparative Zoology (Type no. 31114).

***Strumigenys rogeri* Emery** Fig. 29.

See Brown, 1954, Bull. Mus. Comp. Zool., Harv. **112**: 20, for complete synonymy.

DISTRIBUTION: SAMOA: *Savai'i*: Asau, 170 m, strays ex rotten log, rain forest (RWT acc. 504) and berlesate of leaf mold, 22.III.1962 (RWT acc. 597). Falealupo, nest in rotten log, rain forest, 20.III.1962 (RWT acc. 437). Gagaifomauga, berlesates, leaf mold, soil and moss on rotten logs, rain forest, 14.VI.1962 (GE accs. S1-S4, S6). Lotogo, 350 m, strays under bark rotten log, rain forest (RWT acc. 450); nests in rotting wood fragments (RWT accs. 478, 479); nests under stones (RWT accs. 480, 481); all 21.III.1962. Matega, 65 m, banana clearing, forest edge, strays from moss and leaf mold on boulders, 20.III.1962

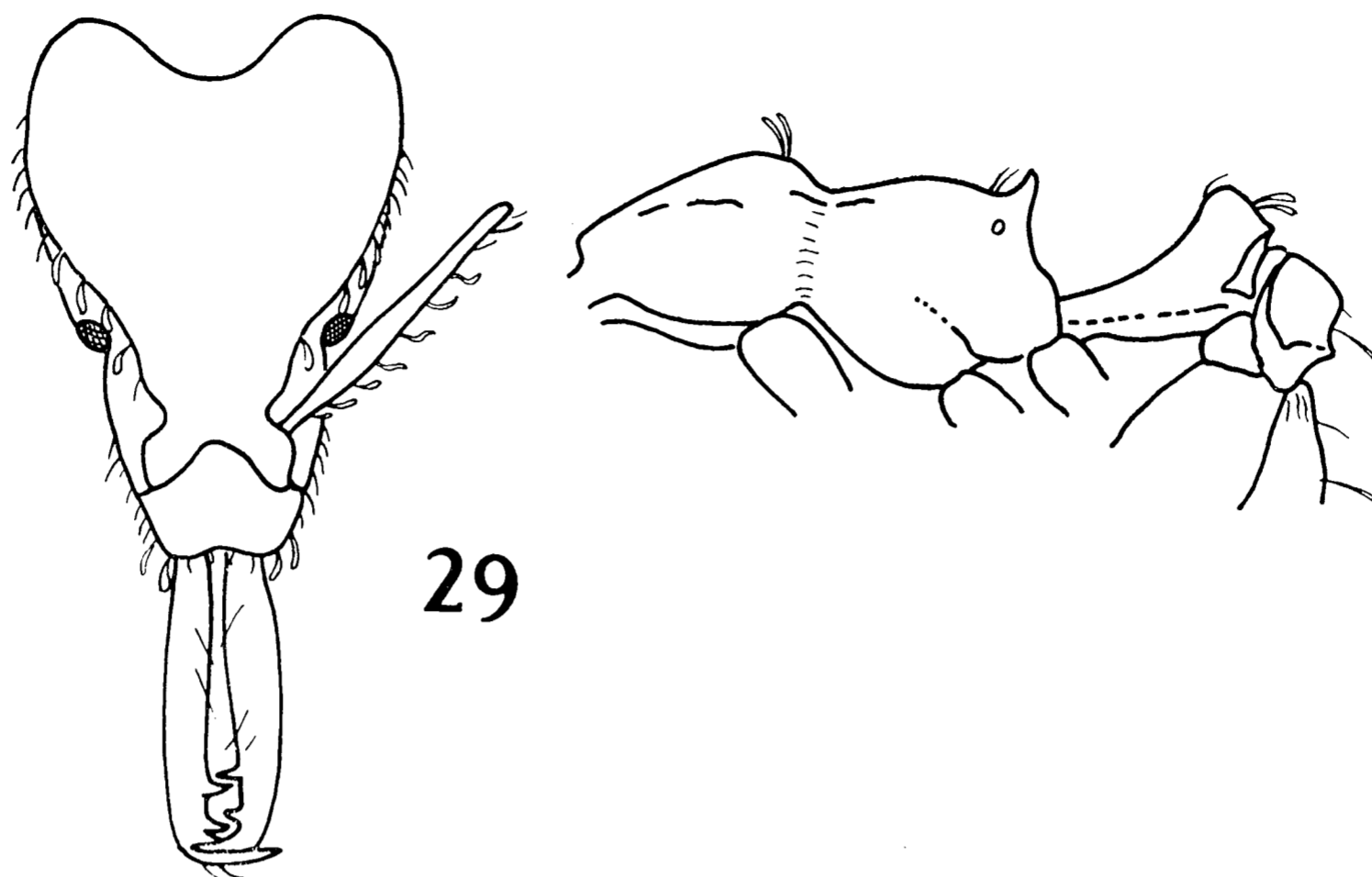


Fig. 29. *Strumigenys rogeri* Emery, worker from Vaipoto, Upolu (TEW).

(RWT accs. 390, 391). Mt. Matafa, berlesate of tree moss, 23.III.1962 (RWT acc. 588). Mt. Matafa Road, 200 m, strays in rotten wood rain forest, 19.III.1962 (RWT acc. 364). Mt. Olomanu, berlesates, moss, soil and epiphytes on logs, rain forest, 15.VI.1962 (GE accs. S7-S11). Samalaelulu, coastal rain forest, strays under small trunk epiphytes (RWT acc. 509); nest in rotten log (RWT acc. 519); berlesate of leaf mold and soil (RWT acc. 596); all 22.III.1962 *Upolu*: Afiamalu, 700 m, berlesate, leaf mold, rain forest, 6.I.1956 (TEW); nest under moss on tree trunk, 1.5 m from ground level, 25.III.1962 (RWT acc. 598); nest series from small rotting wood fragments, disturbed rain forest, 9-15.III.1962 (RWT accs. 237, 238, 304); berlesate, moss on tree trunks 1.2 m from ground level, dealate ♀ and workers, 11.III.1962 (RWT acc. 262); nests under moss on ground, partly cleared rain forest, 12.III.1962 (RWT accs. 228, 281); strays in rotten log, 9.III.1962 (RWT acc. 224); berlesates, moss on logs in disturbed rain forest, III-IV.1962 (RWT accs. 2315, 2320; GE accs. 24, 47, 48); berlesates of tree moss at 8-9 m from ground in disturbed rain forest (RWT accs. 2305, 2306; GE accs. 43, 45). Fagoloa, 170 m, berlesate moss on log, rain forest, 13.VI.1962 (GE acc. 67). Falepuna, berlesate, leaf litter, edge of swamp, 31.III.1956 (TEW). Above Falevao, 200 m, berlesate, moss and soil, rain forest, I.1956 (TEW). Lauli'i, berlesate, 17.I.1956 (TEW). Le Mafa, 400 m, berlesate, soil and moss, 10.I.1956 (TEW); berlesates of moss, soil and epiphytes, rain forest, 13.VI.1962 (GE accs. 61, 63, 65, 66). Malololelei, 660 m, berlesate of moss, rain forest, 19.I.1956 (TEW). Matautu, berlesate, leaf mold under *Ficus*, 2.II.1956 (TEW). Salea Puga, berlesate, leaf mold, coastal *Futu* grove, 10.I.1956 (TEW). Sliding Rock, 200 m, nests and strays under moss and on streamside rocks, 13.III.1962 (RWT accs. 286, 287). Tanumalala, berlesate, leaf mold, rain forest, 2.II.1956 (TEW). Tiapapata, berlesates of moss on rotten logs, rain forest, 19.VI.1962, (GE accs. 69, 71, 75). Togitogiga, 400 m, berlesates, leaf litter, rain forest, 12.VI.1962 (GE accs. 57, 58). Utumapu, 17.I.1956 (TEW); nests under moss and small trunk epiphytes on trees, up to 2 m above ground level, 17.III.1962 (RWT accs. 568, 575). *Tutuila*: North of Aloau, 450 m, berlesates, moss on logs, rain forest, 13.VII.1962 (GE accs. T17, T19, T20). Le Mafa, 250 m, berlesates of tree fern roots and moss on rock cliff, rain

forest, 12.VII.1962 (GE accs. T6, T10). Malaeimi, berlesates, moss on rotten logs, rain forest, 13.VII.1962 (GE accs. T21-T24). Between Oloava and Olomanu, berlesates of moss, leaf litter and soil from rotten logs on forest floor, rain forest, 13.VII.1962 (GE accs. T13-T15). Tafuna, berlesate, soil and leaf mold, rain forest, 26.I.1956 (TEW). SOCIETY IS.: Tahiti: Pounaauia district, open field, 1949 (J. M. Dixon). HAWAII: Oahu: Tantalus, Honolulu, 1933 (F. X. Williams). This may be the species recorded by Williams (1937) as *S. lewisi* Cameron, from Mount Olympus Trail.

The distribution and biology of this species have been discussed by Brown (1954). It is native to Africa and has been spread widely in the tropics by human commerce.

***Strumigenys szalayi* Emery** Fig. 30.

Strumigenys szalayi Emery, 1897, Természetr. Füzet. **20**: 578, pl. 14, fig. 10, worker, ♀.

DISTRIBUTION: SAMOA: Upolu: Afiamalu, 700 m, beating shrubbery, 1940 (ECZ); berlesate of moss and ferns off trees, rain forest, 19.I.1956 (TEW); nest with alates ex rotten wood fragment, rain forest, 16.III.1962; nest in small rotten wood fragment, partly cleared forest, 17.III.1962; nest with alates in rotten treefern stump, Taro patch, 19.III.1962 (all RWT accs. 318, 319, 334, 352, 603); berlesates, moss on logs, disturbed rain forest, III-IV.1962 (RWT acc. 2315); berlesate of tree moss at 11 m, 9.IV.1962 (GE acc. 37). Malololelei Road, 590 m, dead leaf sheaf of *Clinostigma*, 8.VII.1940 (OHS). Tiapapata, berlesate of epiphyte ferns, rain forest, 19.VI.1962 (GE acc. 72). Tiavi, 700 m, 1940 (ECZ).

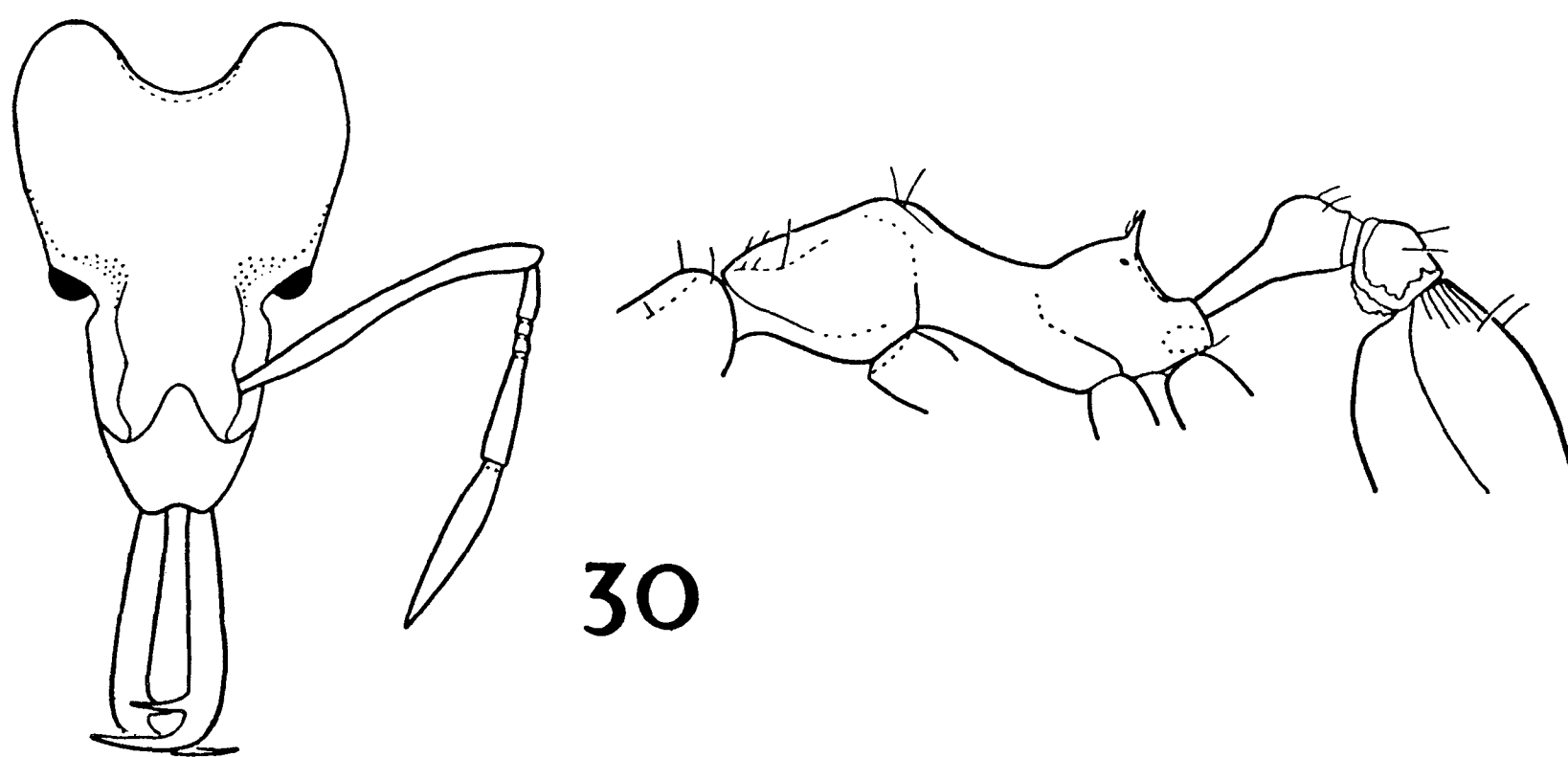


Fig. 30. *Strumigenys szalayi* Emery, worker from Boana, N.-E. New Guinea (E. O. Wilson).

W. L. Brown, who is currently revising the *szalayi* group is of the opinion (*pers. comm.*) that the series just cited constitute a recognizable Samoan form close to *szalayi* Emery. Workers of *szalayi* from the lowlands of the N. coast of New Guinea are distinguished by small size (HL 0.68-0.77 mm) and blackish-brown gaster contrasting with ferruginous body. Those from the Philippines, Queensland, parts of New Guinea and the New Hebrides, mostly at intermediate elevations, are distinguished by larger size (HL 0.74-0.91 mm) and concolorous ferruginous body. The Samoan population, which is on the borderline of distinctness as a species (allopatric semi-species), combines quite large size (HL 0.81-0.90 mm) with a bicolorous body resembling that of northern New Guinean *szalayi*.

Quadristruma emmae (Emery) Fig. 23.

Epitritus emmae Emery, 1890, Bull. Soc. Ent. Ital. **22**: 70, pl. 8, fig. 6, worker (Type locality: St. Thomas, Virgin Is., West Indies).

Epitritus wheeleri Donisthorpe, 1916, Ent. Rec. **28**: 121, worker (Type locality: Honolulu, Hawaii).

Quadristruma emmae: Brown, 1949, Trans. Amer. Ent. Soc. **75**: 47.

DISTRIBUTION: SAMOA: *Upolu*: Lauli'i, Berlese funnel sample, 17.I.1956 (TEW). HAWAII: *Oahu*: Waimanalo (Swezey 1922). *Waimanalo, in cane stool. *Honolulu.

Brown (1949b) believes *Q. emmae* to be African in origin. It is related to the African *Strumigenys rogeri* group through the intergradient *S. tetraphanes* Brown. *Emmae* has been spread by human commerce to the following tropical areas (Brown 1949b): Hawaii, Guam, Southern Florida (U.S.A.), Puerto Rico, St. Vincent, Cuba, Surinam, Sumatra, Singapore, New Guinea. More recently this species has been collected in the islands of Negros, Philippines, and Espiritu Santo, New Hebrides. It has also been taken at Kuranda, North Queensland by Taylor (acc. 1362, 4.VI.1962).

Pheidole (P.) aana Wilson and Taylor, new species Fig. 31.

DIAGNOSIS AND RELATIONSHIPS: A medium-sized member of the *variabilis* group of species, which are mostly limited to Australia. Among these, *ampla* Forel, *mackayensis* Forel, and *tasmaniensis* Mayr differ from *aana* in their larger size, darker soldier coloration, more rounded humeri in the soldier, proportionately shorter propodeal spine in the soldier, and shining minor workers. *Variabilis* Mayr differs from *aana* in having the cephalic rugae extending into the posterior 1/2 of the head surface and in having the pronotum transversely rugose; also, its minor worker is mostly shining. *Vigilans* Fr. Smith closely resembles *aana* but is larger, more lightly colored, and possesses a distinctively large, evenly convex pronotum. *Yarrensensis* Forel is smaller, has a more rounded mesosomal profile in the soldier and has a shining minor worker. We have been unable to discover any Melanesian species in our extensive determined and undetermined collections that resemble *aana* as closely as these Australian species.

Holotype soldier: HW 1.48 mm, HL 1.65 mm, SL 0.74 mm, PW 0.65 mm. Head very large proportionate to remainder of body. Head shape, body shape, and cephalic sculpturing as illustrated in fig. 31. Dorsum and anterior halves of sides of pronotum mostly smooth and shining. Posterior halves of sides of pronotum, entire mesothorax, and most of propodeum irregularly rugose, rugae spaced widely apart, their interspaces shagreened and subopaque. Anterior halves of petiolar and postpetiolar nodes smooth and shining, remainder of pedicel irregularly rugose, interspaces shagreened and subopaque. Abdomen shining. Head and mesosoma light, clear reddish brown, grading to clear brownish yellow in posterior 1/2 of mesosoma. Remainder of body clear brownish yellow.

Paratype minor worker: (From holotype nest series). HW (including eyes) 0.55 mm, HL 0.56 mm, SL 0.55 mm, PW 0.34 mm. Mesosoma and pedicel as shown in fig. 31. Mandibles feebly shining, striate, clypeus, antennal fossae, and entire sides of head rugoreticulate; entire head surface, including reticular interspaces, "shagreened", that is, evenly micro-rugoreticulate with microreticular diameters all about 0.01 mm. Entire mesosoma "shagreened" in the same fashion. Head and mesosoma surfaces mostly opaque. Anterior dorsal surface of petiolar node smooth and shining, remainder of surface microrugoreticulate

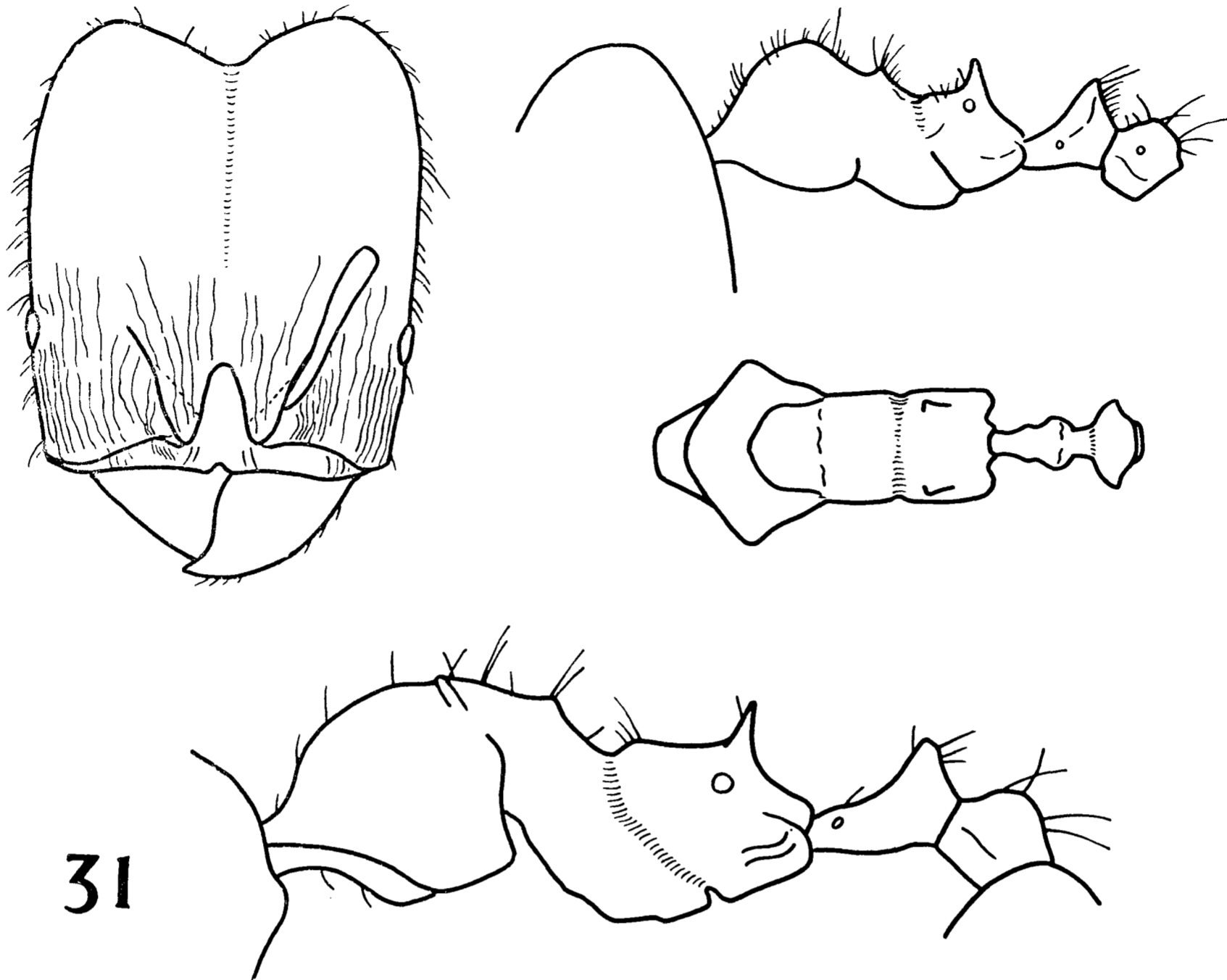


Fig. 31. *Pheidole aana* Wilson and Taylor, holotype soldier (left and upper right), paratype minor worker (lower).

and opaque. Postpetiole and abdomen mostly smooth and shining. Body concolorous light brown; appendages a contrasting brownish yellow.

Other paratypes: The other members of the holotype nest series show little deviation from the individuals described above. A single additional soldier has HW 1.53 mm; a random sample of 10 minor workers has HW range 0.53–0.57 mm. The other nest series (RWT acc. 246) differs markedly in coloration: both the soldier and minor workers are reddish yellow. This could be an artifact of preservation. Otherwise this second series resembles the holotype nest series closely. The soldier has HW 1.46 mm; the HW of the minor workers ranges 0.58–0.61 mm.

MATERIAL EXAMINED: SAMOA: *Upolu*: Afiamalu, 16.III.1962, undisturbed rain forest, under stone, holotype soldier, 1 paratype soldier, 34 paratype minor workers (RWT acc. 333); 10.III.1962, disturbed rain forest, in rotting log, paratype soldier, 5 paratype minor workers (RWT acc. 246).

The species is named in apposition after Aana, one of the four ancient districts of Samoa.

Pheidole* (P.) *atua Wilson and Taylor, new species Fig. 32.

DIAGNOSIS AND RELATIONSHIPS: Similar to *P. knowlesi* Mann of Fiji, differing in the soldier caste in having the entire dorsum of the posterior part of the head and of the pronotum roughly sculptured (occipital lobes and pronotum smooth and shining in *knowlesi*) and the postpetiole seen from above elliptical but not spinose (sides of postpetiole drawn

out into spines in *knowlesi*). Differing in the minor caste in the possession of abundant, distinctively patterned rugae over the head and thorax. Together, *knowlesi* and *atua* are phenetically rather close to the *variabilis* group of the Indo-Australian area, including *P. aana* Wilson & Taylor of Samoa.

Holotype soldier: HW 1.13 mm, HL 1.18 mm, SL 0.68 mm, PW 0.48 mm. Head shape, body shape, and cephalic sculpturing as illustrated in fig. 32. Cephalic rugal interspaces feebly shagreened and subopaque to feebly shining. Pronotum and mesonotum crossed with about 12 transverse, evenly spaced rugae; interspaces feebly shagreened and moderately shining. Several transverse rugae on anterior 1/2 of basal face of propodeum. Most of propodeum, pedicel, and gaster smooth and shining. Body concolorous yellowish red, the appendages a shade lighter, approaching clear yellow.

Paratype minor worker: (Chosen at random from RWT acc. 308). HW (including eyes) 0.58 mm, HL 0.58 mm, SL 0.60 mm, PW 0.38 mm. Mesosoma and pedicel forms as shown in fig. 32. Sculpturing very distinctive. Head covered with over 30 fine transverse rugae spaced on the average about 0.02 mm apart. These gradually curve to a longitudinal alignment on occiput, so that those around midline of head at occiput are nearly perfectly longitudinal. Scattered longitudinal cross-rugae join dominant transverse ones, creating a weak reticular effect in places. Interfaces feebly shagreened and subopaque. Thorax similarly sculptured. Propodeum lacks distinct rugae but is more heavily shagreened (microreticulate with reticular diameters about 0.1 mm) and subopaque. Pedicel and gaster smooth and shining.

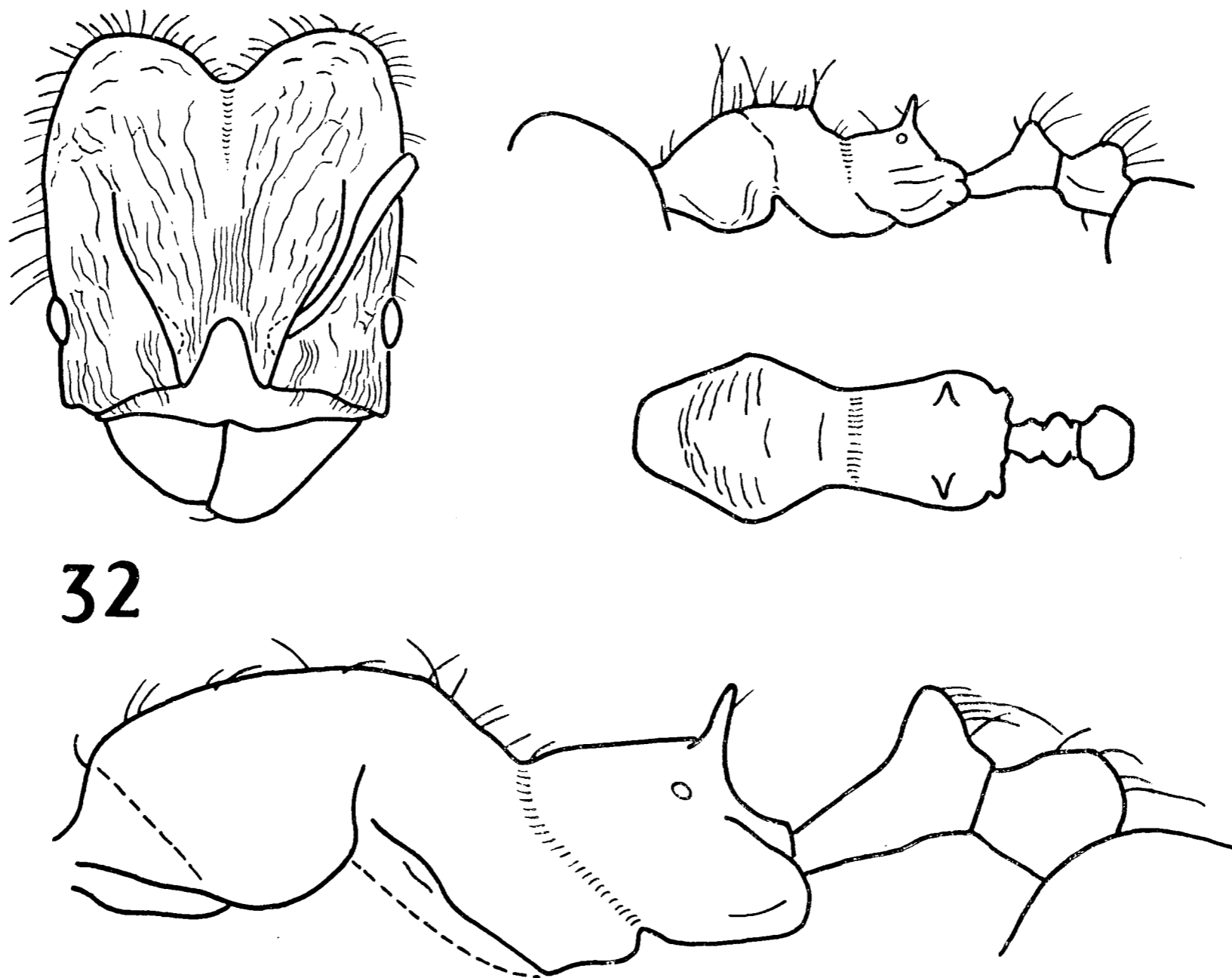


Fig. 32. *Pheidole atua* Wilson and Taylor, holotype soldier (left and upper right), paratype minor worker (lower).

Other paratypes: Little variation is shown. Two soldiers both have HW 1.07 mm. A random sample of 10 minor workers has HW 0.56–0.60 mm.

MATERIAL EXAMINED: SAMOA: *Upolu*: Afiamalu, 700 m, partly cleared rain forest, fallen tree trunk, 17.III.1962, holotype (RWT acc. 353); disturbed rain forest, from rotting log, 16.III.1962, 2 paratype soldiers and 25 paratype minor workers (RWT acc. 308).

The species is named after Atua, one of the four ancient districts of Samoa.

***Pheidole* (P.) *fervens* Fr. Smith** Fig. 33.

Pheidole fervens Fr. Smith, 1858, Cat. Hym. Brit. Mus. **6**: 176 (Type locality: Singapore).

Pheidole javana Mayr, 1867, Tijdschr. Ent. **10**: 98, worker, soldier (Type locality: Batavia, Java). **New Synonymy** (*fide* W. L. Brown).

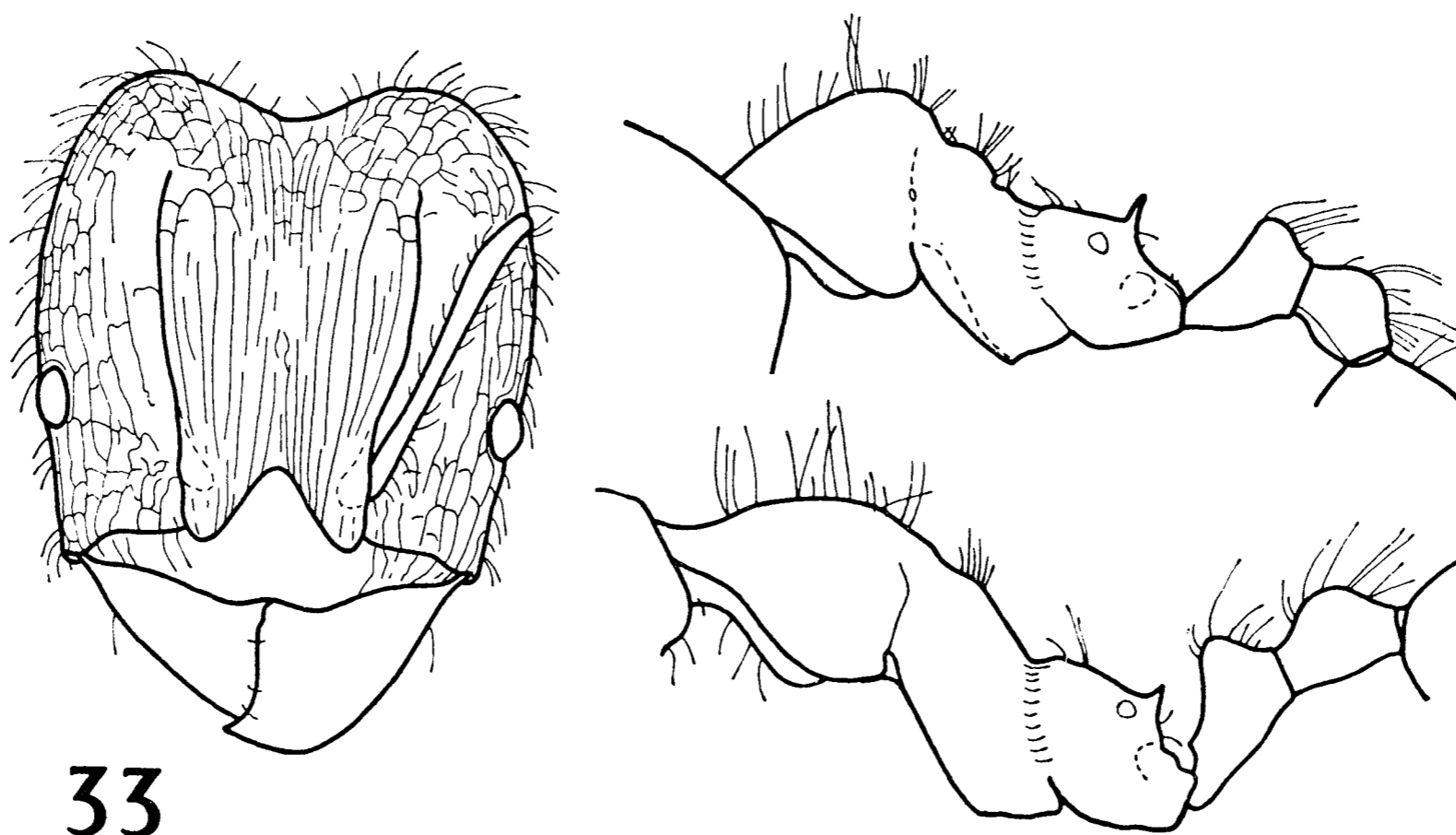
Pheidole oceanica subsp. *cavannae* Emery, 1877, Ann. Mus. Stor. Nat. Genova **25**: 464, nota, soldier (Type locality: New Caledonia); 1914b: distribution. **New Synonymy**.

Pheidole (*Pheidole*) *oceanica* var. *nigriscapa* Santschi, 1938, Insects of Samoa **5**: 48–49, fig. 3a, worker, soldier (Original localities: Apia and Pago Pago, Samoa). **New Synonymy**.

Pheidole oceanica nigriscapa var. *tahitiana* Santschi, *In* Cheesman & Crawley, 1928, Ann. Mag. Nat. Hist. ser. 10, **2**: 516–517, worker, soldier (Type locality: Tahiti). **New Synonymy**.

Pheidole megacephala, auct. (*partim*), nec *Formica megacephala* Fabricius, 1793.

DISTRIBUTION: SAMOA: *Upolu*: Afiamalu, 700 m, beating dead branches (ECZ, OHS, 1940). *Tutuila*: Pago Pago (A. F. Judd, 1926). TONGA: *Tongatabu* (W. Cottrell-Dormer). *Vavau*: Neiafu and Holonga (NK, 1956). *Eua*: Ohonua (NK, 1956). TOKELAU IS.: *Fakaofu* (EHB, 1924). COOK IS.: *Rarotonga* (G. P. Wilder 1925; unknown collector 1937). SOCIETY: *Tahiti*: W. M. Mann (1914). Fautaua Vall., 3.2 km, from sea (A. M. Adamson 1928). Afaahiti, near Vaitaare (ECZ, 1934). Tiupi Bay, Papeari, "household nuisance" (ECZ, 1934). 3.2 km S of Papeete on coast (RWT, 1960). *Moorea*: (McTavish; G. P. Wilder 1925; H. Smith). **Raiatea* (1926). **Huahiné* (1926). *Makatea* (G. P. Wilder 1932). Wheeler (1936) records *fervens* from numerous localities on Tahiti. Cheesman & Crawley



33

Fig. 33. *Pheidole fervens* Fr. Smith. Afiamalu, Upolu (ECZ): soldier, left and upper right; minor worker, lower right.

record it from several of the islands listed, as well as Motu Moute (near Bora Bora), and note that it is "extremely abundant on the inhabited shore-belts, where workers swarm in the houses and native huts after food." AUSTRAL IS.: *Rurutu*: 15 m, 300 m from sea (A. M. Stokes 1921). Upopepe Vall., 30 m (ECZ, 1934). **Rimatara*: Oromana Hills, 80 m (1934). *Raivavae*: Mt. Anatonu (1934). Near Unurau, 30 m (1934). *GAMBIER IS.: *Timoé*, northern islet (1934). *MARQUESAS: *Mohotane*, 200 m. *Ua Huka*: Hanatekeo, 300 m. *Hiva Oa*. Cheesman & Crawley (1928) also record the species from Fatu Hiva. *PITCAIRN: Back of village and S. side of island (1934).

This species is widespread through tropical Asia, from China to the Moluccas. It is spottily distributed in the Pacific Region, where it has apparently been spread by human commerce. We have seen samples from Micronesia, the Fijis, and New Caledonia, as well as Polynesia. In the past *fervens* has been consistently confused with *oceanica*, so that published records are frequently mixed. It can be distinguished from *oceanica* by its smaller size and lighter sculpturing. In *oceanica* the broad area between the eyes and posterior limits of the frontal carinae is completely covered with heavy longitudinal rugae; in *fervens* the same area is covered partly by a feebler, irregular rugoreticulum and (in most series) partly by coarse shagreening. Actually, *fervens* is not close to *oceanica* at all. In some features it more closely resembles *megacephala*. From the latter species it can be separated by the completely rugose head of the soldier, contrasting with the smooth and shining condition of the entire occipital region of the *megacephala* soldier.

***Pheidole* (P.) *megacephala* (Fabricius)** Fig. 34.

Formica megacephala Fabricius, 1793, Ent. Syst. 2: 361, soldier.

DISTRIBUTION: ONTONG JAVA: Leuanua (J. G. Bradley 1953). SAMOA: *Savai'i*: Patamea, Puapua, Sili (all NK, 1955). Vaisala, coastal native village, strays on banana-case wood imported 2 days previously from Apia (Upolu), 21.III.1962. *Upolu*: Afiamalu, 700 m (OHS, 1940); berlesates of tree moss at 8 m, ground moss, disturbed rain forest, III-IV.1962 (RWT accs. 302, 580; GE accs. 45, 48); foragers in house (RWT acc. 299); numerous colonies collected and observed under stones, rotting logs, and in moss or leaf litter, disturbed rain forest (RWT accs. 225, 226, 272, 279, 280); sweepings from grass and herbage at roadside (RWT accs. 230, 263). All RWT records were made during III.1962. Falepuna, berlesate, leaf litter, edge of swamp (TEW, 1956). Fasitooufa, strays on roadside weeds in disturbed rain forest; nest under bark, rotting log, coconut plantation, 29.III.1962 (RWT accs. 604, 605). Fusi (NK, 1955). Malololelei (NK, 1955, **1924). Sliding Rock track, colonies collected under stones and in disused termite carton nests on trees, overgrown plantation, 13.III.1962 (RWT accs. 291-296). Tapuellele (NK, 1955). Lau'i'i, coastal *Futu* grove (TEW, 1956). Le Mafa, 400 m, berlesate of leaf mold, rain forest, 13.VI.1962 (GE acc. 63). Utumapu, rain forest, colonies in rotting wood, 17.III.1962 (RWT accs. 573, 577). Vaipoto, rain forest (TEW, 1955). *Tutuila*: Apia (ECZ, 1940; J. L. Gressitt 1952; **1924). Blunt's Point, sweeping Bermuda grass (OHS, 1940). Fagatogo, 300 m (OHS, 1940). Le Mafa, 250 m, berlesates from epiphytes and fern roots, rain forest, 12.VII.1962 (GE accs. 73, 74, 76). Moloata, 300 m, beating dead branches (ECZ, 1940); 200 m, sweeping (OHS, 1940). Pago Pago, on *Ficus* at seashore (OHS, 1940); (A. F. Judd 1924; **1925). ***Manono*: Mulifanua (1925). Listed from Pago Pago as *P. teneriffana* Forel by Santschi (1919). ROTUMA: "Melisa" (H. St. John 1938). DANGER IS.: *Motu Kotawa* (EHB

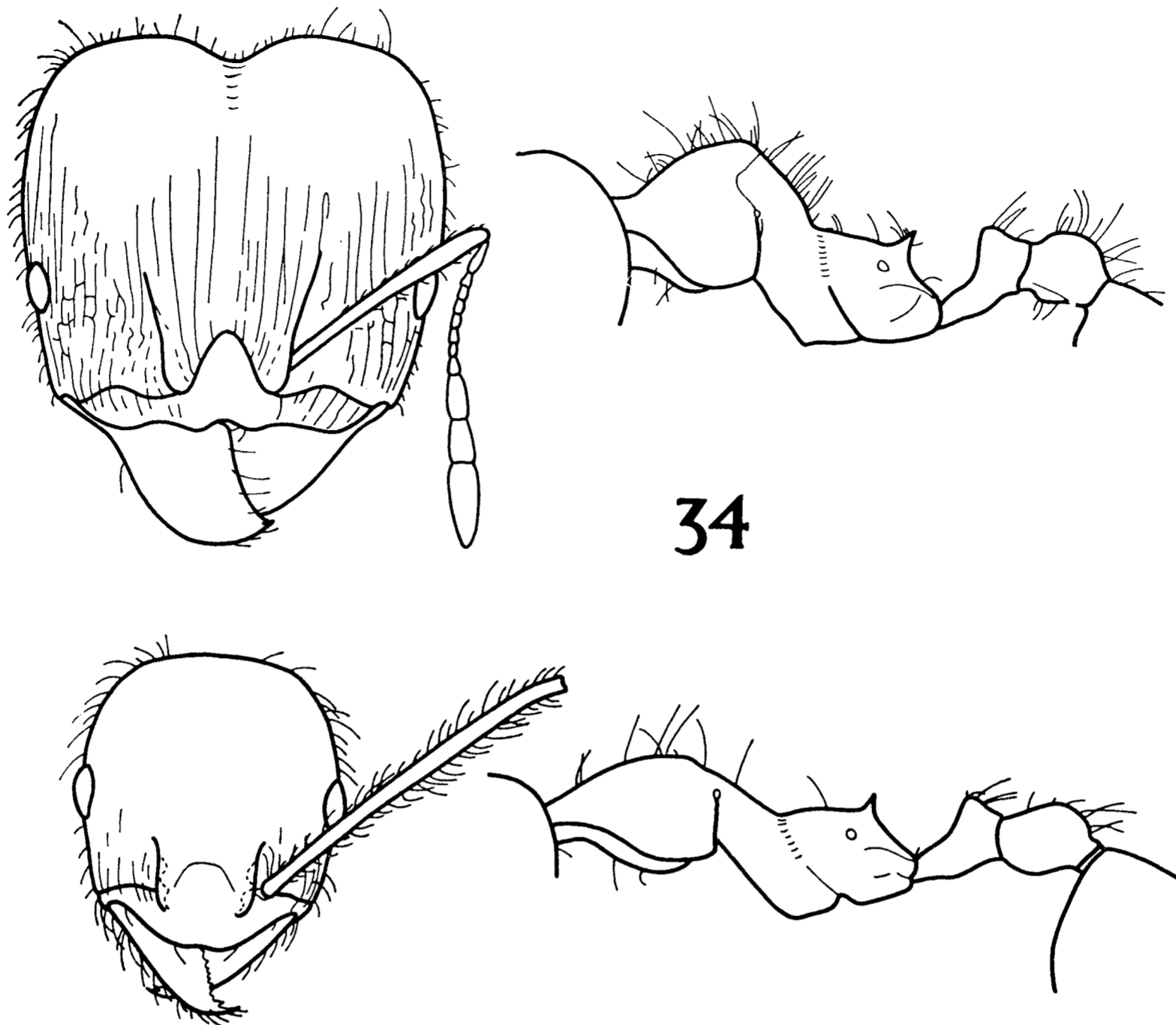


Fig. 34. *Pheidole megacephala* (Fabricius). Vaipoto, Upolu (ECZ): soldier, upper; minor worker, lower.

1924). *Nassau* (EHB 1924). LINE IS.: *Fanning* (S. C. Ball. 1922). *Palmyra*: E. J. Ford (1959) records this species on sprouted coconuts brought from Palmyra to Honolulu in 1957. SWAINS I.: (ECZ, 1940). COOK IS.: *Rarotonga*: Aoarua (Wheeler 1914). SOCIETY IS.: *Raiatea* (H. E. Crampton 1908). *AUSTRAL IS.: *Tubuai*: Mt. Tavaetu, 250 m (1934). Murivani (1934). SW side of Mt. Taita, 300 m (1934). *Tapapatauai Islet* (1934). *GAMBIEB IS.: *Mangareva*: NW slope of Mt. Duff, 60-90 m (1934). Pass W of Rikitea (1934). *Agakauitai* (1934). *Aukena*, NW side (1934). *Korovao* (1934). *Taravai*, NW side (1934). *Akamaru*, N. side (1934). MARQUESAS: Wheeler (1932b) records the species from numerous localities on the following islands: Hiva Oa, Tahuata, Fatu Hiva, Mohotane, Nuku Hiva, Ua Huka, Ua Pu, Eiao. Cheesman & Crawley (1928) record it as abundant in inhabited areas on Nuku Hiva, Fatu Hiva, and Hiva Oa. It appears to be one of the dominant ants throughout the Marquesas. Adamson (in Wheeler 1932b) states that it "extends its range up to the highest elevations in the Marquesas, though at 900 m its numbers begin to diminish." HAWAII: *Megacephala* apparently occurs on all of the islands, including even Laysan (Butler 1961) and Midway (Timberlake 1926) up to an elevation of 900 m. It is probably the dominant ant species in the lowlands and has been a serious economic pest for many years. It is generally attributed by naturalists as being one of the agents most destructive to the native Hawaiian insect fauna. According to Illingworth (1917), who provided a full account of *megacephala* in Hawaii together with a general bibliography of the species, the exact date of its introduction is unknown. In 1880 Blackburn & Kirby stated it to be one of the commonest ants in the islands.

P. megacephala apparently is native to Africa, where the populations are maximally variable. It has been spread by commerce to almost all of the more humid parts of the tropics.

Nuptial flights of *megacephala* were reported by members of the Hawaiian Entomological Society as occurring widely on 14.XII.1934, at various localities on Oahu (Proc. Hawn. Ent. Soc. 9: 3).

***Pheidole* (P.) *oceanica* Mayr** Fig. 35.

Pheidole oceanica Mayr, 1866, Sitz. Akad. Wiss. Wien (Math.-Nat. Cl.) 53: 510, worker, soldier, queen (Type locality: Ovalau). Type series restricted to soldier and queen, Mayr (1870).

Pheidole oceanica var. *pattersoni* Mann, 1919, Bull. Mus. Comp. Zool., Harv. 63: 317, worker, soldier (Type locality: Graciosa Bay, Santa Cruz I). **New Synonymy.**

Pheidole oceanica var. *upoluana* Santschi, 1928, Insects of Samoa, 5: 47, fig. 3b, worker, soldier, queen (Original localities: Malololelei, Upolu, and Safune, Savai'i). **New Synonymy.**

Pheidole oceanica var. *boraborensis* Wheeler, 1935, Bull. B. P. Bishop Mus. 113: 15-16, worker, soldier (Type locality: Borabora, Society Is.) **New Synonymy.**

DISTRIBUTION: SAMOA: *Savai'i*: Aopo, ca. 170 m, rain forest, colonies in rotting logs (RWT accs. 504-506). Asau, disturbed lowland rain forest, strays and colonies from rotting logs (RWT accs. 487, 492, 500, 505). Falealupo, lowland rain forest, strays and colony from rotting logs (RWT accs. 426, 441, 443). Gagaifoumauga, rain forest, berlesate of moss from logs (GE acc. T4). Lotogo, 350 m, rain forest, strays from low shrubbery and from branches of *Ficus* tree, 35 m above ground, nests with larvae and pupae from rotting logs and a stump (RWT accs. 453, 458, 472, 475, 477, 485). Ga'utavai, native village, strays from coconut palm trunks (RWT acc. 383). Matega, 65 m, banana clearing, edge of rain forest, strays from ground, rotting logs and low vegetation, nests with late larvae and pupae in rotting logs, 1 with alate queens, 1 with ♂♂, 20.III.1962 (RWT accs. 392, 394, 398, 401, 402, 404, 410). Mt. Matafa, 700 m, rain forest, strays from foliage in

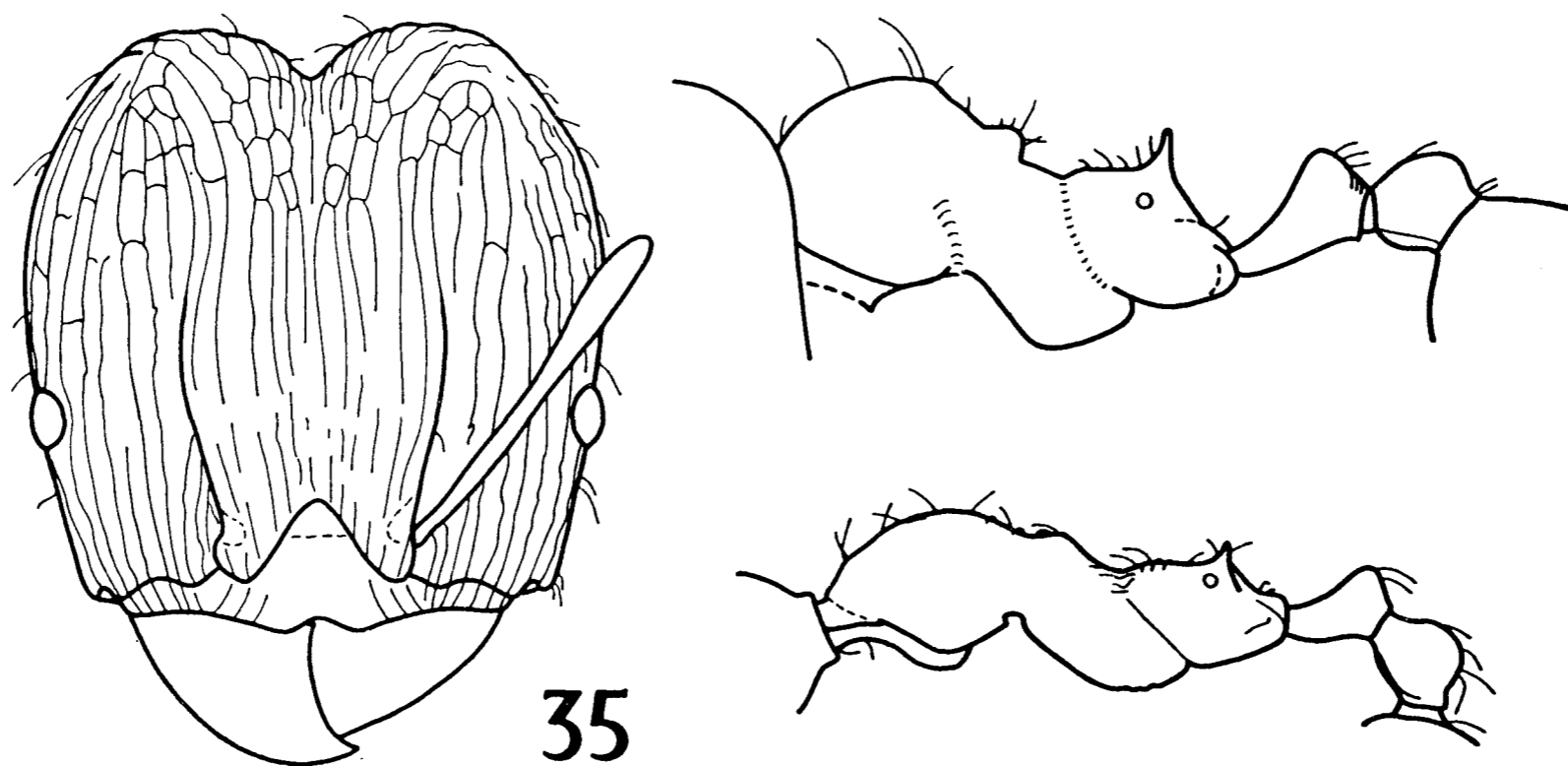


Fig. 35. *Pheidole oceanica* Mayr. Syntypes of "var. *boraborensis* Wheeler": soldier, left and upper right; minor worker, lower right.

forest, and from roadside grass (RWT accs. 531, 532, 535). Mt. Matafa Road, 200 m, rain forest, strays from foliage and under bark on rotting logs, nests with larvae and pupae in and under rotting logs and in soil under stone (RWT accs. 361, 365-367, 371, 372, 374). Papa, native banana plantation, nest under bark of very dry dadap log (RWT acc. 377). Patamea (NK, 1955). Puapua (NK, 1955). **Safune, 300-700 m, low forest (1924). Samalaeulu, coastal rain forest, strays from foliage (RWT acc. 513). Toga, coastal rain forest, nest under trunk epiphyte 1 m above ground (RWT acc. 380). *Upolu*: Apia, sweeping (ECZ, 1940). **Malololelei, 600 m (1924). Saagafou, rain forest, nest under stagfern epiphyte and strays under moss on trees (RWT accs. 610, 611). Satalo, *Taro* patch, edge of rain forest, strays under bark on rotting log (RWT acc. 614). Sinaele, 350 m, beating (ECZ, 1940). Tanumalala, 350 m, rain forest, strays from foliage and nest from rotting log (RWT acc. 606, 607). Tapatapao, 300 m, under dead bark, winged queen, 21.VIII.1940 (ECZ). Tiavi, 600 m (OHS, ECZ, 1940). Togitogiga, 400 m, rain forest berlesates of leaf litter and moss from rotting logs (GE accs. 56, 58, 59). *Tutuila*: Fagatoga, 300 m, beating dead branches and shrubbery (ECZ, 1940). Moloata, 220 m, sweeping dealate queen (ECZ, 1940). Reservoir at Fangatanga, beating shrubbery, dealate queen (ECZ, 1938). Pago Pago (A. F. Judd **1923). *Manua*: ***Ta'u* (1923). ELLICE IS.: Mayr (1870). TONGA: *Tongatabu*, record by Mayr (1870). ROTUMA: "Kilinga", 60 m, workers, winged queens, 4.VIII.1938 (H. St. John). COOK IS.: *Rarotonga* (G. P. Wilder 1925). TOKELAU IS.: *Fakaofu* (EHB, 1924). DANGER IS.: *Motu Kotawa* (EHB, 1924). LINE IS.: *Fanning* (S. C. Ball, 1922). SOCIETY IS.: *Bora Bora (boraborensis* types, H. E. Crampton 1908). *Tahiti*: Papenoo Valley (NK, 1955). *Moorea*: Baie de Cook (NK, 1955). *Raiatea*: Uturoa (NK, 1955). MARQUESAS: *Mohotane* (Le Bronnec & Tauraa 1931). *Ua Huka*: Hanatekeo, 300 m, Hane Valley (Le Bronnec & Tauraa 1931).

The true *oceanica* (see discussion under *P. fervens*) ranges continuously from New Guinea and New Caledonia northward into Micronesia and eastward to the Marquesas Is. The distributional and taxonomic evidence suggests that it is native to most or all of this range. Unlike the tramp species *megacephala*, it does not extend beyond the Marquesas and is not known outside the Pacific area. Further, it is closely related to *P. impressiceps* Mayr, a species native to northern Queensland and western Melanesia.

Previous authors have indicated a considerable amount of geographic variation in the soldier caste of *oceanica*. The characters cited have been total size, body form (especially head shape), scape length, form and intensity of sculpturing (especially on the head) and color. In the present study extensive series from over the entire range of the species have been examined. Variation has been found to be unusually pronounced, but most of it is nongeographic. Nearly the entire range of variation in most of the characters can be found in several series from Upolu, for example, and large segments of the variational range of single characters can be found even in single nest series. Only one character, thickness of propodeal spine, seems to show significant geographic differentiation. Soldiers in 8 of 9 series examined from Samoa have thicker propodeal spines than members of the same caste from all 20 Melanesian series examined, originating from New Guinea, Solomon Is., Santa Cruz Is., New Hebrides, and Fiji. Single series from Rotuma, Danger Is., Bora Bora, and Marquesas Is. conform to the Samoan type. Thus in the limited material available Polynesian series generally can be separated from Melanesian series on the basis of this one character. It may be noted that in several Micronesian series thus far examined, originating from several parts of the Caroline Is., all soldiers possess the thinner propodeal

spines characteristic of the Melanesian populations.

Pheidole (P.) umbonata Mayr Fig. 36.

Pheidole umbonata Mayr, 1870, Verh. Zool.-bot. Ges. Wien, **20**: 978-9, soldier (Type locality: Tonga Is.)

Pheidole (Pheidole) umbonata subsp. *zimmermani* Wheeler, 1936, B. P. Bishop Mus., Occ. Pap. **12**: 6-7, soldier, worker, queen, ♂ (Type locality: near Vaitaare, Papeari, Tahiti). **New Synonymy.**

DISTRIBUTION: SAMOA: *Savai'i*: Alagaogao, ca. 100 m, banana plantation, colony in rotting log (RWT acc. 418). Asau, lowland rain forest, colonies in rotting logs and a stump (RWT accs. 488-9, 501). Falealupo, dry rain forest, strays under bark, dry rotting log (RWT acc. 436). Lotogo, 350 m, rain forest, colony in rotting stump (RWT acc. 486). Manase, strays ex clay bank (RWT acc. 507). Matega, 65 m, banana clearing, edge of rain forest, colonies in rotting logs (RWT accs. 395-6, 407). Mt. Matafa Rd., ca. 200 m, edge of rain forest, strays ex foliage and under bark, rotting log (RWT accs. 361, 365). Palauli (NK, 1955). Patamea (NK, 1955). Samalaeula, coastal rain forest, colonies under small epiphytes on tree trunks, and in rotting logs (RWT accs. 514, 517-19). Sili (NK, 1955). Taga, coastal rain forest, ground strays (RWT acc. 381). *Upolu*: Afiamalu, 700 m OHS, ECZ, 1940); (TEW, 1956); undisturbed, disturbed, and partly cleared rain forest, strays and colonies from small rotting wood fragments, in and under rotting logs, under moss and epiphytes on logs, stumps and tree trunks, and 1 colony each under a stone and under moss on ground (RWT accs. 241, 264-6, 268-70, 278, 309, 331-2, 336, 348-9, 601); disturbed or partly cleared rain forest, berlesates, moss on logs (RWT accs. 2319-23; GE accs. 46, 53-4); berlesates, tree moss, 8-10 m (RWT acc. 2307; GE accs. 44-5). **Apia (1925). Fagaloa, 170 m, rain forest, berlesate, epiphytes and litter on rotting log (GE acc. 68). Falepuna, edge of swamp (TEW, 1956). Le Mafa, 400 m, rain forest, strays on roadside clay bank and under moss on tree trunk (RWT acc. 634-5); berlesates, leaf litter,

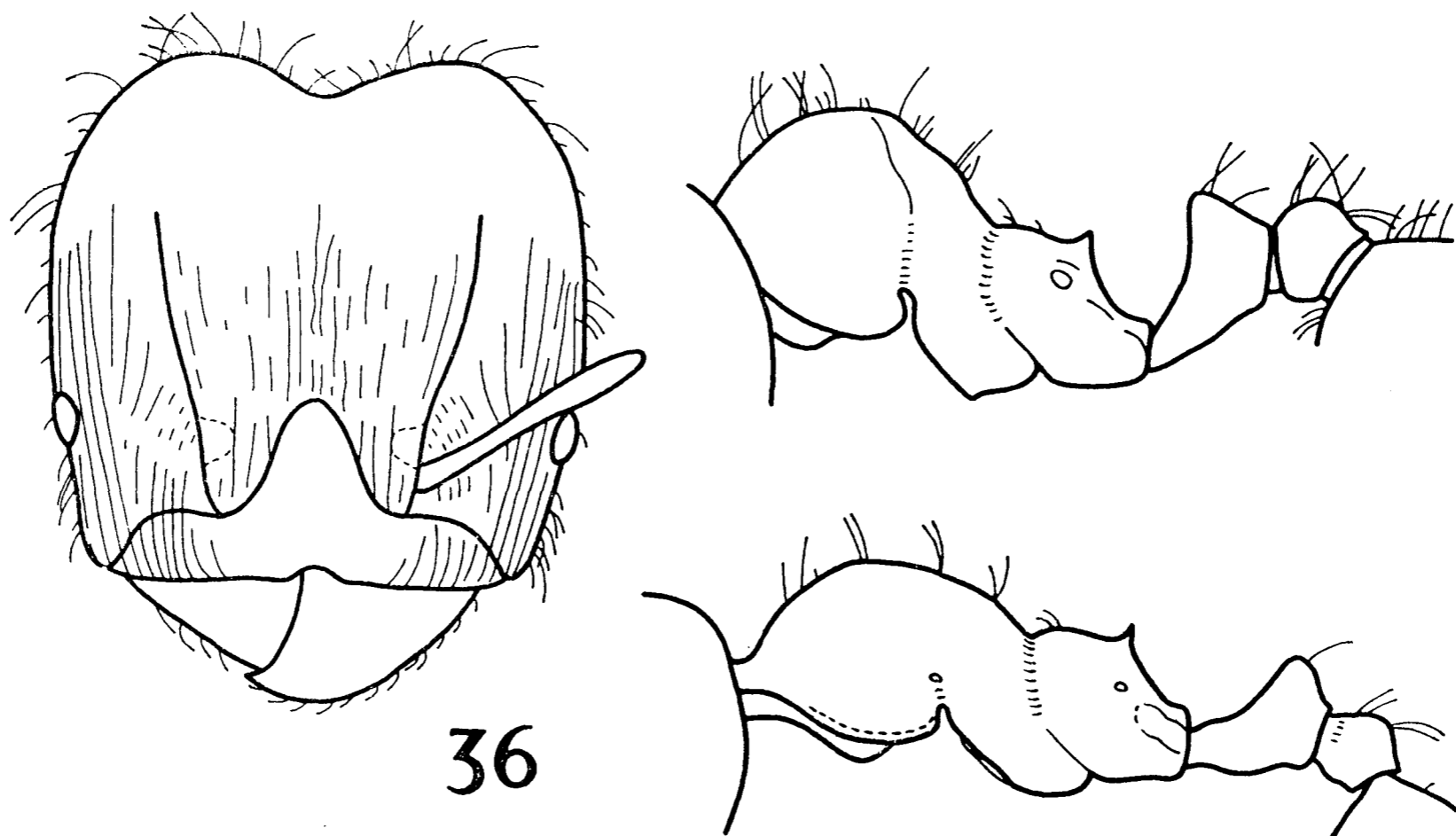


Fig. 36. *Pheidole umbonata* Mayr. Afiamalu, Upolu (ECZ): soldier, left and upper right; minor worker, lower right.

moss, epiphytes (GE accs. 63, 65-6); (NK, 1955). Malololelei Road, 550 m, dead tree fern fronds (OHS, 1940; **1924). Poutasi (TEW, 1956). Sa'agafou, lowland rain forest, colonies under epiphyte ferns on tree trunks (RWT accs. 609-11). Sinaele, 450 m (ECZ, 1940). Above Selani Falls, rain forest (TEW, 1956). Tanumulala (TEW, 1956); 350 m, disturbed weed-overgrown rain forest, colonies under moss on tree trunk and in rotting stump (RWT accs. 606-7). Tapatapao, 250 m, beating dead branches (ECZ, 1940). Tiapapata, rain forest, berlesates, moss on trees and vines (GE accs. 69-71, 73-4). Togitogiga, 400 m, rain forest, berlesates, debris on rotting log and leaf litter (GE accs. 57, 59). **Tuaefu (1924). **Vailima (1925). Utumapu (TEW, 1956). *Tutuila*: North of Aloau, 450 m, stunted forest, berlesates, moss on logs (GE acc. T16). **Leone Road (1923). Moloata (C. P. Hoyt 1953). Mt. Pioa, 550 m, beating shrubbery (ECZ). Naval station, winged ♂♂ and queens, 12.VII. 1940 (OHS, ECZ, 1940). Mayr recorded the species from Samoa in 1876. All Samoan collections by Taylor (RWT) and Ettershank (GE) were made in March-July 1962. TONGA: (Type locality Mayr, 1870). *SOCIETY IS.: *Tahiti*: near Vaitaare, Papeari. Tiupi Bay, Papeari. *Moorea*: Tehau Point. *AUSTRAL IS.: *Rurutu*: Mt. Manureva, 400 m. *Raivavae*: Mt. Hiro, 400 m. *MARQUESAS: *Fatu Hiva*: Vaikoao, Omoa, 500 m.

P. umbonata ranges from New Guinea N into the Marianas and E continuously across Melanesia to Samoa. It is unknown from central Polynesia but widely dispersed in the Society, Austral, and Marquesas Is. Emery (1914) records it from New Caledonia, but the record is probably in error, referring to a closely related species that replaces it there. The latter species, which is undescribed, can be distinguished from *umbonata* by its distinctly longer antennal scapes, more elongate petiolar peduncle, and several minor sculptural characters. On New Guinea *umbonata* is a relatively scarce species known only from coastal localities. Emery (1900) records it only from Friedrich-Wilhelmshafen (Madang) and Beliao I. There is in the Museum of Comparative Zoology a single series from Finschhafen, collected by N. G. L. Wagner. During a 3-month collecting tour of eastern New Guinea, Wilson did not succeed in finding it once. *Umbonata* is mostly replaced on New Guinea by a bewildering array of related endemic species that occur chiefly in the inner rain forests and highlands. The densest populations of *umbonata* are in outer Melanesia and Samoa.

Geographic variation has been noted in two independent characters, worker size and coloration. Both show roughly concentric patterns and are notably discordant with respect to each other. They can be summarized as follows:

Size. Soldier and minor workers originating from the central populations (New Britain, New Hebrides, Fiji) are slightly smaller than those from the peripheral populations (New Guinea, Marianas, Samoa, Tahiti). This pattern is shown in the following soldier head width measurements, given in millimeters, for small samples of individuals from each available nest series: Finschhafen, New Guinea, 0.80, 0.83, 0.83; Ralum, New Britain, 0.76; Rennell I., Solomons, 0.76, 0.77; Sola, Vanua Lava, Banks I., 0.79, 0.79; Luganville, New Hebrides, 0.79; Baldwin Bay, New Hebrides, 0.80, 0.80; Lasema, Fiji, 0.76; Loma Loma, Fiji, 0.76, 0.76, 0.79; Somo Somo, Fiji, 0.73; Suene, Fiji, 0.77, 0.79, 0.79; Agrihan, northern Marianas, 0.82, 0.82, 0.83; Afiamalu, Samoa, #1, 0.83, 0.84, 0.86; Afiamalu, Samoa, #2, 0.83, 0.84, 0.85; Malololelei, Samoa, 0.80, 0.82, 0.82, 0.82; Sinaele, Samoa, 0.80, 0.82, 0.83; Tapatapao, Samoa, 0.80, 0.84; Vaitaare, Tahiti, 0.77, 0.82, 0.86. (Maximum error of measurement = ± 0.01 mm).

Color. Soldiers and minor workers originating from central areas and from the northern periphery (Marianas) tend to be lighter in coloration. Series from Rennell I. (Solomons), Banks Is., New Hebrides, Samoa, and the Marianas are very light reddish brown to reddish yellow. The lightest of all are from the Marianas (Agrihan). Occasional Samoan nest samples tend to a darker shade, approaching medium reddish brown. Series from Ralum, New Britain, and Tahiti, which are more peripherally located, are medium to dark reddish brown. A single series from Finschhafen, New Guinea, is an intermediate shade that can perhaps best be described as light reddish brown.

Pheidole (Pheidolacanthinus) sexspinosa Mayr Fig. 37.

Pheidole sexspinosa Mayr, 1870, Verh. zool.-bot. Ges. Wien, pp. 977-978, worker, soldier (Type locality: Ellice Is.)

Pheidole (Pheidolacanthinus) sexspinosa subsp. *adamsoni* Wheeler, 1932, Bull. B. P. Bishop Mus. **98**: 157, worker, soldier, queen, ♂ (Type locality: Vaikoao, Omoa Valley, Fatu Hiva, Marquesas). **New Synonymy.**

DISTRIBUTION: SAMOA: *Sava'i*: Asau, 170 m, strays on low foliage, rain forest (RWT and GE). Falealup, dry rain forest, strays from forest floor and low foliage

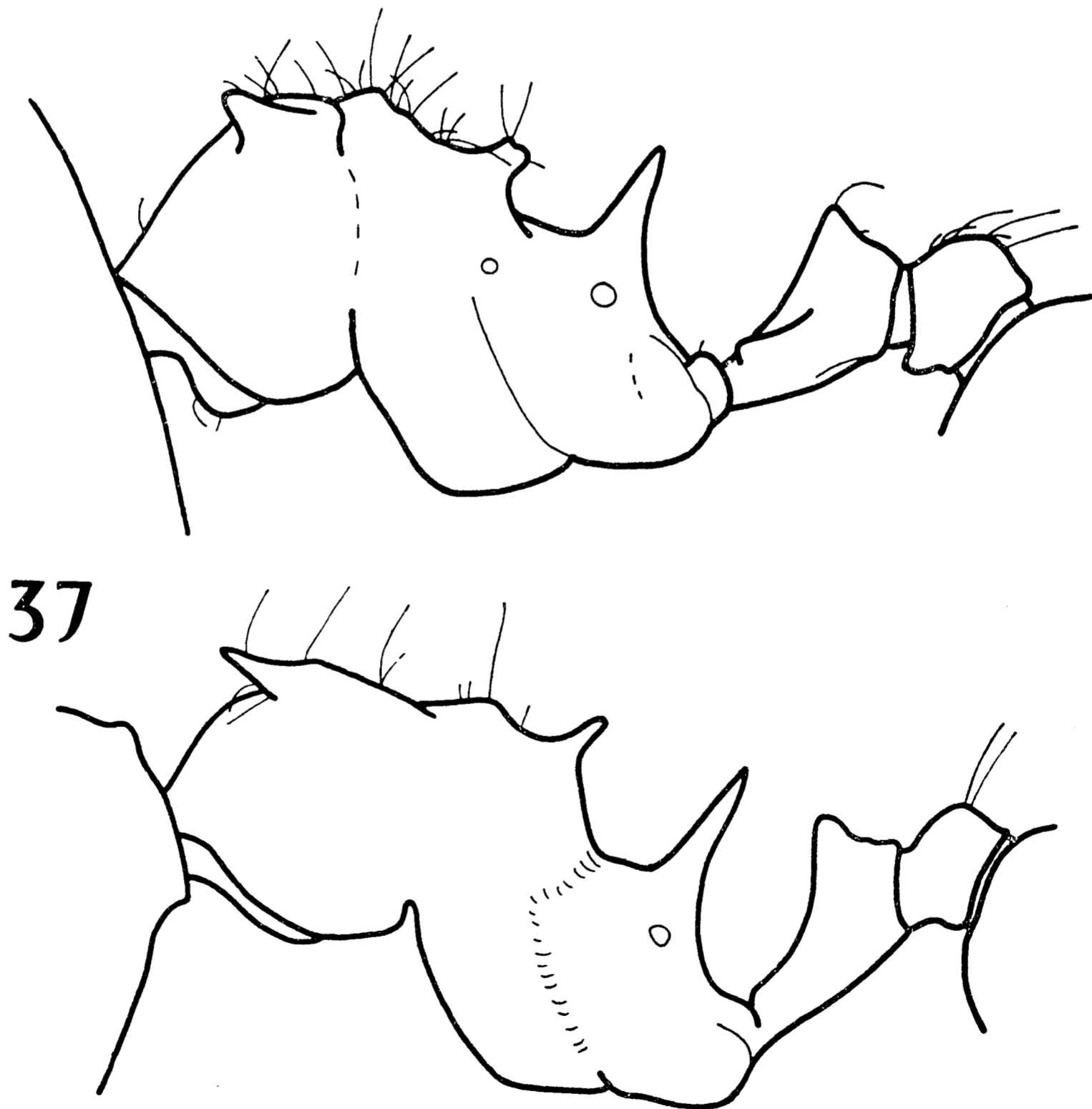


Fig. 37. *Pheidole sexspinosa* Mayr. Syntypes of "subsp. *adamsoni* Wheeler" from Fatu Hiva, Marquesas: soldier, upper; minor worker, lower.

(RWT accs. 424, 427, 440). Le Mafa, 400 m, strays under small trunk epiphytes (GE acc. 66). Lotoga, 330 m, rain forest, strays from tree trunk (RWT acc. 477). Matega, 65 m, banana clearing, forest edge, nest with alates under bark on log (RWT acc. 393); strays from rain forest floor and rotting stump (RWT accs. 390, 400, 409). Mt. Matafa Rd., 100 m, rain forest, strays from low foliage and under bark of rotting log (RWT acc. 361, 365). Mt. Matafa, 350 m, rain forest, nests under small trunk epiphyte and in rotting log (RWT acc. 530, 533). Puapua (NK, 1955). Samalaeulu, coastal rain forest, strays under trunk epiphytes (RWT acc. 510). All RWT and GE accessions from Savai'i were made in III.1962. *Upolu*: Afiamalu, 700 m, workers and winged queen, beating shrubs and under dead bark, 25.VII.1940 (ECZ); colony under log, *Taro* patch, 16.III.1962 (RWT acc. 322); partly cleared rain forest, ground foragers, 12.III.1962 (RWT acc. 265); berlesate, disturbed rain forest, moss on logs, 9.IV.1962 (GE acc. 54). Mafa Pass Road (NK, 1955); Malololelei, 500 m (ECZ, 1924, **1924). *Tutuila*: West side, Afono Trail, 150 m, (EHB 1935; ECZ 1940). Amouli, 300 m, (ECZ, 1940 **1923). **Fagasa (1924). Fagotogo, 300 m, beating shrubbery (ECZ, 1940). **Leone Rd. (1923). "Moloata", 300 m, beating dead branches (ECZ 1940). Matafao Trail, 400 m, beating shrubbery (ECZ 1940). Mt. Piao, 550 m, beating shrubbery (ECZ 1940). N. side, Pago Pago, 400 m, beating dead branches (ECZ, 1940). Pago Pago (NK, 1941; **1924). ELLICE IS.: type locality (Mayr 1870). SOCIETY IS.: *Tahiti*: Papeari (A. M. Adamson 1928), *adamsoni* syntypes. MARQUESSAS: *Fatu Hiva*: Vaikao, *adamsoni* syntypes (Le Bronnec 1931).

Sexspinosa occurs continuously in Melanesia from New Guinea to the New Hebrides and northward into the Caroline and Marshall Is. It is absent from Fiji and New Caledonia. It appears to be rather common in Samoa, especially on Tutuila, but is scarce in the remainder of Polynesia.

Geographic variation is shown by at least 2 independent characters in the soldier and worker castes. The body color in the 2 Society and Marquesas series is piceous brown. In 16 Melanesian and Samoan series it ranges from medium to dark reddish brown. In 5 Micronesian series it is dark reddish brown, averaging intermediate in shade between the Melanesian-Samoan and outer Polynesian samples. The Society-Marquesas sample also differs from the other material examined in having slightly thicker propodeal spines, a geographic trend paralleling that found in the soldier caste of *P. oceanica*. Contrary to Wheeler's (1932b) statement, no significant geographic variation appears to be shown in head form or in the sculpturing of head and thoracic dorsum in the soldier caste. These features vary, especially pronotal sculpturing, but the variation is non-geographic and may even be in large part intranidal.

P. sexspinosa belongs to a group of species maximally diversified on New Guinea. The nature of geographic variation in the species seems to indicate that it is native throughout most of its present range in the Pacific.

Cardiocondyla emeryi Forel Fig. 39.

Cardiocondyla emeryi Forel, 1881, Mitt. München Ent. Ver. 5: 5, worker.

Cardiocondyla nuda subsp. *nereis* Wheeler, 1927, Proc. Amer. Acad. Arts Sci. 62: 140, worker, queen (Type locality: Norfolk I.) **New Synonymy.**

DISTRIBUTION: SAMOA: *Upolu*: Afiamalu, 700 m, several series swept from grass and weeds in overgrown European garden, and along roadside in disturbed rain forest

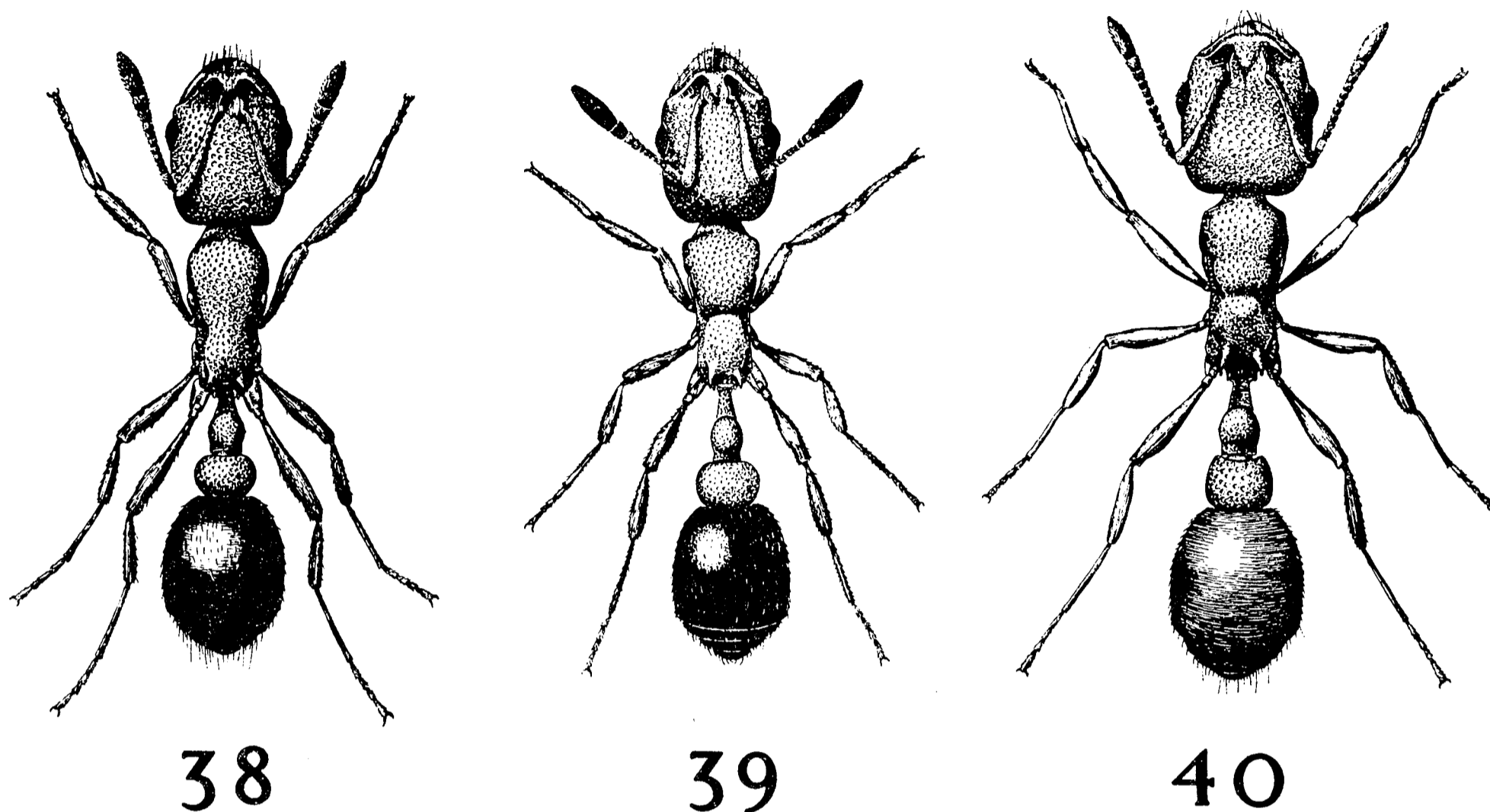


Fig. 38. *Cardiocondyla nuda* (Mayr). Fig. 39. *C. emeryi* Forel. Fig. 40. *C. wroughtoni* (Forel). Workers from United States. (After M. R. Smith, 1944.)

(RWT accs. 230, 263, 287, 297). SOCIETY: *Tahiti*: Faa, 6 km from sea, 300 m, sweeping over grasses (A. M. Adamson 1928). Hitiaa, 5 km from sea, 300 m, from *Metrosideros*, winged queen, 20.II.1928 (Adamson). Papenoo Vall. (NK 1955). *Moorea*: Tehau Point, near sea level, sweeping grasses and low herbage (ECZ 1934). Baie de Cook (NK 1955). *Raiatea*: Opoa (NK 1955). Uturoa (NK, 1955). Cheesman & Crawley (1928) found *emeryi* in 2 localities near Papeete. Wheeler (1936) records "*nuda* subsp. *nereis*", presumably this species, from numerous additional localities on Tahiti and Bora Bora. AUSTRAL IS.: *Tubuai*: Murivahi, near sea level, sweeping grasses and low herbage (ECZ, 1934). *Raiavavae*: near Anatonu, near sea level, sweeping grasses and low herbage (ECZ, 1934). Near Ahuovi Point, sea level (ECZ 1934). *Rimatara*: Anapoto, 8 m, sweeping grasses and low herbage (ECZ 1934). Wheeler (1936) records numerous additional series collected by Zimmerman in 1934 on most of the principal Austral Is.: Rimatara, Maria I., Raiavavae, Tubuai, Rurutu, Morotiri. It was clearly a dominant species during at least the time of Zimmerman's visit. *TUOMOTU: *Tukuhora*: Anaa (ECZ, 1934). GAMBIA IS.: *Mangareva*: Point Teone Kura, 400 m (ECZ, 1934). *Agakauitai*: sea level (ECZ, 1934). *Aukena*: Korovao (ECZ, 1934). *Taravai*: winged queen, 1.VI.1934 (ECZ). All of these samples were taken by sweeping grasses and low herbage. MARQUESAS: *Eiao*: 500 m (Le Bronnec & Tauraa 1931). *Hiva Oa*: Kopaafaa, 900 m (Mumford & Adamson 1927). Tanaeka Val., 450 m, dry slope (Mumford & Adamson 1929). *Ua Huka*: Tauheeputa, 550 m (Le Bronnec & Tauraa 1931). Wheeler (1932b) records this species from numerous additional samples taken during 1927-1931 by Adamson, Le Bronnec, Mumford, and Tauraa in the following islands: Hiva Oa, Tahuata, Fatu Hiva, Mohotane, Nuku Hiva, Ua Huka, Eiao, and Hatutaa. *Emeryi* was clearly one of the most abundant ants throughout the Marquesas at least during this time. PITCAIRN: N. side (ECZ 1934). *HENDERSON: N and NW side (ECZ 1934). OENO: (ECZ 1934). HAWAII: Swezey

(1943) reports that M. R. Smith determined a majority of the series of *Cardiocondyla* collected in the Hawaiian Is. as *emeryi*. No particular islands were cited. As noted by Swezey, *emeryi* was not recorded by Wheeler (1934a) in abundant collections of *Cardiocondyla* made up to the early thirties. Since *emeryi* is a distinctive species, the chances are great that it first gained a secure foothold in the islands during the thirties.

C. emeryi is a native African species that has been distributed by commerce throughout the tropics. It is closely related to the better known *C. nuda* (Mayr) and has been consistently confused with that species by past authors. In the Pacific Region at least, *emeryi* can be distinguished from *nuda* by the following worker characters: (1) the thoracic dorsum is relatively finely and sparsely punctate with its surface feebly shining, as opposed to densely punctate and opaque in *nuda*; (2) the humeri are slightly more produced and angulate; (3) the petiolar node is distinctly more slender and from directly above appears longitudinally elliptical, as opposed to subcircular in *nuda*. Also, the overall pigmentation averages lighter and the propodeal spines somewhat longer in *emeryi*, although the ranges of these characters overlap in the 2 species.

***Cardiocondyla nuda* (Mayr) Fig. 38.**

Leptothorax nudus Mayr, 1866, Sitz. Akad. Wiss. Wien, Math. Nat. **53**: 508, worker (Type locality: Ovalau, Fiji).—M. R. Smith, 1944, Proc. Ent. Soc. Wash. **46**: 38, taxonomy, distribution.

Cardiocondyla nuda var. *minutior* Forel, 1899, Fauna Hawaiiensis (Heterogyna), p. 120, worker (Original localities: Hawaii and Molokai). **New Synonymy.**

DISTRIBUTION: SAMOA: *Savai'i*: Fanga (NK, 1955). Palauli (NK, 1955). Patamea (NK, 1955). Puapua (NK, 1955). **Safune (1924). *Upolu*: Afiamalu, 700 m, under dead bark and sweeping *Commelina*, several series (ECZ, 1940). Alagaogao, 100 m, strays from roadside weeds (RWT acc. 416). Falefa (NK, 1955). Lafanga (NK, 1955). Le Mafa, nest from soil of clay roadside cutting undisturbed rain forest (RWT acc. 635). *Tutuila*: Aua, seashore, sweeping *Sporobolus* (OHS, 1940). Fagatogo, 300 m (OHS, 1940). Pago Pago (W. M. Wheeler 1931). Vailoa (D. T. Fullaway 1930). ***Manua*: *Ta'u* (1923). Mayr recorded *nuda* from the islands in 1876. TONGA: *Tongatabu*: Nukualofa (NK, 1956). Mayr (1876). COOK IS.: *Rarotonga* (G. P. Wilder, 1925). DANGER IS.: *Motu Kotawa* (EHB, 1924). SOCIETY IS.: *Raiatea*: Opoa (NK, 1955). AUSTRAL IS.: *Rimatara*: Oromana Hills, 80 m, sweeping grasses and low herbage (ECZ 1934). *MARQUESAS: *Fatu Hiva*: Omoa, Wheeler (1932b) cites a worker "clearly belonging to the typical form of the species." LINE ISLANDS: What may be this species was recorded from Johnston I. by M. R. Smith as "*Cardiocondyla* sp." (in Chilson 1953). *FLINT I.: Wheeler (1934b) recorded "var. *minutior*." EASTER I.: Wheeler (1922) recorded the species as "var. *minutior*." I. E. Efford and J. A. Mathias collected it at the following localities in January 1965: on grass on hillside at Ovahe, winged queen; "on vegetation in Cabin"; Rano Raraku, winged queens. HAWAII: *Oahu*: Honolulu (1910, no collector given); no locality (van Zwaluwenburg, probably 1925-33). *Hawaii*: Kilauea, 1300 m. (Wheeler, 1930). Forel (1899) records the species (as "var. *minutior*") from Hawaii and Molokai. Records from Midway, Necker, and French Frigate Shoals are given by Timberlake (1926); the collections were made in 1923 by Bryan & Fullaway. Between this date and the early 1930's numerous other collections (recorded in Wheeler 1934a) were made on Oahu, Molokai, La-

nai, Maui, Kauai, Hawaii, Midway, Necker I., and French Frigates Shoal. Bryan (1935) records it from little (600 m diameter) Rabbit I. near Oahu, and Butler (1961) mentions specimens collected on Laysan I. in 1959. Butler also collected the species on Kure I. in September 1961.

C. nuda is a species of probably African origin that has been spread by commerce throughout the warmer parts of the world.

Cardiocondyla wroughtoni (Forel) Fig. 40.

Emeryia wroughtonii Forel, 1890, Ann. Ent. Belg. (Comptes-Rend. Seances) **34**: 110, ergatomorphic ♂ (described as worker) (Type locality: Poona, India).

Cardiocondyla wroughtonii var. *hawaiiensis* [!] Forel, 1899, Fauna Hawaiiensis (Formicidae), p. 119, worker (Type locality: Molokai). **New Synonymy.**

DISTRIBUTION: HAWAII: *Oahu* (R. H. van Zwaluwenburg). Several specimens from flower spikes and seed pods collected 1940–1948 (*Ex* USNM collection). Between the years 1899 and 1934 *wroughtoni* was collected on the following islands (records in Wheeler 1934a): Molokai, Oahu, Kauai, Maui, and Hawaii.

Wroughtoni is evidently native to tropical Asia. A single collection has been made on the beach at Ralum, New Britain (Forel 1901), but the species does not seem to be native E of Formosa and the Asian mainland. Instead, it is replaced by the related species *nigrocerea* Karawajew in the Moluccas and *nivalis* Mann in the Solomon Is. *Wroughtoni* occurs probably as an introduced population in the Carolines and Marianas. It has also been spread by commerce to southern Florida in the United States.

Vollenhovia pacifica Wilson and Taylor, new species Fig. 41.

DIAGNOSIS: A Samoan population closely resembling the widespread Indo-Australian *oblonga* (Fr. Smith) (= *oblonga pedestris auct.*) which ranges from tropical Asia to New Hebrides and New Caledonia. *Pacifica* differs from *oblonga* chiefly in its smaller average size, proportionately longer head, and the following feature of cephalic sculpturing: longitudinal striae limited to median 1/4 of head, their interspaces containing punctures that do not distort striae (in *oblonga* striae covering almost entire anterior surface and in many places curve around large, conspicuous interstitial foveae).

Holotype worker: HW 0.61 mm, HL 0.74 mm, CI 82, SL 0.47 mm, SI 77, EL 0.15 mm, PW 0.50 mm. Body form as shown in

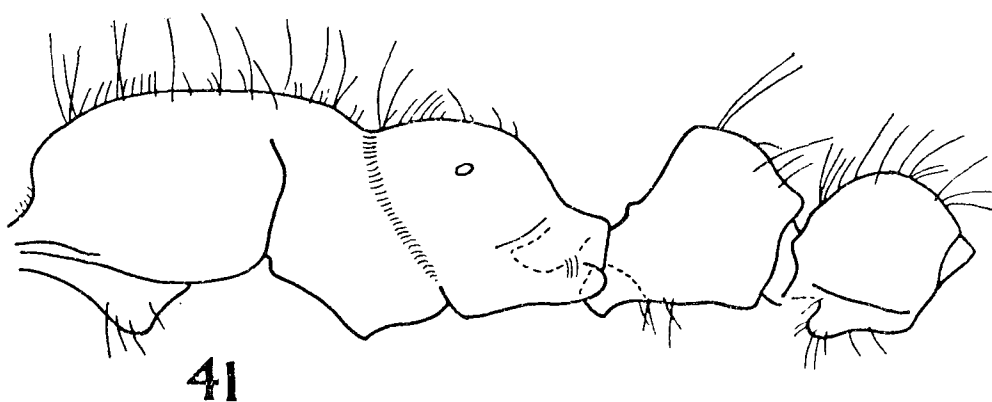


Fig. 41. *Vollenhovia pacifica* Wilson and Taylor, holotype worker.

fig. 41. Except for head proportions these figures fit most specimens of *oblonga* also. But note subpetiolar process; it is subangular and with a straight posterior border; in most *oblonga* it is smoothly rounded behind and with a slightly convex posterior border. Head of *Pacifica* holotype with median longitudinal striae extending to occiput, diverging prominently from midline near frontal carinae and near occiput. Strial patch is about 0.22 mm across, or the distance between frontal carinae. Interstitial spaces less than 0.01 mm across and filled

with irregular punctures and shagreening. Away from striae, sides of head are densely covered with nearly perfectly round, flat-bottomed foveae 0.01–0.02 mm in diameter; no particular orientation of intervening rugulae noticeable. Pronotum very feebly and sparsely foveolate and rugulate, feebly shining; in contrast with remainder of alitrunk, which is heavily sculptured and opaque. In other respects resembling a small *oblonga* worker. As in *oblonga*, the body is concolorous blackish brown and the appendages contrasting brownish yellow.

Paratypes: Worker: HW 0.56–0.60 mm. The series is very uniform in almost all of the characters cited with reference to the holotype. The subpetiolar process varies from somewhat more angulate than the holotype to as blunted and rounded as the extreme end of variation in *oblonga* in the direction of *pacifica*.

Queen: HW 0.72 mm, HL 0.82 mm, CI 88, SL 0.55 mm, SI 76. The queen of the holotype nest series. A normal, formerly alate individual sharing diagnostic characters of the species cited for worker. In addition to the usual caste difference, the queen differs in a more prominent development of rugulae on the alitrunk and pedicel; these form a conspicuous concentric pattern around the propodeal spiracle.

♂. HW (across and including eye) 0.58 mm. Distinguished from ♂♂ of sympatric *samoensis* by its jet black body coloration (medium yellowish brown in *samoensis*) and densely sculptured, opaque head and pronotum (these parts mostly smooth and shining in *samoensis*).

MATERIAL EXAMINED: SAMOA: *Upolu*: Afiamalu, 700 m, holotype worker, 11 workers, queen, 2♂♂, 9.III.1962 (RWT acc. 255); 6 workers, 9.III.1962 (RWT acc. 236); 15 workers, 10.III.1962 (RWT acc. 244); 4 workers, 10.III.1962 (RWT acc. 245); 15 workers, 30.III.1962 (RWT acc. 632); berlesates, moss on logs, disturbed rain forest III–IV 1962 (RWT accs. 2319, 2320; GE acc. 47); berlesates, tree moss, 8–9 km, disturbed rain forest, III–IV 1962 (RWT acc. 2312; GE acc. 45).

Pacifica seems best regarded as being a peripheral cognate of *oblonga*. It is interesting that specimens of *oblonga* from New Caledonia, which is geographically relatively close to Samoa, are nevertheless more similar to the "typical" *oblonga* from central Melanesian populations.

Vollenhovia samoensis Mayr Fig. 42.

Vollenhovia samoensis Mayr, 1876, J. Mus. Godeffroy, Hamburg 12: 44–45, worker, ♂.
(Type locality: Samoa).

Vollenhovia agilis Santschi, 1928, Insects of Samoa 5 (1): 44–45, fig. 1, queen (Type locality: Fagasa, Tutuila, Samoa). **New Synonymy.**

DISTRIBUTION: SAMOA: *Savai'i*: Gagaifoumauga, rain forest, berlesate, frass under bark of newly fallen tree, 8 m above ground, 17.V.1962 (GE acc. SI). Matega, 600 m, edge of rain forest, under moss on rotting log, 20.III.1962 (RWT). *Upolu*: Afiamalu, 700 m, beating shrubbery (ECZ, 1940); disturbed rain forest, nest in moss on tree 2 m from ground (RWT acc. 235); same as acc. 235, strays in berlesate; disturbed rain forest, nest in rotting log on ground (RWT acc. 298); rain forest, wet leaf mold in leaf bases of bromeliad low on tree (RWT acc. 306); *Taro* patch in forested area, nest in rotting tree fern (RWT acc. 318); rain forest, under moss in galleries of wire worms (RWT acc.

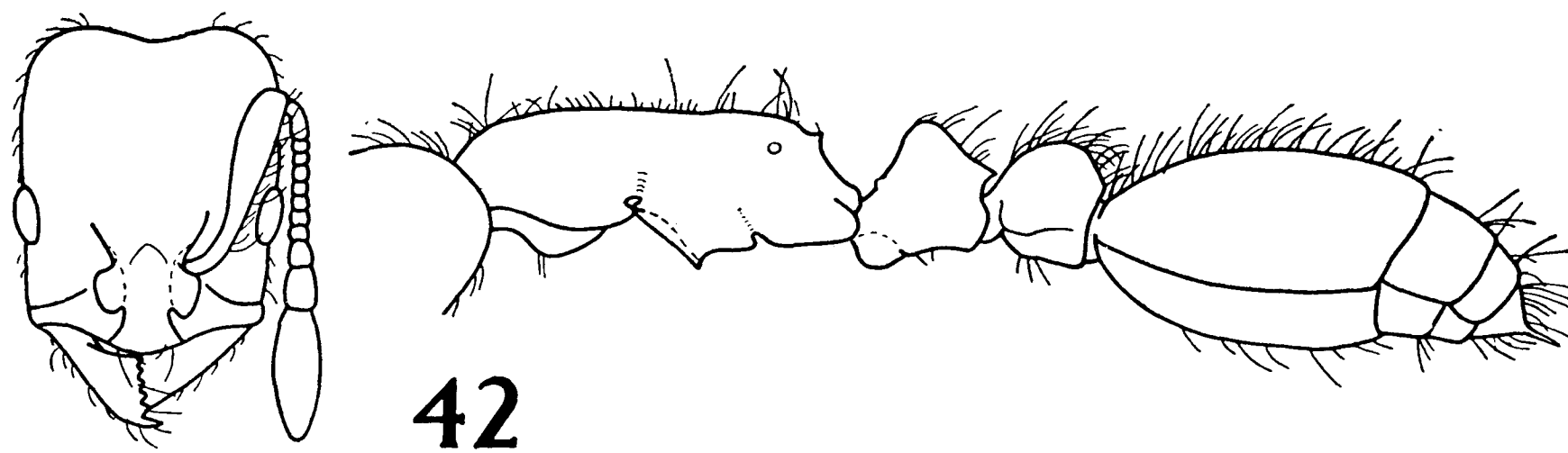


Fig. 42. *Vollenhovia samoensis* Mayr, worker from Afiamalu, Upolu (ECZ).

602); disturbed rain forest, under moss on fallen log (RWT acc. 632); all Afiamalu records by R. W. Taylor made in III-IV.1962. Malololelei Road, 500 m (OHS, 1940; NK, 1955). Togitogiga, 400 m, rain forest, berlesate, moss on rotting log, 12.V.1962 (GE acc. 60). *Tutuila*: N of Aloau, 450 m, stunted forest, berlesate, moss on logs (GE acc. T19). **Fagasa (1924). Matafao Trail, 400 m, beating dead branches (ECZ, 1940). Naval Station, ♂♂ at light, 19.VII.1940 (OHS). Between Oloaua and Olomanu, rain forest, berlesate of moss and litter from rotting log, 13.VI.1962 (GE acc. T13).

V. agilis Santschi is clearly the queen of *V. samoensis*. These two forms, corresponding exactly to the two castes, have been found associated in our Afiamalu series.

Samoensis retains its status as one of the few ant species truly endemic to Samoa. Even so, it is very close to *denticulata* Emery of New Caledonia, New Hebrides, and Fiji. (We have recently examined series of *denticulata* from Lasema, Fiji, 1915-16, collected by W. M. Mann; and Santo, Espiritu Santo, New Hebrides, 22.VIII.1958, collected by Borys Malkin. These are the first records from outside New Caledonia.) *Samoensis* appears to differ from *denticulata* only in its distinctly lighter body sculpturing. In particular the pronotum is sparsely punctate and feebly shining, as opposed to longitudinally striate, heavily shagreened, and subopaque in *denticulata*. The latter characters are maximal in the New Caledonian and New Hebridian *denticulata*. Statistical studies on larger samples in the future may force the synonymy of *denticulata* with *samoensis*.

These 2 species in turn more distantly resemble *brachycera* Emery of New Guinea, differing in their lighter coloration (light reddish brown opposed to piceous brown), distinctly broader subpetiolar processes, and somewhat longer antennal scapes. They are also related to *dentata* Mann of the Solomon Is., which is distinguished by its slightly larger size, denser and coarser mesosomal sculpturing, and total lack of propodeal teeth. Together, the 4 forms present the classical pattern of an insular superspecies, with the most far-flung pair, *denticulata* and *samoensis*, being the least differentiated between themselves.

At Afiamalu Taylor found *samoensis* to be relatively abundant in rain forest in various degrees of disturbance by man. The species nested on the ground, in rotting logs and under moss, and in tree trunks under moss and in epiphytes. His impression was that it favored the arboreal sites more than *V. pacifica* at the same locality.

***Solenopsis geminata* (Fabricius) Fig. 43.**

Atta geminata Fabricius, 1804, Syst. Piez., p. 423, worker.

Atta rufa Jerdon, 1851, Madras J. Lit. Sci. 17: 106, worker.

DISTRIBUTION: TONGA: *Tongatabu*: Nukualofa, workers, ♂, II.1956 (NK); W. Cottrell-Darmer, no date, probably sometime before 1935. *Vavau*: Falevai (NK 1956). *Eua*: Ohonua (NK 1956). COOK IS.: *Rarotonga*: Avarua (W. M. Wheeler 1914). No further locality (no collector given, 1924; G. P. Wilder 1925; C. E. Clarke 1937). SOCIETY: *Tahiti*: (record in Mayr 1876). 1.6 km S of Papeete, under stones by road (RWT, 1960). *Vallée de la Reine (1929). Hitiaa, 300 m (1929). *Fautaua Vall. (1929, 1934). *Arihiri, Pare (1934). *Tiupi Bay, Papeari (1934). *Arne. *Moorea*: Baie de Cook (NK, 1955). *Faaroa Vall., 300 m (1934). *Tehau Pt. (1934). No locality, (1906-07). *Raiatea*: Utoroa (NK, 1955). *Paaoi Vall., 250 m (1934). Cheesman & Crawley (1928): "[In 1925] Tahiti and Raiatea, abundant on shore-belts on Tahiti, inland on the coast-hill behind Papeete at 1500 ft." Taylor found the species to be extremely abundant in the environs of Papeete in 1960. *AUSTRAL IS.: *Rapa*: Mont Tanga, 250 m (1934). *FLINT I.: (1934). TUAMOTU IS.: *Fakarava*: "Abundant on the beach feeding upon dead molluscs, II-2-25" (Cheesman & Crawley 1928).

LINE IS.: *Johnston* (1947-52), *vide* Chilson (1953). HAWAII: Abundant on Oahu (*1934a; Ito, 1943), especially in pineapple fields, sugarcane fields, and dry coastal regions (Ito). Carter (1957) reported the species as having appeared for the first time on Molokai (Naiwa-Apana area) around 1956. Bryan (1935) records it from Little Rabbit I., near Oahu, in 1934. Suehiro records it for the first time from Midway in 1960.

S. geminata is native to the tropics and warm North Temperate Zone of the New World. A light reddish form ("subsp. *rufa*") has been spread by commerce throughout the moister parts of the Indo-Australian tropics and the darker "typical" form has established itself in Africa. In the New World the *rufa* variant occurs, and produces continuous intergrades with the dark variant, from the southern United States to British Honduras and Guatemala (Creighton 1930). *Rufa* has been characterized by past authors as possessing a mesosternal spine or tooth, but in the material we have examined the structure lacks constancy. In either case the uniformity in coloration of the respective Indo-Australian and African samples and the differences between them illustrate nicely the genetic "bottleneck" effect in recently founded populations. It is interesting further to note that the *rufa* variant of *geminata* was first described by Jerdon from India in 1851, while it was first recorded from Tahiti (by Mayr) in 1876. Thus *geminata* has had a respectably long history as a tramp species. Since colonies ordinarily mature in 1 or 2 years, it is fair to say that in the case of the Indo-Australian population 50 or more generations have not been sufficient to produce a significant differentiation in coloration or any other obvious external character.

Geminata favors the drier habitats in Polynesia. As Phillips (1934) and subsequent authors have pointed out, it is usually replaced in moister, more favorable areas by the more widespread *Pheidole megacephala*.

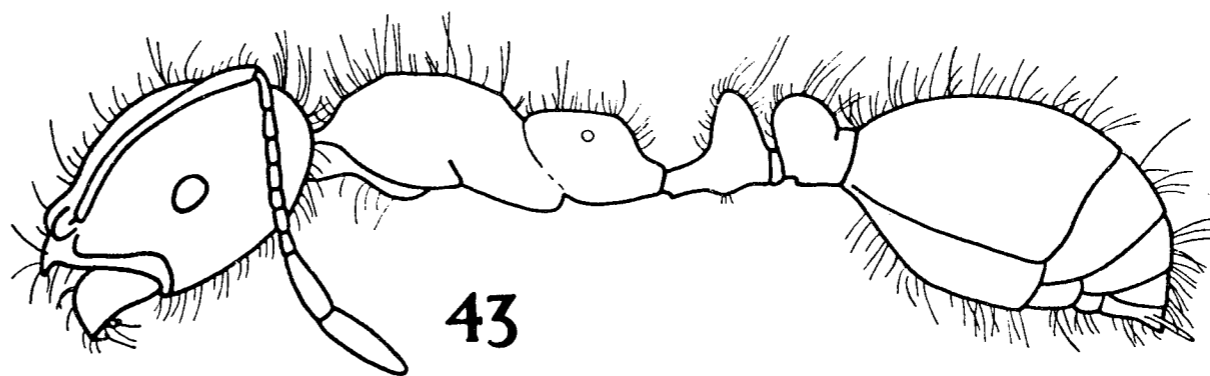


Fig. 43. *Solenopsis geminata* (Fabr.), minor worker from Aturoa, Raiatea, Society Islands (NK).

Solenopsis papuana Emery Fig. 44.

Solenopsis papuana Emery, 1900, Természetr. Füz. **23**: 330, worker, queen (Original localities: Berlinhafen (Aitape) and Friedrich-Wilhelmshafen (Madang), NE New Guinea).

Solenopsis Dahlii Forel, 1901, Mitt. Zool. Mus. Berl. **2**: 14-15, worker ♂ (Type locality: Ralum, New Britain). **New Synonymy.**

Solenopsis cleptis Mann, 1919, Bull. Mus. Comp. Zool., Harv. **63**: 330-31, worker (Type locality: Wai-ai, San Cristoval, Solomon Is.). **New Synonymy.**

Solenopsis cleptes var. *vitiensis* Mann, 1921, Bull. Mus. Comp. Zool., Harv. **64**: 444-45, worker (Type locality: Nadarivatu, Viti Levu, Fiji Is.). **New Synonymy.**

DISTRIBUTION: SAMOA: *Savai'i*: Asau, 170 m, rain forest, nest and strays from rotting logs, V.1962 (RWT accs. 502-504). Gagaifoumauga, rain forest, berlesates of leaf mold and soil around tree roots, 14.V.1962 (GE). Letui, lowland rain forest, berlesate of leaf mold and soil (RWT acc. 597). Mt. Matafa Rd., 200 m, nest from small rotting wood fragment on forest floor, and strays from rotting wood (RWT acc. 364, 365). *Upolu*:

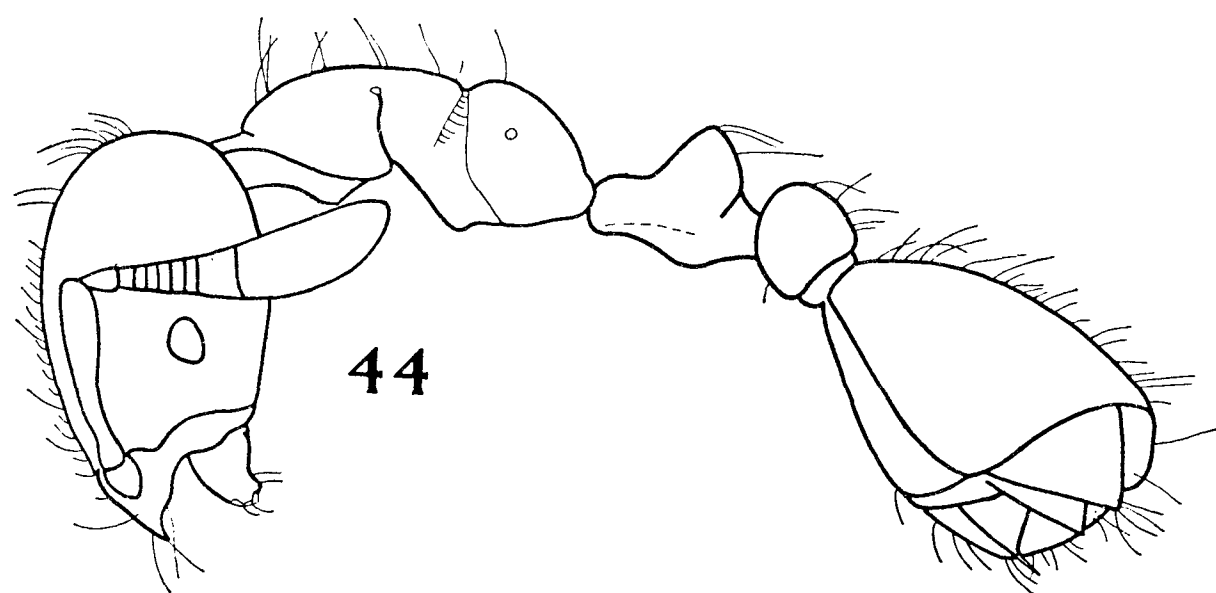


Fig. 44. *Solenopsis papuana* Emery, worker from Tapatapao, Upolu (ECZ).

rain forest, berlesates of frass at base of orchid and of leaf litter, 12.VI.1962 (GE accs. 55, 57). *Tutuila*: between Oloava and Olomanu, berlesate of moss on rotting log, 13.VI.1962 (GE acc. T12).

Mann's *cleptis* and *vitiensis*, described from the Solomons and Fiji respectively, were erroneously compared with *maxillosa* Emery rather than *papuana*. We have been unable to find any significant differences of species quality between extensive series of *papuana* from New Guinea and "*cleptis*" from eastern Melanesia. Fijian and Samoan workers differ from New Guinea workers in average coloration. They are uniformly light reddish yellow, while New Guinea samples range (by nest series) from light reddish yellow to medium reddish brown.

The new Samoan records, made mostly from Berlese funnel collections, show this inconspicuous species to be a prominent member of the cryptozoa of the Samoan rain forests.

Oligomyrmex atomus Emery Fig. 45.

Oligomyrmex atomus Emery, 1900, Természetr. Füz. **23**: 328-29, pl. 8, fig. 30, worker, sol-

dier (Original localities (New Guinea): Hansemann Mts.; Tamara I.; Beliao).

DISTRIBUTION: SAMOA: *Savai'i*: Asau, 170 m, rain forest, in rotting log, (RWT and GE acc. 503). Falealupo, lowland rain forest, from fragment of rotting wood on forest floor (RWT and GE acc. 439). Samalaeulu, rain forest, colony nesting under small epiphyte on tree trunk (RWT and GE acc. 511). *Upolu*: Fagaloa, 170 m, berlesate, rain forest, moss on rotting log (GE acc. 67). Le Mafa, 400 m, berlesates of ground moss and soil (GE accs. 61, 65). Utumapu, rain forest, nest under small epiphyte 2 m from ground (RWT acc. 570). Tiapapata, berlesates, rain forest, moss in trunks of living trees (GE acc. 76). Togitogiga, 400 m, berlesates, rain forest, leaf litter (GE accs. 57, 59). (All Taylor & Ettershank records III-VI.1962). Lauli'i (TEW 1956). Tanumalala, leaf mold in rain forest (TEW 1956). Poutasi (TEW 1956). *Tutuila*: Alega, leaf litter in coastal *Futu* grove (TEW 1956).

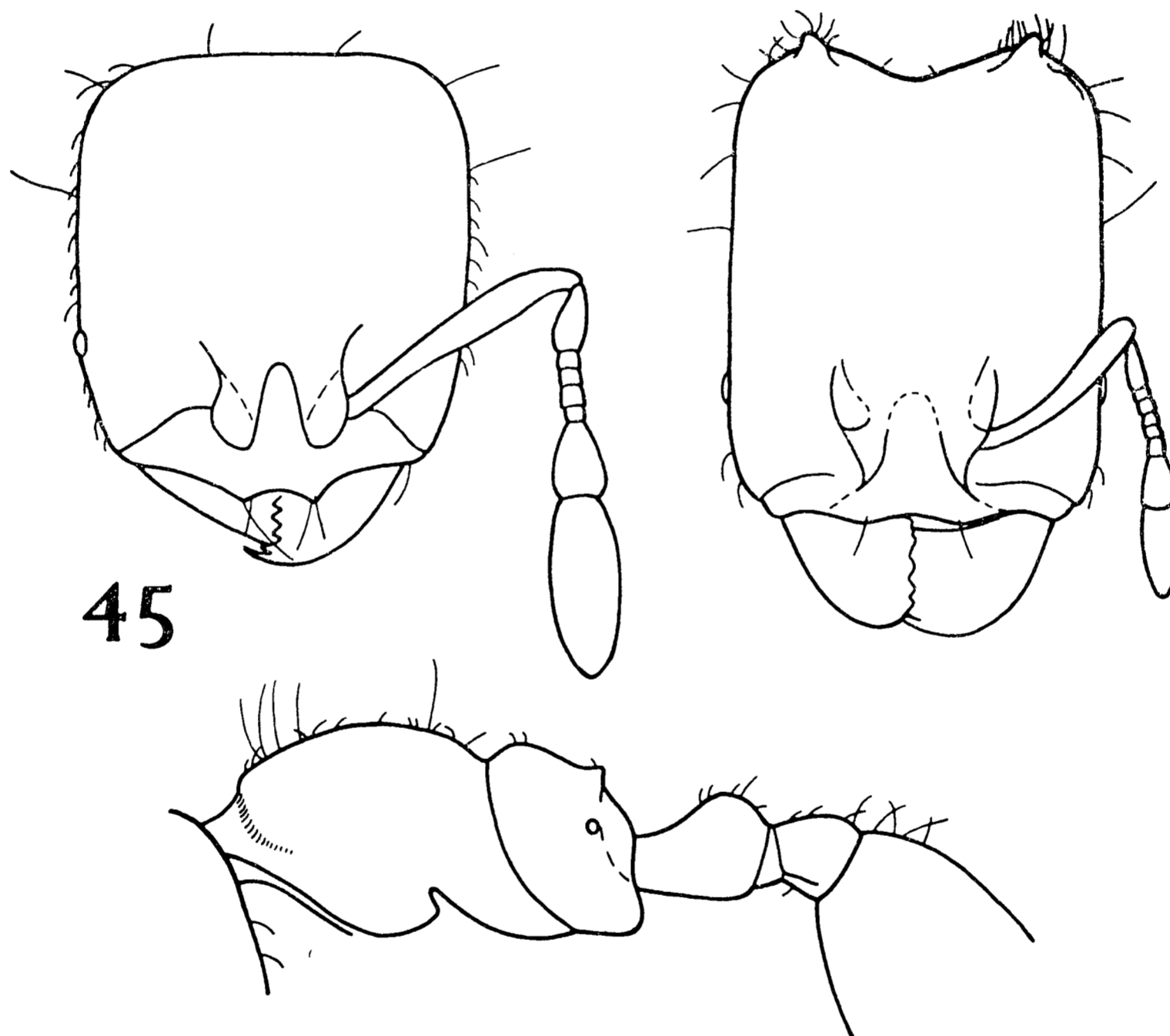


Fig. 45. *Oligomyrmex atomus* Emery. Above left and below, minor worker from Utumapu, Upolu (RWT). Above right, soldier from Falealupo, Savai'i (RWT).

Minor workers of *O. atomus* are among the smallest ants in the world. The species was collected in 1962 at Lomolagi, Viti Levu, Fiji, by Taylor, thus closing the gap in its known distribution from New Guinea to Samoa. Despite fairly extensive collecting it has not yet been found in the New Hebrides. The Fiji-Samoa workers can be distinguished from those originating in New Guinea and the Solomons by the following 2 characters: pronotum and mesonotum smoother and more shining in Fiji-Samoan samples; occipital horns of soldier shorter (about 0.04 mm long as opposed to 0.05 mm in New Guinea

and Solomons specimens). This difference is perhaps borderline to specific distinctness. We prefer the conservative interpretation of considering all the populations conspecific. No discernible geographic variation occurs within the Fiji-Samoa samples.

Oligomyrmex tahitiensis Wheeler Fig. 46.

Oligomyrmex tahitiensis Wheeler, 1936, B. P. Bishop Mus. Occ. Pap. 12: 11-12, queen, ♂
(Type locality: Taopiri, Mt Aorai, "3500-4500 ft.", Tahiti).

The species is known only from the type collection of the winged queen and 2♂♂ from

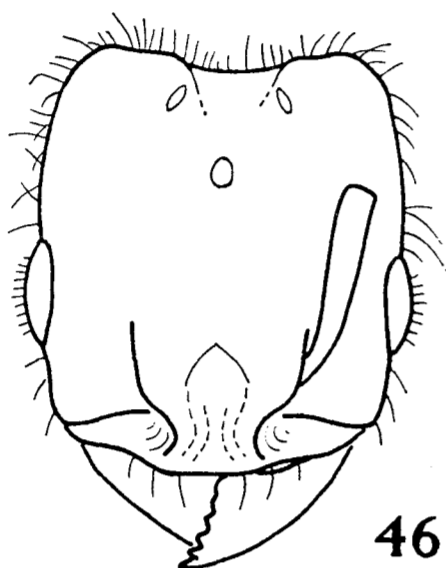


Fig. 46. *Oligomyrmex tahitiensis* Wheeler, syntype queen.

Tahiti. Unfortunately, most of the many Indo-Australian *Oligomyrmex* species are known only from the worker and soldier castes, which are often radically different from the queen, so that the status of *tahitiensis* cannot be established at this time. We have been able, however, to compare the syntype with definitely associated queen of *atomus* and can ascertain at least that it is not that species. In the following description we have given the measurements of the type and compared it critically with the New Guinea queens of the wide-ranging *atomus*, in the hope that generally useful characters will be highlighted. For further details, in the absence of comparative material, the more complete original description should be consulted.

Queen syntype: HW 0.80 mm, HL 0.90 mm, CI 89, SL 0.50 mm, SI 60, EL 0.26 mm. (HW of *atomus* queen is only about 0.42 mm, but the eye is proportionately much larger, with EL=0.20 mm). Occipital margin deeply concave, depth at midline (difference between transects of occipital corners and occipital midline) about 0.05 mm, in contrast to feebly concave border of *atomus*. In side view the dorsal and basal propodeal faces meet in a right angle (evenly rounded in *atomus*). Subapical process of petiole better developed, consisting of a distinct, acute, anteriorly directed tooth beneath anterior peduncle. All of the head evenly, longitudinally striate, except the occiput for a distance of about 0.2 mm from corners, region posterior to eyes, and gulae, which are very smooth and shining. Entire propodeum, metapleuron, petiole, and postpetiole shagreened and opaque: remainder of mesosoma and gaster very smooth and shining. Legs and antennae brownish yellow; body nearly concolorous rich reddish brown.

The record of this *Oligomyrmex* species from Tahiti is an anomaly, since only *O. atomus* is otherwise known as far east as Samoa. No judgment can be made on its status until the worker caste is obtained and studied with reference to the Indo-Australian species.

Chelaner antarcticus (White) Fig. 47.

Formica antarctica White, 1848, Voy. Erebus and Terror, Zool.: Insects, pl. 7, fig. 13, alate ♀ (Type locality: New Zealand).

Monomorium (Notomyrmex) rapaense Wheeler, 1936, Occ. Papers, B. P. Bishop Mus. 12: 10-11, worker (Type locality: NE ridge of Mangaoa Peak, 300-400 m, Rapa). (Syn-types examined—MCZ). **New Synonymy.**

Monomorium antarcticum: Brown, 1958, Acta Hymenopt. 1: 29, fig. 4, taxonomy (much

synonymy), dist., ecology.

Chelaner antarcticus: Ettershank, 1966, Austr. J. Zool. 14: 93.

DISTRIBUTION: KERMADEC IS.: *Raoul*, records dated 1907-1908 and 1956 (Taylor & Wilson 1961). AUSTRAL IS.: *Rapa*: type locality of *rapaense* (see above). E. ridge of Mt. Perapu, 400-550 m (ECZ). NE slope of Mt. Tevaitahu, 200-250 m (ECZ). S slope of Mt. Tepiahu, 150-200 m (ECZ).

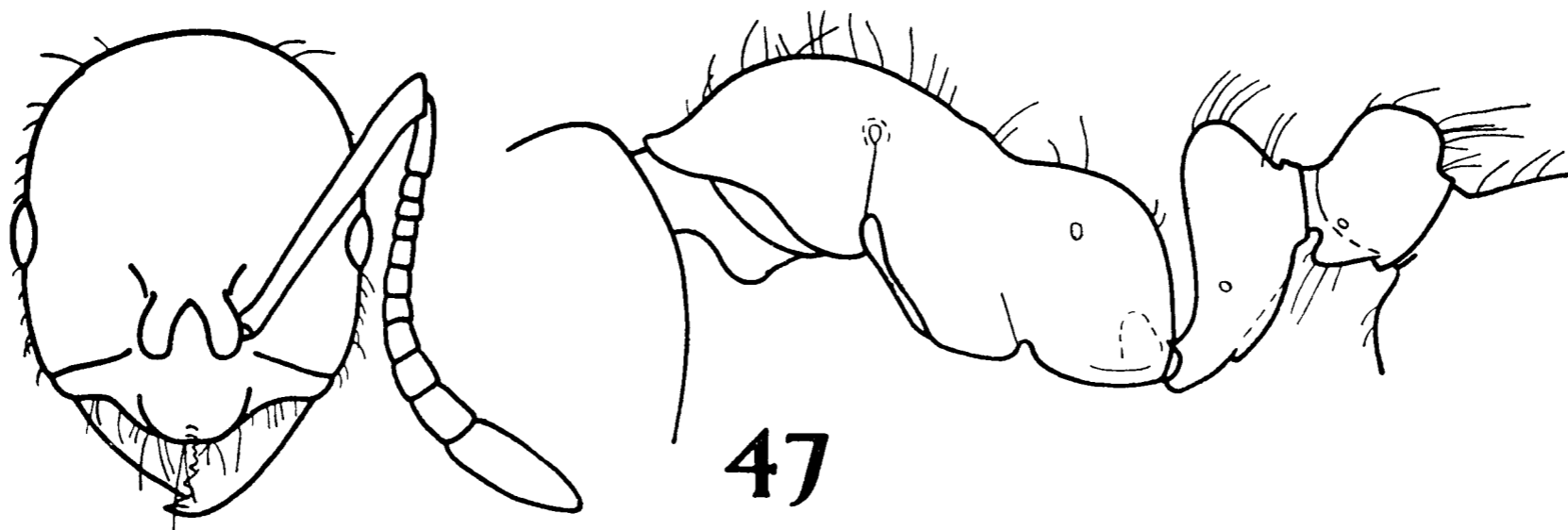


Fig. 47. *Chelaner antarcticus* (White), syntype worker of synonymous *M. rapaense* Wheeler.

The *rapaense* types are about as large as the average worker of New Zealand *antarcticus*. Their body coloration falls within the extreme range of *antarcticus*, being somewhat lighter than average and lacking the gastric banding conspicuous in many New Zealand samples. The body and appendages are nearly concolorous light reddish brown, the cephalic dorsum and gastric tergites being a shade darker than the rest of the body. The propodeal dorsum is broadly and evenly convex, departing from the flattened condition typical of most *antarcticus* but within the extreme range of the New Zealand population. Similarly, the petiolar node is thicker and with a somewhat more convex anterior face than the New Zealand average but still not beyond the extreme of variation. In other morphological characters *rapaense* conforms to *antarcticus*.

No nest series of New Zealand *antarcticus* has yet been collected that matches the *rapaense* types precisely in all characters, yet particular samples can be demonstrated that match them in each of the characters described above. If Brown (1958) is followed in conceiving *antarcticus* as an exceptionally variable species, embracing such extreme forms as the "species" *nitidum* Forel and *suteri* Forel, then *rapaense* is logically considered conspecific. Should new evidence arise to indicate the presence of multiple species in an *antarcticus* complex on New Zealand, the status of *rapaense* will have to be reconsidered.

In sum, the present evidence suggests that the Rapa population contains but a small segment of the extensive genetic variation of the New Zealand *antarcticus* population. It is interesting to note that *antarcticus* also occurs on the Chatham and Kermadec Is. Significantly, workers from the latter islands present in the MCZ collection are very similar to the *rapaense* types, differing only in their much smaller size.

Antarcticus is limited to New Zealand and the Pacific Islands just mentioned. According to W. E. Moore (in Brown, 1958), the habits of the New Zealand population are highly diversified. Colonies nest in rotting logs, under logs and stones, and in crater nests in the open soil. They occur in the warm forests of the north, cold bogs at higher

altitudes in the south, and open pastures everywhere. The workers are general feeders, preying on small insects, scavenging and tending homopterans. On Rapa E. C. Zimmerman collected workers during the day by beating shrubs and low trees.

Monomorium destructor (Jerdon) Fig. 48.

Atta destructor Jerdon, 1851, Madras J. Lit. Sci. 17: 105.

DISTRIBUTION: SAMOA: *Savai'i*: Vaisala, coastal village, strays from house and surroundings, banana case shed, and coffee fermenting bin (RWT accs. 466-468). COOK IS.: *Rarotonga* (G. P. Wilder 1925). SOCIETY IS.: *Tahiti* (Wilder, 1925). *HAWAII: *Kauai*: Kekaha. *Oahu*: Honolulu. Kaimuki. *Laysan*, 1923 (Fullaway) (Timberlake 1926). Intercepted at Honolulu Quarantine Station, from Japan. We have also seen a series from Pearl I., Wake Atoll, collected by N.L.H. Krauss in 1957.

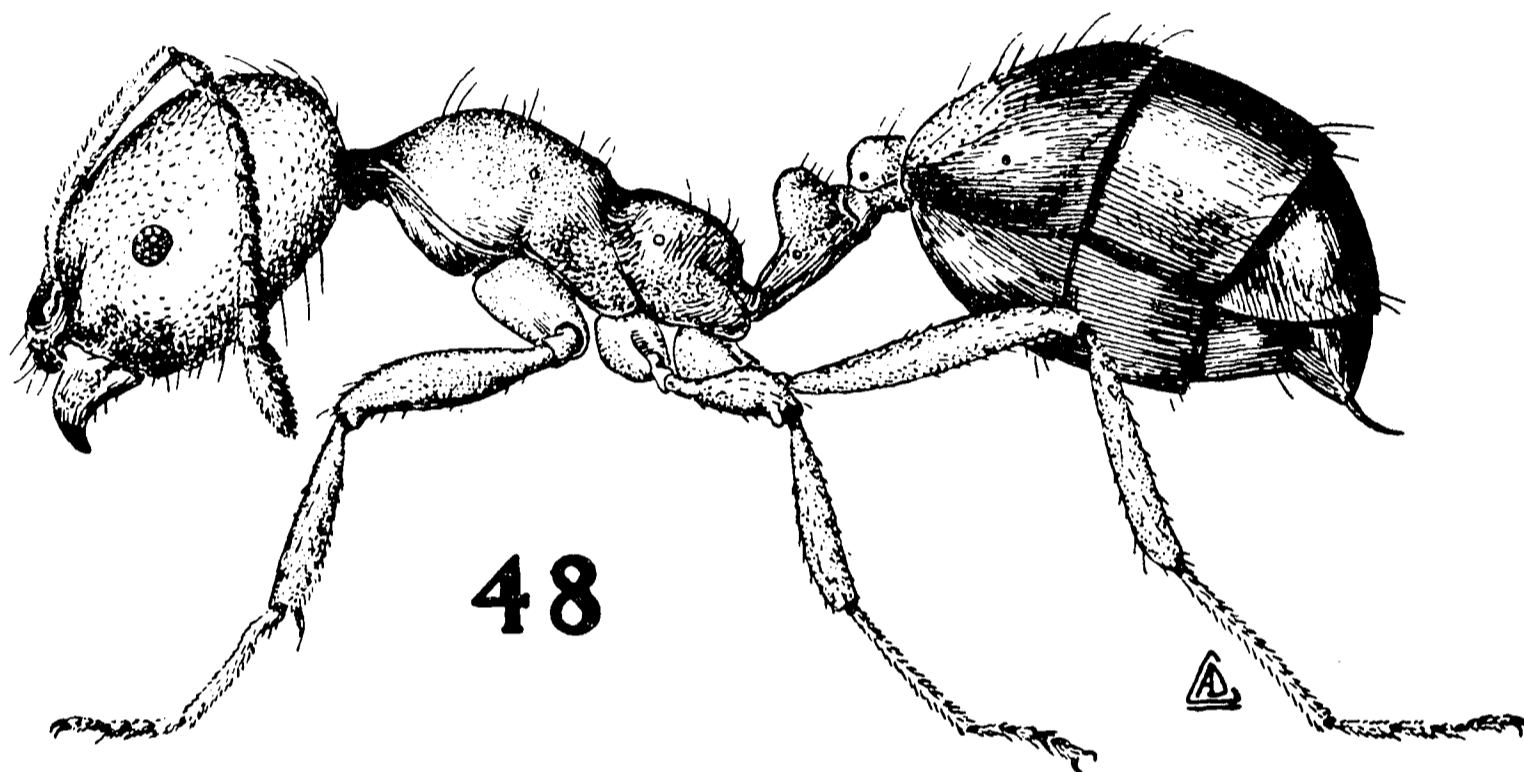


Fig. 48. *Monomorium destructor* (Jerdon), worker from United States. (After A. D. Cushman in M. R. Smith, 1947).

This is a pantropical tramp species which probably originated, like other members of the subgenus *Parholcomyrmex*, from Africa. Its distribution in the Pacific is very spotty. In Melanesia it is known only from several recent collections from Port Moresby and Aroa Plantation, Papua (J. H. Barrett 1957).

Monomorium floricola (Jerdon) Fig. 49.

Atta floricola Jerdon, 1851, Madras J. Lit. Sci. 17: 107, queen.

Monomorium specularis Mayr, 1866, Sitz. Akad. Wiss. Wien, 53: 509 (Type locality: Upolu).

DISTRIBUTION: SAMOA: *Savai'i*: Falealupo, dry lowland rain forest, strays on foliage, 20.III.1962 (RWT acc. 424). Fanga (NK, 1955). Ga'utavai, coastal coconut grove, strays on coconut trunks, 19.III.1962 (RWT acc. 379). Mt. Matafa, 700 m, strays on roadside weeds near rain forest, 23.III.1962 (RWT acc. 532). **Safune (1924). Salelologa, in domestic gardens, strays on foliage, 23.III.1962 (RWT acc. 547). *Upolu*: (No further data, Mayr 1866). **Apia (1924). Mafa Pass Road (NK, 1955). **Lalomanu (1924). Mo'ata, near Apia, numerous colonies nesting in twigs in mangrove trees, strays foraging during day, 18.III.1962 (RWT accs. 548, 552, 554, 555, 557-559, 561). **Malololelei (1924). Tapatapao, 300 m (OHS, ECZ, 1940). *Tutuila*: west side, Afono Trail, 150 m (ECZ 1940).

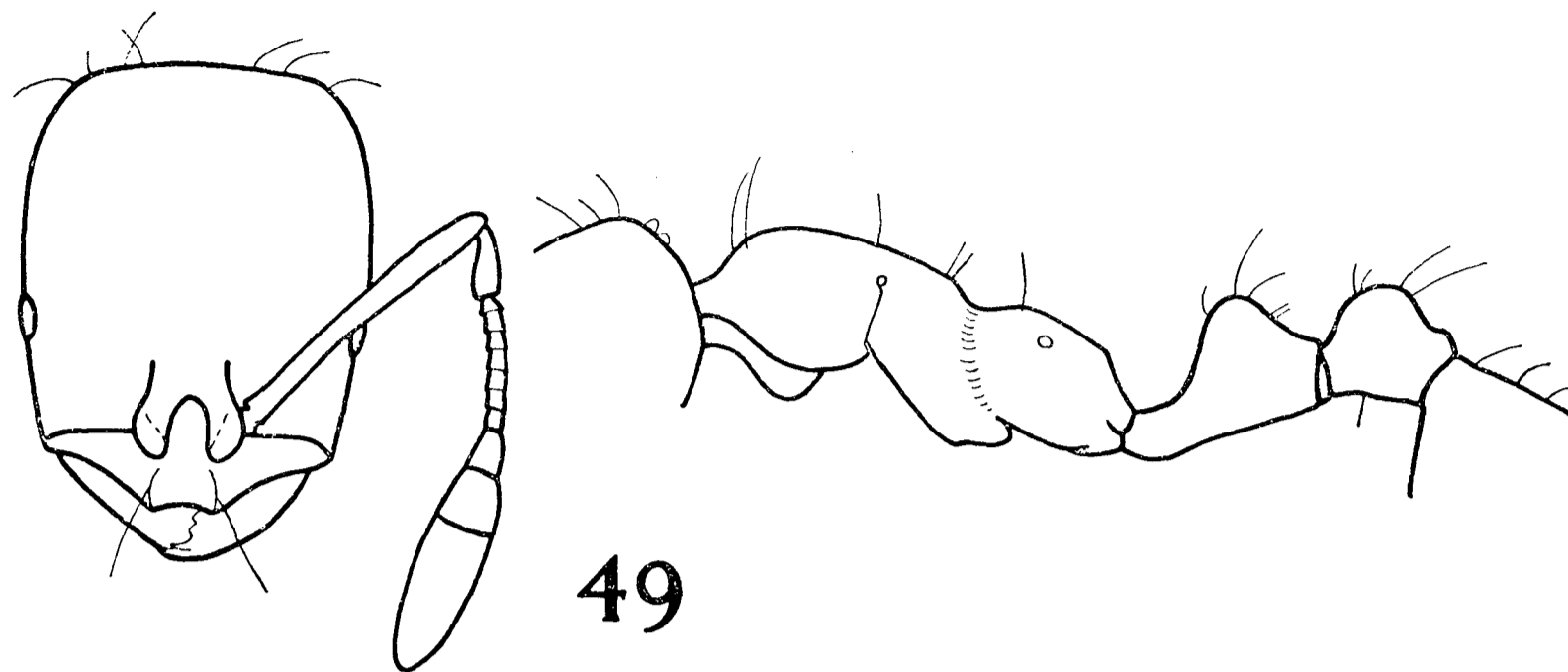


Fig. 49. *Monomorium floricola* (Jerdon), worker from Malaeini, Tutuila (GE).

Amouli (1923). Breaker Point (C. Hoyt 1953). Fagatoga, 300 m, beating shrubbery and dead branches (ECZ 1940). Malaeini, rain forest, berlesate, moss on rotten log, 13.VI.1962 (GE acc. T24). Mt. Pioa, 300 m (OHS 1940). **Pago Pago (1923). Utulei, 150–200 m, beating vegetation (ECZ 1940). *Manua*: *Ta'u* (1923). Mayr (1866) described the synonymous *M. speculare* on the basis of early specimens originating from Upolu. TONGA: Mayr (1876) recorded specimens in Godeffroy Museum of Hamburg. TOKELAU IS.: *Fakaofu* (EHB 1924). COOK IS.: *Rarotonga* (G. P. Wilder 1925). LINE IS.: *Fanning I.* (S. C. Ball, 1924). *SOCIETY IS.: *Bora Bora*: W. slope of mountain W of Mt. Pahia, 200–250 m (1934). *Moorea*: (about 1924; also 1934). *Raiatea*: valley above Utura (Cheesman & Crawley 1928). *Tahiti*: numerous lowland localities, 1934, recorded by Wheeler (1934b), also recorded by Cheesman & Crawley (1928). *AUSTRAL IS.: *Raivavae*: nr. Unurau (1934). *Rimatara*: Oromana Hills, 80 m (1934). *Maria I.*: NE islet (1934). *TUAMOTU IS.: *Hao*: Boring Bay (1934). *South Marutea* (1934). *GAMBIER IS.: *Timoé* (1934). *Agakauitai* (1934). *Taravai*: NW side (1934). *MARQUESAS: *Ua Huka*: Tauheeputa, 550 m (1928). *Eiao*: 350–550 m (1928). *Hatutu*: 450 m (1928). *PITCAIRN I.: (1934). *HENDERSON I.: (1934). *FLINT I.: (1934). HAWAII: Perkins (in Forel 1899) recorded *floricola* from Oahu, Molokai, Lanai, and Maui and expressed the opinion that it occurred on all of the islands. Wheeler (1934a) recorded it from localities on Oahu, Maui, Nihoa, and Wake; while Butler (1961) states that he collected workers and males on Laysan I. both in 1959 and in September 1961. Records dated 1923 from Midway and Wake are given by Timberlake (1926).

M. floricola is one of the most abundant and widespread of all pantropical ant species. Emery (1921) in a review of this and other members of the *minutum* group, concluded that *floricola* originated ultimately from tropical Asia. It is almost wholly arboreal, forming large colonies in trees and bushes in habitats of various degrees of disturbance. It is a prominent urban species in most tropical countries. Colonies seem unable to penetrate undisturbed native forests.

***Monomorium fossulatum* Emery** Fig. 50.

Monomorium fossulatum Emery, 1894, Ann. Mus. Stor. Nat. Genova **34**: 465–66, worker, queen (Type locality: Rangoon, Burma).

Monomorium fossulatum sechellense Emery, 1894, Ann. Soc. Ent. Fr. **63**: 69–70, text-fig., worker, queen (Type locality: Marie-Anne, Seychelles). **New Synonymy.**

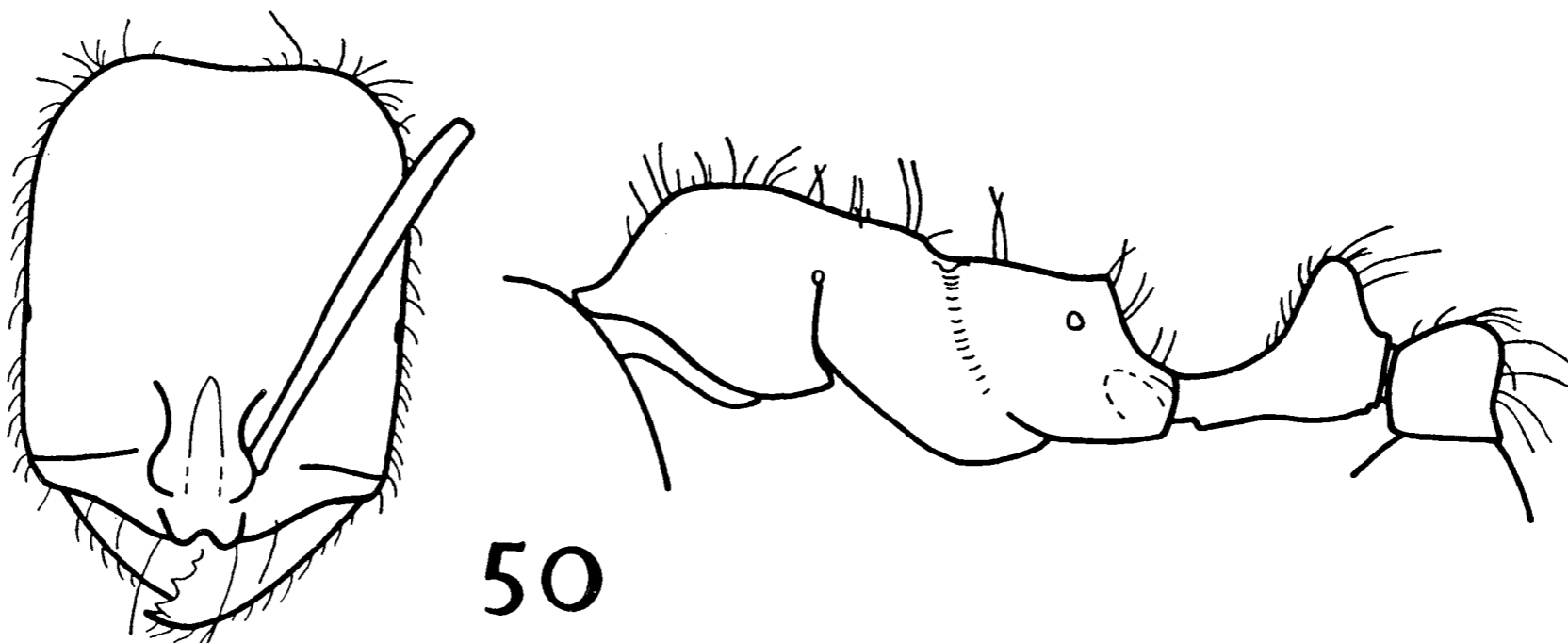


Fig. 50. *Monomorium fossulatum* Emery, worker from Afiamalu, Upolu (ECZ).

DISTRIBUTION: SAMOA: *Upolu*: Afiamalu, 700 m, under dead bark (ECZ 1940).
*HAWAII: Widespread, recorded from numerous localities on Maui, Kanai, and Oahu.

Emery's subsp. *sechellense* is said to differ from "typical" *fossulatum* by having smaller cephalic punctures (these are reported to approach the size and appearance of foveolae in *fossulatum*) and lacking interpunctural sculpturing. In the worker material at our disposal, all originating from islands in the Pacific and Indian Oceans, this character is somewhat variable but does not embrace the extreme *fossulatum* condition. However, Emery states that the queens of the 2 type series are identical, and since *fossulatum* is also so well removed from the remainder of *Monomorium*, the conspecificity of the 2 forms seems probable.

Fossulatum has been collected in Burma, Formosa, and Papua, as well as in the Seychelles and Pacific Islands. A related species, *subcoecum* Emery, has been recorded from the West Indies and southern Australia. Taken at face value, the limited evidence seems to suggest that *fossulatum* is native to tropical Asia and includes in its variation a weakly sculptured form (*sechellense*) that has been distributed to a limited extent by commerce. The single collection from Afiamalu, Samoa, in 1940 is curious. The species was not uncovered by the intensive work by Ettershank & Taylor at the same locality in 1962.

***Monomorium gracillimum* (Fr. Smith)**

Myrmica gracillima Fr. Smith, 1861, J. Proc. Linn. Soc. Lond. 6: 34, worker.

DISTRIBUTION: (DOUBTFUL): *HAWAII: *Laysan I.*

We have been unable to find any reliable differences between African and Indo-Malayan material separated as *destructor* and *gracillimum* respectively by previous workers in the Museum of Comparative Zoology. Since *destructor* (q.v.) has also been recorded from Laysan I. it seems safest to regard Wheeler's determination of a second species, *gracillimum*, as being in error.

***Monomorium latinode* Mayr** Fig. 51.

Monomorium latinode Mayr, 1872, Ann. Mus. Stor. Nat. Genova 2: 152, worker.

DISTRIBUTION: HAWAII: *Oahu*: Nuuanu Vall. (Ehrhorn 1923).

This distinctive species has a native range extending from Ceylon to Formosa and S to

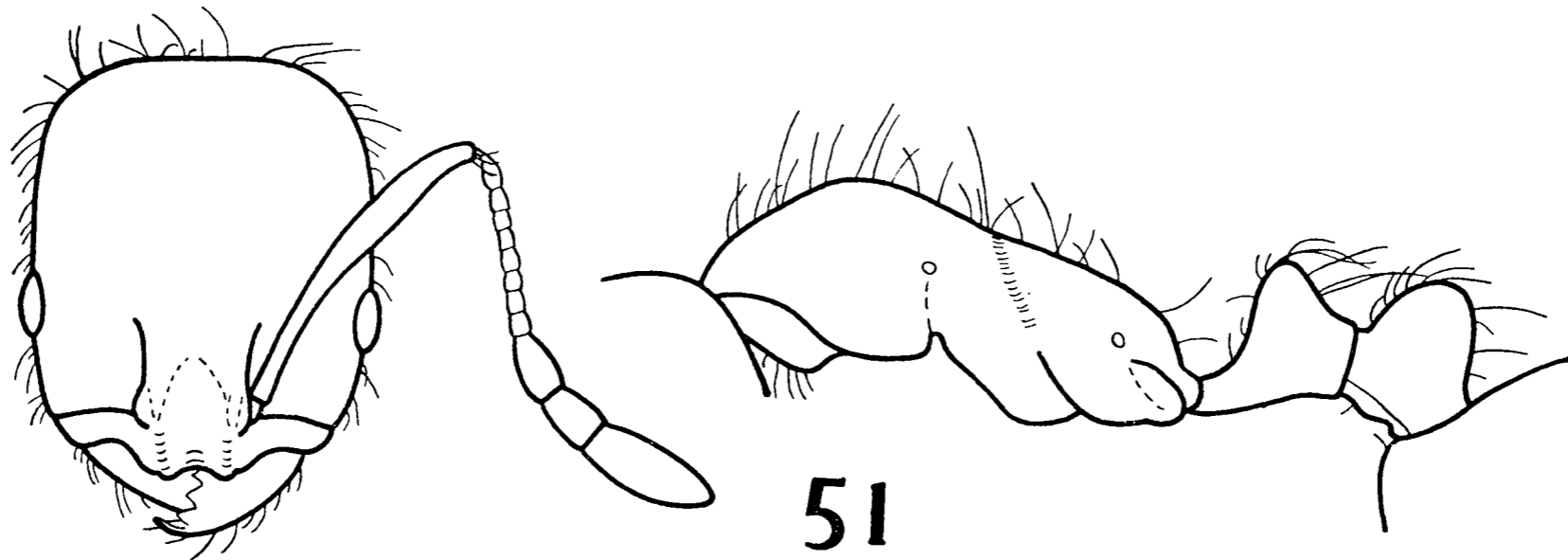


Fig. 51. *Monomorium latinode* Mayr, worker from Semarang, Java.

Java and Sumatra.

Monomorium minutum Mayr Fig. 52.

Monomorium minutum Mayr, 1855, Verh. Zool.-bot. Ges. Wien **5**: 453, worker.

Monomorium minutum var. *liliuokalanii* Forel, 1899, Fauna Hawaiiensis (Heterogyna: Formicidae), p. 119, worker (Type locality: Honolulu, Hawaii). **New Synonymy** (Tentative).

Monomorium minutum var. *samoanum* Santschi, 1928, Insects of Samoa **5**: 46, fig. 26, worker (Type locality: Apia Samoa). **New Synonymy** (Tentative).

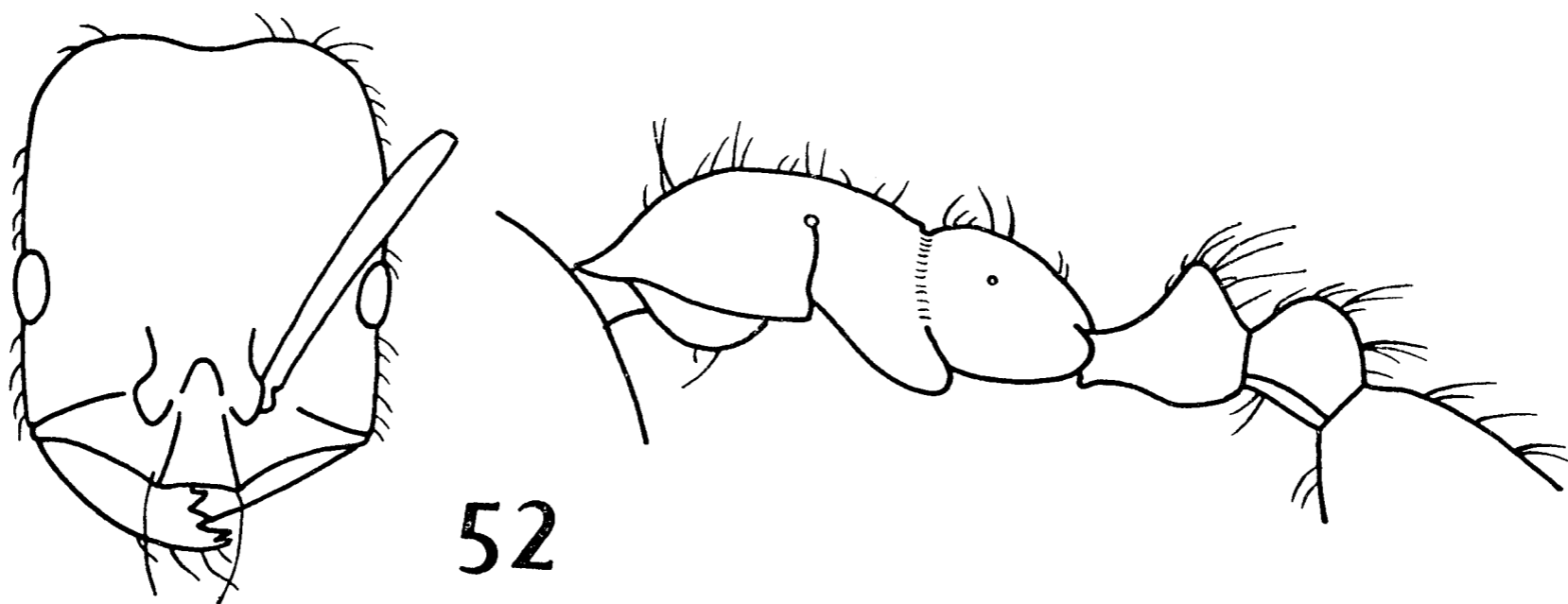


Fig. 52. *Monomorium minutum* Mayr, worker from Apia, Upolu (ECZ).

DISTRIBUTION: SAMOA: *Upolu*: Apia (ECZ, 1940). **Malololelei, 600 m (1924). *Tutuila*: **Amouli (1923). **Fagasa (1923). **Leone Road (1923). **Pago Pago (1924). N. side, Pago Pago, seashore (ECZ, 1940). **SOCIETY IS.:** *Moorea*: Baie de Cook (NK 1955). *Tehau Point (1934). **Tahiti*: Tuaruru Vall. Vallée de la Reine. Mataiea. Papeari. Valley E of Pirae, Pare (1934). **MARQUESAS:** *Ua Huka*: Haavei Vall. ***HAWAII:** *Oahu*: Honolulu. Manoa and Barbers Point. Kaimuki. Koko Head. *Kauai*. *Hawaii*: Hilo. *Laysan*. *Midway* and *Necker* (Timberlake 1928).

Minutum is distributed from Cape Colony to southern Europe, thence sporadically through southern and eastern Asia to the Pacific Islands. It has also been recorded from Brazil. In the Pacific it is chiefly limited to the most disturbed habitats.

In the examination of extensive Pacific material, we have been unable to distinguish

forms that can be considered specifically distinct from the African *minutum*. Characters in the shape and size of the clypeal teeth and length of pubescence used by Forel to separate the variety *liliuokalanii*, and in the shape of the mesosoma and node used by Santschi to erect *samoanum* are evidently within the broad range of variation conventionally recognized as being embraced by the single species *minutum*. However, the possibility that we are dealing with a group of sibling species cannot be excluded until more extensive collections, including queens, are made available from many parts of the range.

The relatively numerous records from Samoa in the 1920's and in 1940, contrasted with the failure of collectors in the late 1950's and in 1962 to capture a single specimen, is indicative of considerable fluctuation in population density. It is even possible that the species is now extinct in Samoa.

Monomorium pharaonis (Linné) Fig. 53.

Formica pharaonis Linné, 1758, Syst. Nat. 10th ed. 1: 580.

DISTRIBUTION: SAMOA: *Savai'i*: Gagaifoumauga, rain forest, berlesates, fern roots from rocks and trees and moss on rotting log, 14.VI.1962 (GE acc. S1, S3). **Sala'ilua (1924). Salelologa, strays from house and environs (RWT acc. 547). *Upolu*: Afiamalu, 700 m, disturbed rain forest, berlesate, ground moss, 9.IV.1962 (GE acc. 50). Apia (NK, 1955). Malololelei, moss in rain forest (TEW, 1956). Le Mafa, 400 m, rain forest, berlesate, epiphytic fern bases from trees, 13.V.1962 (GE acc. 66). Saleapuga, leaf mold in coastal *Futu* forest (TEW, 1956). Tiapapata, rain forest, berlesates from moss on rotting log and from soil, 19.V.1962 (GE accs. 71, 72, 75, 76). Poutasi, leaf mold in rain forest (TEW 1956). Above Salani Falls, moss in rain forest (TEW 1956). Tanamalala, leaf mold in rain forest (TEW 1956). Falepuna, edge of swamp, leaf litter (TEW 1956). Matautu, leaf litter under *Ficus* (TEW 1956). Vaipoto, rain forest, soil and leaf litter (TEW 1956). *Tutuila*: Pago Pago (C. P. Hoyt 1953). Malaeimi, rain forest, berlesate, moss on rotting log, 13.VI.1962 (GE acc. T23); moss on coconut trunk (TEW, 1956). Tafuna (J. L. Gressitt 1952) **Center of island (probably in 1920's). *Manua*: *Ta'u*: Luma (Wray Harris 1957). Samoa: no further locality (Mayr 1876). TONGA: *Tongatabu* (W. Cottrell-Darmer, probably sometime before 1935). *Tonga*: no further locality (Mayr 1876). *SOCIETY IS.: *Moorea* (1906-07). *MARQUESAS: *Ua Huka*: Haavei Vall., sea level (in 1920's). LINE IS.: *Johnston* (1947-52, *vide* Chilson, 1953); before 1934

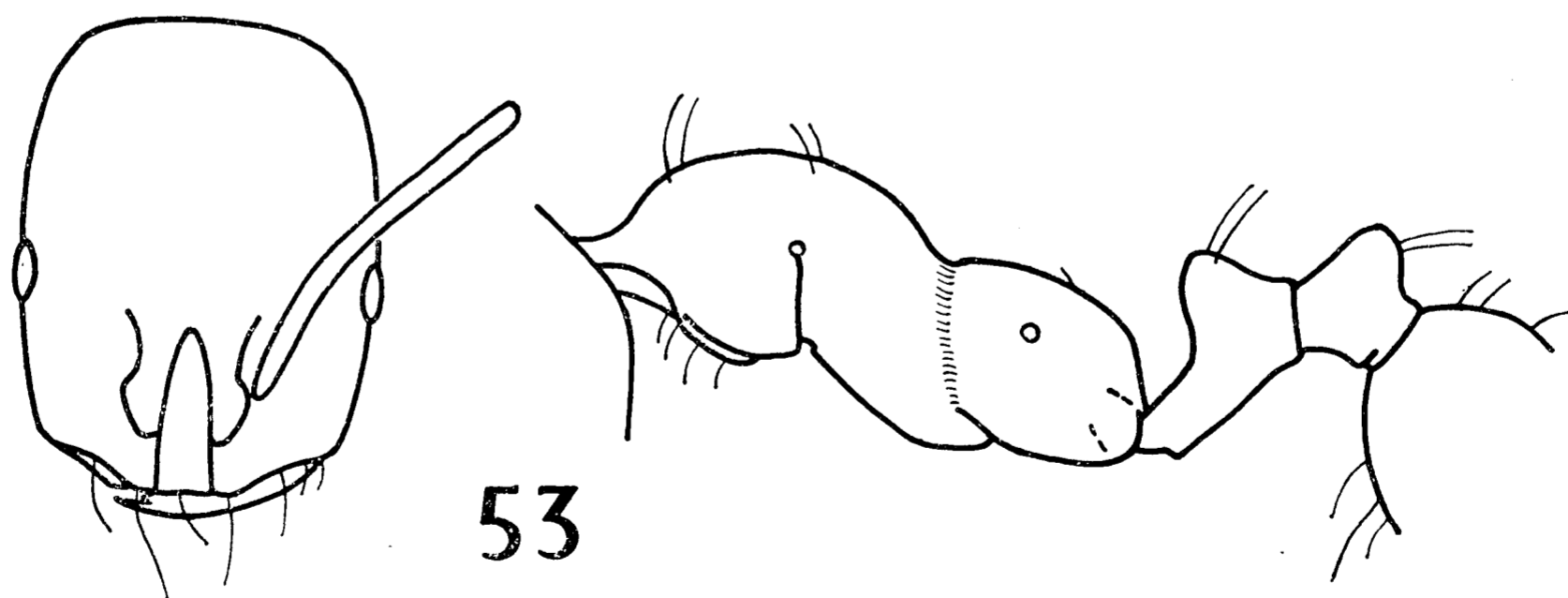


Fig. 53. *Monomorium pharaonis* (L.), worker from Apia, Upolu (NK).

(*1934b). HAWAII: Wheeler (1934a) records collections from Oahu, Hawaii, French Frigates Shoal and Wake.

This little species is probably the most widely distributed of all ant species. In the tropics it occurs in both disturbed and (on Samoa) natural habitats out of doors, as well as in human dwellings. In temperate zones it is a prominent house pest around the world. Emery, in his 1921 review of *Monomorium*, suggests that *M. pharaonis* is native to tropical Asia.

***Monomorium talpa* Emery** Fig. 54.

Monomorium talpa Emery, 1911, Nova Guinea. Zool. **9**: 252-53 (Type locality: Etna Bay, W. New Guinea).

Ireneidris myops Donisthorpe, 1943, Ent. Mon. Mag. **79**: 81-82 (Type locality: Camp Nok, Waigeo).

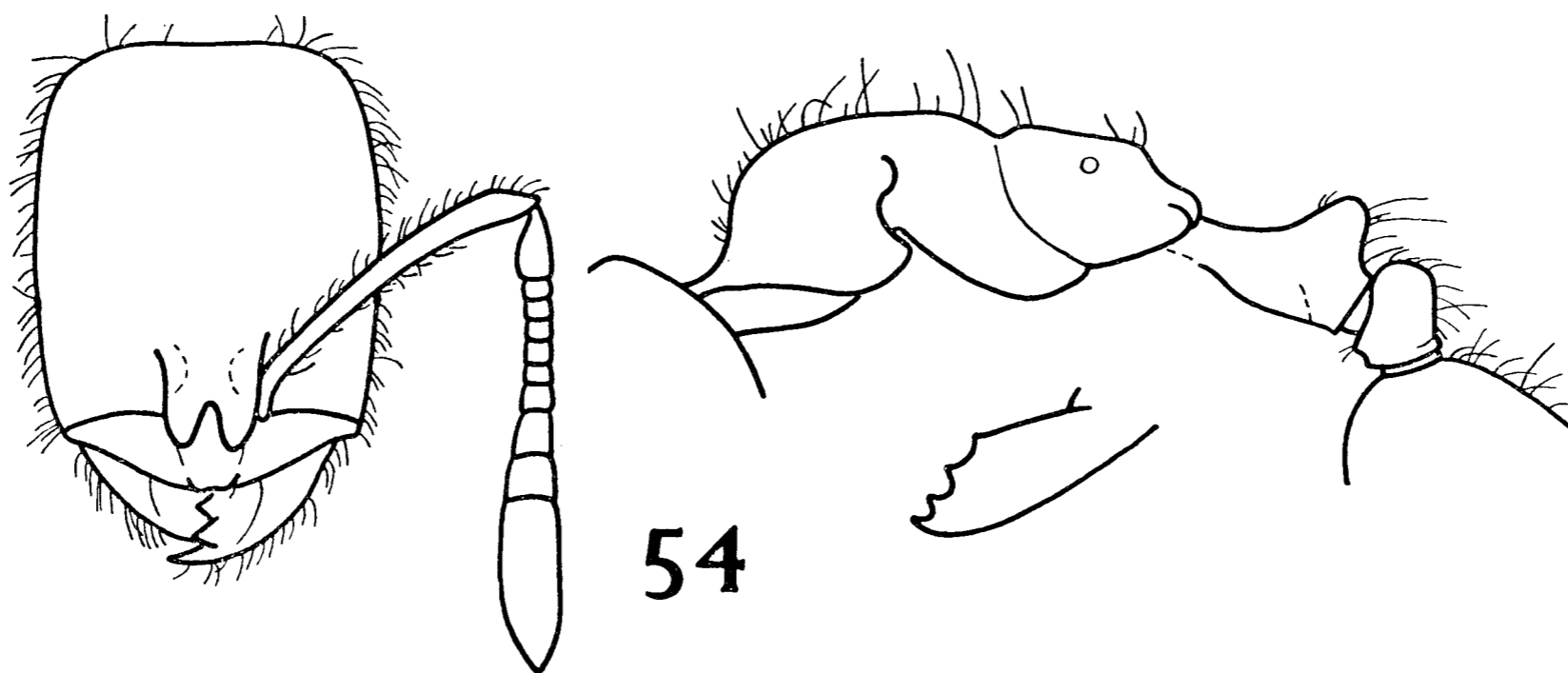


Fig. 54. *Monomorium talpa* Emery, worker from Utumapu, Upolu (TEW).

DISTRIBUTION: SAMOA: *Savai'i*: Gagaifomauga, rain forest, berlesate, leaf mold and soil around base of tree, 14.VI.1962 (GE acc. S4). Matega, W. coast, 60 m, banana clearing at edge of rain forest, nest in rotting log, workers with dealate queen, 20.III.1962 (RWT acc. 397). Mt. Matafa Road, 250 m, rain forest, nest under log, workers and 2 dealate queens, 19.III.1962 (RWT acc. 369). Mt. Matafa, 650 m, rain forest, nest under stone, workers and 2 dealate queens 23.III.1962 (RWT acc. 544). Mt. Olomanu, rain forest, berlesates of moss on trees, 15.VI.1962 (GE accs. S7, S11). *Upolu*: Lauli'i, N. coast, I.1956 (TEW). Matautu, berlesate of leaf litter under *Ficus* (TEW, 1956). Togitogiga, 400 m, rain forest, berlesates, leaf litter and debris on rotting log, 12.VI.1962 (GE accs. 57-59). Utumapu, 130 m (TEW, 1956). Vaipoto, leaf litter and soil in rain forest (TEW, 1956). *Tutuila*: Alega, W. Dist., leaf litter and soil in coastal *Futu* grove (TEW, 1956). Tafuna, berlesate of leaf litter in rain forest (TEW, 1956).

M. talpa is an aberrant member of the genus now known from Waigeo, eastern New Guinea, Micronesia, and the Solomons, as well as Samoa. The Samoan material shows consistent minor differences from the Melanesian: the mandibles are somewhat less slender, the gap between the basal and antebasal mandibular teeth is narrower, and the clypeal carinae are slightly more distinct. In these characters the Samoan population is more "primitive", bridging some of the gap between *talpa* and the rest of *Monomorium*

and making Donisthorpe's *Ireneidris* less tenable. We have not considered the differences between the Melanesian and Samoan forms sufficient to justify recognizing the latter as a distinct species, but this is admittedly a borderline case.

Triglyphothrix striatidens (Emery) Fig. 55.

Tetramorium obesum subsp. *striatidens* Emery, 1889, Ann. Mus. Stor. Nat. Genova 27: 501, worker.

DISTRIBUTION: SAMOA: *Upolu*: "Apia, 1000 ft" (Harold Swale, no date). DANGER IS.: Motu Kotawa (EHB, 1924). LINE IS.: *Fanning* (A. R. Foster, 1920).

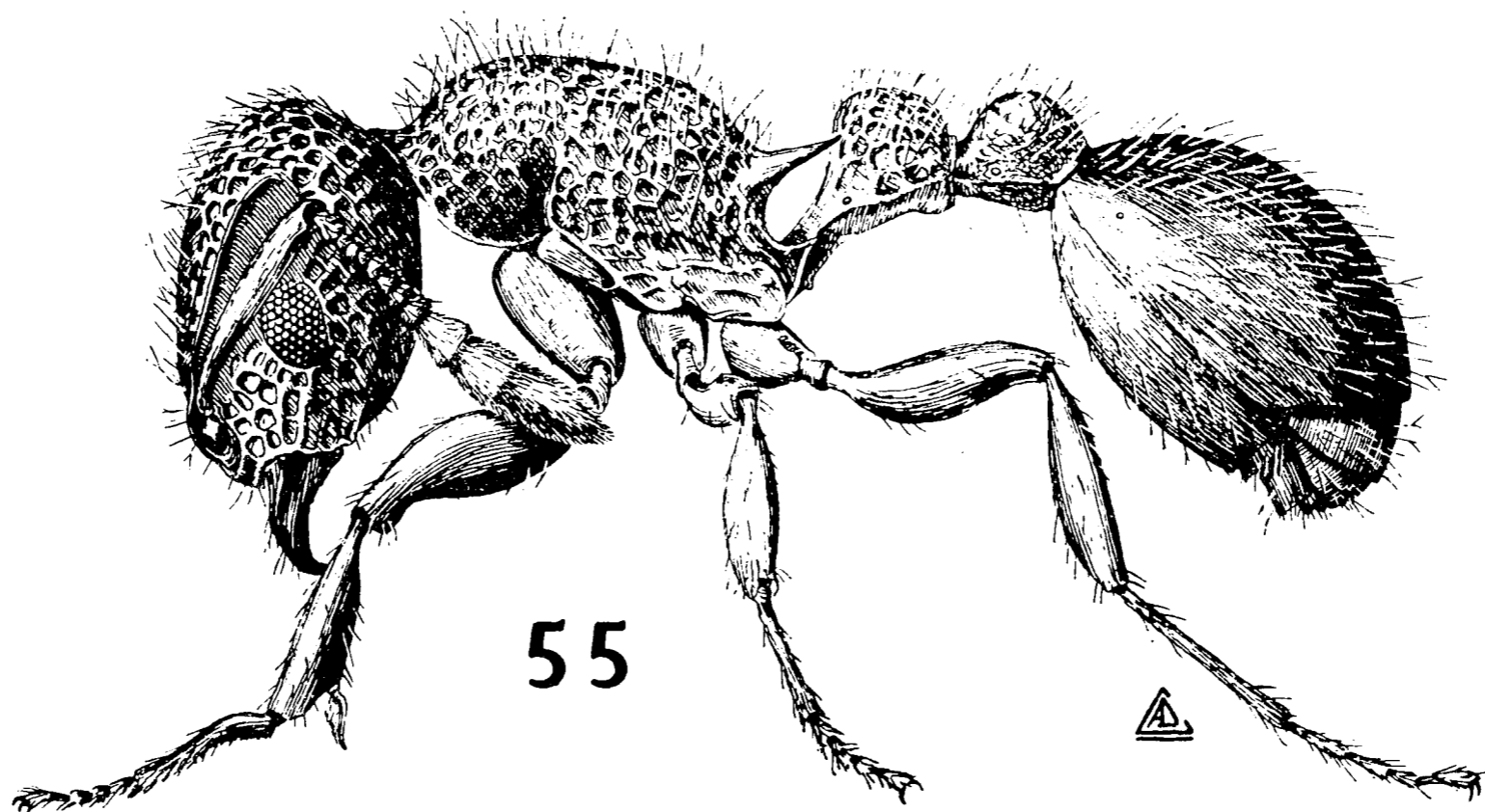


Fig. 55. *Triglyphothrix striatidens* (Emery), worker from United States. (After A. D. Cushman in M. R. Smith, 1947).

This species is probably native to tropical Asia and has been spread by commerce to Africa, Queensland, and the Pacific coast of Mexico (Taylor & Wilson 1962). The above records are the first from Polynesia. The Samoan record is based on a single worn specimen taken many years ago; the species has not been recorded from the islands since, despite intensive collecting. *T. striatidens* was one of the 3 ant species occupying Clipperton Is., in the extreme eastern Pacific, during 1958; repetitive collections made by A. M. Peterson and C. F. Harbinson indicate it was abundant at that time (Taylor & Wilson 1962). Since the workers are conspicuous and easily collected, the absence of the species from collections from most of the Pacific islands probably indicates that it is truly very rare or absent through most of this region.

Tetramorium caespitum (Linné)

Formica caespita Linné, 1758, Syst. Nat. 10th ed. 1: 581, worker.

DISTRIBUTION: SOCIETY IS.: Wheeler (1936) mentions a single worker of this European species collected by G. P. Wilder at Lake Vaihiria, Tahiti, on 5.V.1927. Except for specimens intercepted sporadically at the Quarantine Station, Honolulu, the species has not otherwise been recorded from the Pacific Region. We have not been able to verify Wheeler's record.

Tetramorium guineense (Fabricius) Fig. 56.

Formica guineense Fabricius, 1793, Ent. Syst. 2: 357, worker.

Tetramorium guineense var. *macra*: Santschi, 1928, Insects of Samoa 5: 50. (?=*maera* Emery, 1914, from New Caledonia).

DISTRIBUTION: SAMOA: *Savai'i*: **Fagamalo (1925). Lotogo, 350 m, rain forest, nest in rotting log, 21.III.1962 (RWT acc. 477). Matega, 65 m, banana clearing at forest edge, nest from piece of rotting wood under vegetable debris, and strays from ground layer, 20.III.1962 (RWT accs. 400, 409). Palauli (NK, 1955). Salailua, nest under bark of coconut tree, 19.III.1962 (RWT acc. 385). Samalaeulu, coastal rain forest, strays under small tree-trunk epiphytes, 22.III.1962 (RWT acc. 509). *Upolu*: Afiamalu, 700 m, workers and winged queens, beating shrubbery, 13.VI.1940 (ECZ; **1923). Apia (ECZ, 1940; **1924). Falefa (NK, 1955). **Malololelei, 650 m (1924). Malololelei Road, 400 m, under dead bark (OHS, 1940). Sa'agafou, lowland rain forest, several nests under small tree-trunk epiphytes 1-2 m above ground level, 28.III.1962 (RWT acc. 610). Tapatapao, under dead bark (OHS, 1940). Tapueleele (NK, 1955). **Tongatata (1923). **Tuaefu (1923). **Vaea, 130 m (1925). **Vailima, 130 m (1925). *Tutuila*: Afono Trail, west side, 150 m (ECZ, 1940). Amanave, 130 m (OHS, 1940). **Amouli (1925). Fagaitua (EHB 1935). Fagatogo, 300 m, beating vegetation (ECZ 1940). Pago Pago (**1925; *1931; EHB 1935; NK 1941). Pago Pago, northside 300 m, under bark (OHS, ECZ 1940). Pago-Matafao Trail, 400 m, beating shrubbery (ECZ 1940). Mt. Pioa, 300 m (OHS 1940). *Manua*: ***Ta'u* (1923). *Rose* (Wray Harris 1938). WALLIS: Emery (1914a): date of collection not given. TONGA: *Tongatabu*: Nukualofa (NK 1956). *Vava'u*: Pangai (NK, 1956). Falevai (NK, 1956). KERMADEC IS.: *Raoul*, Meyer, records dated 1956 (Taylor & Wilson 1961) COOK IS.: *Aitutaki*: Akaiami (NK, 1955). TOKELAU IS.: *Fakaofu* (EHB, 1924). PHOENIX IS.: *Canton* (EHB 1924; Wilson 1954; NK 1958); 1940 *fide* van Zwaluwenburg (1943). *DANGER IS.: *Puka Puka* (1933). LINE IS.: *Palmyra* (EHB 1938). E. J. Ford (1959) records this species on sprouted coconuts brought from Palmyra to Honolulu in 1957. *Christmas* (L. A. Whitney 1924). *Johnston* (1947-52), *fide* Chilson (1953). SOCIETY IS.: **Tahiti* (1926-34). **Bora Bora* (1934). *Raiatea* (*1934). Opoa and Uturoa (NK, 1955). Cheesman & Crawley (1928): Tahiti (1925), Raiatea (1925). AUSTRAL IS.: **Maria*: NE islet (1934). *Rimatara* (A. M. Stokes 1921; ECZ 1934). **Raivavae* (1934). *Rapa* (A. M. Stokes, 1921; ECZ 1934). TUAMOTU IS.: **Tepoto*

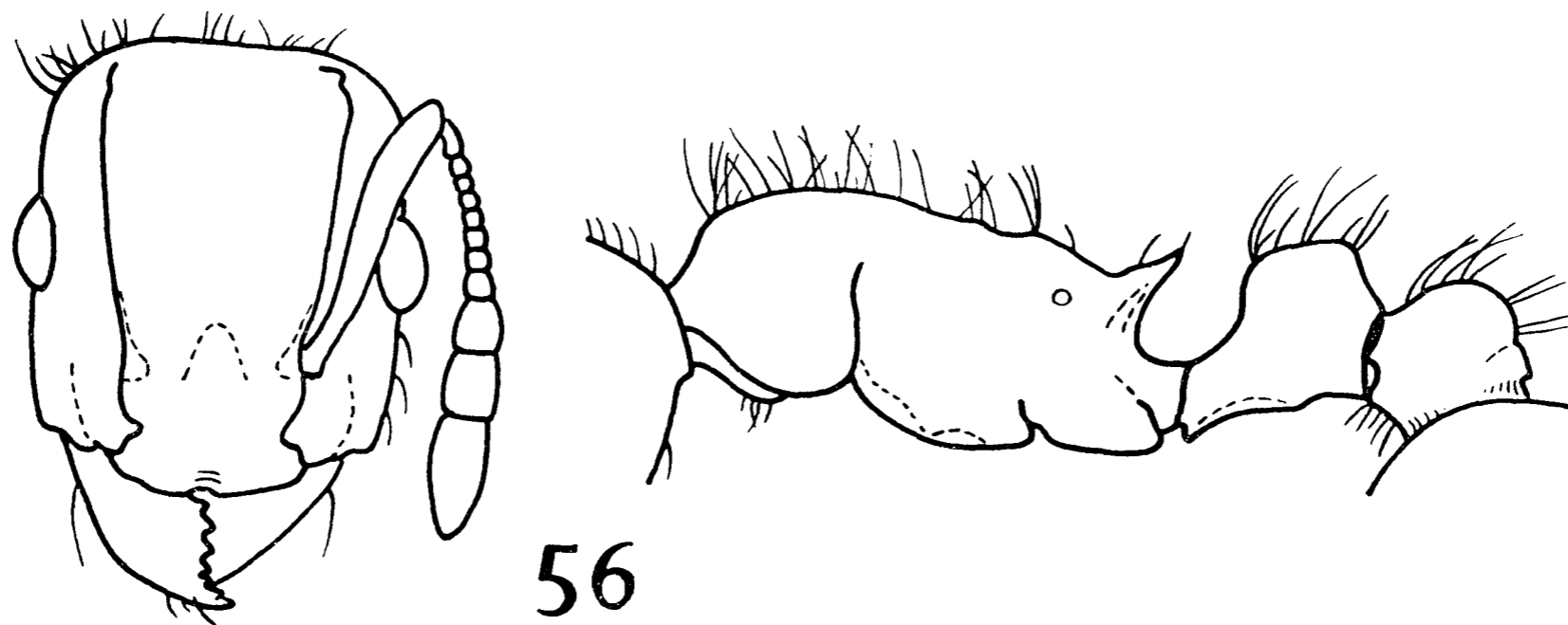


Fig. 56. *Tetramorium guineense* (Fbr.), worker from Upolu (ECZ).

(1934). **Timoé*: north islet (1934). *Makatea* (G. P. Wilder 1932). GAMBIER IS.: **Taravai* (1936). **Mangareva* (1934). MARQUESAS: **Hiva Oa* (1929). **Tahuata* (1929). **Fatu Hiva* (1929). **Mohotane* (1929). **Ua Huka* (1929). **Eiao* (1929). ***Hatutu*. Cheesman & Crawley: *Nuku Hiva* (1925). *PITCAIRN (1934). *HENDERSON (1934). *OENO (1934). EASTER (*1922): The species was collected at the following places by I. E. Efford and J. A. Mathias in I-II.1965: in *Zea mais*, Hanga Roa; on grass, hillside behind beach at Ovahe; "litter under *Eucalyptus* village"; in crater, Rano Raraku. Winged queens and ♂♂ were collected on 26 & 29. I. *HAWAII: *Oahu, Kauai, Maui, Molokai, Hawaii*. Timberlake (1926) lists records made in 1923 on the following islands: *Nihoa, Necker, Midway, Laysan, Pearl and Hermes Reef, Kure (Ocean)*. We have seen material collected on Laysan and Kure by G. D. Butler in IX.1961. Alate queens are present in the Laysan sample.

Guineense is one of the most abundant and widespread of the pantropical tramp species. It is evidently native to Africa, where it is associated with related endemic species and shows considerable infraspecific variation of its own. It is abundant throughout tropical Asia in disturbed habitats and ranges into Queensland and through the Pacific. In the New World it occurs in many disturbed habitats as a dominant ant, from South America through the West Indies to the Florida Keys, and it is also occasionally encountered in greenhouses in various parts of the United States. The colonies are mostly arboricolous, while the workers forage both arboreally and on the ground.

***Tetramorium pacificum* Mayr** Fig. 57.

Tetramorium pacificum Mayr, 1870, Verh. Zool.-bot. Ges. Wien **20**: 38, worker, (Type locality: Tongatabu, Tonga).

DISTRIBUTION: SAMOA: *Savai'i*: Le Mafa, roadsides, strays under moss on tree trunk (RWT acc. 635). Lotogo, 370 m, rain forest, 3 nests in hollow twig on *Ficus* tree, 1-35 m above ground (RWT acc. 457, 458, 460); strays on foliage (RWT acc. 451). Mt. Matafa, 700 m, rain forest; strays in leaf mold at base of tree fern (RWT acc. 520); nest in hollow twig on tree (RWT acc. 524); nest under small tree-trunk epiphyte (RWT acc. 531); strays on roadside weeds (RWT acc. 532). Mt. Matafa Road, 200 m, rain forest, strays on foliage (RWT acc. 361). Puapua (NK, 1955). Palauli (NK, 1955). ***Salailua* (1924). *Upolu*: Afiamalu, 700 m, beating shrubbery (ECZ, 1940); disturbed forest, colony in rotting tree stump (RWT acc. 314); dealate queen, stray on tree trunk (RWT acc. 343); sweeping roadside weeds (RWT acc. 252). Mafa Pass Road (NK, 1955) Malololelei (OHS 1940; NK 1955). Sa'agafou, lowland rain forest, colony in hollow twig on tree (RWT acc. 610). Sinaele, 400 m, beating vegetation (ECZ, 1940). ***Taefu* (1924). Tapatapao, 250 m, beating vegetation (ECZ 1940). Tapueleele (NK 1955). Tanumalala, 350 m, disturbed weed-overgrown rain forest, strays in foliage (RWT acc. 606). *Tutuila*: Amanava, 130 m (ECZ, OHS, 1940). Afono Trail, W. side, 130 m (ECZ 1940). Amouli, 130 m (**1923; D. T. Fullaway 1930; ECZ 1940). Fagasa (D. T. Fullaway 1930). Fagasa Trail, 200 m (OHS, 1940). Fagatogo, 300 m beating shrubs (ECZ, 1940). Fangatanga, Reservoir, beating shrubs (ECZ 1938). Leone-Aula (D. T. Fullaway 1930). ***Leone Road* (1923). Moloata, 300 m, beating dead branches (ECZ, 1940). ***Pago Pago* (1924). Pago Pago, N. side, 400 m, beating dead branches (ECZ 1940). Mt. Pioa, 300 m (OHS 1940). ***Manua*: *Ta'u* (1923). All Samoan collections by RWT were made in III-VI.1962. TONGA:

Tongatabu: Nukualofa (NK 1956). Record by Mayr (1870). *Vava'u*: Neiafu (NK 1956). *Eua*: Ohonua (NK, 1956). ROTUMA: Solkope (H. St. John 1938). COOK IS.: *Rarotonga* (G. P. Wilder 1927, 1929). SOCIETY IS.: *Tahiti*: Papenoo Vall. NK, 1955); (*1927, 1934; Cheesman & Crawley 1925). **Moorea* (1924). **Mehetia* (1934). **Raiatea* (1934). *AUSTRAL IS.: *Raivavae* (1934). *Rautaro Islet, Tubuai* (1934). *Rurutu* (1934). *Rapa* (1934). *TUAMOTU IS.: *Makatea* (1932). *GAMBIER IS.: *Mangareva* (1934). *MARQUESAS: *Fatu Hiva. Nuku Hiva*.

T. pacificum ranges over most or all of SE Asia, most of Melanesia, including New Caledonia, Micronesia, and Polynesia east to the Marquesas. The species is perhaps native to most or all of this range. On the other hand, *pacificum* can be carried by human commerce. Individuals have been intercepted in quarantine at Honolulu, although the species has not to our knowledge become established in the Hawaiian Is. At least 6 related species occur in Melanesia, including *bicolor* Viehmeyer, *melanogyna* Mann, *validiusculum* Emery, and *wilsoni* Mann. On New Guinea *pacificum* is mostly replaced in natural habitats by the sibling species *validiusculum*. We have been unable to find any significant geographical variation in the species.

***Tetramorium simillimum* (Fr. Smith)**

Fig. 59.

Myrmica simillima Fr. Smith, 1851, List Brit. Anim. Brit. Mus. 6: 118, worker.

DISTRIBUTION: SAMOA: *Savai'i*: Falealupo, dry rain forest, nest under bark of dry log, 20.III.1962 (RWT acc. 426). Ga'utavai, coastal coconut grove, strays on palm trunks, 19.III.1962 (RWT acc. 379). Lotogo, 350 m, strays in banana plantation, 21.III.1962 (RWT acc. 469). Salelologa, in domestic garden, 23.III.1962 (RWT acc. 547). *Upolu*: Apia (H. Swale, no date, probably 1920's or 1930's). *Tongatabu* (W. Cottrell-Dormer, no date). COOK IS.: *Rarotonga* (1937). TOKELAU IS.: *Fakaofu* (EHB, 1924). PHOENIX IS.: *Phoenix* (EHB, 1924). Howland (195) *Canton*, in soil beneath heaps of old coconuts, 1940-41 (*vide* van Zwaluwenburg, 1943). LINE IS.: *Jarvis*, bunch grass (W. W. Graf, 1935). SOCIETY IS.: Cheesman & Crawley (1928): *Tahiti* (1925), *Bora Bora* (1925). *AUSTRAL IS.: *Raivavae* (1934). EASTER IS.: (*1922); at camp, Hanga Roa, 4.II.1965 (I. E. Efford & J. A. Mathias). *HAWAII: *Oahu*.

Like its larger and better known congener *T. guineense*, *T. simillimum* is native to Africa and has been widely distributed through the tropics by commerce.

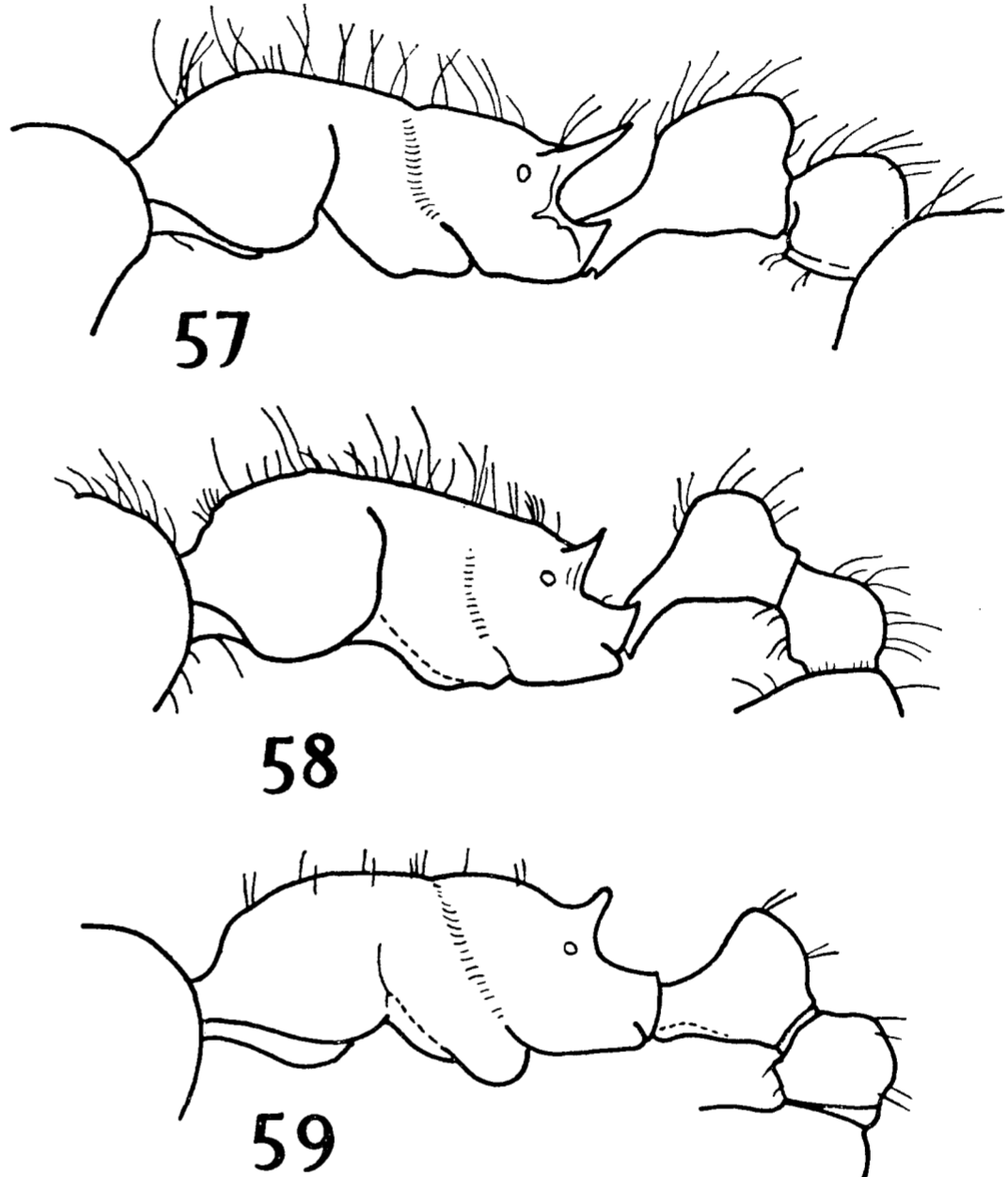


Fig. 57. *Tetramorium pacificum* Mayr, worker from Afiamalu, Upolu (ECZ). Fig. 58. *Tetramorium tonganum* Mayr, worker from N. Side, Pago Pago, Tutuila (ECZ). Fig. 59. *Tetramorium simillimum* (Fr. Smith), worker from Jarvis I., Line Is. (W. W. Graf).

Tetramorium tonganum Mayr Fig. 58.

Tetramorium tonganum Mayr, 1870, Verh. Zool.-bot. Ges. Wien **20**: 38, worker (Type locality: Tongatabu, Tonga).

DISTRIBUTION: SAMOA: *Savai'i*: Asau, 170 m, lowland rain forest, nest under small trunk epiphyte (RWT and GE acc. 491). Ga'utavai, coastal coconut grove, nest under bark of coconut palm (RW and GE acc. 383). Gagaifoumauga, rain forest, moss on rotting log (GE acc. S6). Lotogo, 370 m, strays on *Ficus* tree, 35 m, above ground (RWT and GE acc. 459). Matega, 65 m, banana clearing, forest edge, strays under bark and on surface of rotting log (RWT accs. 396, 401); disturbed rain forest, strays on ground and in litter (RWT and GE acc. 402). Patamea (NK, 1955). Puapua (NK, 1955). **Sala'ilua (1924). Samalaeulu, coastal rain forest, one colony and several series of strays under small trunk epiphytes (RWT and GE accs. 509, 510, 515). *Upolu*: Afiamalu, 700 m, disturbed forest, berlesates, ground moss (GE acc. 53). Le Mafa, 400 m, rain forest, berlesates, leaf litter, soil, moss and epiphytes (GE accs. 61, 63, 66). Malololelei Road, 500-600 m, beating shrubbery (ECZ, 1940; NK, 1955). Mafa Pass Road (NK, 1955). Tiapapata, rain forest, berlesates, moss on trees, vines, and epiphytes (GE accs. 71, 72, 74). **Vailima (1924). *Tutuila*: N of Aloau, 430 m, stunted forest, berlesates, moss on logs, with alate queens, 13.VII.1962 (GE accs. T16, T18). Amouli, 160 m, beating (ECZ, 1940). **Fagasa (1923). Fagatogo, 200 m, beating shrubbery (ECZ 1940). Reservoir, Fangatanga (ECZ, 1938). Le Mafa, 250 m, rain forest, berlesate, moss on rotting log (GE acc. T9). **Leone Road (1923). Malaeini, stunted forest, berlesate, moss on rotting log (GE acc. T21). Matafao Trail, 100 m, beating dead branches (ECZ, 1940). Maupasaga, Fagasa Trail (D. T. Fullaway 1930). Pago Pago, N. side, 400 m, beating dead branches (ECZ 1940). Pago Pago (EHB, 1935; NK 1941; **1924). Between Oloaua and Olomanu, rain forest, berlesates, and moss on trees and epiphytes (GE accs. T11, T12). All Samoan records by Ettershank & Taylor from March through July 1962. TONGA: Mayr (1870). *LINE IS.: *Christmas* (1934). *SOCIETY IS.: *Huahine* (1934). *Moorea* (1934). *Raiatea* (1934). *Mehetia* (1934). *AUSTRAL IS.: *Rimatara* (1934). *Rurutu* (1934). MARQUESAS: **Hiva Oa* (1929). **Fatu Hiva*. Cheesman & Crawley (1928): *Nuku Hiva* (1925). HAWAII: **Oahu* (1927). *Kure Island*, September 1961 (G. D. Butler).

Tonganum ranges more or less continuously from New Britain to Micronesia and eastern Polynesia. It is apparently absent from New Guinea, New Caledonia, and Australia. The compact, restricted nature of this distribution suggests that it must be natural at least in part. This interpretation is supported by the presence on New Guinea of a related endemic species, *wagneri* Viehmeyer. Whether *tonganum* is native to all or part of its current range in Polynesia is not ascertainable on the basis of present evidence.

Rogeria exsulans Wilson and Taylor, new species Fig. 60.

DIAGNOSIS AND RELATIONSHIPS: This species is a true member of *Rogeria s. str.*, a genus of rather rare species hitherto known only from the New World tropics (W. W. Kempf 1962). We are grateful to Dr Kempf for comparing paratypes with his extensive collection of *Rogeria* and aiding in making the following diagnosis. *Exsulans* is most similar to *germaini* Emery of Brazil and *scabra* Weber of Cuba.

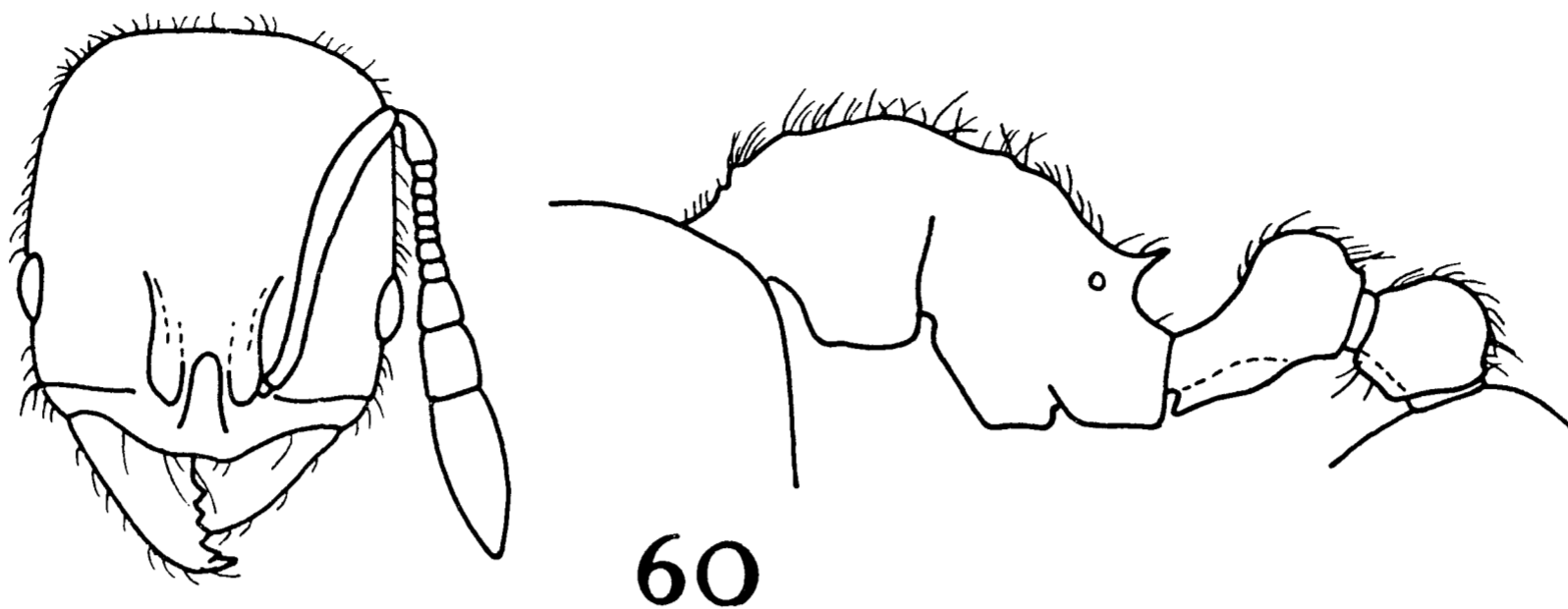


Fig. 60. *Rogeria exsulans* Wilson and Taylor, paratype worker (Afiamalu, Samoa, collected by E. C. Zimmerman).

It differs from *scabra* in the following characters: (1) in *exsulans* the space between the posterior margin of the propodeal spiracle and the posterior border of the declivitous propodeal face is approximately equal to the maximum width of the spiracle, whereas in *scabra* this space is less than 1/2 the maximum spiracular width; (2) the subpetiolar flange is wider in *exsulans*, especially in the anterior 1/2; (3) the scapes of *exsulans* are proportionately longer; in repose and directed toward the occipital angles they fail to reach the border of the angles by approximately their own maximum width; whereas in *scabra* the scapes fail to reach the borders by nearly 2× their maximum width; (4) in *exsulans* the mesosomal sculpturing is composed of a rugoreticulum with no distinct longitudinal orientation; in *scabra* the major mesosomal sculpturing is composed predominantly of longitudinally oriented rugae. In other details of body form, sculpturing, and color the 2 species are very similar. The differences cited have been noted to hold consistently for extensive series of *scabra* examined from several localities in central and western Cuba. (The 3 Cuban forms *brunnea* Santschi 1930, *scabra* Weber 1934, and *caraiba* Santschi 1936 are all very close and very possibly conspecific with one another. Cuban material in the Museum of Comparative Zoology, Harvard University, gathered about the syntypes of *scabra* is highly and continuously variable in the characters which are supposed to be diagnostic for *brunnea* and *caraiba*).

Exsulans differs from *germaini* by the strictly decumbent and relatively long pilosity of the gaster and the completely rugoreticulate sculpture of the thoracic dorsum.

The above species are in turn related to *belti* Mann of Central America, *cubensis* Santschi of Cuba, and 2 or 3 additional species, probably undescribed, which we have obtained from southern Mexico. From all of these *exsulans* can be easily separated by the combination of relatively large eye size (EL 0.09 mm); relatively small, anteriorly placed propodeal spiracle; well developed subpetiolar flange; moderately large total size; and dense rugoreticulate mesosomal sculpturing. Finally, *exsulans* is completely distinct from *manni*, *stigmatica* and *sublevinodis*, the only other Old World members of *Rogeria s. lat.* The characters shown in fig. 60 can be used to separate it from these other species.

Holotype worker: HW 0.57 mm, HL 0.66 mm, SL 0.46 mm, length of 1st segment of antennal club 0.07 mm; length of 2nd club segment 0.09 mm, length of 3rd (terminal) club segment 0.27 mm, length of funiculus exclusive of club 0.24 mm, EL 0.09 mm (eye contains about 15 ommatidia).

MATERIAL EXAMINED: SAMOA: *Upolu*: Afiamalu, 700 m, under dead bark, 9.XI.1940 (ECZ); rain forest, from fern and moss on tree trunk, 19.I.1956 (TEW); disturbed rain forest, berlesates of moss on logs (RWT acc. 2318; GE acc. 54) and berlesates of moss on tree trunks 8-9 m from ground (RWT acc. 2308; GE acc. 45); strays from rotting logs and small fragments of rotting wood on forest floor (RWT accs. 223, 282, 339, 601). All RWT and GE collections were made in III and IV, 1962. The holotype was drawn from the series collected in 1956 by T. E. Woodward.

As noted in the comparative description given above, *exsulans* is a distinct species closely allied to a complex of species endemic to Mexico, Central America, and the West Indies. None of these forms is known to have been dispersed by human commerce, and there is no basis to assume that *exsulans* reached the western Pacific in this manner. Furthermore, *exsulans* itself is not known from the New World. Until contrary evidence is obtained *exsulans* should be tentatively considered an endemic Samoan species. If this is truly the case, it represents one of the most anomalous discontinuous distributions found in the ants. A roughly parallel case is seen in the genus *Rhopalothrix*, which is represented by several species in the New World tropics and one undoubted endemic on New Guinea (Brown & Kempf 1960).

***Rogeria sublevinodis* Emery, new status** Fig. 61.

Rogeria stigmatica subsp. *sublevinodis* Emery, 1914, Nova Caledonia (Zool.) 1: 415, worker (Type locality: Raoua, Mare, Loyalty Is.).

DISTRIBUTION: SAMOA: *Savai'i*: Alagaogao, 100 m, banana plantation, strays from rotting wood on ground (RWT acc. 417). Falealupo, rain forest, from fragment of rotting wood on forest floor (RWT acc. 439). Gagaifoumauga, rain forest, berlesates of leaf mold, soil, and rotting log (GE accs. S4, S5). Lotogo, 350 m, rain forest, nest in fragment of rotting wood on forest floor (RWT acc. 471). Matega, 65 m, edge of rain forest and banana plantation, nest under bark of rotting log (RWT acc. 406). Mt. Matafa Rd., 200 m, rain forest, nest with alates, under moss and bark on rotting log: also strays under bark of rotting log, 19.III.1962 (RWT accs. 367, 368). *Upolu*: Falepuna, leaf litter at swamp edge (TEW, 1956). Le Mafa, 400 m, rain forest, berlesate of epiphytic fern bases on trees (GE acc. 66). Lauli'i (TEW, 1956). Matautu, from moss under *Ficus* (TEW, 1956). Poutasi, rain forest, leaf mold (TEW, 1956). Sale Puga, coastal *Futu* forest, leaf mold (TEW, 1956). Sliding Rock, 200 m, rain forest, colony in rotting wood fragment on forest floor (RWT acc. 285). Tanumalala, 350 m, disturbed and weed-overgrown rain forest, nest under leaf litter at side of rotting stump (RWT acc. 607). Utumapu, 400 m (TEW, 1956); rain forest, nest with alates under stones, 17.III.1962 (RWT accs. 567, 569). Vaipoto, rain forest, leaf litter and soil (TEW, 1956). *Tutuila*: Alega, coastal *Futu* grove, leaf litter and soil (TEW, 1956). N of Aloau, 450 m, stunted forest, berlesate of moss from rotting log (GE acc. T20); Pago Pago (collector unknown, 1910). Tafuna, rain forest, leaf mold and soil (TEW 1956). (All Samoan col-

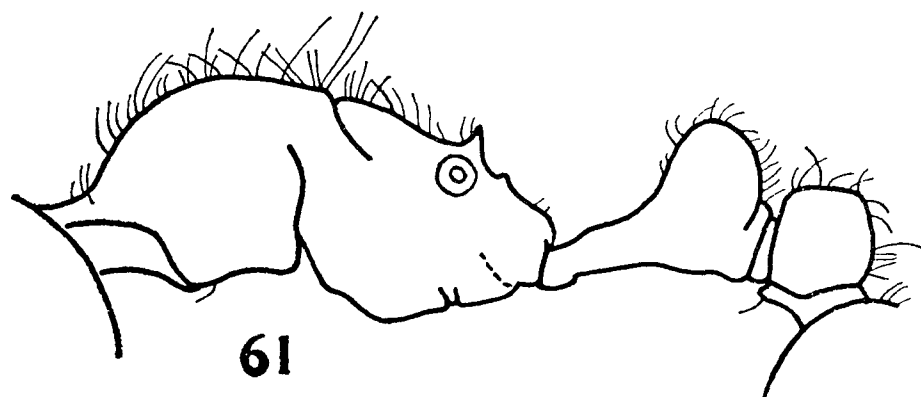


Fig. 61. *Rogeria sublevinodis* Emery, worker from Saleapuga, Upolu (TEW).

est, nest under leaf litter at side of rotting stump (RWT acc. 607). Utumapu, 400 m (TEW, 1956); rain forest, nest with alates under stones, 17.III.1962 (RWT accs. 567, 569). Vaipoto, rain forest, leaf litter and soil (TEW, 1956). *Tutuila*: Alega, coastal *Futu* grove, leaf litter and soil (TEW, 1956). N of Aloau, 450 m, stunted forest, berlesate of moss from rotting log (GE acc. T20); Pago Pago (collector unknown, 1910). Tafuna, rain forest, leaf mold and soil (TEW 1956). (All Samoan col-

lections by Ettershank & Taylor were made in III-VII.1962). SOCIETY: *Tahiti*: Rivnac, Punaauia Dist., "berlese—open field" (J. M. Dixon 1949; deposited in Chicago Museum of Natural History). *Raiatea*: Cheesman & Crawley (1928): "in the interior of the northern end of the island, at the head of a gully at 2000 ft. in dense scrub. Series of workers and portion of the nest which was in a rotten log..."

Sublevinodis occurs throughout the Fiji Is., even as far as Munia, Lau (collected by W. M. Mann in 1914). It is also known from the Loyalty Is. (type locality). From these parts of outer Melanesia its range extends apparently spottily to the Society Is. and Micronesia. It is replaced in New Guinea and the Solomons by *stigmatica* Emery, which is larger and with denser dorsal pedicellar sculpturing. We have been unable to find any significant differences among workers from Samoa, Tahiti and Fiji.

***Adelomyrmex* (*Arctomyrmex*) *samoanus* Wilson and Taylor, new species** Fig. 62.

DIAGNOSIS: Similar to the only other described species of the subgenus, *Adelomyrmex* (*Arctomyrmex*) *hirsutus* Mann of Fiji and New Caledonia, differing (in the worker caste) in having a much more deeply impressed metanotal groove and much heavier sculpturation, especially on head.

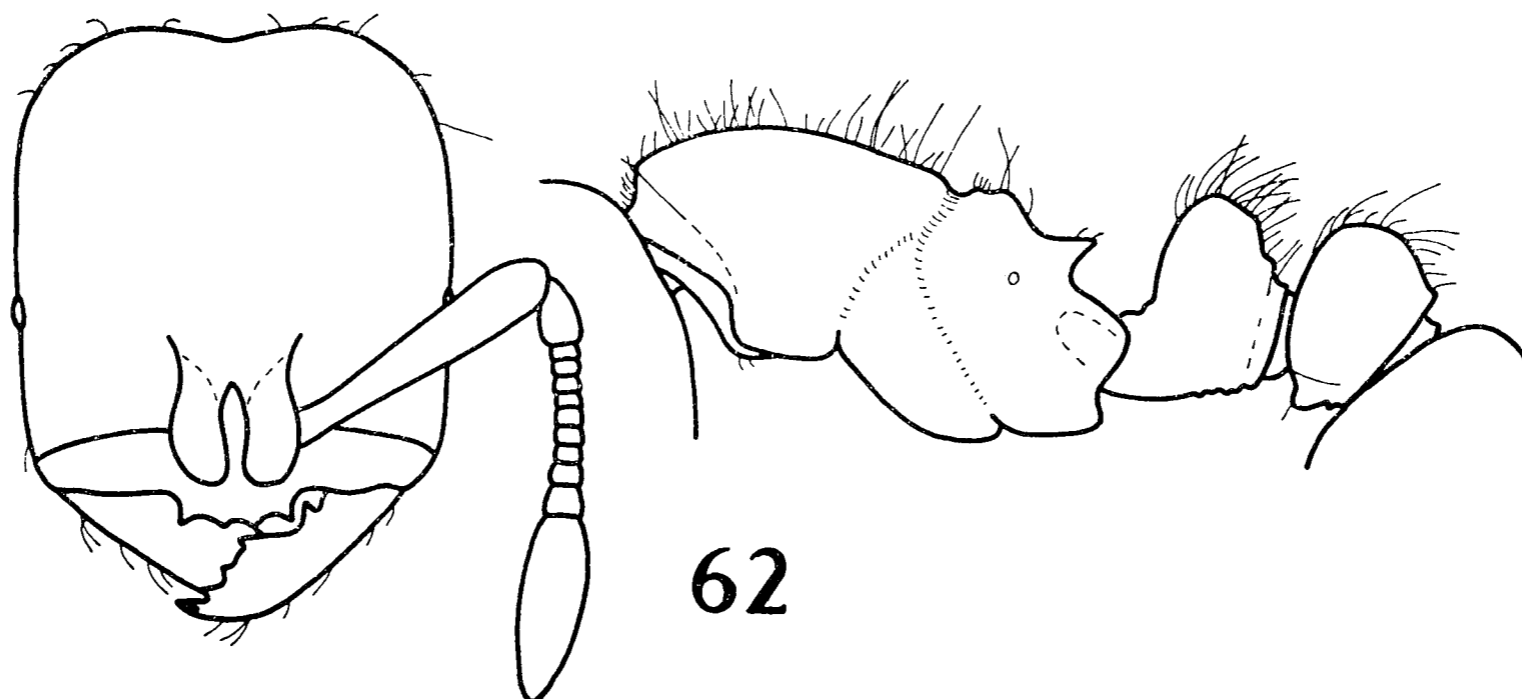


Fig. 62. *Adelomyrmex* (*Arctomyrmex*) *samoanus* Wilson and Taylor, paratype worker from the type locality, Utumapu, Upolu.

Holotype worker: HW 0.45 mm, HL 0.50 mm, CI 90, SL 0.31 mm, SI 69. Head, antenna, and body form of the very distinctive *Arctomyrmex* form shown in fig. 62. Mandibles feebly and longitudinally striate, their surfaces shining. Clypeus smooth and shining; almost entire remainder of head rugoreticulate, diameters of round forea-like interspaces about 0.01 mm, surface of interspaces shagreened and opaque, surfaces of reticulum itself feebly shining. Meso- and metathorax longitudinally rugose and feebly shining, prothorax and most of propodeum sparsely punctate and strongly shining. Petiolar node coarsely sculptured in a manner similar to most of cephalic surface. Postpetiole and gaster mostly sparsely punctate and strongly shining. [*A. hirsutus*, described from Fiji by Mann (1921) and more recently collected at several localities on New Caledonia by E. O. Wilson, has almost the entire surface of the body sparsely punctate and strongly shining.] Most of dorsal surface of head medium brown. Remainder of body light brown. Appendages clear brownish yellow.

Paratypes: Workers from Upolu and Tutuila do not deviate significantly from the holotype specimen. The HW of the single Tutuila specimens measured is 0.45 mm; that of the extensive Upolu series ranges 0.42–0.49 mm. The single Savai'i worker, on the other hand, is quite different. It is larger (HW 0.60 mm); longitudinal rugae extend from the mesothorax halfway across the pronotum, and the rugoreticulum of the petiole is more shallow than in other Samoan material.

MATERIAL EXAMINED: SAMOA: *Savai'i*: Gagaifoumauga, rain forest, berlesate, soil around tree roots, 1 worker, 14.V.1962 (GE acc. S4). *Upolu*: Le Mafa, rain forest, berlesate, leaf litter, 1 worker (GE acc. 63). Poutasi, rain forest, leaf mold, 9 workers (TEW 1956). Above Salani Falls, rain forest, leaf mold, 1 worker (TEW 1956). Utumapu, 130 m, 20 workers *including holotype*, 17.I.1956 (TEW). *Tutuila*: Tafuna, rain forest, berlesate, leaf mold and soil, 1 worker (TEW 1956).

Subfamily DOLICHODERINAE

Iridomyrmex anceps (Roger) Fig. 63.

Formica anceps Roger, Berl. Ent. Z. 7: 164–165, worker (Type locality: Malacca, Malaya).

Iridomyrmex gracilis subsp. *papuanus* Emery, 1897, Ann. Mus. Civ. Stor. Nat. Genova 18: 572, worker (Type locality: Kapa Kapa, New Guinea). **New Synonymy.**

Iridomyrmex anceps r. *papuanus*: Forel, 1901, Mitt. Zool. Mus. Berlin 2: 19, worker, queen, ♂.

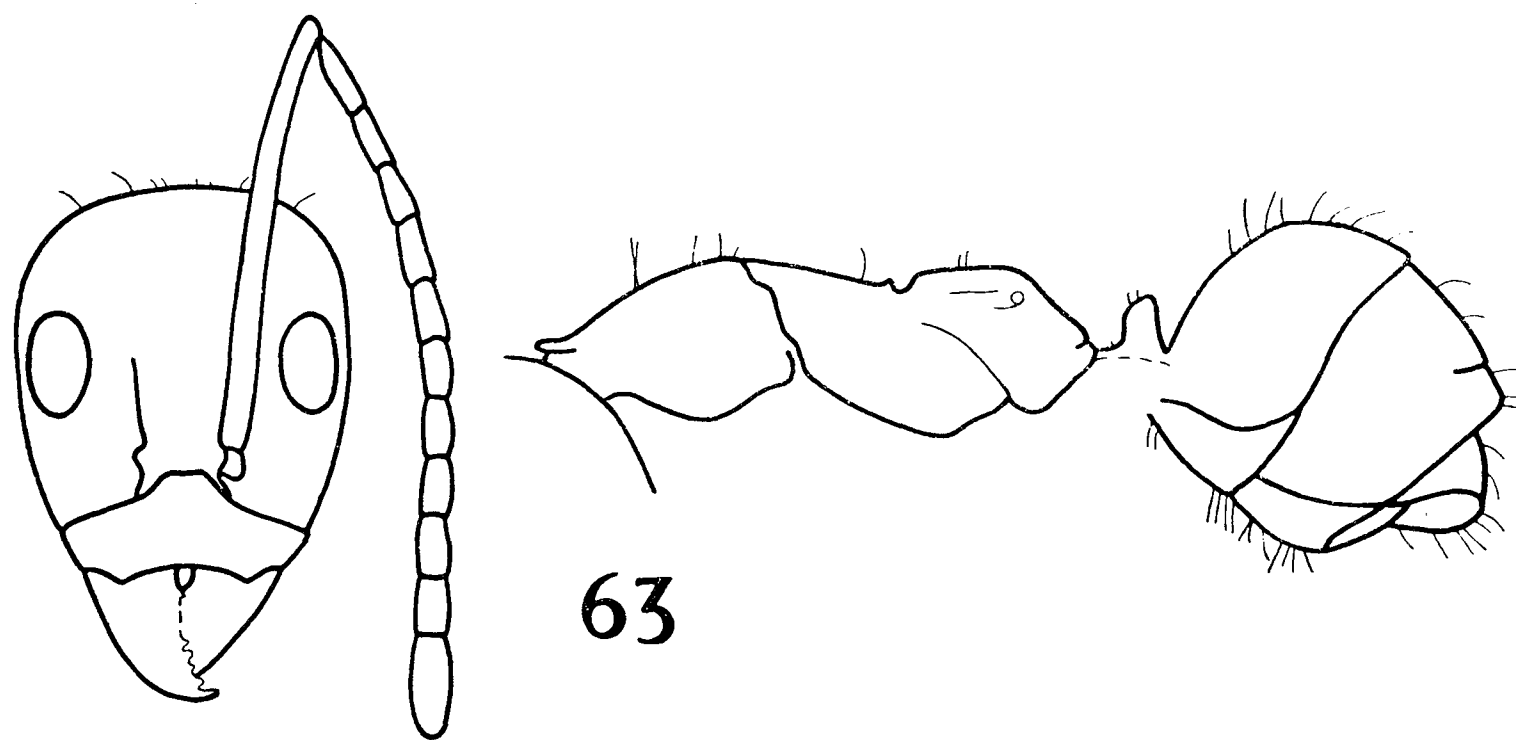


Fig. 63. *Iridomyrmex anceps* (Roger), worker from Akaiami, Aitutaki, Cook Is. (NK).

DISTRIBUTION: COOK IS.: *Aitutaki*: Akaiami (NK 1955).

Anceps is the most widespread of the Indo-Australian *Iridomyrmex*, ranging continuously from India to eastern Australia, through Micronesia and almost all of Melanesia. The above record is the first from Polynesia. Evidently the species is in the process of spreading with the help of man. We have recently seen the first series collected on Fiji; these originate from Nandi, Viti Levu (an international airport) and were taken by E. J. Ford, Jr., in May 1956. The great distance of the Cook Is. from the nearest source populations also indicates spread by commerce.

Iridomyrmex humilis (Mayr) Fig. 64.

Hypoclinea humilis Mayr, 1868, Ann. Soc. Nat. Modena 3: 164, worker (Type locality: Buenos Aires, Argentina).

DISTRIBUTION: HAWAII: *Oahu. Hawaii. Maui.*

Before it became established this famous South American pest species was frequently intercepted at the Honolulu quarantine station on goods coming from California during the 1930's (*1934a; Zimmerman 1940). It finally gained a foothold, probably in the Spring of 1940, in Fort Shafter, within the center of Honolulu. Zimmerman (1940) reported that when he examined the population about X.1940, "numerous strongly developed colonies" were present but all were confined to Fort Shafter. The species appeared to be in the act of eliminating other ant species it contacted, a destructive ecological trait it has exhibited elsewhere. Pemberton (1944) reported that in 1944 the range of the species occupied a growing area two-fifth by four-fifth kilometer within the military reservation, but that it was apparently still confined to this one locality.

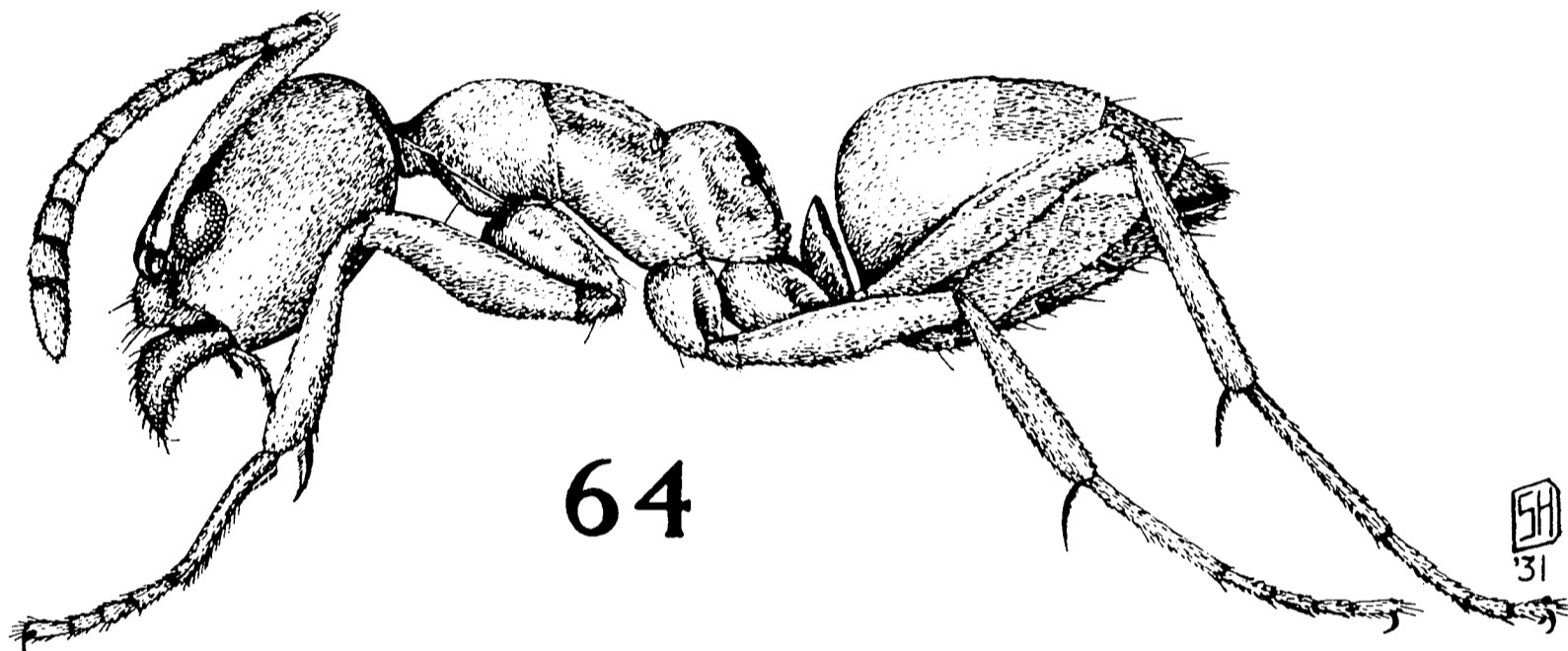


Fig. 64. *Iridomyrmex humilis* Mayr, worker from United States. (After S. H. DeBord in M. R. Smith, 1947).

By September 1949, the species had expanded beyond Fort Shafter. On this date W. Thomsen and G. D. Peterson, Jr. (Proc. Hawn. Ent. Soc. 14: 14, 1950) found colonies at Pearl Harbor, at that time "the farthest known extension" from Fort Shafter. By October 1949, Pemberton and Thomsen (Ibid. 14: 16, 1950) found *humilis* at Nuuanu Moanalua Gardens, Moanalua golf course, and north Halawa Valley. In November of the same year, Thomsen & Pemberton (Ibid. 14: 20) traced colonies throughout the Ewa Plantation, "from Pump 10 to the western end." Interestingly, these investigators suggested that the original point of infestation was an army camp, since abandoned, in kiawe growth nearby. By 1949 the infestation was obviously spreading by jumps, aided by commerce. On 29 September, 1950, Thomsen (Ibid. 14: 219, 1951) discovered *humilis* on Route 212 four-fifths kilometer S of Mauna Kapu, in the SE ridge of the Waianae Range, Oahu, at 750 m elevation. From this center the infestation continued about two-fifths kilometer in either direction along the road.

In November 1950, populations of *humilis* were reported from Kamuela, Hawaii, and Makawao, Maui, by J. E. Eckert (Ibid. 14: 222). Their origins were unknown, although Eckert suggested that the Maui population, which was in a flourishing condition, was es-

established by troops quartered in the area during World War II.

Subsequent reports by Thomsen, Chilson, K. Ito, L. F. Steiner, and R. H. van Zwaluwenburg in the "Notes and Exhibitions" sections of the *Proc. Hawn. Ent. Soc.* follow in detail the discoveries of additional infestations on Oahu subsequent to 1950. Among the more noteworthy records is that of Chilson (1956) who found *humilis* on 15 March 1955 at Kaneohe, the first record for windward Oahu. It is clear that, as in other countries, the species disperses on its own only very slowly, apparently solely by emigration of colonies over the ground. Nuptial flights involving queens are rare or non-existent. The longer jumps in distribution are made by colonies carried through human commerce. As Thomsen has pointed out, many of the Hawaiian local populations are associated with army camps and bivouacs, and it is reasonable to assume that the colonies were carried inadvertently with supplies and equipment. The species probably became firmly established and widely distributed in this way during World War II and shortly afterward.

The authors cited confirm what has been observed elsewhere, that *I. humilis* excludes other larger ant species, including the formidable *Pheidole megacephala*. One species found to be compatible with it on Hawaii is the diminutive *Cardiocondyla nuda*.

Zatapinoma wheeleri Mann Fig. 65.

(Doubtful record).

Zatapinoma wheeleri Mann, 1935, *Psyche* 42: 36-37, fig. 2, soldier (Type locality: "taken in quarantine at Honolulu on plants from Samoa").

While *wheeleri* appears to be a valid species, its presumptive origin in Samoa (taken in quarantine at Honolulu) must be doubted until additional material is obtained. When it

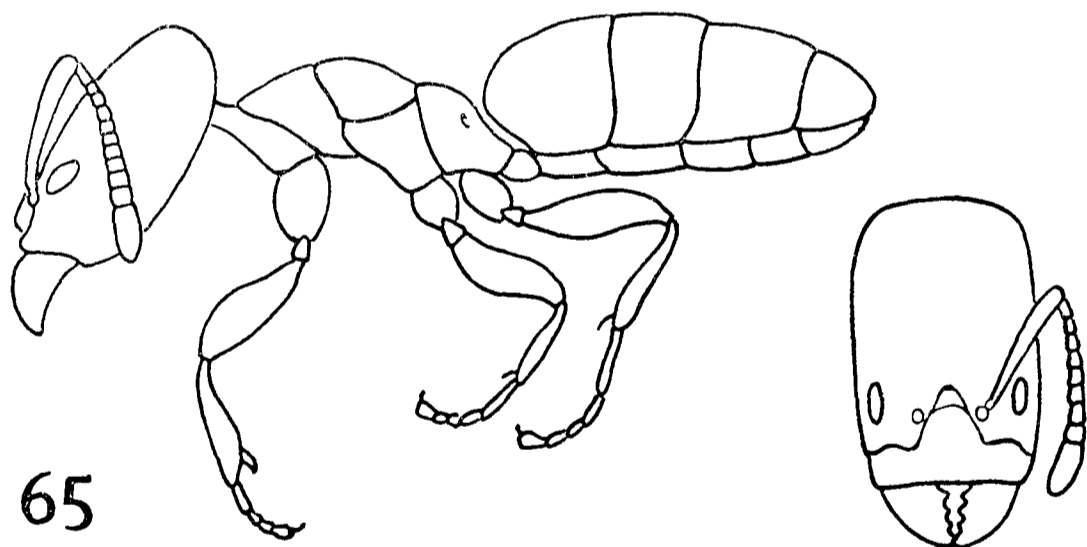


Fig. 65. *Zatapinoma wheeleri* Mann. Syntype soldier (after W. M. Mann).

is recalled that Samoa has been so intensively collected for ants, especially arboricolous species, the complete lack of additional verified records renders the existence of *Zatapinoma* in the islands improbable. Moreover, no species of the genus has been recorded from Melanesia. On the other side, significance may be lent to series of winged queens of 2 undescribed species that we have recently seen from the Palau Is. The possibility exists that these ants occupy unusual habitats

that make them inaccessible to usual collecting methods.

Tapinoma melanocephalum (Fabricius) Fig. 66.

Formica melanocephalum Fabricius, 1793, *Ent. Syst.* 2: 353, worker.

Tapinoma (Micromyrma) melanocephalum var. *australis* Santschi, 1928, *Insects of Samoa* 5: 53, worker (Type locality: "Mog. Narbor", Espiritu Santo, New Hebrides). **New Synonymy.**

DISTRIBUTION: SAMOA: *Savai'i*: Alagaogao, 100 m, near Neiafu, strays on roadside

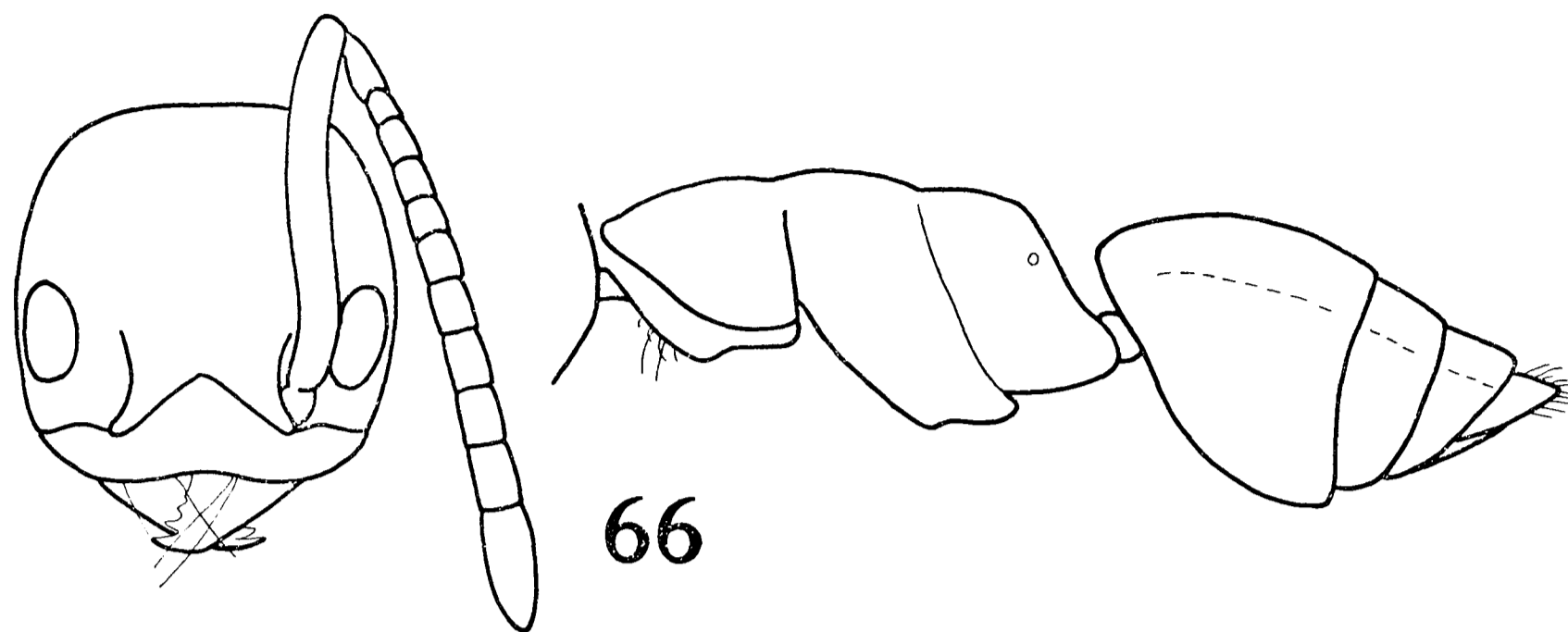


Fig. 66. *Tapinoma melanocephalum* (Fabr.), worker from Opoa, Raiatea (NK, 1955).

weeds (RWT and GE acc. 416). Falealupo, dry rain forest, strays on ground (RWT and GE acc. 424). Lotogo, 370 m, rain forest, strays on *Ficus*, 35 m above ground level (RWT acc. 459); banana plantation, strays on foliage (RWT acc. 469). Matega, 65 m, banana clearing at edge of rain forest, strays from moss and leaf mold on boulders (RWT acc. 390); rain forest, strays from ground layer (RWT acc. 409). Papa, banana plantation, strays on banana plants (RWT acc. 375); nest under bark of dry dadap log (RWT acc. 378). Puapua (NK, 1955). Samalaeulu (NK, 1955). Sili (NK, 1955). **Safune (1924). *Upolu*: Apia (ECZ, 1940; **1923). Lefanga (NK, 1955). Le Mafa, strays around roadside cutting, 29.III.1962 (RWT acc. 635). Mo'ata, near Apia, several nests in hollow twigs in mangrove forest (RWT acc. 560). Tanumulala, 350 m, disturbed weed overgrown rain forest, strays ex foliage (RWT acc. 610). Tapatapao, 250 m, beating dead branches (ECZ, 1940). Tapueleele (NK, 1955). *Tutuila*: N of Aloau, 450 m, stunted forest, berlesate, moss on logs (GE acc. T17). **Amouli (1923). **Leone Road (1924). N. side, Pago Pago, 200 m, from tree fern (OHS, 1940). Pago Pago (Wheeler 1931; **1923). Utulei, 150-200 m, beating (ECZ, 1940). Recorded from Samoa by Mayr (1876). TONGA: Recorded by Mayr (1876). No further data (H. Cottrell-Dormer). TOKELAU IS.: *Fakaofo* (EHB, 1924). COOK IS.: *Rarotonga*. SOCIETY ISLANDS: *Moorea*: *(1906-07, 1925). Baie de Cook (NK, 1955). *Tehau Pt. (1934). *Tahiti*: *Fautaua, 250 m. "Abundant" around Papeete in 1925 (Cheesman & Crawley, 1928). Papenoo Valley (NK, 1955). *Valley of Pirae, Pare (1934). *Tuauru. *Urufara Valley, 100 m (1934). *Raiatea*: Opoa (NK, 1955). Uturoa (Cheesman & Crawley, 1928). PHOENIX IS.: *Canton*, 1940-41, *vide* van Zwaluwenburg (1943). *AUSTRAL IS.: *Maria*, NE islet (1934). *TUAMOTU IS.: *Timoé*, northern islet (1934). *GAMBIER IS.: *Akamaru*, N. side (1934). *MARQUESAS: *Eiao*, 500 m. *Hatutu*, 300 m. *Ua Huka*: Teanatuhiwa, 100 m; Hanapoua Valley. *HENDERSON I.: N. side (1934). *FLINT I. (1934). HAWAII: "Honolulu and Waianae, Oahu; also on Lanai and Molokai and no doubt the other islands" (Perkins in Forel, 1899). Emery (1899) records *melanocephalum* as one of the 4 ant species collected on Laysan by Schauinsland in 1896-97. Wheeler (1934a) reported it to be widespread on Oahu, Lanai, Molokai, Hawaii, Nihoa, Midway, Ocean I., and Laysan. Clagg (1957) reports that the species was formerly a household pest in Honolulu but disappeared by 1949. Some additional collections were made in the Pearl Harbor area in 1956. In September 1961, G. D. Butler collected the species on Kure I.

The origin of this ubiquitous tramp species is unknown. Related species are native to various parts of Africa, southeastern Asia, and the New World subtropics and tropics.

Tapinoma minutum Mayr Fig. 67.

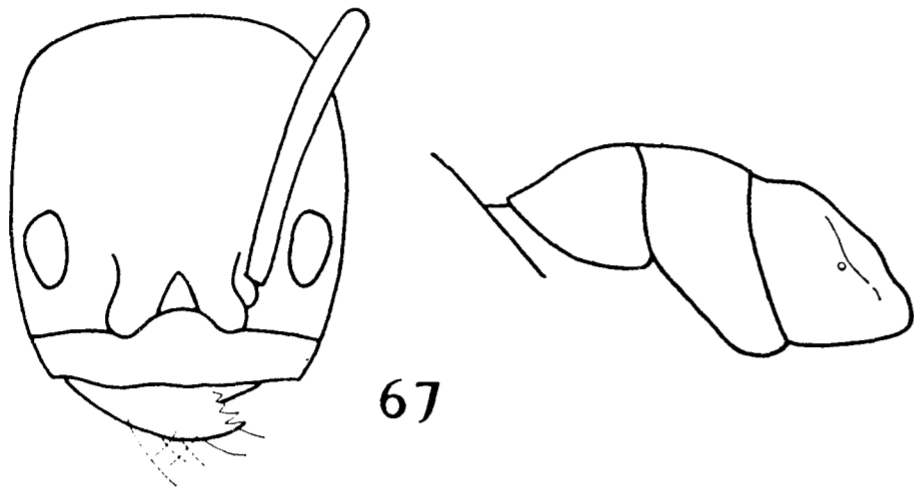


Fig. 67. *Tapinoma minutum* Mayr, worker from Afiamalu, Upolu (ECZ).

Tapinoma minutum Mayr, 1862, Verh. Zool.-bot. Ges. Wien **12**: 703, worker (Type locality: New South Wales).

Prenolepis minutula atomus var. *fullawayi* Wheeler, 1912, J. N.Y. Ent. Soc. **20**: 46, worker (Type locality: Guam). **New Synonymy.**

DISTRIBUTION: SAMOA: *Savai'i*: Falealupo, dry forest, strays from foliage (RWT acc. 424). *Upolu*: Afiamalu, 700 m, beating (ECZ, 1940); disturbed rain forest, strays on ground and under bark of log (RWT accs. 277, 341).

Mo'ata, coastal mangroves, nest with ♂♂ in dead twig, 18.III.1962 (RWT acc. 558).

We have seen additional material of this inconspicuous little species from Queensland, New Guinea, Solomons, Fiji, and Micronesia. The new synonymy is based on examination of Wheeler's types of *fullawayi*.

Technomyrmex albipes (Fr. Smith) Fig. 68.

Formica (Tapinoma) albipes Fr. Smith, 1861, Proc. Linn. Soc. London, Zool. **6**: 38, worker. (Type locality: Tondano, Celebes).

Technomyrmex albipes var. *vitiensis* Mann, Bull. Mus. Comp. Zool., Harv. **64**: 473, worker (Type locality: Nadarivatu, Viti Levu, Fiji). **New Synonymy.**

Technomyrmex albipes st. *rufescens* Santschi, 1928, Rev. Suisse Zool. **35**: 70, fig. 1, worker (Type locality: Aiwa, Lau, Fiji). **New Synonymy.**

DISTRIBUTION: SAMOA: *Savai'i*: Asau, 170 m, disturbed rain forest, nest in leaves in tree crotch (RWT acc. 498). Falealupo, dry rain forest, nest from leaf mold in tree crotch (RWT acc. 430). Gagaifoumauga, rain forest, berlesates, fern roots and moss, and under bark of tree, 8 m from ground (GE accs. 51, 52). Ga'utavai, coastal village, nest with ♂♂ under bark of coconut palm, 19.III.1962 (RWT acc. 382). Lotogo, 340 m, rain forest, strays from tree trunks and foliage (RWT accs. 451, 459). Matega, 65 m, banana clearing, edge of rain forest, strays from boulders and rotting logs (RWT accs. 390, 401, 404, 409). Mt. Matafa, rain forest, strays from roadside weeds, and nest under small epiphyte or tree trunk (RWT accs. 532, 538). Palauli (NK, 1955). Puapua (NK, 1955). **Safune, 600-1300 m, rain forest (1924). Samaeulu, coastal rain forest, strays from foliage (RWT acc. 509). *Upolu*: Afiamalu, 700 m, workers in rotting logs (OHS, 1940) and ♂♂ at light, 10.VI. and 5.VII.1940 (OHS and ECZ); strays from weeds and grasses in overgrown garden (RWT accs. 252, 532); disturbed rain forest, strays from foliage (RWT acc. 606); berlesate, tree moss 8 m from ground (GE acc. 40). **Apia (1925). Mafa Pass, ♂, 10.II.1956. Malololelei Road, 500 m (OHS, 1940; **1925). Sinaele, 400 m (OHS, 1940). Tanumalala, 350 m, disturbed rain forest, strays from foliage (RWT acc. 606). Tapatapao (Lanufao Trail), 400 m, sugar cane (OHS, 1940). Utumapu, rain forest, nest in dry rot-

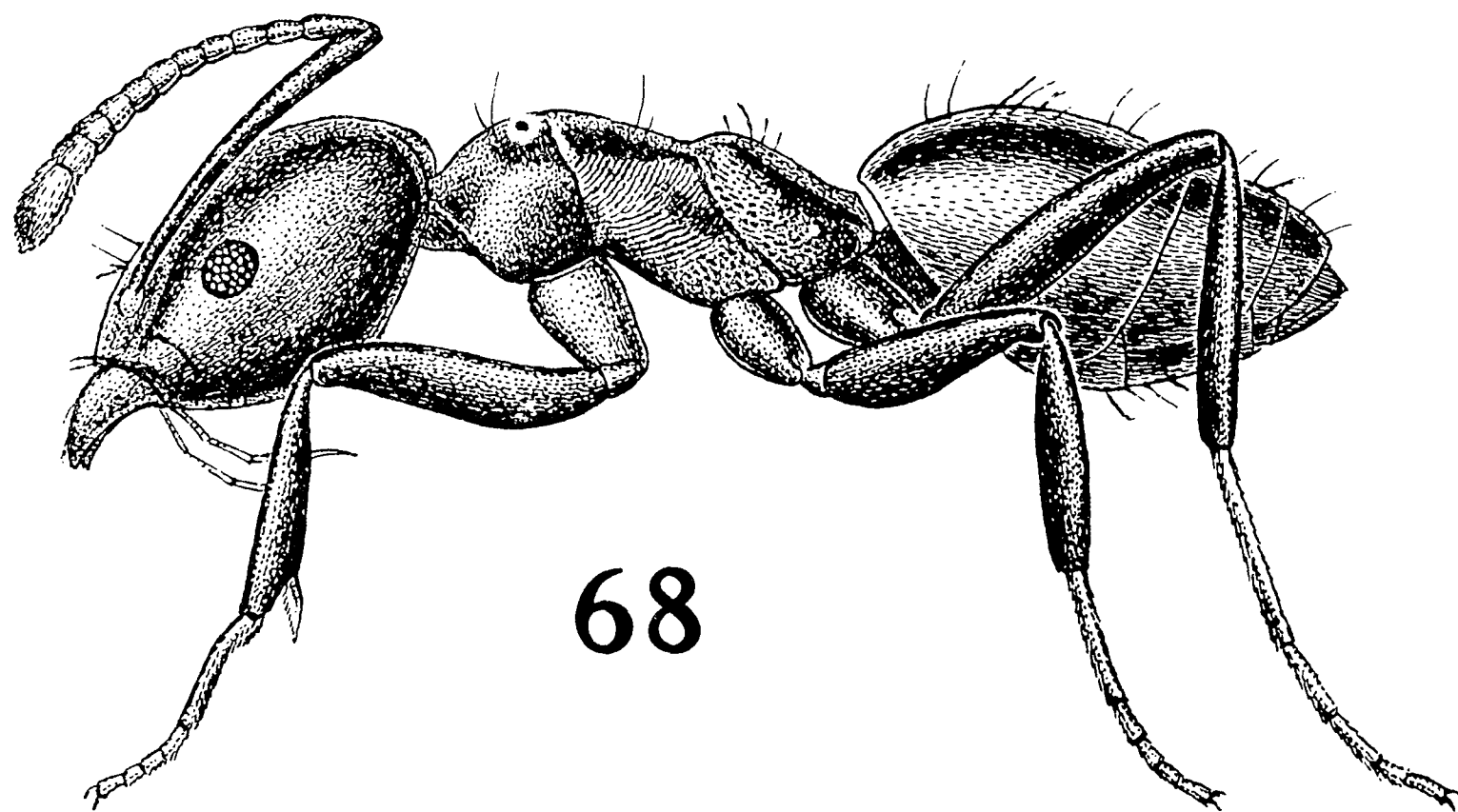


Fig. 68. *Technomyrmex albipes* (Fr. Smith). Worker from Koror (NE), Palau, Micronesia.

ting log (RWT acc. 578). **Vaea, 350 m (1924). **Vailima (1924). *Tutuila*: Afono Trail (W. Side), 150 m (ECZ 1940). Amanave (OHS 1940). Amouli, 250-300 m (ECZ, 1940; **1923). Aua-Afono (Fullaway 1930). Fagatogo, 300 m, beating shrubbery (ECZ 1940). Fagasa Trail (D. T. Fullaway, 1930). Leone-Aule (Fullaway 1930). Mt. Pioa, beating shrubbery, ♂, 29.VIII.1940 (ECZ). Pago Pago (N. Side), beating dead branches, 400 m (ECZ, 1940) **Pago Pago (1924). **Fagasa (1923). *Manua*: *Ta'u*: Luma (W. Harris, 1937). Recorded from Samoa by Mayr (1876). *TONGA*: *Tongatabu*: Nukualofa (NK, 1956). Haamea (NK, 1956). *Vava'u*: Falevai (NK, 1956). Neiafu (NK, 1956). *Eua*: Ohonua (NK, 1956). Recorded from Tonga by Mayr (1876). *COOK IS.*: *Rarotonga*: 300 m (G. P. Wilder 1929). Avarua (W. M. Wheeler 1914). *TOKELAU IS.*: *Fakaofu* (EHB, 1924). *SOCIETY IS.*: *Moorea* (*1906-07, 1925). *Faaroa, 300 m. Baie de Cook (NK, 1955). *Tahiti*: *Tuaruru. *Fautaua Vall. (1934). *Faraura Vall., Hitiaa, 150 m. *Papeari. *Arihiri, Pare (1934). *Lake Vaihiria (1927). *Mt. Aorai Trail, 1150 m (1934). Vallée de la Mission, 3.2 km inland (1925; Cheesman & Crawley 1928). Coast-hills behind Papeete (1925; Cheesman & Crawley, 1928). Vaitepiha Vall. (1925; Cheesman & Crawley 1928). Papenoo Vall. (NK, 1955). *Raiatea*: Opoa (NK 1955). *(1925). *Tahaa*: Tiva (NK, 1955). *NW ridge of Mt. Turi, 500-700 m (1934). *AUSTRAL IS.*: *Raivavae*: E. and W. slopes of Mt. Muanui, 150-250 m (1934). Near Unurua (1934); S. slope of Pic Rouge (1934). *Tubuai*: Rautaro Islet (1934). *Rimatara*: Maraitere (1934). *Rurutu*: SW slope of Mt. Manureva, 300 m (1934). **TUAMOTU IS.*: *Timoé*, north islet (1934). **GAMBIER IS.*: *Agakauitai* (1934). *Mangareva* (1934). *Akamaru* (1934). *Taravai* (1934). *MARQUESAS*: Wheeler (1932b, 1933d) lists many records of collections, made chiefly in the Twenties, from Hiva Oa, Tahuata, Fatu Hiva, Moho Tane, Nuku Hiva, Ua Huka, and Eiao. The localities ranged from near sea level to 800 m. On the basis of comparative collections it is clear that *T. albipes* is a dominant ant species in this archipelago. **HENDERSON I.*: N. and NW side (1934). **PITCAIRN I.*: N. side (1934). **HAWAII*: Wheeler (1934a) records this species from Kauai, Oahu, and Molokai. Curiously, it was not present in the collections studied by Forel in 1899; it might well have been introduced through human commerce in the intervening decades.

Donisthorpe (1932: 465) identified *Formica albipes* Fr. Smith 1861 as synonymous with *F. detorquens* Walker 1859 and in subsequent publications (1932-1950) used the latter name. This is unfortunate, since *albipes* had been used countless times in reference to this ecologically very important species, and a clear case for conserving it was evident. Other authors since 1932 have continued to use *albipes*. Now it appears that Donisthorpe's synonymy was not justified. Brown (1958) states: "In 1950, the late Mr. John Clark told me that he had learned that the type of Walker's *detorquens* was a badly damaged female specimen, the identity of which could not certainly be made out." In order to promote nomenclatural stability in a case where it is badly needed, it is here proposed to treat *detorquens* as a *nomen dubium* and to follow the century of continuous usage of the name *albipes*.

The species is the most widespread of all the Indo-Australian *Technomyrmex*, ranging as a dominant ant from India to eastern Australia and throughout the Pacific, including Melanesia and Micronesia.

Subfamily FORMICINAE

Anoplolepis longipes (Jerdon) Fig. 69.

Formica longipes Jerdon, 1851, Madras J. Lit. Sci. **17**: 122, worker.

DISTRIBUTION: SAMOA: *Savai'i*: Alagaogao, 100 m, plantation, tending aphids on cocoa flower stalks (RWT acc. 415). **Fagamalo (1925). Falealupo, dry forest, nest under stone (RWT acc. 428) and strays from foliage (RWT acc. 425). Fanga (NK, 1955). Ga'utavai, coastal coconut plantation, nest under bark of coconut trunk (RWT acc. 383). Manase, native village, strays from roadside weeds (RWT acc. 507). Patamea (NK, 1955). **Safune (1925). Salelologa, strays around house (RWT acc. 547). Samalaeulu (NK, 1955); coastal rain forest, strays from vegetation (RWT acc. 509). Sili (NK, 1955). Vaisala, native village, strays from cocoa-fermenting bin (RWT acc. 467). *Upolu*: Apia (ECZ, 1940; **1923). Falepuga, seashore (OHS, 1940). Lau'i'i (TEW, 1956). Malololelei Road, 400 m (OHS, 1940). **Mulifanua (1925). Sa'agafou, lowland rain forest, strays from foliage (RWT acc. 600). **Siumu (1923). Tapatapao, 300 m (OHS, 1940). *Tutuila*: Afono Trail, W. side, 80 m (OHS, 1940). Amouli, 250-300 m (ECZ, 1940; **1923). Aua (EHB, 1935; OHS, 1940). Breaker Point (OHS, 1940). Fagatogo (OHS, 1940). Reservoir, Fangatanga (ECZ, 1938). **Leone Road (1925). Mt. Pioa, 300 m (OHS, 1940). Naval Station, male at light, 11.VIII.1940 (OHS, ECZ). Pago Pago (EHB, 1924; NK, 1941; **1925). *Manua*: *Ta'u* (A. F. Judd 1926; **1923, 1926). Recorded from Samoa by Gustav Mayr (1870). TONGA: *Vava'u*: Neiafu (NK, 1956). Recorded by Mayr (1870) from Tonga, no further locality. WALLIS: Recorded by Emery (1914a) from material in the Paris Museum. ROTUMA: Paho, 30-200 m. Saluaka, 80 m. Sölkope, 0-130 m. (Rotuma collections all by H. St. John, VIII.1938). ELLICE IS.: Recorded by Mayr (1870). LINE IS.: *Fanning* (S. C. Ball, 1924). TOKELAU ISLANDS: *Fakaofu* (EHB 1934). COOK IS.: *Rarotonga* (C. E. Clarke 1937). SOCIETY IS.: *Moorea*: Baie de Cook (NK, 1955). *Tehau Pt. (1934). *Tahiti*: *Arihiri, Pare (1934). *Arue (1941). *Blue Lagoon (1934). *Fautaua Valley (1934). *Papeete (1926, 1932). Taharaa, near Pt. Venus (RWT, 1960). *Tehau Pt. (1934). *Raiatea*: *Faaroa Bay (1934). Opoa (NK, 1955). *Huahine*: Haapu (NK, 1955). Abundant on Tahiti and Raiatea in 1925 (Cheesman & Crawley 1928). *AUSTRAL IS.: *Rimatara*: Oromana

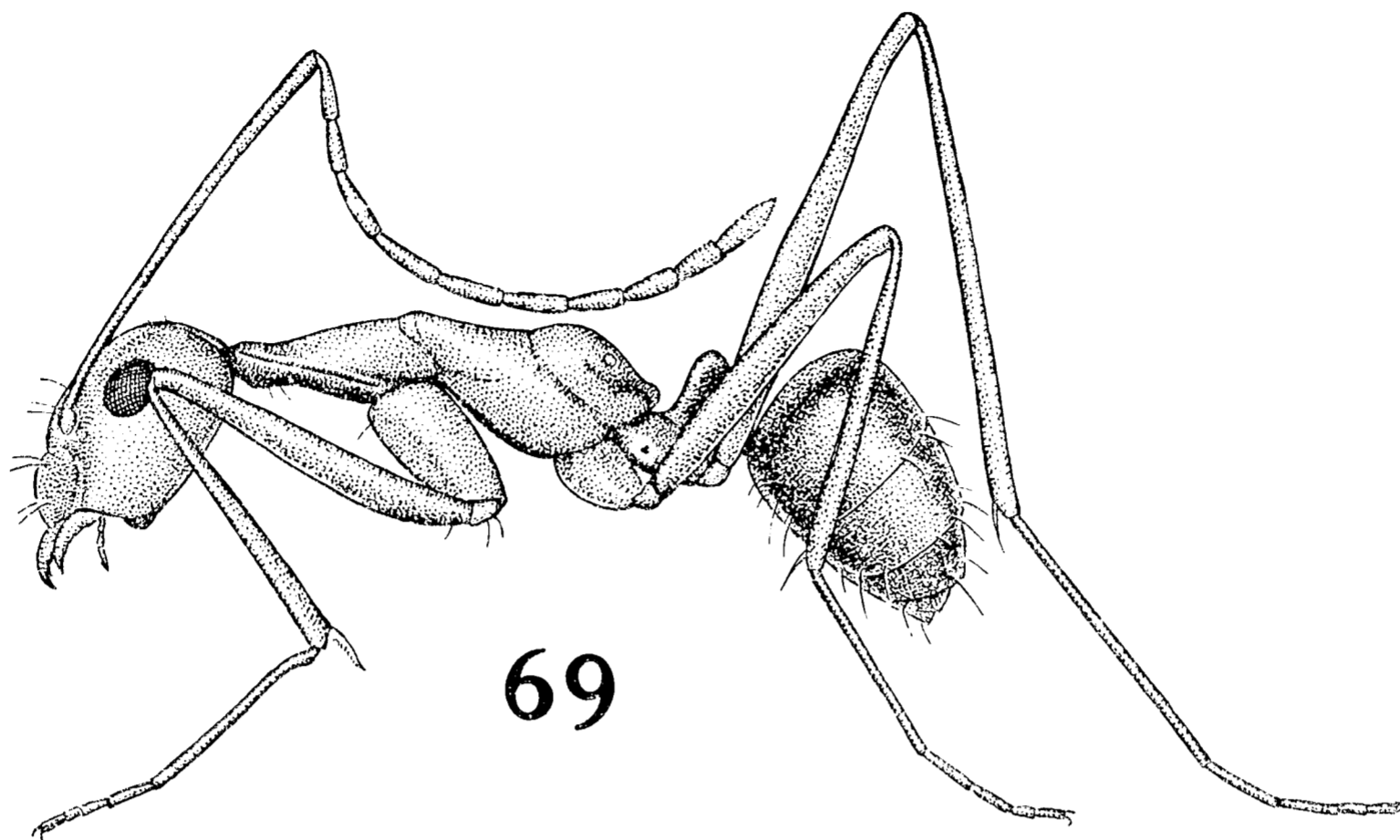


Fig. 69. *Anoplolepis longipes* (Jerdon), worker from Sorol I., Sorol Atoll, W. Caroline Is.

Hills (1934). *TUAMOTU IS.: *Tukuhora*: Amaa (1934). *South Marutea*: NW islet (1934). *Makatea* (1934). Abundant on Fakarava in 1925 (Cheesman & Crawley 1928). *GAMBIER IS.: *Agakauitai* (1934). *Mangareva*: Near convent (1934). *MARQUESAS: Numerous localities on Hiva Oa, Tahuata, Fatu Hiva, Nuku Hiva, Moho Tane, Ua Huka, and Eiao; all collections in 1920's determined by W. M. Wheeler. Abundant on Hiva Oa and Fatu Hiva in 1925 according to Cheesman and Crawley (1928). HAWAII: *Oahu*: Barber's Point, queen and workers (P. W. Weber, XII.1952). Zimmerman (1953) identified workers collected at the same locality by E. J. Ford, Jr., from *Hibiscus* on 17.IV.1952. Since the species is so distinctive in appearance and Hawaii has been generally well collected, there is little doubt that the Barber's Point population represents a relatively young (or ecologically very restricted) infestation.

A. longipes is native to Africa and has been spread by human commerce throughout most of the Old World tropics. It is a dominant ant in disturbed habitats in Melanesia and Micronesia.

Plagiolepis alluaudi Forel Fig. 70.

Plagiolepis alluaudi Emery, 1894, Ann. Ent. Soc. France **63**: 71, worker (Type locality: La Misere, Make, Seychelles).—Smith, 1957, J. N. Y. Ent. Soc. **65**: 195-198, taxonomy, biology.

Plagiolepis mactavishi Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. **24**: 166, worker (Type locality: Moorea).

Plagiolepis foreli Santschi, 1920, Bull. Soc. Vaud. Sci. Nat. **53**: 165, figs. G, H, I, worker (Type locality: Botanical Garden, Zurich, Switzerland).

Plagiolepis foreli var. *ornata* Santschi, 1920, Bull. Soc. Vaud. Sci. Nat. **53**: 166, worker (Type locality: New Caledonia).

Plagiolepis augusti Emery, 1921, Ann. Ent. Soc. Belg. **61**: 317, *Nom. nov. pro foreli* Mann.—Cheesman & Crawley, 1928, Ann. Mag. Nat. Hist. ser. 10, **2**: 524.

Plagiolepis foreli: Mann. 1921, Bull. Mus. Comp. Zool., Harv. **64**: 473, worker (Type locality: Suva, Viti Levu, Fiji).

DISTRIBUTION: *SOCIETY: *Moorea* (1906-07). *Tahiti*: Valley of Pirae, Pare (1934). *Raiatea*: (1925). *Uturoa* (1925). *Huahine* (1925). Cheesman & Crawley (1928) record this

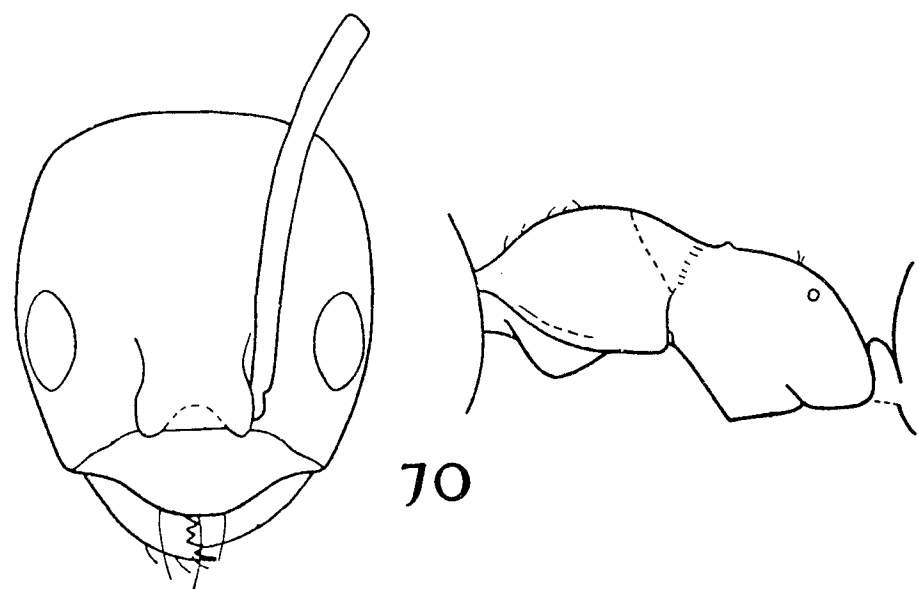


Fig. 70. *Plagiolepis alluaudi* Emery, syntype worker of synonymous *P. mactavishi* Wheeler from Moorea, Society Is.

species (as *augusti* Emery) from collections made in the Vallée de Ste. Amelie, Tahiti, in 1925. *AUSTRAL IS.: *Rapa*: two-fifth kilometer E of Area (1934). NE ridge of Mangaoa Peak (1934). *Raivavae*: Pic Rouge, S. slope (1934). *GAMBIER IS.: *Akamaru*: N. side (1934). *Mangareva*: NE slope of Mt. Duff (1934). *MARQUESAS: *Hiva Oa*: Hanaheka, 350 m. Atuona, 400 m. Vaioa, 400 and 600 m (in 1920's). Cheesman & Crawley (1928) record the species from Tahuata in 1925. EAST-ER I.: Recorded by Wheeler (1922). Collected by I. E. Efford and J. A. Mathias at the following localities in I-II 1965: in *Zea mais*,

Hanga Roa; outer slopes of Rano Kao, litter under *Eucalyptus*; in crater of Rano Kao; in crater of Rano Raraku. HAWAII: **Oahu*: Honolulu. Koko Head. **Molokai*: forests. **Kauai*: Kapaa, in pineapple fields. Suehiro (1960): *Midway*. *Laysan*: workers and alate queens, IX.1961 (G. D. Butler).

According to M. R. Smith (1957) this pantropical tramp species is steadily increasing its range through transport with human commerce. It is apparently native to Africa. Specimens have recently been recorded from St. Helena, in the South Atlantic (Taylor & Wilson 1962), as well as Suva, Fiji (W. M. Mann 1914; NK 1949, 1950) and Szechwan Province, China (W. L. Brown 1945).

***Plagiolepis exigua* Forel** Fig. 71.

Plagiolepis exigua Forel, 1894, J. Bombay Hist. Soc. **8**: 415, worker, queen (Type locality: Poona, India).

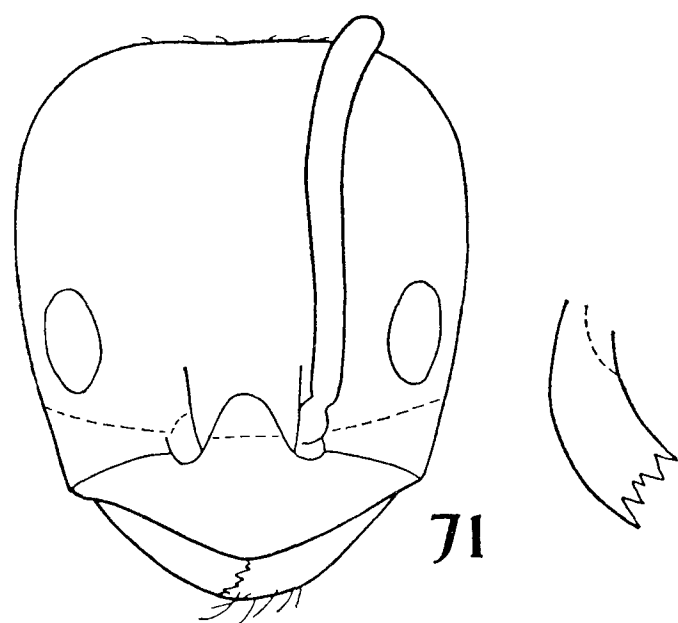


Fig. 71. *Plagiolepis exigua* Forel, syntype worker from Poona, India.

DISTRIBUTION: *HAWAII: *Oahu*: Makiki. Kalihi. Aiea. Tantalus. *Hawaii*: Naalehu.

Exigua has been recorded from India, western China, Hong Kong, Madagascar, and Ethiopia, as well as from Hawaii. It can be distinguished from the much more common and widespread *alluaudi* by its shorter antennal scapes, sparser pilosity, and shinier body surface. The above Hawaiian records have not been verified by us. The specimens used by Wheeler have apparently been lost, and no further collections from Hawaii have come to our notice. It is entirely possible that Wheeler misidentified samples of *P. alluaudi* as this species.

Paratrechina (P.) longicornis (Latreille) Fig. 72.

Formica longicornis Latreille, 1802, Fourmis, p. 113, worker.

DISTRIBUTION: SAMOA: *Savai'i*: Puapua (NK, 1955); **Safune 600–1800 m (1924). *Upolu*: Togitogiga, rain forest, berlesate, base of pencil orchid, 12.VI.1962 (GE acc. 55). *Tutuila*: Malaeini, rain forest berlesate, moss on rotting logs, 13.VII.1962 (GE acc. T21). Pago Pago (1918). **Leone Road (1925). Mayr (1870) recorded the species from Samoa without specifying any locality. SWAINS I.: Sweeping *Scaevola frutescens* (ECZ, 1940). TONGA: *Tongatabu*: Nukualofa (NK, 1956). Tongatabu, no further locality (G. P. Wilder 1923). TOKELAU IS.: *Fakaofu* (EHB, 1924). PHOENIX IS.: *Canton* (E. O. Wilson extremely abundant around airstrip in 1955; NK 1958). "The dominant ant in the inhabited part of the island" in 1940–41 (van Zwaluwenburg 1943). DANGER IS.: *Motu Kotawa* (EHB, 1924). *Puka Puka (1933). COOK IS.: *Rarotonga* (G. P. Wilder 1925). LINE IS.:

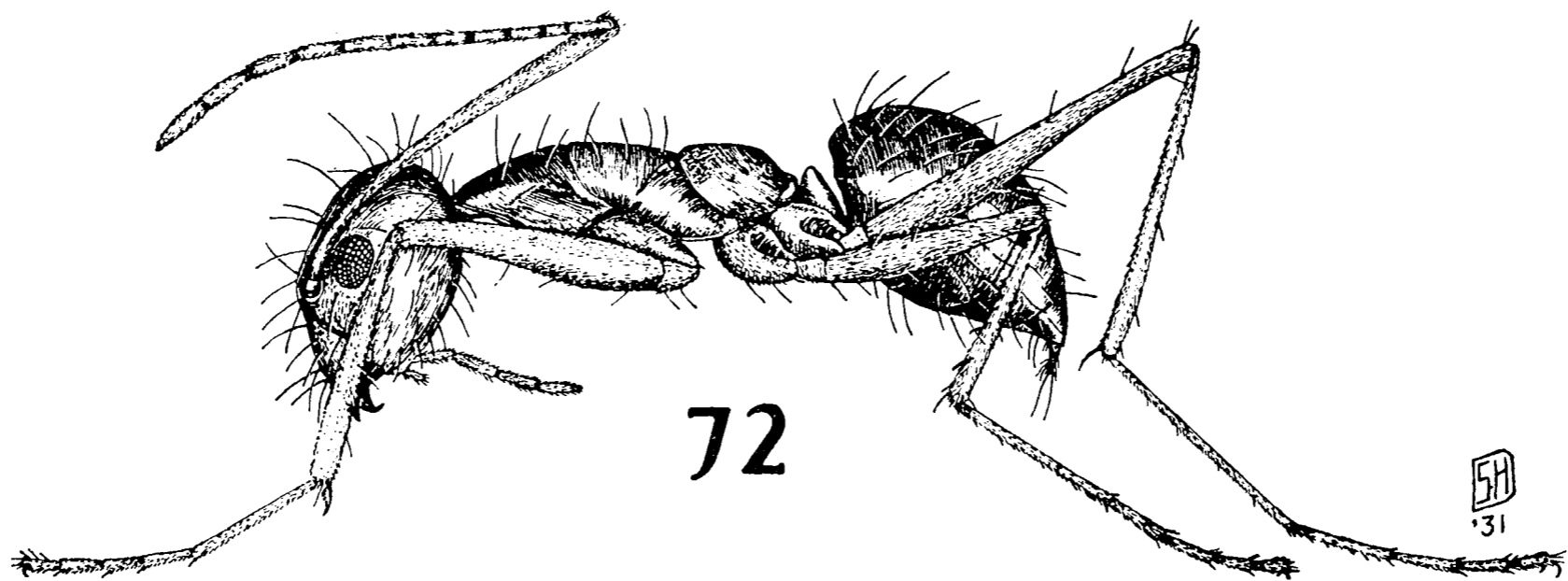


Fig. 72. *Paratrechina longicornis* (Latreille), worker from United States. (From S. H. DeBord in M. R. Smith, 1947).

Jarvis (EHB, 1935). *Palmyra*: E. J. Ford (1959) records this species on sprouted coconuts brought from Palmyra to Honolulu in 1957. *Johnston*: 1947–52 (*fide* Chilson 1953). *SO-CIETY IS.: *Moorea* (1906–07). *Tahiti*: Teohu Vall. (collector unknown). 1.6 km S of Papeete on coast road (RWT, 1960). Cheesman & Crawley (1928) report collections made in the Vallée de Ste. Amelie, Tahiti, and on the coast of Bora Bora in 1925). MARQUE-SAS: Wheeler (1932b) reports collections from Moho Tane (60–100 m), Ua Huka, Ua Pu, and Eiao (4500 m) made in the 1920's. Cheesman & Crawley (1928) report it occurring on Tahuata in 1925. *OENO I.: (1934). HAWAII: Perkins, in Forel (1899), stated that in the 1890's *longicornis* was "abundant all over the plains." Wheeler (1934a) cites numerous records from Oahu, Maui, Kauai, Hawaii and Nihoa I. Suehiro (1960) records it more recently from Midway.

P. longicornis is one of the most widespread and abundant of all pantropical ant species. It is especially well adapted to dry habitats and abounds in the most urbanized portions of many tropical towns and cities. It probably originated within the Old World tropics, perhaps specifically in southeastern Asia or Melanesia. The most closely related species appears to be *P. (Parapatrechina) pallida* Donisthorpe of New Guinea.

Paratrechina (Nylanderia) bourbonica (Forel)

Prenolepis nodifera st. *bourbonica* Forel, 1886, Ann. Ent. Soc. Belg. 30: 210–11, worker,

queen, ♂ (Type locality: St. Denis, Reunion).

Prenolepis bourbonica r. *bengalensis* Forel, 1894, J. Bombay Nat. Hist. Soc. **8**: 406, 407-408, worker, ♂ (Original localities: Calcutta, India; Burma). **New Synonymy.**

Prenolepis bourbonica r. *hawaiiensis* [!] Forel, 1899, Fauna Hawaiiensis, (Heterogyna: Formicidae), pp. 120-21, worker, queen, ♂. (Original localities: Oahu, Molokai, Hawaii). **New Synonymy.**

Prenolepis (*Nylanderia*) *bourbonica* subsp. *skottsbergi* Wheeler, 1923, Nat. Hist. Juan Fernandez **3**: 318, worker, ♂ (Type locality: Easter I.). **New Synonymy.**

DISTRIBUTION: SAMOA: *Savai'i*: Ga'utavai, native village, nest with ♂♂ and winged queens under bark of coconut palm, 19.III.1962 (RWT acc. 379). Puapua (NK, 1955). Salelologa, strays around house (RWT acc. 547). Vaisala, strays inside house (RWT acc. 446). *Upolu*: Apia (OHS, 1940); ♂♂ and winged queens in light trap, 4-9.IV.1962 (GE). Utumapu, rain forest, strays on tree trunks (RWT acc. 564). *Tutuila*: **Amouli (1923). **Leone Road (1926). Naval Station, ♂♂ at light, 12.VIII.1940 (OHS, ECZ). **Pago Pago (1923). Tunulu, seashore (OHS, ECZ, 1940). *Manua*: *Olosega* (D. T. Fullaway 1930). TONGA: *Tongatabu*: Nukualofa (NK, 1955). PHOENIX IS.: *Canton*, 1940-41, *fide* van Zwaluwenburg (1943). *Hull* (EHB, 1924). COOK IS.: *Aitutaki*: Akaiami (NK, 1955). *Rarotonga* (G. P. Wilder, 1925). LINE IS.: *Fanning*: workers and a single ♂, VII.1922 (S. C. Ball 1922). SOCIETY IS.: *Tahiti*: Papenoo Vall. (NK, 1955). Pt. Venus (C. H. Edmondson, 1933). 1.6 km S of Papeete on coast road (RWT, 1960). *Tuauru Val. *Blue Lagoon, near Papeete (1934). *Raiatea*: Uturoa (NK, 1955). *Huahine*: Haapu (NK, 1955). Cheesman collected *bourbonica* near Papeete, in the Vaitepiha Valley, Tahiti, on Raiatea, on Motu Moute (near Bora Bora), and below Mt. Papoti on Bora Bora, all in 1925 (Cheesman & Crawley, 1928). AUSTRAL IS.: *Raiyavae*, in house (A. M. Stokes, 1922). **Tubuai*: Murivani (1934). *TUAMOTU IS.: *Tekotiko*: Hao (1934). *Tepoto*: near center (1934). *GAMBIER IS.: *Taravai* (1934). *Mangareva*: near convent, 100 m (1934). *Agakauitai*: (1934). MARQUESAS: Numerous records from Tahuata, Fatu Hiva, and Ua Huka; workers at sea level, 1♂ captured at light at 900 m (Wheeler 1932b, 1933d). Collected on Tahuata, Nuku Hiva, and Fatu Hiva in 1925 (Cheesman & Crawley 1928). *PITCAIRN I.: S. side, 200-300 m (1934). *FLINT I.: (1934). EASTER: (*1922; see comment below). I. E. Efford and J. A. Mathias collected the species at the following places in I-II.1965: Hanga Roa, 4 collections; garden of Carlos Rapu; on grass, hillside behind beach at Ovahe; Motu Nui; Rano Raraku. Winged ♂♂ were found on 19, 29, and 30.I. and 1.II. A winged queen was found 22.I. HAWAII: "Oahu, Molokai, and Hawaii; from the coast to 400 ft." (Perkins, in Forel, 1899). Numerous records from Oahu, Hawaii, Maui, Kauai, Midway, and Wake (*1934a).

The male of *bourbonica* is easily recognized by its distinctive genitalia: the parameres are broad, short, and with excised outer margins, while the volsellae are unusually heavy and broad, and darkly colored. The workers are consistently large, with long scapes that surpass the occipital corners by almost exactly half their own length, and concolorous dark brown. Most workers are most readily separated (in the absence of males) from the similar *P. vaga* by their size; the head width of the great majority of individuals range between 0.65 and 0.72 mm. *Vaga* males have relatively longer, tapered parameres with entire outer margins and thinner, more lightly colored volsellae. The workers of *vaga* are extremely variable in the characters just cited with reference to *bourbonica*; in the study

series a few workers can be found that overlap *bourbonica* in individual characters. The great majority of *vaga* workers have head widths between 0.45 and 0.62 mm and slightly shorter scapes than *bourbonica*, and are light to medium reddish brown in body color. It is to be admitted, however, that a few individuals (e. g., "*vaga*" from Fanning) cannot be placed with certainty in either species.

Bourbonica apparently originated from tropical Asia and has been spread by commerce throughout the Indian and Pacific Oceans and to a few localities in the New World tropics. On Samoa it favors more disturbed habitats than either *minutula* and *vaga*.

Paratrechina (Nylanderia) minutula (Forel) Fig. 73.

Prenolepis minutula Forel, 1901, Mitt. Zool. Mus. Berl. 2: 25, nota, worker (Type locality: New South Wales, Australia).

Prenolepis minutula r. *atomus* Forel, 1901, loc. cit., worker (Type locality: Ralum, New Britain). **New Synonymy** (provisional).

DISTRIBUTION: SAMOA: *Upolu*: Utumapu, rain forest, nests with ♂♂, ex rotting wood fragment and under epiphyte on trunk of sapling, 18. III. 1962 (RWT acc. 575). Vaipoto, rain forest, leaf litter and soil (TEW, 1956). *Tutuila*: N of Aloau, 450 m, stunted forest, workers and ♂, 13. VII. 1962 (GE accs. T16, T19). Fagatogo, 300 m, beating shrubbery (ECZ, 1940). Fangatanga, Reservoir (ECZ, 1938). Le Mafa, 250 m, rain forest, berlesates, epiphytes, leaf litter, moss on newly fallen and rotting logs, 12. VII. 1962 (GE accs. T1-T8, T10). Malaeini, rain forest, berlesates, moss on rotting logs, 13. VII. 1962 (GE accs. T21, T24). Naval Station, males at light, 11-15. VIII. 1940 (ECZ). **Pago Pago (1925). Between Oloava and Olomanu, 430 m, rain forest, moss on rotting log, litter, and soil, 13. VII. 1962 (GE accs. T12, T14). Utulei, 150-200 m (ECZ 1940).

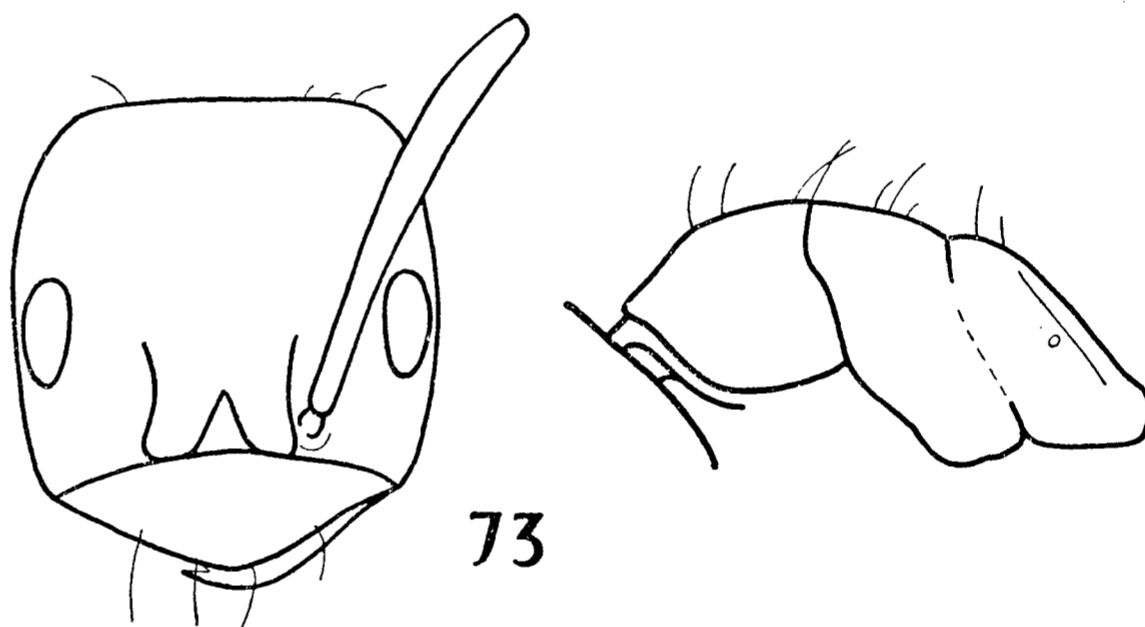


Fig. 73. *Paratrechina minutula* (Forel). Worker from Utelei, Tutuila (ECZ).

Among Indo-Australian series of the *minutula* complex in the Museum of Comparative Zoology, the only character showing variation of possible species significance is in size. Workers from Rottneest I., Western Australia and Lord Howe I. ("typical" *minutula*) are larger, with head width ranging 0.39-0.40 mm. Series from Brisbane, Queensland; Lampong Districts, southern Sumatra; Ugi, Solomon Is.; and Samoa (form "*atomus*") have head widths ranging 0.33-0.38 mm. This difference does not seem sufficient to warrant specific separation at the present time. Among the smaller ("*atomus*") variant, color varies from medium brown (Queensland, Samoa) to yellowish brown (others). The geographic origin of *minutula* is unknown, although the species is probably native to some part of the great Indo-Australian area.

Paratrechina (Nylanderia) sharpi (Forel)

(Doubtful establishment)

Prenolepis sharpii Forel, 1899, Fauna Hawaiiensis (Heterogyna: Formicidae), p. 121, figs. 1-1a, worker, queen, ♂ (Type locality: Honolulu).

DISTRIBUTION: HAWAII: *Oahu*: "Honolulu, brought with plants from China." (Forel 1899).

The species is very close to *vaga*, evidently being distinguishable only in the male caste. Judging from Forel's figure, the parameres are distinctively narrower and more tapered than in *vaga*, and the ventral margins are crenulated. Since the type series came from what was evidently a single colony introduced from China more than 60 years ago, the establishment of *sharpii* in Hawaii must be considered in great doubt until additional material is collected.

Paratrechina (Nylanderia) stigmatica (Mann)

(Doubtful record)

Prenolepis (Nylanderia) stigmaticus Mann, 1919, Bull. Mus. Comp. Zool., Harv. **63**: 367-68 (Type locality: Wai'ai, San Cristoval, Solomon Is.)

DISTRIBUTION: SAMOA: "Upolu: Vailutai, 1 incomplete worker, 28.IV.1924 (Bryan)" (Santschi 1928).

This single record must be considered very doubtful, especially since the much more extensive ant collections made in 1938-40 and 1956-62 contain no further series. *Stigmatica* is a distinctive species, the worker being marked by a flattened mesothorax and unusually long, slender scapes, which surpass the occipital corners by 5/8 their length. It is still known with certainty only from the Solomon Is.

Paratrechina (Nylanderia) vaga (Forel) Fig. 74.

Prenolepis obscura st. *vaga* Forel, 1901, Mitt. Zool. Mus. Berl. **2**: 26, worker (Type locality: Ralum, New Britain).

Prenolepis vividula: Mayr, 1876, J. Mus. Godeff, Hamburg **12**: 23, distribution in Pacific (*Nec Formica vividula* Nylander).—Mann, 1921, Bull. Mus. Comp. Zool., Harv. **64**: 476 (Distribution in Fiji, *Nec Formica vividula* Nylander).

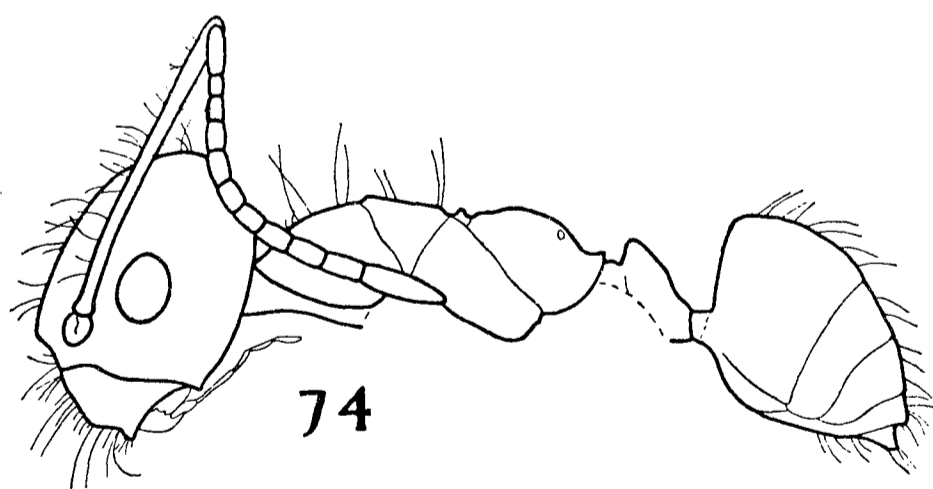


Fig. 74. *Paratrechina vaga* (Forel). Based on workers from Tonga.

Paratrechina (Nylanderia) vaga var. *crassipilis* Santschi, 1928, Rev. Suisse Zool. **35**: 71, worker, 1928, Insects of Samoa, **5**: 54-55, figs. 7b-c, 8d-e, worker, dist. in Samoa (Original localities: Lau (many localities) and Suva Bay, Viti Levu, Fiji). **New Synonymy.**

Paratrechina (Nylanderia) vaga var. *irritans* Santschi, 1928, Insects of Samoa **5**: 54-55, figs. 7e, 8a-c (Original localities: Savai'i,

Tutuila, Upolu, and Manua, Samoa). **New Synonymy.**

Paratrechina (Nylanderia) sharpi: Wheeler, 1934, B. P. Bishop Mus., Occ. Pap. **10**: 18 (? *Nec Prenolepis sharpii* Forel).

(?) *Paratrechina vitiensis*: Cheesman & Crawley, 1928, Ann. Mag. Nat. Hist. ser. 10, **2**: 525 (*Nec Paratrechina vitiensis* Mann).

DISTRIBUTION: **SIKAIANA (1933). SAMOA: *Savai'i*: Asau, 170 m, disturbed rain forest, nest in rotting log (RWT acc. 490); strays from foliage and forest floor (RWT accs. 487, 501). Fanga (NK, 1955). Falealupo, dry rain forest, nests in rotting logs, small wood fragments and under stone, same with ♂♂ and/or alate ♀♀, 20.III.1962 (RWT accs. 429, 442, 444, 445); strays from foliage and forest floor (RWT accs. 424, 427, 435, 440). Gagaifoumauga, rain forest, berlesates, fern roots from rocks and trees, moss from rotting log (GE accs. S1, S2). Lotogo, 340 m, rain forest, nests from rotting logs and under stone (RWT accs. 465, 482, 484); strays from rotting log (RWT accs. 455, 456, 483); strays from foliage (RWT acc. 451). Matega, 65 m, new banana clearing, edge of rain forest, 20.III.1962, strays from foliage and on ground, rocks, and rotting logs (RWT accs. 398, 401, 402, 409); several claustral ♀♀ under moss or leaf mold on boulders (RWT acc. 391). Mt. Matafa, 700 m, rain forest, nests from rotting log and under small epiphyte on tree trunk (RWT accs. 521, 539); strays from foliage (RWT acc. 522); berlesate of leaf mold (RWT acc. 520). Mt. Matafa Road, 200 m, rain forest, 19.III.1962, nests with males under moss on stump and in rotting log (RWT accs. 368, 373); strays from logs and foliage (RWT accs. 361, 365, 374). Mt. Olomanu, rain forest, berlesate, moss and epiphytes from fallen tree (GE acc. S10). Patamea (NK, 1955). Puapua (NK, 1955). **Safune, low forest (1924). **Salailua (1924). Samalaeulu, coastal rain forest, nests and strays under small epiphytes on tree trunks (RWT accs. 509, 512, 515, 516); berlesate of leaf mold and soil (RWT acc. 596). Sili (NK 1955). *Upolu*: Afiamalu, 700 m, sweeping, workers and queens, 11.VI.1940 (OHS, ECZ); leaf mold berlesate (TEW, 1956); **workers 1924; berlesates, ground moss (RWT accs. 2317, 2318, 2321; GE accs. 46, 48, 51, 53); berlesates, tree moss 2-3 m from ground (RWT acc. 262) 10-12 m from ground (RWT accs. 2306, 2308; GE acc. 37). This was the ant most frequently encountered by Taylor at Afiamalu; it was collected in all major habitats visited—within slightly to extremely disturbed rain forest, in overgrown European gardens, and in native *Taro* patches and a banana plantation. Nests were taken in rotting stumps or logs and in small wood fragments on the ground, as well as under moss cushions on logs and tree trunks (RWT accs. 239, 240, 248-250, 271, 305, 307, 312, 324, 326, 330, 338). Alate ♂♂ and queens were taken from several colonies collected between 9 and 17.III. **Apia (1924). Fagaloa, 170 m, rain forest, berlesate of moss from logs (GE acc. 67). Falefa (NK, 1955). Falepuna (TEW, 1956). Lauli'i (TEW, 1956) Malololelei (NK, 1955), (TEW, 1956), **1925. Matautu (TEW, 1956). Poutasi (TEW, 1956). Sa'agafou, lowland rain forest, strays from foliage (RWT accs. 610, 611). Salea Puga (TEW, 1956). Tanumalala (TEW, 1956). Tapueleele (NK, 1955). Tiapapata, berlesates of moss on logs and trees (GE accs. 69, 70-72, 75, 76). Togitogiga, 400 m, berlesates, base of pencil orchid, leaf mold, and moss on rotting logs (GE accs. 55-60). Utumapu (TEW, 1956); rain forest, nests and strays under epiphytes on tree trunks (RWT accs. 566, 571, 579). Vaipoto (TEW, 1956). *Tutuila*: N of Aloa, rain forest, berlesates of moss from logs (GE accs. T17, T18, T20). Amanere, 100 m, beating (ECZ, 1940). Amouli (D. T. Fullaway 1930). **1923. Aua-Afono (Fullaway, 1930). Breaker Point (OHS, 1940). Fagaitua (EHB, 1935). Faga'togo, 300 m (OHS, 1940). Le Mafa, 250 m, rain forest, berlesate of soil and leaves (GE acc. T7). Maupasaga-Fagasa trail (Fullaway, 1930). Mt. Pioa, 300 m (OHS, 1940). Naval Station, ♂ at light, 19.VIII.1940 (OHS). Between Oloava and Olomanu, 430 m, berlesates of epiphytes and moss from trees (GE accs. T11, T15). Pago Pago (EHB 1924; NK 1941; **1923). Pago-Matafao trail, 400 m, beating shrubbery (ECZ, 1940). Tafuna (TEW, 1956). *Manua*: *Ta'u* (NK, 1955; **1923). *Vaga* was recorded

from Samoa by Mayr (1876) as *vividula* Nylander. The T. E. Woodward material was collected mostly from berlesates of soil and leaf litter in rain forest; one record (Falepuna) is from the edge of a swamp. SWAINS I.: (EHB, 1935). TONGA: *Tongatabu*: Nukualofa, ♂♂, II.1956 (NK). *Vava'u*: Neiafu NK, 1956). Pangai (NK, 1956). *Eua*: Ohonua (NK, 1956). Recorded from Tonga by Mayr (1876). ELLICE IS.: Recorded by Mayr (1876). COOK IS.: *Rarotonga* (1937). TOKELAU IS.: *Fakaofu* (EHB 1924). PHOENIX IS.: *Hull* (EHB, 1923). DANGER IS.: *Motu Kotawa* (EHB, 1924). LINE IS.: *Fanning* (S. C. Ball, 1924). *Johnston*: What is probably this species was recorded from Johnston by M. R. Smith as "*Paratrechina* (*Nylanderia*) sp." (Chilson 1953). SOCIETY IS.: **Huahine*: NW ridge of Mt. Turi, 500-600 m (1934). **Mehetia*: Fatia-po, 150-300 m (1934). **Moorea*: (1906-07; 1925). *Tahiti*: **Arihiri*, Pare (1934). **Faraura Valley*. **Maara*, Papiera. **Paea*, Papenoo Valley. Papeete (ECZ, 1934; *1920). **Valley E of Pirae*, Pare (1934). Rimatu (1925). **Tiupi Bay*, Papeari (1934). **Tuauru*. **Vallée de la Reine*. Cheesman & Crawley (1928) erroneously list this species as *vitiensis* Mann, a distinct Fijian species. Collections of *vaga* were made by Cheesman in 1925 near Papeete, at 1000 m, and Vaitepiha Valley, Tahiti, and on Raiatea at about 650 m. *AUSTRAL IS.: Numerous records by Wheeler (1936) from Rimatara, Rapa, Maria I. (NE islet), and Raivavae, all based on collections made by Zimmerman in 1934. The relative frequencies of records suggest that the species is especially abundant on Rapa. *TUAMOTU IS.: *South Marutea*, NW islet (1934). *Timoé*: N. islet (1934). *GAMBIER IS.: *Taravai* (1934). *Aukena*: Korovao (1934). *Mangareva* (1934). *MARQUESAS: Wheeler (1932b, 1933d) lists numerous collections made in the 1920's from Hiva Oa, Tahuata, Fatu Hiva, Nuku Hiva, Ua Huka, and Ua Pu. Elevations of worker collections on these islands range from sea level to 1000 m. HENDERSON I.: NW side (1934). *FLINT I.: (1934). HAWAII: *Oahu*: Honolulu (Lewis 1910). *Manoa Vall.*, Honolulu (1910).

Vaga ranges more or less continuously from Queensland, the Philippines, and New Guinea across the Pacific to Juan Fernandez. It shows strong internidal variation in total size, convexity of thoracic dorsum, pilosity, density of cuticular shagreening, and depth of color. As noted in an earlier study of the Rennell, Solomon Is., population (Wilson, 1960), the variation is nearly continuous, embracing none of the forms identical with *Nylanderia* species known to be sympatric with *vaga* elsewhere. But the genus is notoriously difficult taxonomically, and all of the Indo-Australian species need to be carefully studied to ascertain the exact status and origin of *vaga*. In particular, the Australian *obscura* (Mayr) and Chinese *sharpi* (Forel) must be reexamined with reference to this problem.

Brachymyrmex obscurior Forel, n. status Fig. 75.

Brachymyrmex heeri var. *obscurior* Forel, 1893, Trans. Roy. Ent. Soc. Lond. p. 345, worker (Type locality: St. Vincent, West Indies).

Brachymyrmex heeri var. *aphidicola*, Wheeler, 1934, B. P. Bishop Mus., Occ. Pap. 10: 17 (? *nec aphidicola* Forel).

DISTRIBUTION: SAMOA: *Savai'i*: Puapua (NK, 1955). *Upolu*: Apia, workers and ♂♂, II.1955 (NK); workers only (ECZ, 1940); ♂♂ at light, 4-9.IV.1962 (GE). Le Mafa, disturbed roadside forest, under moss on tree trunk, 30.III.1962 (RWT acc. 635). Tapatapao (OHS, 1940). HAWAII: *Oahu*: Honolulu, in orchid baskets (H. Lyon 1914).

The material cited above belongs to the form generally referred to in the literature as

obscurior. Its recognition as a distinct species here is purely a provisional measure, contingent upon a fuller revision of the large and difficult genus to which it belongs. For the moment it can safely be said that *obscurior* is native to the New World tropics and probably specifically to Central America and Tropical Mexico. It is one of the most widespread ants in the West Indies and has been introduced into Florida (M. R. Smith 1951) and the port of Mobile, Alabama (records from 1949, E. O. Wilson).

The Samoan records cited above are the first for *Brachymyrmex* from the South Pacific.

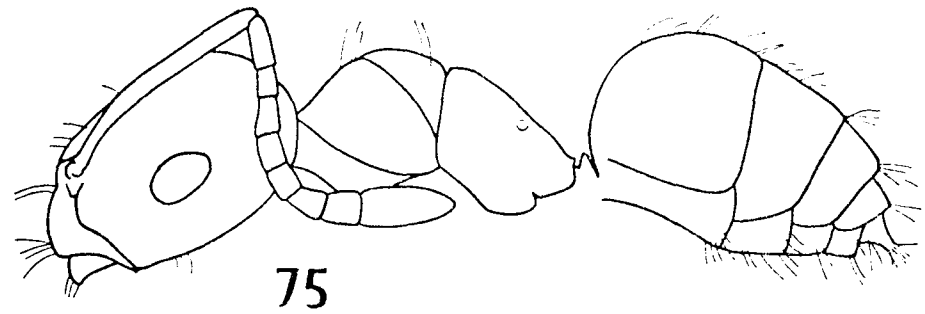


Fig. 75. *Brachymyrmex obscurior* Forel. Based on workers from Tapatapao, Upolu (OHS).

Camponotus (Myrmoturba) chloroticus Emery Fig. 76.

Camponotus maculatus subsp. *chloroticus* Emery, 1897, Ann. Mus. Civ. Stor. Nat. Genova **38**: 574, worker (Type locality: Irupara, New Guinea).

Camponotus (Myrmoturba) maculatus chlorotica var. *chlorogaster* Emery, 1914b, Nova Caledonia **1**(4): 429, worker, soldier (Original localities: Espiritu Santo and Ambrim, New Hebrides). **New synonymy.**

Camponotus (Myrmoturba) maculatus pallidus var. *Samoensis* Santschi, 1919, Bull. Soc. Vaud. Sci. Nat. **52**: 326-27, worker, soldier (Type locality: Apia, Upolu). **New Synonymy.**

Camponotus (Myrmoturba) maculatus subsp. *sanctae crucis* Mann, 1919, Bull. Mus. Comp. Zool., Harv. **63**: 369, fig. 42, soldier (Type locality: Santa Anna, Graciosa Bay, Santa Cruz I.). **New Synonymy.**

Camponotus novaehollandiae, Mayr, 1870, J. Mus. Godeffroy, Hamburg **12**: 66. ?*Nec novaehollandiae* Mayr, 1870, Cape York, Queensland.

DISTRIBUTION: SAMOA: *Savai'i*: Falealupo, rain forest, nest with alate queens under bark of rotting log, 20.III.1962 (RWT acc. 431). Lotogo, 350 m, rain forest, nest in hollow twig on tree and strays on tree trunk, 21.III.1962 (RWT accs. 470, 471). Mt. Matafa, 700 m, rain forest, nest in dry, hollow branch on tree, 23.III.1962 (RWT acc. 525). Palauli (NK 1955). Patamea (NK 1955). **Safune (1925). Sili (NK 1955). Taga, coastal *Futu* grove, nest under epiphyte 1.5 m above ground, 19.III.1962 (RWT and GE acc. 350). **Tuasivi (1924). *Upolu*: Afiamalu, 700 m, alate queen on grass in evening, 10.III.1962 (RWT acc. 261). **Apia (1924, 1925). Falefa (ECZ 1940). Le Mafa, roadside, nest under moss on tree trunk 2 m above ground, 29.III.1962 (RWT acc. 635). Mo'ata, near Apia, colonies in twigs of mangrove, 18.III.1962 (RWT accs. 548, 550, 551, 553, 556). Malololelei Road, 500 m, winged queens (OHS, ECZ, 1940). **Mulifamua, ♂ (1925). Sa'agafou, lowland rain forest, nest in twig on tree, 28.III.1962 (RWT acc. 610). Tapatapao, 300 m, dead log (OHS 1940). Tapueleele (NK, 1955). *Tutuila*: Afono Trail, W. Side, 150 m (ECZ, 1940). **Amouli (1923, 1926). Amanave, 130 m (OHS, 1940). **Fagasa (1923). Fagatogo, 300 m, beating dead branches (ECZ, 1940). Naval Station, ♂♂ at light, 12.VIII.1940 (OHS, ECZ). Pago Pago (P. J. Darlington 1931; EHB 1935; **1923). N. Side, Pago Pago, 200 m, on tree fern (ECZ, 1940). Mt. Pioa, 300 m (OHS, 1940). *Manua Ta'u*: Luma, ♂♂ at light, 11.IX.1937 (W. Harris). **Ofu (1926). The species is recorded by Mayr (1870) as *novaehollandiae* from Samoa, with no further locality cited. TONGA: *Tongatabu*: Nukualofa, workers and ♂♂, II.1956 (NK). *Vava'u*: Holonga (NK

1956). No locality (G. P. Wilder 1925). *Eua*: Ohonua (NK 1956). *Haapai*: (G. P. Wilder 1925). Recorded by Mayr (1870) as *novaehollandiae* from Tonga, with no specific island cited. ELLICE IS.: Recorded by Mayr (1870) as *novaehollandiae*. ROTUMA: Fapufa (H. St. John 1938). "Kilinga" (=Kil-liga?), 60 m (St. John 1938). Pa-ho, 30-200 m (St. John 1938). Sölkope, sea level to 130 m (St. John 1938). DANGER IS.: *Motu Kotawa* (EHB, 1924).

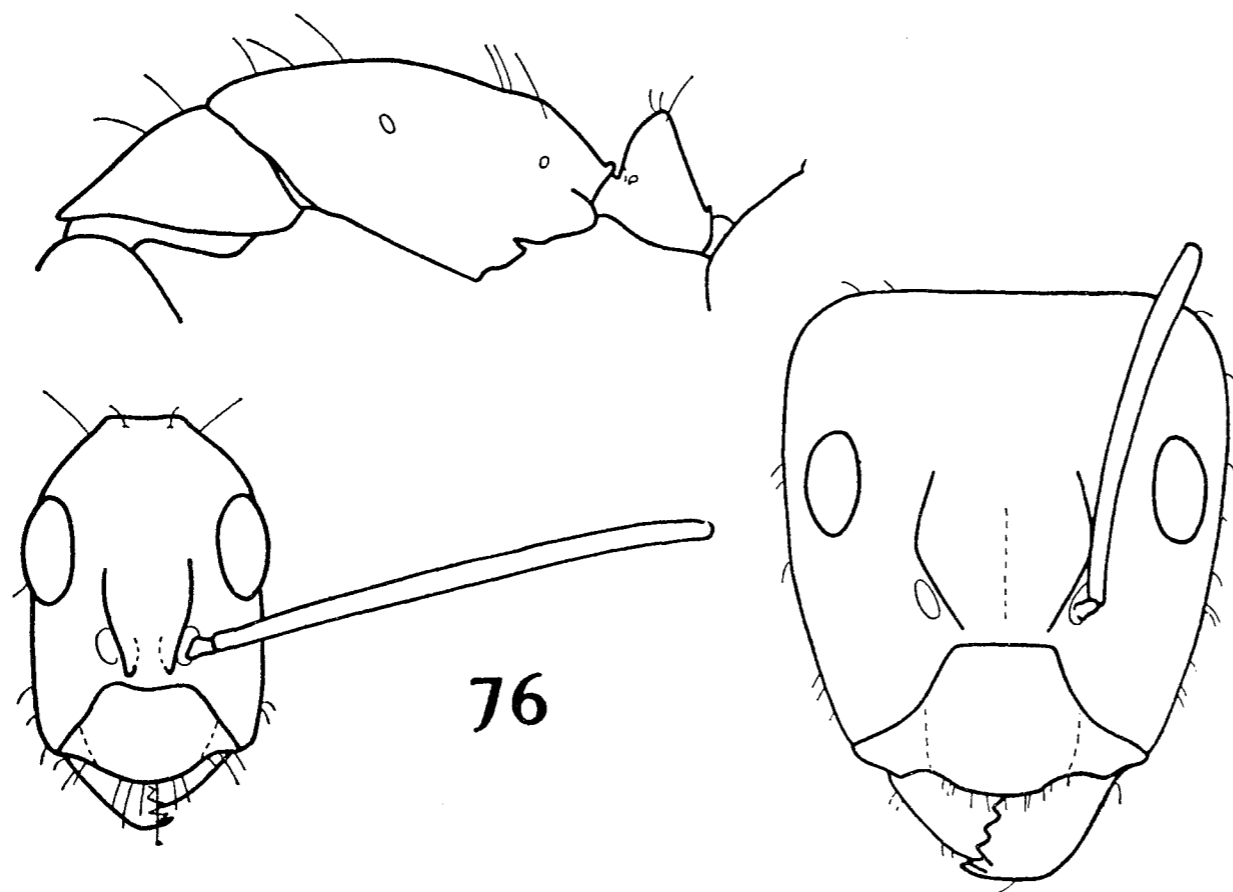


Fig. 76. *Camponotus chloroticus* Emery. Sölkope, Rotuma (H. St. John): above and left, minor worker; right, soldier.

This large, conspicuous species ranges from New Guinea through Micronesia and outer Melanesia (excepting New Caledonia) to Tonga and the Danger Is. Unfortunately, the taxonomic status of the population here called *chloroticus*, and hence our understanding of its precise distribution in the remainder of the Indo-Australian region, must remain

clouded until the difficult *maculatus* group is better worked out as a whole. Suffice it to say that there is a species, to which the name *chloroticus* evidently applies, that can be distinguished as a widespread population distinct from several related sympatric species in the western Pacific, including New Guinea. Whether *chloroticus* is in fact the oldest name applicable to the species cannot be stated with certainty at the present time.

***Camponotus (Myrmoturba) navigator* Wilson and Taylor, new species** Fig. 77.

DIAGNOSIS AND RELATIONSHIPS: A member of the *irritans* group, closest to the sympatric *chloroticus* but differing from that species as follows: antennae proportionately longer; entire body distinctly less pilose; petiole distinctly thinner in side view; body color predominantly blackish brown (brownish yellow in *chloroticus*). *Navigator* also resembles *papua* Emery of New Guinea, being more similar to it than to *chloroticus* in pilosity and relative scape length; but differing in petiole form and color, and, in addition, lacking the abrupt mesonotal rise just posterior to the promesonotal suture that distinguishes *papua* from *chloroticus*.

Holotype major worker: HW 2.25 mm, HL 2.43 mm, CI 93, SL 1.96 mm, SI 87, PW 1.31 mm. Characteristics as indicated in diagnosis and shown in fig. 77. The color needs further description: head, except mandibles, uniformly blackish brown; mandibles deep "mahogany" reddish brown; remainder of body very dark reddish brown to blackish brown, predominantly the latter; scape blackish brown, remainder of appendages medium to dark reddish brown.

Worker paratype variation: Strongly and continuously polymorphic, HW ranging in holotype nest series from 1.00-2.25 mm. Pilosity variable: in callows many of the long hairs

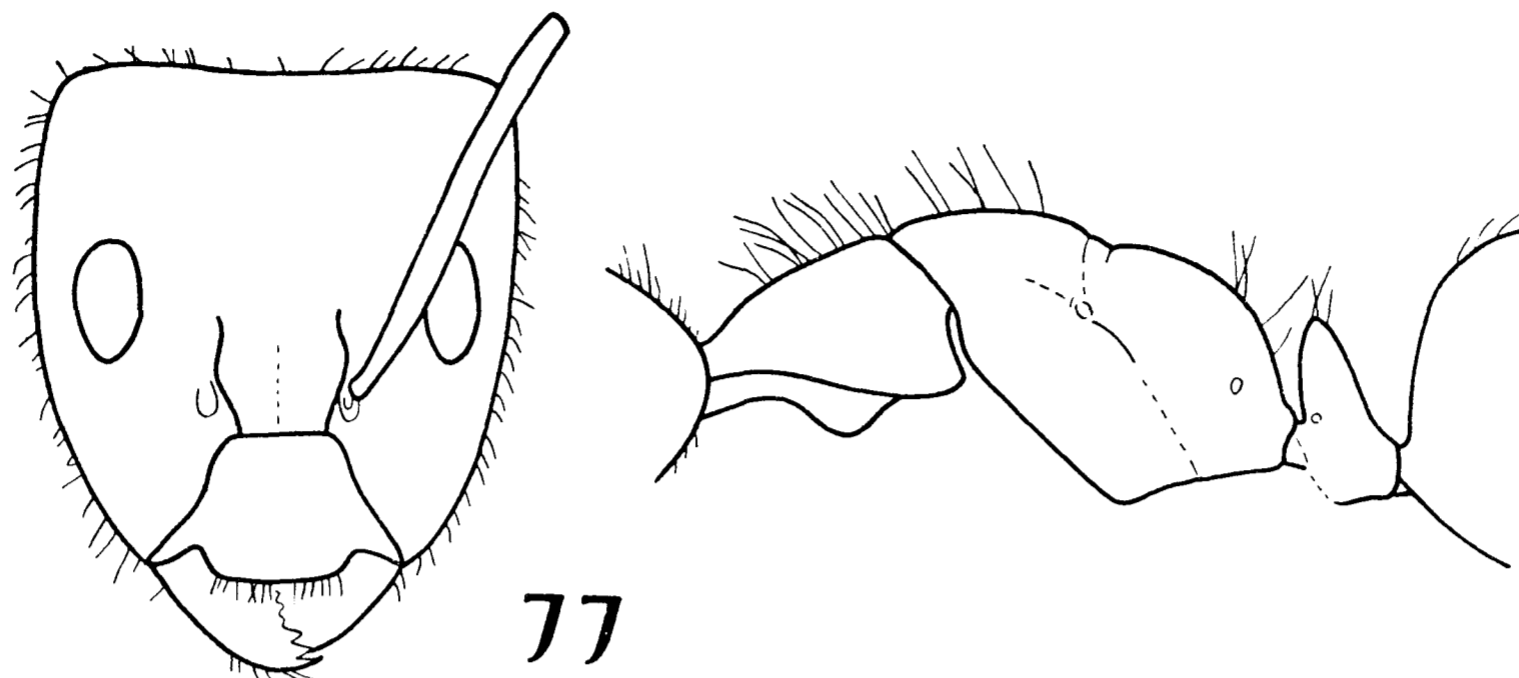


Fig. 77. *Camponotus navigator* Wilson and Taylor, holotype soldier.

have dried in a sinuous form but in fully developed workers they are straight or smoothly and highly curved; number of long propodeal hairs 1-8 in the several nest series, with most workers having 3-6. Body form, scape index, and coloration relatively uniform.

Queen: HW 1.88 mm, HL 2.18 mm, SL 1.95 mm. Sharing the diagnostic worker characteristics just described, otherwise a typical queen for this species group showing the usual caste characteristics.

MATERIAL EXAMINED: SAMOA: *Savai'i*: Matega, W. coast, 70 m, all collections on 20. III.1962 by Taylor & Ettershank. Acc. no. 387: holotype worker, 7 paratype workers, dealate queen. Acc. nos. 388, 389, 404, 408, 411, 412: 30 paratype workers, belonging to all worker subcastes. The species is named in apposition after the Navigator Is., an old European name for Samoa.

This species is known only from Matega, an area well away from the inter-island ports of *Savai'i*. The several nest series were taken from nests under the bark of fairly sound logs lying on the ground, in a recently established banana clearing, about one acre in extent. Relatively undisturbed lowland rain forest surrounded the collection site. The ants were abundant, 2 or 3 colonies being found on some of the larger logs. Nests contained pupae and larvae at various stages of development; no alate sexuals were observed.

Because of its apparent closest similarity to *chloroticus* of all the *Camponotus* species available to us in the Museum of Comparative Zoology collections, we have tentatively interpreted *navigator* as a derivative of *chloroticus* or a *chloroticus-navigator* antecedent, with *navigator* representing the first invader of Samoa and *chloroticus* the second. But because of the considerable differences between the two species, the conclusion must be taken cautiously and further attempts should be made to match *navigator* with other extra-Polynesian species.

***Camponotus* (*Tanaemyrmex*) *variegatus* (Fr. Smith) Fig. 78.**

Formica variegata Fr. Smith, 1858, Cat. Hym. Brit. Mus. 6: 19, worker, queen (Original localities: Ceylon, Singapore).

Camponotus maculatus mitis var. *hawaiiensis* Forel, 1899, Fauna Hawaiiensis, p. 122, worker, queen, ♂ (Type locality: Honolulu, Hawaii).

Camponotus variegatus hawaiiensis: Emery, 1925, Gen. Ins. 183: 96.

DISTRIBUTION: HAWAII: "In and around houses in Hawaii" (Perkins, in Forel,

1899). Wheeler (1934a) lists records from Oahu, Maui, Molokai, and Hawaii. The single Hawaii collection was made at 1300 m. Suehiro (1960) cites a collection made on Midway in 1959. E. O. Wilson collected winged queens at lights in Honolulu in late November 1955.

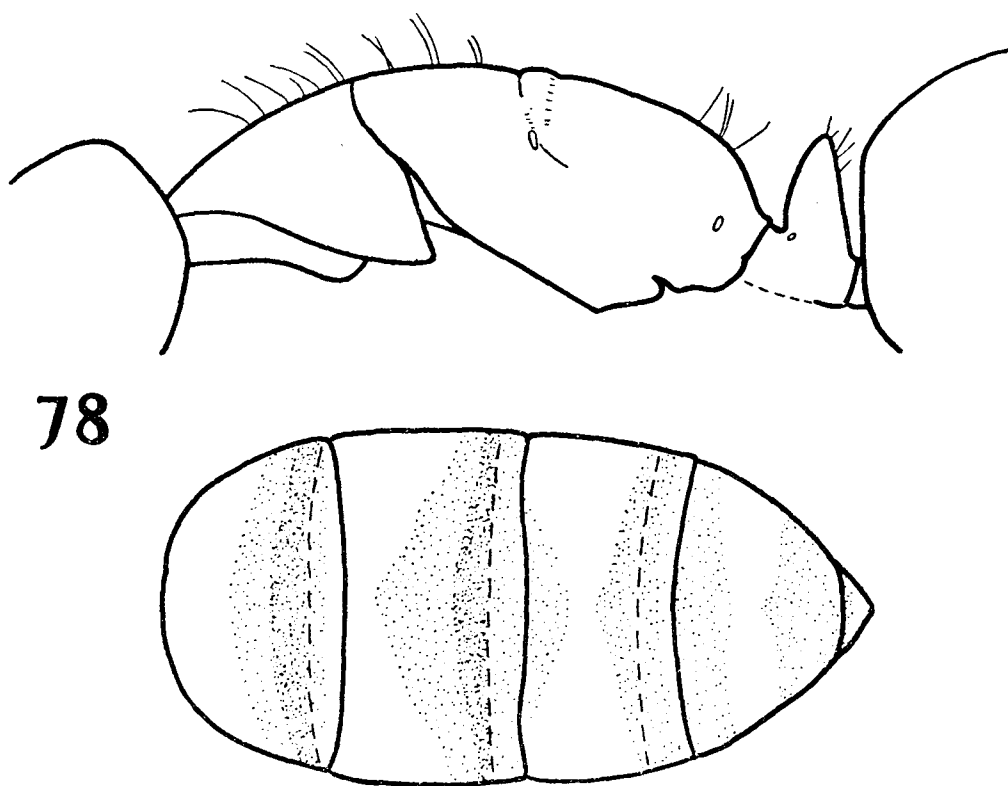


Fig. 78. *Camponotus variegatus* (Fr. Smith), minor worker from Koko Head, Oahu, Hawaii.

The present usage of the name *variegatus* with reference to the Hawaiian samples is in the broad sense. The Hawaiian population appears almost certainly to have been introduced from southeastern Asia, and the name *hawaiiensis* will probably fall as a synonym of one of the species of the *variegatus* complex concealed under the multitude of existing subspecific and varietal names.

***Camponotus* (*Colobopsis*) *conicus* Mayr** Fig. 80.

Colobopsis rufifrons Mayr, 1870, Verh. Zool.-bot. Gen. Wien **20**: 944-45, worker, soldier, queen (*Partim. Nec rufifrons* Fr. Smith).

Colobopsis conica Mayr, 1876, J. Mus. Godeffroy, Hamburg **12**: 67, worker, soldier, queen (based on description of *rufifrons*, above) (Type locality: Tonga).

DISTRIBUTION: TONGA: *Tongatabu*: Nukualofa (NK 1956). *Eua*: Okonua, worker and winged ♂, II.1956 (NK). Described from Tonga by Mayr (1870) without further specification of locality.

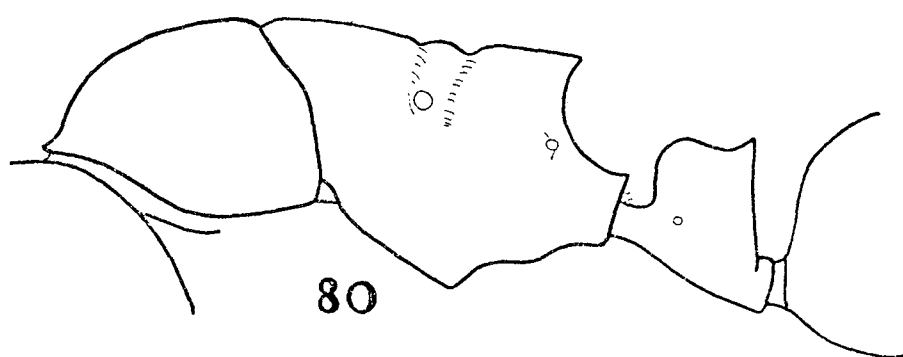
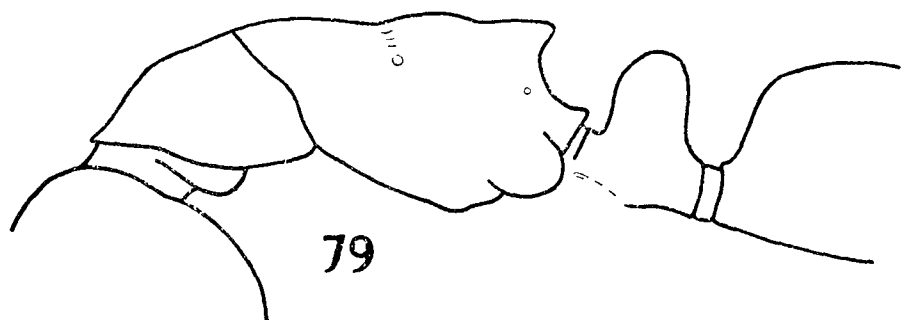


Fig. 79. *Camponotus flavolimbatus* Viehmeyer, minor worker from Tapueleele, Upolu (NK). Fig. 80. *Camponotus conicus* Mayr, minor worker from Nukualofa, Tongatabu, Tonga (NK).

This endemic Tongan species is related to *dentatus* Mayr of Fiji. It differs in its all-black body coloration, much lighter mesosomal sculpturing (consisting almost entirely of shagreening), and in the lack of well developed propodeal spines. The 2 species are related to *guppyi* Mann of the Solomon Is.; the latter species is easily distinguished by its concolorous deep yellow body coloration and lack of pedicellar teeth. Finally, the aberrant *bryani* group of Fiji appears to be derived from the *conicus-dentatus* stock.

***Camponotus* (*Colobopsis*) *flavolimbatus* Viehmeyer** Fig. 79.

Camponotus (*Calobopsis*) [!] *flavolimbatus* Viehmeyer, 1922, Arch IV Natur. **88**: 218-19, queen (Type locality: Samoa).

Camponotus (Colobopsis) buxtoni Santschi, 1928, Insects of Samoa 5: 56-57, worker (Type locality: Malololelei, Upolu, Samoa). **New Synonymy.**

Camponotus (Colobopsis) conithorax var. *nautarum* Santschi, 1919, Bull. Soc. Vaud. Sci. Nat. 52: 327, worker (?) (Type locality: Apia, Upolu, Samoa). **New Synonymy.**

Camponotus (Colobopsis) rufifrons var. *leucopus*: Santschi, 1928, Insects of Samoa 5: 58, queen (? *Nec leucopus* Emery).

DISTRIBUTION: SAMOA: *Savai'i*: Asau, 170 m, lowland rain forest, strays on foliage, 22.III.1962 (RWT acc. 487). Falealupo, dry rain forest, strays on foliage, 20.III.1962 (RWT acc. 424). Lotogo, 370 m, rain forest, strays on foliage, nest under epiphyte on *Ficus* tree 35 m above ground, 21.III.1962 (RWT accs. 451, 458). Mt. Matafa, 700 m, rain forest, nest in dry hollow branch on tree, strays on roadside weeds, 23.III.1962 (RWT accs. 522, 526). Palauli (NK, 1955). Patamea (NK, 1955). Puapua (NK, 1955). **Safune, 600-1300 m, rain forest (1924). Samalaeulu (NK, 1955). Sili (NK, 1955). *Upolu*: Afiamalu, 700 m, (OHS, ECZ, 1940); sweeping from roadside weeds, 10.III.1963 (RWT acc. 252); foraging on leaves of *Taro* patch, 16.III.1962 (RWT acc. 321); disturbed rain forest, strays on tree trunks, 12-17.III.1962 (RWT accs. 264, 341). Apia (G. P. Wilder 1925). **Malololelei (1924, 1925). Sa'agafou, lowland rain forest, colony in twig on bush, 28.III.1962 (RWT acc. 612); strays under moss on tree trunk (RWT acc. 611). Tanumalala, 350 m disturbed rain forest overgrown by weeds, strays on foliage, 28.III.1962 (RWT acc. 606). Tapatapao, 300 m, queens and ♂♂ at light, 19.VII.1940 (OHS, ECZ). Tapueleele (NK, 1955). **Tuaefu (1923). **Vaea, 350 m (1924). *Tutuila*: Fagasa Trail, 200 m (OHS, 1940). Fagatoga, 300 m (OHS, 1940). Naval Station, ♂♂ at light, 12.VIII.1940 (OHS, ECZ). **Pago Pago (1924).

In describing *conithorax* var. *nautarum*, a junior synonym of *flavolimbatus*, Santschi correctly points out that the Samoan species differs from *conithorax* Emery of the New Hebrides in the lighter coloration of the worker appendages (light reddish or yellowish brown as opposed to dark ferruginous in *conithorax*). It might be added that yet a better character is found in the cephalic sculpturing of the soldier; in the true *conithorax* the longitudinal carinae of the anterior portion of the head are sparser and more widely spaced. On the basis of present evidence, *flavolimbatus* should be considered a distinct but closely related Samoan endemic species.

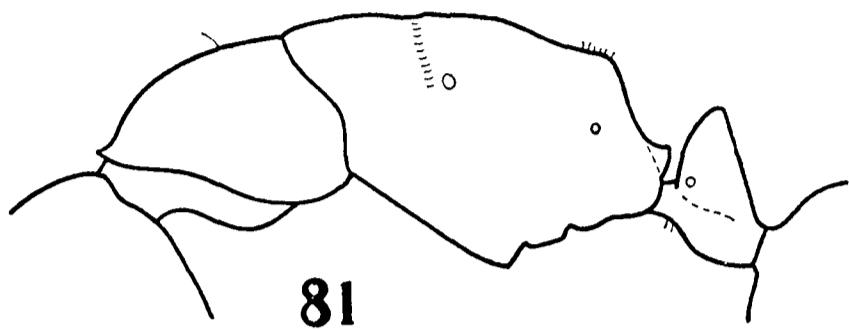
Santschi was evidently unaware of the existence of the name *flavolimbatus* in the literature at the time of his 1928 description. He distinguished "*buxtoni*" from "*nautarum*" chiefly on the basis of "the scale lower and longer than in *conithorax* [*nautarum*]; the thorax more rounded as in *loa* Mann." These are two of the more variable characters in our sample of the population. Santschi's description and figure do not appear to depart in any significant way from the variation shown by these samples. Another notably variable character is the color of the appendages; in particular, the legs vary from nearly clear yellow (as described in the *flavolimbatus* type queen) to medium ferruginous. In short, there is at present no evidence of the existence of more than a single species in the extensive collections of Samoan *Colobopsis* now available.

***Camponotus (Colobopsis) nigrifrons* Mayr** Fig. 81.

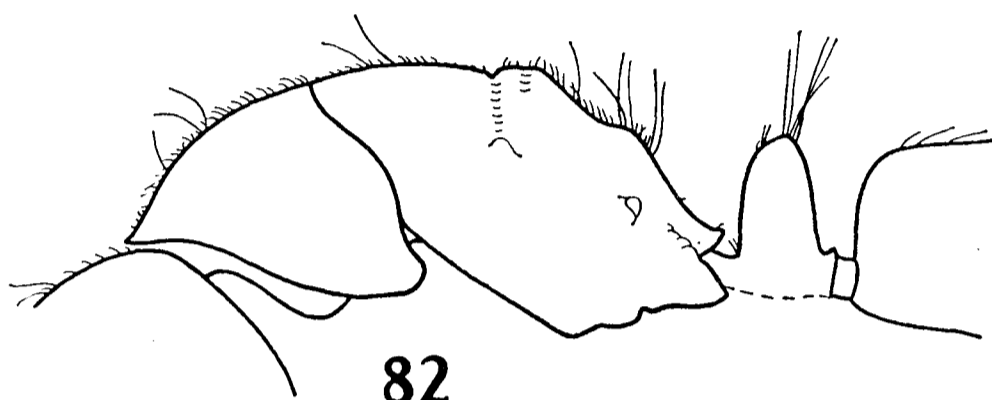
Colobopsis nigrifrons Mayr, 1870, Verh. Zool.-bot. Ges. Wien 20: 943-44, queen (Type locality: Tonga).

DISTRIBUTION: TONGA: *Tongatabu*: Haamonga (NK, 1956), small media worker, tentative determination, see below. Described from Tonga by Mayr (1870) without further locality specification.

Forel (1914) placed this species in *Myrmamblys*, without explanation. Emery (1925)



81



82

Fig. 81. *Camponotus nigrifrons* Mayr, minor worker from Haamonga, Tongatabu, Tonga (NK). Fig. 82. *Camponotus rotumanus* Wilson and Taylor, paratype worker.

placed it in the *truncatus* group of *Colobopsis*. Regardless of its precise phyletic relationships, it fortunately has several good and simple characters that should make it easily recognizable. The following is a translation of Mayr's original description: "Queen: length 9 mm. Shining, red, mandibles ferruginous, frons, vertex and abdomen black, legs entirely yellow; sparsely pilose, feebly coriaceous, mandibles longitudinally rugulose and sparsely punctate, anterior part of head weakly truncate, roughly carinate-striate in longitudinal direction; clypeus longitudinally feebly convex, quadrangular, slightly longer than broad; genae convex, not angulate; thorax [propodeum] unarmed; petiole with somewhat incrassate scale, subquadrate, slightly broader

than high; its angles rounded; anterior wings 9 mm in length, subhyaline, pterostigma and costa ochraceous."

The single media worker we have examined agrees reasonably well with the description of the type queen. It is extremely similar to *flavolimbatus* medias of the same size, differing only in coloration as follows: whereas all *flavolimbatus* workers from Samoa thus far examined have concolorous piceous brown bodies, the *nigrifrons* media is strikingly tricolorous: the head medium ferruginous, the mesosoma and pedicel clear light ferruginous, and the gaster piceous brown. The appendages of the *nigrifrons* individual are light to medium ferruginous, as in many *flavolimbatus* workers.

Nigrifrons, if our media worker has been correctly identified, is thus distinguishable only on the basis of a color character, albeit a clear-cut one. Its recognition as a distinct species here is a conservative, provisional measure.

***Camponotus* (*Myrmamblys*) *rotumanus* Wilson and Taylor, new species** Fig. 82.

DIAGNOSIS (MINOR WORKER): A member of the widespread and very diverse *reticulatus* group. Most closely resembling *albocinctus* (Ashmead) of the Philippines, differing in the minor caste as follows: (1) antennal scapes proportionately much longer, exceeding occipital corners by approximately 1/2 their total length, the scape index 122-146 (in single *albocinctus* minor examined, the scapes exceed occipital border by only 1/3 their total lengths, scape index 95); (2) tibiae medium to dark brown (light yellowish brown in *albocinctus*); (3) total size probably greater (HW 1.03-1.15 mm as opposed to 0.91 mm in *albocinctus*). This diagnosis is based on comparison of the *rotumanus* type series with a single *albocinctus* worker, lacking a pedicel and gaster, from Dumaguete, Philippine Is.

Also used for comparison of additional characters were a small series of *albocinctus* soldiers and queens from Dumaguete, Los Baños, and Manila. *Rotumanus* also resembles *fullawayi* Wheeler of Guam; it can be distinguished (in the minor worker) by its much larger size, markedly lighter coloration, and sparser, more appressed body pubescence. Finally, it can be easily distinguished from *reticulatus* itself, the dominant and most widespread member of the group in Melanesia and Micronesia, by the much lighter coloration and denser pubescence and body shagreening of *rotumanus*.

Holotype worker: HW 1.09 mm, HL 1.32 mm, SL 1.43 mm, pronotal width 0.91 mm. Body form and pilosity as shown in fig. 82. Entire body covered with moderately dense, completely appressed pubescence. Pilosity and pubescence pale yellow. Vertex, occiput, mesothorax, propodeum, tibiae, tarsi and most of pedicel and gaster dark brown with little evidence of reddish tinge; posterior margins of gastric tergites pale yellow; remainder of body and appendages yellowish brown.

Paratype variation: See measurements in diagnosis, above. These specimens show little significant variation in the other characters cited.

MATERIAL EXAMINED: Holotype minor worker (BISHOP 7424), ROTUMA: Sölkope, sea level to 130 m, 24.VIII.1938; 4 paratype minor workers, same data. Soloroa, 60 m, 11.VIII.1938, 3 paratype minor workers. Saluaka, 29.VIII.1938, 1 paratype minor worker. "Killinga" (=Killiga?), 60 m, 4.VIII.1938, 2 paratype minor workers. All collections by H. St. John. Holotype and paratypes in Bishop Museum, paratypes in Museum of Comparative Zoology and U. S. National Museum.

***Polyrhachis (Chariomyrma) rotumana* Wilson and Taylor, new species** Fig. 83.

DIAGNOSIS AND RELATIONSHIPS: Most closely resembling *P. rere* Mann of the Solomons and Santa Cruz Is. but easily distinguished from that species by the following characters: (1) propodeal and lateral petiolar spines thicker; (2) median petiolar spine longer and its apex acute, whereas apex is obtuse in *rere*; (3) Dorsal surface of the lateral petiolar spines coarsely and irregularly pitted, and opaque, whereas, in *rere* the same surfaces bear only scattered punctures and are feebly shining; (4) striae (or rugulae) of pronotum weaker and show a very weakly defined longitudinal orientation, as opposed to a strong horizontal orientation in *rere*, while the striae (or rugulae) of the head and mesonotum are feeble and show a weakly defined longitudinal orientation compared to *rere*; (5) anterior lateral mesonotal angle less strongly marked than in *rere*. In other respects *rotumana* is very similar, if not identical, to *rere*.

Holotype worker: HW 1.22 mm, HL 1.44 mm, SL 1.54 mm, PW 1.15 mm.

Worker paratype variation: HW 1.20-1.35 mm. The 4 or more nest series represented

in the type collection are remarkably invariable, showing only relatively minute departures

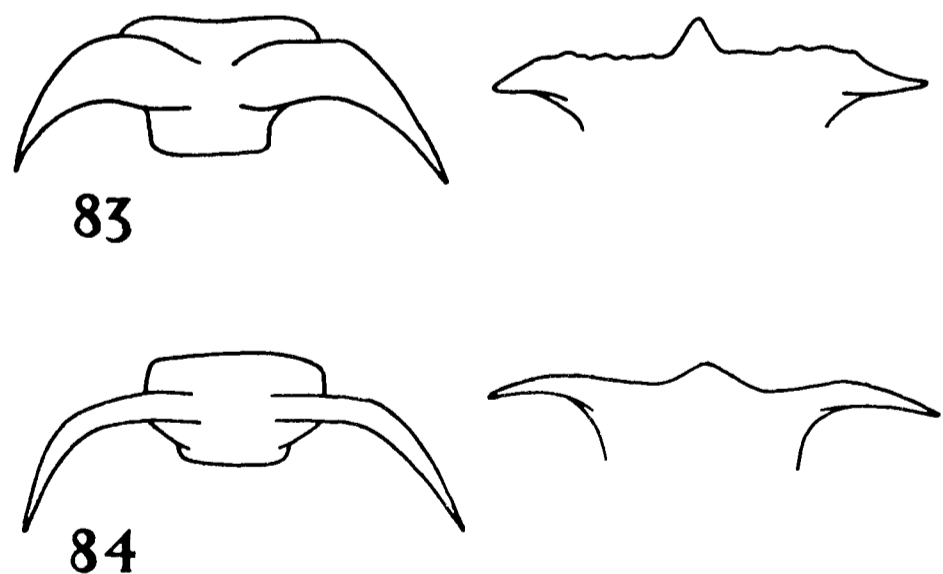


Fig. 83. *Polyrhachis rotumana* Wilson and Taylor, holotype worker, dorsal and rear views of petiole. Fig. 84. *P. rere* Mann, worker from Anuda, Santa Cruz Is.

Table 3. Doubtful Records and Unsuccessful Introductions

SPECIES	ULTIMATE ORIGIN	POLYNESIAN RECORDS	AUTHORITY
<i>Gnamptogenys porcata</i> (Emery)	Neotropical	Honolulu (intercepted)	Wheeler (1934a)
<i>Rhytidoponera metallica</i> (Fr. Smith)	Australian	Samoa (probably erroneous record)	Santschi (1928)
<i>Brachyponera luteipes</i> Mayr	Oriental	Honolulu (intercepted)	Wheeler (1934a)
<i>B. solitaria</i> (Fr. Smith)	Oriental	Honolulu (intercepted)	Wheeler (1934a)
<i>Odontomachus ?simillimus</i> (Fr. Smith)	Indo-Australian (?)	Honolulu (intercepted)	Wheeler (1934a)
<i>Pheidole hyatti</i> Emery	California	Honolulu (intercepted)	Wheeler (1934a)
<i>P. fervens</i> (Smith) (= <i>javana</i> Mayr)	Oriental	Honolulu (intercepted)	Wheeler (1934a)
<i>P. punctatissima</i> Mayr	Neotropical	Honolulu (intercepted)	Wheeler (1934a)
<i>P. rhombinoda</i> (Fr. Smith)	China	Honolulu (intercepted)	Wheeler (1934a)
<i>Pheidologeton affinis</i> (Fr. Smith)	Oriental	Honolulu (intercepted)	Wheeler (1934a)
<i>Monomorium destructor</i> (Fr. Smith)	Oriental	Honolulu (intercepted)	Wheeler (1934a)
<i>Crematogaster laboriosa</i> (Fr. Smith)	Oriental	Honolulu (intercepted)	Wheeler (1934a)
<i>C. lineolata</i> (Say)	California	Honolulu (intercepted)	Wheeler (1934a)
<i>Tetramorium caespitum</i> (L.)	Palaeartic	Honolulu (intercepted) Tahiti (doubtful record)	Wheeler (1934a)
<i>T. pacificum</i> Mayr	Indo-Australian	Honolulu (intercepted)	Wheeler (1934a)
<i>Triglyphothrix striatidens</i> Emery	Oriental	Honolulu (intercepted)	Wheeler (1934a)
<i>Wasmannia auropunctata</i> (Roger)	Neotropical	Honolulu (intercepted)	Wheeler (1934a) Swezey (1945)
<i>Strumigenys lewisi</i> Cameron	Japan	Honolulu (intercepted)	Wheeler (1934a)
<i>Cyphomyrmex rimosus</i> (Spinola)	Neotropical	Honolulu (intercepted)	Wheeler (1934a)
<i>Hypoclinea bituberculata</i> Mayr	Oriental	Honolulu (intercepted)	Wheeler (1934a) Swezey (1945)
<i>H. quadripunctatus</i> (L.)	Japan	Honolulu (intercepted)	Wheeler (1934a) Swezey (1945)
<i>Iridomyrmex itoi</i> Forel (= <i>glaber</i> Mayr)	Japan	Honolulu (intercepted)	Wheeler (1934a)
<i>I. rufoniger</i> (Lowne)	Australia	Samoa (probably erroneous record)	Santschi (1928)
<i>Plagiolepis melanogaster</i> Emery	Philippines	Honolulu (intercepted)	Wheeler (1934a)
<i>Oecophylla smaragdina</i> (Fabr.)	Indo-Australian	Upolu, Samoa (doubtful record)	Santschi (1919)
<i>Lasius niger</i> (L.)	Japan, China	Honolulu (intercepted)	Wheeler (1934a)
<i>L. alienus</i> Foerster	Both Japan and California	Honolulu (intercepted)	Wheeler (1934a)

SPECIES	ULTIMATE ORIGIN	POLYNESIAN RECORDS	AUTHORITY
<i>L. flavus</i> (Fabr.)	Europe	Honolulu (intercepted)	Wheeler (1934a)
<i>Formica subpolita</i> Mayr	Western U. S.	Honolulu (intercepted)	Wheeler (1934a)
<i>Camponotus obscuripes</i> Mayr	Japan	Honolulu (intercepted)	Wheeler (1934a)
<i>C. exiguoguttatus</i> Emery	China	Honolulu (intercepted)	Wheeler (1934a)
<i>C. abdominalis</i> (Fabr.)	Trinidad	Honolulu (intercepted)	Wheeler (1934a)
<i>C. itoi</i> Forel	Japan	Honolulu (intercepted)	Wheeler (1934a)
<i>C. planatus</i> Roger	Central America	Honolulu (intercepted)	Wheeler (1934a)
<i>C. flavomarginatus</i> Viehmeyer	Africa	Samoa (doubtful record)	Santschi (1928)
<i>Polyrhachis (Myrmhopla) argentea</i> Mayr	Philippines	Honolulu (intercepted)	Wheeler (1934a)
<i>Paratrechina (Nylanderia) parva</i> Mayr	Eastern U. S.	Honolulu (intercepted)	Wheeler (1934a)
<i>P. (N.) sharpi</i> Forel	China	Honolulu (intercepted)	Forel (1899)
<i>P. (N.) stigmatica</i> Mann	Solomon Islands	Samoa (doubtful record)	Santschi (1928)

from the holotype.

MATERIAL EXAMINED: Holotype worker (BISHOP 7425), ROTUMA: Solkope, sea level to 130 m, 24.VIII.1938; 3 paratype, workers, same data. Fapufa, 15.VIII.1938, 1 paratype worker. "Kilinga" (=Killiga?), 60 m, 4.VIII.1938, 1 paratype worker. Soloroa, 60 m, 11.VIII.1938, 5 paratype workers. All collections by H. St. John. Holotype and paratypes in Bishop Museum, other paratypes in Museum of Comparative Zoology and U. S. National Museum.

This interesting species is the first Polynesian member of the huge genus *Polyrhachis* to be discovered. As noted in the diagnosis, it is closest to *rere* of the Solomons and Santa Cruz Is. To date neither *rere* nor any cognate species has been found in the neighboring Banks Is., New Hebrides, or Fiji.

APPENDIX I: SPECIES KNOWN FROM INTERCEPTIONS AND DOUBTFUL RECORDS

The species listed in Table 3 are known only from single doubtful records or else from material intercepted at quarantine. In either case, it is very unlikely that permanent populations are now in existence on the islands where the records were made.

The following species were intercepted at Honolulu *after* they had already become successfully established. All records are taken from Wheeler (1934a): *Pheidole megacephala*, *Solenopsis geminata*, *Monomorium floricola*, *M. pharaonis*, *M. gracillimum*, *Tetramorium guineense*, *T. simillimum*, *Technomyrmex albipes*, *Tapinoma melanocephalum*, *Paratrechina longicornis*, *P. bourbonica*. These collections are significant in that they show that the introduction of pantropical "tramp" species is a recurring process.

APPENDIX II: THE ANTS OF NEW ZEALAND

In a first complete analysis of the ants of New Zealand, Brown (1958) showed the native fauna to be much smaller than one would expect to find on warm-temperate islands of such considerable size. Moreover, the few native stocks are almost exclusively of Australian origin, thus differing conspicuously from the native ants inhabiting the remainder of western Polynesia. In addition New Zealand contains a considerable number of introduced species. Brown (1958), Cumber (1959) and Taylor (1959, 1961) have shown that some of these are the familiar tropical tramp species distributed elsewhere in the Pacific, while others have been brought in directly from Australia and are as yet unknown from other parts of the world. In Table 4 we have listed the 32 species recorded from New Zealand to date, together with an estimation of their origins.

Table 4. List of the Ants of New Zealand.

- Myrmecia brevinoda* Forel. Introduced from E. Australia. Brown (1958).
- Amblyopone australis* Erichson. Probably introduced from Australia. Brown (1958).
- Amblyopone saundersi* Forel. Endemic. Brown (1958).
- Heteroponera brouni* Forel. Endemic. Brown (1958).
- Rhytidoponera metallica* (Fr. Smith). Introduced from E. Australia. Taylor (1961).
- Discothyrea antarctica* Emery. Endemic. Brown (1958).
- Mesoponera castanea* (Mayr). Endemic. Brown (1958). Taylor (unpublished notes) finds that

- this name applies to a species with ergatoid queens, apparently limited to the North I. *Mesoponera castaneicolor* (Dalla Torre). Endemic. Taylor (unpublished notes) finds that this Dalla Torre name applies to a sibling relative of *M. castanea* which has winged queens, also found on North I.
- Brachyponera luteipes* (Mayr) [= *B. chinensis* (Emery) ?]. Introduced from Indo-Australian area. Brown (1958), Taylor (1961).
- Hypoconerops eduardi* (Forel) [= *Ponera antipodum* Forel]. Introduced, ultimate origin probably Africa. Brown (1958), Taylor (1967).
- Ponera leae* Forel. Introduced from E. Australia or Tasmania. Taylor (1960, 1966).
- Pheidole megacephala* (Fabricius). Introduced, ultimate origin Africa. Taylor (1961).
- Pheidole variabilis* Mayr. Introduced from E. Australia. Taylor (1961).
- Pheidole vigilans* Fr. Smith (= *yarrensis* Forel). Introduced from E. Australia. Cumber (1959).
- Huberia striata* (Fr. Smith). Endemic. Brown (1958). [Note: the genus *Huberia* is endemic to New Zealand.]
- Huberia brouni* Forel. Endemic. Brown (1958).
- Tetramorium grassii* Emery. Introduced from South Africa. Brown (1958).
- Tetramorium guineense* (Fabricius). Introduced, ultimate origin Africa. Taylor (1961).
- Chelaner antarcticus* (White). Endemic. Brown (1958).
- Chelaner smithi* Forel. Endemic. Brown (1958), Taylor (1959).
- Monomorium orientale* Mayr. Introduced from Old World tropics. Brown (1958).
- Monomorium pharaonis* (L.). Introduced, ultimate origin Old World tropics. Brown (1958), Taylor (1961).
- Mayriella abstinens* Forel. Introduced from E. Australia. Taylor (1961).
- Orectognathus antennatus* Fr. Smith. Probably introduced from Australia. Brown (1958).
- Strumigenys perplexa* (Fr. Smith). Probably introduced from E. Australia. Brown (1958).
- Iridomyrmex darwinianus* (Forel). Introduced from E. Australia. Taylor (1959).
- Iridomyrmex glaber* (Mayr). Probably introduced from E. Australia. Brown (1958).
- Technomyrmex albipes* (Fr. Smith). Introduced, ultimate origin Asia. Brown (1958).
- Prolasius advena* (Fr. Smith). Endemic. Brown (1958).
- Camponotus (Colobopsis) newzealandicus* Donisthorpe. Endemic? Brown (1958).
- Paratrechina vaga* Forel. Introduced, ultimate origin Indo-Australian area. Brown (1958).

REFERENCES

- Blackburn, T. & W. F. Kirby. 1880. Notes on species of aculeate Hymenoptera occurring in the Hawaiian Islands. *Ent. Mon. Mag.* **17**: 89.
- Brown, W. L. 1949a. Revision of the ant tribe Dacetini: I. Fauna of Japan, China and Taiwan. *Mushi* **20**: 1-25.
- 1949b. Revision of the ant tribe Dacetini: III. *Epitritus* Emery and *Quadristruma* new genus. *Trans. Amer. Ent. Soc.* **75**: 43-51.
1954. The ant genus *Strumigenys* Fred. Smith in the Ethiopian and Malagasy Regions. *Bull. Mus. Comp. Zool. Harv.* **112**: 3-34.
1958. A review of the ants of New Zealand. *Acta Hymenopt.* **1**: 1-50.
1960. Contributions toward a reclassification of the Formicidae. III. Tribe Amblyoponini (Hymenoptera). *Bull. Mus. Comp. Zool. Harv.* **122**: 145-230.
1964. The ant genus *Smithistruma*: A first supplement to the world revision (Hymenoptera: Formicidae). *Trans. Am. Ent. Soc.* **89**: 183-200.
- Brown, W. L. & W. W. Kempf. 1960. A world revision of the ant tribe *Basicerotini*. *Studia Ent.* (n. series) **3**: 161-250.

- Brown, W. L. & E. O. Wilson. 1959. The evolution of the dacetine ants. *Quart. Rev. Biol.* **34**: 278-94.
- Bryan, E. H. 1935. Insects from Rabbit Island. *Proc. Hawn. Ent. Soc.* **9**: 39-44.
- Butler, G. D. 1961. Insects and other arthropods from Laysan Island. *Ibid.* **17**: 379-87.
- Carter, W. 1936. (Notes). *Ibid.* **9**: 143.
1957. (Exhibitions). *Proc. Hawn. Ent. Soc. for 1956*, p. 183.
- Cheesman, L. E. & W. C. Crawley. 1928. A contribution towards the insect fauna of French Oceania, pt. 3, Formicidae. *Ann. Mag. Nat. Hist. Ser. 10*, **2**: 514-25.
- Chilson, L. E. 1953. Insect records from Johnston Island. *Proc. Hawn. Ent. Soc.* **15**: 81-84.
- Clagg, C. F. 1956. (Exhibitions). *Proc. Hawn. Ent. Soc. for 1955*, p. 4.
1957. (Exhibitions). *Proc. Hawn. Ent. Soc. for 1956*, p. 197.
- Creighton, W. S. 1930. The New World species of the genus *Solenopsis* (Hymenop. Formicidae). *Proc. Amer. Acad. Arts Sci.* **66**: 39-151.
- Cumber, R. A. 1959. Distributional and biological notes on sixteen North Island species of Formicidae (Hymenoptera). *New Zeal. Ent.* **2** (4): 10-14.
- Donisthorpe, H. 1932. On the identity of Smith's types of Formicidae (Hymenoptera) collected by Alfred Russell Wallace in the Malay Archipelago, with the descriptions of two new species. *Ann. Mag. Nat. Hist. Ser. 10*, **10**: 441-76.
- Emery, C. 1899. Ergebnisse einer Reise nach dem Pacific (Schauinsland 1896-97). *Zool. Jahrb., Abt. Syst.* **12**: 438-40.
1900. Formicidarum species novae vel minus cognitae...Nova Guinea. *Természetr. Füzet.* **23**: 310-38.
- 1914a. Formiche d'Australia e di Samoa raccolte dal Prof. Silvestri nel 1913. *Boll. Lab. Zool. Gen. Agrar. Portici* **8**: 179-86.
- 1914b. Les fourmis de la Nouvelle-Caledonie et des iles Loyalty. In *Sarasin and Roux, Nova Caledonia, Zool.* **1**: 393-435.
1921. Hymenoptera: Formicidae: Myrmicinae. *Gen. Ins.* **174**: 1-397.
1925. Hymenoptera: Formicidae: Formicinae. *Ibid.* **183**: 1-302.
- Ettershank, G. 1965. A generic revision of the world Myrmicinae related to *Solenopsis* and *Pheidologeton* (Hymenoptera: Formicidae). *Aust. J. Zool.* **14**: 73-171.
- Ford, E. J. 1959. (Exhibitions and Notes). *Proc. Hawn. Ent. Soc. for 1958*, p. 18.
- Forel, A. 1899. Formicidae. *Fauna Hawaiiensis*, Cambridge, pp. 116-122.
1901. Formiciden aus dem Bismark-Archipel. *Mitt. Zool. Mus. Berlin* **2**: 5-37.
1914. Le genre *Camponotus* et les genres voisins. *Rev. Suisse Zool.* **22**: 257-75.
- Illingworth, J. F. 1917. Economic aspects of our predaceous ant (*Pheidole megacephala*). *Proc. Hawn. Ent. Soc.* **4**: 349-68.
- Ito, K. 1943. Seasonal trend in the development of the sex forms of the fire ant, *Solenopsis geminata* (Fabr.) var. *rufa* (Jerdon), in the Pineapple fields of Oahu. *Proc. Hawn. Ent. Soc.* **11**: 171-75.
- Kempf, W. W. 1962. Miscellaneous studies on Neotropical ants (Hym. Formicidae). *Studia Ent.* **5**: 1-38.
- Mann, W. M. 1921. The ants of the Fiji Islands. *Bull. Mus. Comp. Zool. Harv.* **64**: 399-499.
- Mayr, G. 1866. Myrmecologische Beiträge. *Sitz. Akad. Wiss. Wien* **53**: 509.
1870. Neue Formiciden. *Verh. Zool.-bot. Ges. Wien* **20**: 939-96.
1876. Die australischen Ameisen. *J. Mus. Godeffroy Hamburg* **12**: 56-115.

- Pemberton, C. E. 1944. (Notes and exhibitions). *Proc. Hawn. Ent. Soc.* **12**: 25.
- Phillips, J. S. 1934. Fire ants in dry areas. *Ibid.* **8**: 515.
- Santschi, F. 1919. Cinq notes myrmecologiques. *Bull. Vaud. Sci. Nat.* **52**: 325-50.
1928. Formicidae. *Insects of Samoa* **5** (1): 41-58.
- Smith, M. R. 1944. Ants of the genus *Cardiocondyla* Emery in the United States. *Proc. Wash. Ent. Soc.* **46**: 30-41.
1947. A generic and subgeneric synopsis of the United States ants based on the workers (Hymenoptera: Formicidae). *Amer. Midl. Nat.* **37**: 521-647.
1951. Formicidae, *In* Synoptic Catalogue of Hymenoptera north of Mexico. *U.S. Dept. Agr. Man.* **2**: 839.
1957. A contribution to the taxonomy, distribution and biology of the vagrant ant, *Plagiolepis alluaudi* Emery (Hymenoptera, Formicidae). *J. N.Y. Ent. Soc.* **65**: 159-98.
- Suehiro, A. 1960. Insects and other arthropods from Midway Atoll. *Proc. Hawn. Ent. Soc.* **27** (2): 289-98.
- Swezey, O. H. 1943. Notes and exhibitions. *Ibid.* **12**: 25.
1945. Insects associated with orchids. *Ibid.* **12**: 343-403.
- Taylor, R. W. 1959. The Australian ant *Iridomyrmex darwinianus* (Forel) recorded from New Zealand. *New Zeal. Ent.* **2** (4): 18-19.
1960. Taxonomic notes on the ants *Ponera leae* Forel and *Ponera norfolkensis* (Wheeler) (Hymenoptera-Formicidae). *Pacific Sci.* **14**: 178-80.
1961. Notes and new records of exotic ants introduced into New Zealand. *New Zeal. Ent.* **2** (6): 1-10, 23-37
1967. A monographic revision of the ant genus *Ponera* Latreille (Hymenoptera-Formicidae). *Pac. Ins. Mon.* **13**: 1-112.
- Taylor, R. W. & E O Wilson. 1961. Ants from three remote oceanic islands. *Psyche* **68** (4): 137-44.
- Timberlake, P. H. 1926. Hymenoptera. *In* "Insects of Hawaii, Johnston Island and Wake Islands," ed. E. H. Bryan. *Bull. Bishop Mus.* **31**: 17-19.
- Wheeler, W. M. 1908. Ants from Moorea, Society Islands. *Bull. Amer. Mus. Nat. Hist.* **24**: 165-67.
1909. Ants collected by Prof F. Silvestri in the Hawaiian Islands. *Boll. Lab. Zool. Gen. Agrar. Portici* **3**: 269-72.
1922. Formicidae from Easter Island and Juan Fernandez. *In* Skottsberg, ed., *Nat. Hist. Juan Fernandez and Easter Island* **2**: 317-19.
- 1932a. Ants from the Society Islands. *Bull. B. P. Bishop Mus.* **113**: 13-19.
- 1932b. Ants of the Marquesas Islands. *Ibid.* **98**: 155-63.
- 1933a. Formicidae of the Templeton Crocker Expedition. *Proc. Calif. Acad. Sci. Ser. 4*, **21**: 57-64.
- 1933b. Three obscure genera of ponerine ants. *Amer. Mus. Nat. Hist. Novit.* **672**: 1-23.
- 1933c. An ant new to the fauna of the Hawaiian Islands. *Proc. Hawn. Ent. Soc.* **8**: 275-77.
- 1933d. A new species of *Ponera* and other records of ants from the Marquesas Islands. *Bull. B. P. Bishop Mus.* **114**: 141-44.
- 1934a. Revised list of Hawaiian ants. *B. P. Bishop Mus., Occ. Pap.* **10**: 3-21.
- 1934b. Check list of the ants of Oceania. *Ibid.* **11**: 3-56.
1936. Ants from the Society, Austral, Tuamotu and Mangareva Islands. *Ibid.* **12**: 3-

17.

- Williams, F. X. 1937. (Notes and exhibitions). *Proc. Hawn. Ent. Soc.* **9**: 375.
- Wilson, E. O. 1953. The ecology of some North American dacetine ants. *Ann. Ent. Soc. Amer.* **46**: 479-95.
1957. The *tenuis* and *selenophora* groups of the ant genus *Ponera*. *Bull. Mus. Comp. Zool. Harv.* **116**: 355-86.
1958. Studies on the ant fauna of Melanesia I-IV. *Ibid.* **118**: 101-53; **119**: 303-71.
1959. Studies on the ant fauna of Melanesia V. *Ibid.* **120**: 483-510.
1960. The ants of Rennell and Bellona Islands, British Solomon Islands. *Nat. Hist. of Rennell I., Brit Solomon Is., (Copenhagen)* **4**: 13-23.
- Wilson, E. O. & R. W. Taylor. 1967. An estimate of the potential evolutionary increase of species density in the Polynesian ant fauna. *Evolution* **11**: 1-10.
- Zimmerman, E. C. 1940. Argentine ant in Hawaii. *Proc. Hawn. Ent. Soc.* **11**: 108.
1953. Notes and exhibitions. *Ibid.* **15**: 10.
- Van Zwaluwenburg, R. H. 1943. The insects of Canton Island. *Ibid.* **11**: 300-12.

INDEX

New names are indicated by **bold face** type, synonyms by *italics*.

- aana**..... 16, 42
adamsoni..... 52
 Adelomyrmex..... 77
 aequalis..... 21
agilis 57
 albipes 18, 82, 102
 alluaudi 18, 85
 Amblyopone..... 19
 ampla..... 42
 anceps..... 7, 18, 78
andrei..... 28
androgyna 28
 Anochetus..... 32
 Anoplolepis..... 84
 antarcticus..... 15, 62
aphidicola 92
 Arctomyrmex..... 77
 atomus (Oligomyrmex)..... 14, 60, 62
 atomus (Paratrechina)..... 89
atua..... 16, 43
augusti..... 85
australis..... 80
 belti..... 75
bengalensis..... 88
boraborensis 48
 bourbonica 18, 87, 102
 Brachymyrmex 92
 brachycera 58
 brunnea..... 75
 bryani..... 96
buxtoni 97
 caespitum..... 70
 Camponotus..... 93
 caraiba 75
 Cardiocondyla..... 8, 53
cavannae..... 45
 Cerapachyinae..... 10, 33
 Chariomyrma..... 99
 Chelaner 62
chlorogaster 93
 chloroticus..... 17, 93
cleptis..... 60
 colaensis 24
 Colobopsis 96
 confinis 12, 26
 conicus 17, 96
conithorax..... 97
crassipilis 90
 Cryptopone..... 23
 cubensis..... 75
 Dacetini..... 13
dahlii 60
decepiens..... 29
 dentatus..... 96
 denticulata 58
 destructor 15, 64, 66
 detorquens 84
 Dolichoderinae..... 10, 78
 dubia 13, 36
 dyak 38
 Ectomomyrmex 21
 emeryi..... 16, 53
 emmae..... 13, 42
 Eurhopalothrix 34
 exigua..... 18, 86
exsulans..... 7, 16, 74
falcata..... 30
 falcigera 30
 fervens..... 7, 8, 17, 45
 flavolimbatus..... 17, 96, 98
 floricola..... 15, 64, 102
foreli 85
 Formicinae..... 10, 84
 fossulatum..... 15, 65
fullawayi..... 82
fuscipennis 31
 geminata 14, 58, 102
 germaini 74
gleadowi..... 28
 godeffroyi..... 14, 36
gracilis 78
 gracillimum..... 66, 102
 graeffei 10, 32
 guineense 15, 71, 73, 102
 guppyi 96
haematodes..... 31
haematodus..... 31
hawaiiensis (Cardiocondyla) 56
hawaiiensis (Paratrechina) 88
hawaiiensis (Camponotus) 95
heeri..... 92
 hirsutus..... 77
 humilis 18, 79
 Hypoponera..... 26

- impressiceps*.....49
incerta..... 12, 23, 25
indagatrix..... 37
inezae.....36
inezi..... 36
insulanus 2, 11, 21
insularis 30
Iridomyrmex 78
irritans.....90
javana..... 45
juliae 37
kalakauae 29
knowlesi 43
kraepelini 11, 19
latinode 15, 66
Leptogenys 30
leucopus..... 97
lewisi.....14, 38, 41
liliuokalani 67
loi..... 12, 24
longicornis.....18, 87, 102
longipes..... 18, 84
mackayensis.....42
macra..... 71
mactavishi..... 5, 85
maculatus 93
mailei 14, 38
majuscula..... 19
manni..... 75
maxillosa.....11, 30
megacephala..... 8, 16, 46, 59, 80, 102
melanocephalum.....18, 80, 102
membranifera 13, 35
metallica.....11, 20
mina.....29
minutior..... 55
minutula..... 18, 89
minutum (Monomorium).....15, 67
minutum (Tapinoma) 18, 82
Monomorium 15, 64
mumfordi (Hypoponera)..... 29
mumfordi (Smithistruma)..... 5, 13, 36
myops..... 69
Myrmamblys 98
Myrmicinae.....10, 13, 34
Myrmoturba..... 93
nautarum (Camponotus) 97
nautarum (Hypoponera) 26
navigator..... 17, 94
nereis 53
nigrifrons 17, 97
nigriscapa 45
nigrocerea.....56
nivalis 56
novaeollandiae.....93
nuda..... 16, 55, 80
Nylanderia 87
obesum 70
oblonga..... 56
obscura 90
obscurior.....17, 92
oceanica (Pheidole) 8, 17, 48, 53
oceanicus (Anochetus)..... 32
Odontomachus.....31
Oligomyrmex..... 60
opaca..... 20
opaciceps 12, 28
opacior 27
ornata..... 85
pacifica (Platythyrea) 20
pacifica (Vollenhovia) 14, 56, 58
pacificum (Tetramorium) 7, 15, 72
pallida 87
papuana..... 14, 60
papuanus..... 78
Paratrechina 8, 87
parallela..... 11, 20
pattisoni..... 48
pedunculata..... 36
perkinsi 28
perplexa..... 38
pharaonis 15, 68, 102
Pheidolacanthinus..... 52
Pheidole.....8, 13, 42
Plagiolepis..... 17, 85
Platythyrea 20
Polyrhachis..... 99, 102
Ponera..... 19, 23
Ponerinae 10, 19
Prionopelta 19
procera 13, 34
punctatissima.....12, 28
punctiventris 32
pusilla..... 20
quadridentata.....22
Quadristruma 42
rapaense (Chelaner; Monomorium) 5, 62
ratardorum..... 24
reticulatus.....99
Rhopalothrix 76
Rhytidoponera 20
rogeri 13, 39, 42

- Rogeria*..... 74
rotumana (Polyrhachis).....17, 99
rotumanus (Camponotus)..... 17, 98
rufa..... 58
rufescens..... 82
rufifrons..... 96
samoanum (Monomorium)..... 67
samoanus (Adelomyrmex) 14, 77
samoensis (Camponotus)..... 93
samoensis (Vollenhovia).....2, 14, 57
sanctaecrucis..... 93
scabra..... 74
schauinslandi..... 28
sechellense..... 65
seini..... 33
sexspinosa..... 16, 52
sharpi..... 89
silvestrii.....5, 10, 33
simillimum (Tetramorium) 15, 73, 102
simillimus (Ectomomyrmex).....21
simillimus (Odontomachus)..... 7, 10, 31
sinensis..... 34
skottsbergi..... 88
Smithistruma.....13, 36
Solenopsis.....58
speculare.....64
stigma..... 11, 22
stigmatica (Paratrechina) 90
stigmatica (Rogeria)..... 75, 76
striatidens 14, 70
Strumigenys..... 13, 36
subcoenum 66
sublevinodis 16, 75, 76
swezeyi 5, 12, 19, 25
syscena 24
Syscia..... 33
szalayi.....13, 41
tahitiana..... 45
tahitiensis..... 5, 14, 62
taipingensis 24
talpa.....15, 69
Tanaemyrmex..... 95
Tapinoma..... 80
Technomyrmex 82
tenuis.....12, 24, 25
testacea 11, 23
Tetramorium 70
tetraphanes 42
tonganum 15, 74
Trachymesopus 22
Trichoscapa..... 35
Triglyphothrix.....70
trigona.....26
typhla..... 33, 34
umbonata 16, 50
upoluana..... 48
vaga..... 18, 88, 90
variabilis.....42, 44
variegatus..... 17, 95
vigilans..... 42
vitiensis (Paratrechina).....90
vitiensis (Solenopsis).....60
vitiensis (Technomyrmex) 82
vividula 90
Vollenhovia..... 56
wagneri..... 74
wheeleri (Epitritus) 5
wheeleri (Quadristruma)..... 42
wheeleri (Zatapinoma) 80
williamsi..... 35
woodwardi..... 12, 24, 26
wroughtoni 16, 56
yarrensis 42
Zatapinoma 80
zimmermani 50
zwaluwenburgi (Amblyopone).....5, 11, 19
zwaluwenburgi (Hypoponera)..... 5, 12, 29