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THE ANTS OF POLYNESIA
(Hymenoptera: Formicidae)

By Edward O. Wilson and Robert W. Taylor

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 equilibrial 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 19

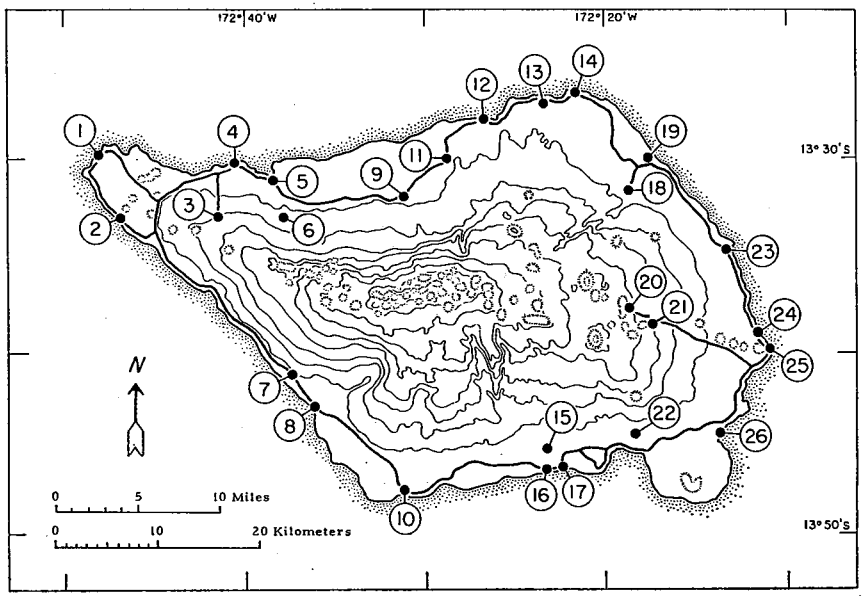
and will not be covered in detail here. In the appendix we have provided a synopsis of the New Zealand species, adding some additional information that has come to light since Brown's paper. The New Zealand fauna, especially its native component, is very different from that of the rest of Polynesia and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

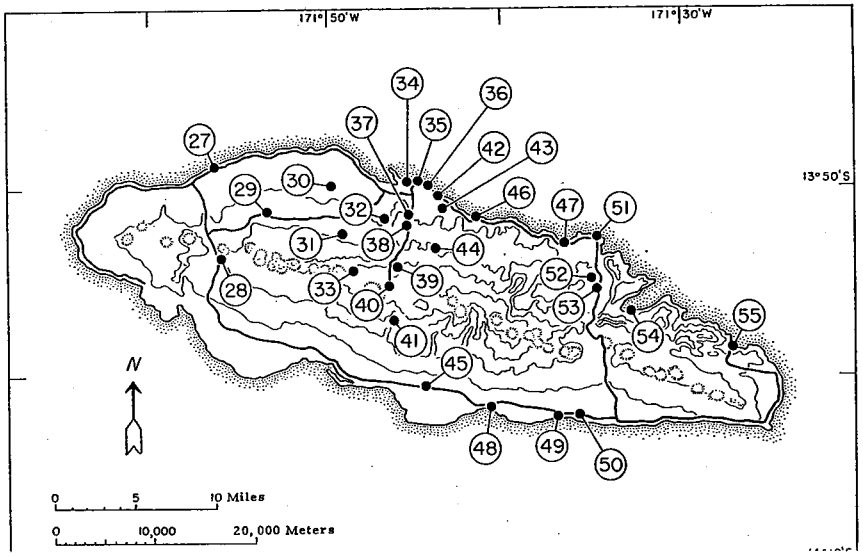
HISTORY OF TAXONOMIC STUDIES

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 faunula a of 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;





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.

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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.

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

ZOOGEOGRAPHIC ANALYSIS

A classification of the 83 known Polynesian species according to origin is giv Table 1. The composition of the faunulae of the better known islands is given in 2. In order to provide a crude measure of the degree of sampling, the number of p who have made substantial collections on each of the islands is also given in Ta From these data, together with a consideration of distributions of individual specie tailed 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 r east of New Zealand, Rotuma, Samoa, and Tonga. No certain endemics are kno occur in Polynesia east of these islands. Five species which prior to 1950 were consi to be endemic, namely *Ponera swezeyi* (Wheeler), *Cerapachys silvestrii* Wheeler, *Ep wheeleri* Donisthorpe, *Monomorium rapaense* Wheeler, and *Plagiolepis mactavishi* Wh have been synonymized with species that occur elsewhere within or outside Poly Four others, *Amblyopone zwaluwenburgi* (Williams) and *Hypoponera zwaluwenburgi* (Wh of Hawaii, *Smithistruma mumfordi* (Wheeler) of the Marquesas Islands, and *Oligom tahitiensis* Wheeler of Tahiti, are still unknown elsewhere; but their endemic status i into doubt by the fact that they belong to notoriously poorly collected and taxono ly little known genera. Moreover, *O. tahitiensis* was described only from the sexual and cannot even be compared with most of the other Indo-Australian members genus, which are known only from the worker caste. Also, despite a plethora of subs and varietal names applied in the past literature to populations of species now livi the central and eastern Pacific, we have discovered only a single example of true geog variation within these populations. The case is furthermore a relatively trivial one propodeal spines of workers and soldiers in samples of *Pheidole umbonata* Mayr fro Society Islands and Marquesas are slightly thicker, and the body color darker, th similar samples from Samoa.

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

1. Endemic to one or more Polynesian archipelagoes:

Ectomomyrmex insulanus, Ponera loi, P. woodwardi, Strumigenys mailei, Pheidole aana, P. atua, Vollenhovia pacifica, V. samoensis, Rogeria exsulans, Adelomyrmex samoanus, Cam ponotus 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, Hypoponera confinis H. punctatissima, Cryptopone testacea, Odontomachus simillimus, Anochetus graeffei, Eurho

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

Hypoponera 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, Hypoponera 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				
				Endemic	Continuous Indo-Austral.	Tramp	Uncertain	Total
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. Fakaofo (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

Archipelago or Island	Area in sq. miles	No. of collectors	No. of genera	No. of species				
				Endemic	Continuous Indo-Austral.	Tramp	Uncertain	Total
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 Ysabie	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

(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×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.

MK. Collected by N. L. H. Krauss.

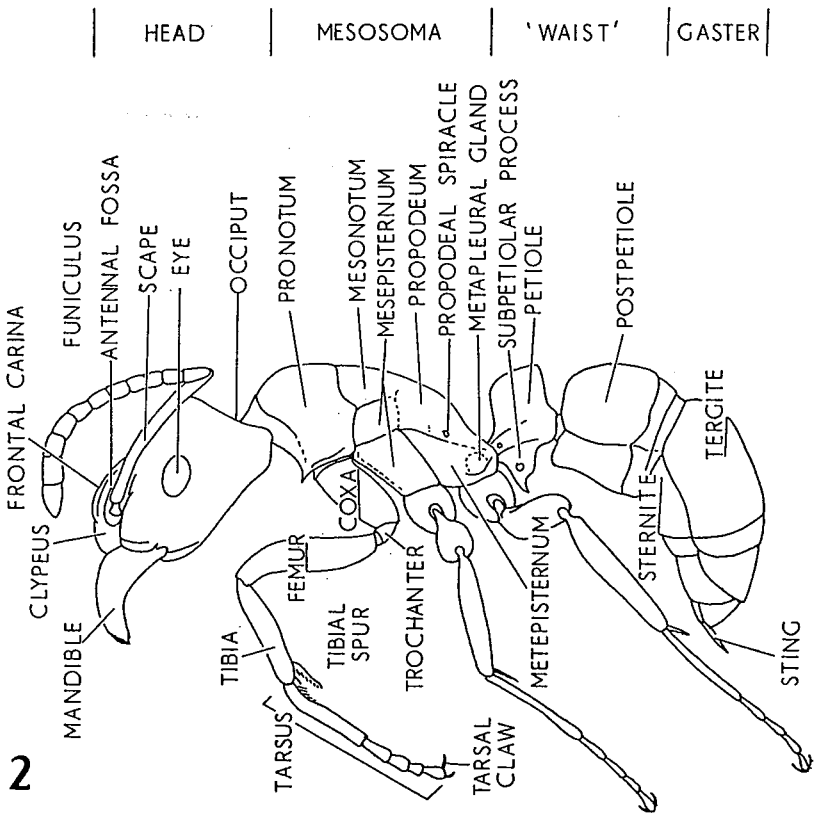

Fig. 2. *Rhytidoponera metallica* (Fr. Smith), worker from Sydney, Australia; labelled to demonstrate the major terminology used in this study.

SI. Scape index=(SL×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.

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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 nar-

   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

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 posterolateral 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

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

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

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-angular; 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 propodeal 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 (*Monomorium*).....24

Propodeum armed with a pair of acute teeth or spines; clypeus not bicarinate 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 petiolar node ..... **Monomorium destructor**

30 (28). Mesosoma (alitrunk) and pedicel clear yellow or at most light brownish yellow, contrasting with dark reddish brown head and abdomen (gaster); seen from side, entire petiole, including peduncle, about 1.5× longer than

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, monomorphic 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 reaching occipital border..... 36

Dimorphic; pronotum of small-headed minor worker either smooth and shining or finely "shagreened"; scapes of minor worker in repose exceeding occipital border..... 37

36 (35). Propodeal spiracle as wide as spine is long, or wider; subpetiolar process absent ..... **Rogeria sublevinodis**

Propodeal spiracle only 1/2 as wide as spine is long, or less; flange-like subpetiolar 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 approximately anterior 3/4 of surface exclusive of mandibles; pronotum of *minor 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**

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**

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.

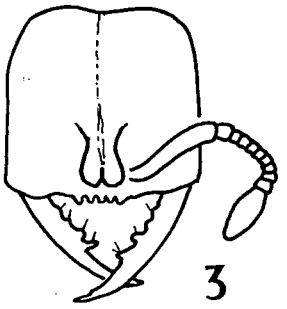


Fig. 3. *Amblyopone zwaluwenburgi* (Williams), type worker from Honolulu, Oahu. (After Williams, 1946.)

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.

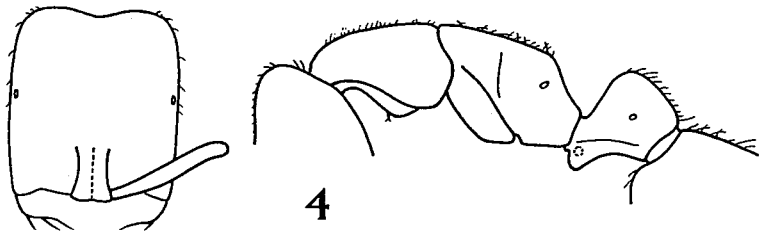
Like the smaller species of the genus *Ponera*, the *celata* group of *Amblyopone*, to which *zwaluwenburgi* belongs, consists of tiny cryptobiotic species which are especially difficult to collect. As in the case of the Hawaiian "endemic" *Ponera swezeyi*, recently recorded from Samoa, future collecting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

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



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. Anatoni (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: Leuaniua (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). Lauli'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, sweep-

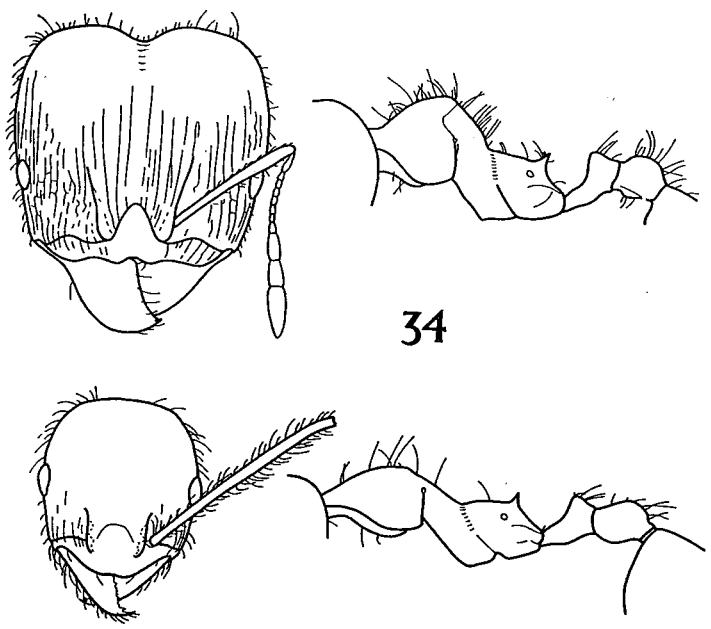


Fig. 34. *Pheidole megacephala* (Fabricius). Vaipoto, Upolu (ECZ): soldier, upper; minor worker, lower.

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). *GAMBIER 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

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.

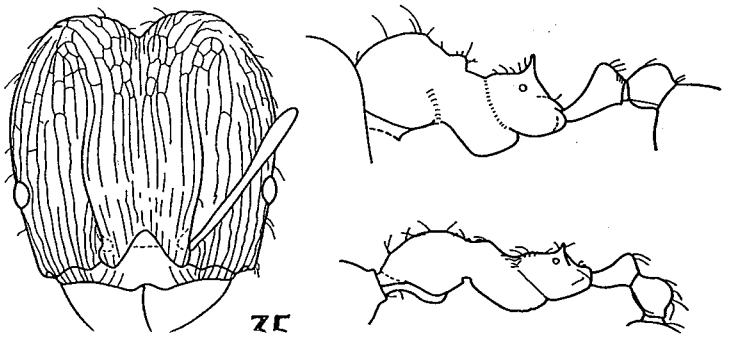
Pheidole oceanica Mayr, 1866, Sitz. Akad. Wiss. Wien (Math.-Nat. Cl.) **53**: 510, worker, soldier, queen (Type locality: Ovalau). Type series restricted to soldier and queen, Mayr (1870).

Pheidole oceanica var. *pattesoni* 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



forest, and from roadside grass (RWT accs. 531, 532, 535). Mt. Matafa Road, 200 m, rai forest, strays from foliage and under bark on rotting logs, nests with larvae and pup 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). Sam laeulu, coastal rain forest, strays from foliage (RWT acc. 513). Toga, coastal rain fores nest under trunk epiphyte 1 m above ground (RWT acc. 380). *Upolu*: Apia, sweepin (ECZ, 1940). **Malololelei, 600 m (1924). Saagafou, rain forest, nest under stagfern ep phyte and strays under moss on trees (RWT accs. 610, 611). Satalo, *Taro* patch, edge rain forest, strays under bark on rotting log (RWT acc. 614). Sinaele, 350 m, beatin (ECZ, 1940). Tanumalala, 350 m, rain forest, strays from foliage and nest from rottin log (RWT acc. 606, 607). Tapatapao, 300 m, under dead bark, winged queen, 21.VIII.194 (ECZ). Tiavi, 600 m (OHS, ECZ, 1940). Togitogiga, 400 m, rain forest berlesates of lea litter and moss from rotting logs (GE accs. 56, 58, 59). *Tutuila*: Fagatoga, 300 m, beatin dead branches and shrubbery (ECZ, 1940). Moloata, 220 m, sweeping dealate queen (EC 1940). Reservoir at Fangatanga, beating shrubbery, dealate queen (ECZ, 1938). Pago Pag (A. F. Judd **1923). *Manua*: **Ta'u* (1923). ELLICE IS.: Mayr (1870). TONGA *Tongatabu*, record by Mayr (1870). ROTUMA: "Kilinga", 60 m, workers, winged queen 4.VIII.1938 (H. St. John). COOK IS.: *Rarotonga* (G. P. Wilder 1925). TOKELAU IS. *Fakaofo* (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 Guine and New Caledonia northward into Micronesia and eastward to the Marquesas Is. Th 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 i 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 th soldier caste of *oceanica*. The characters cited have been total size, body form (especial ly 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 avail

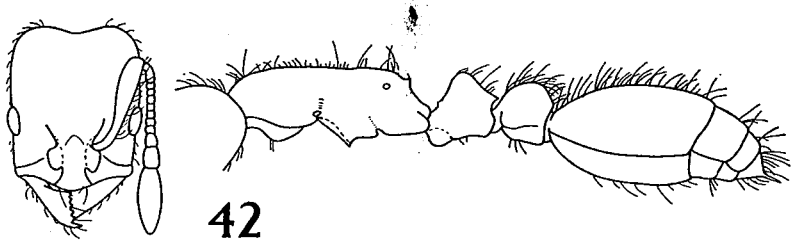


Fig. 42. *Vollenhovia samoensis* Mayr, worker from Afiamalu, Upolu (ECZ).

02); 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, 955). Togitogiga, 400 m, rain forest, berlesate, moss on rotting log, 12.V.1962 (GE acc. 0). *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.

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), *fide* 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.

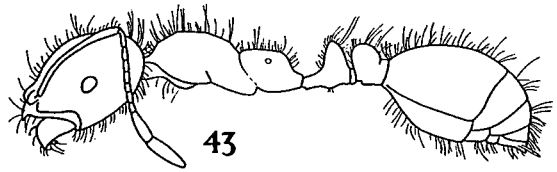


Fig. 43. *Solenopsis geminata* (Fabr.), minor worker from Aturoa, Raiatea, Society Islands (NK).

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

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, ♂.

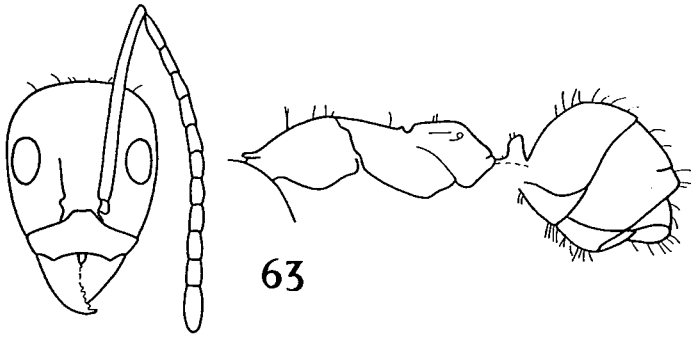


Fig. 63. *Iridomyrmex anceps* (Roger), worker from Akaiami, Aitutaki, Cook Is. (NK).

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

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.

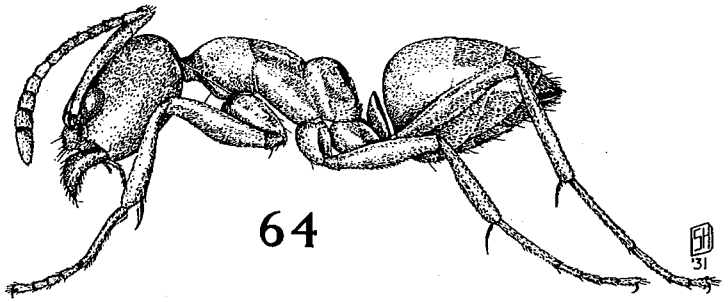


Fig. 64. *Iridomyrmex humilis* Mayr, worker from United States. (After S. H. DeBord in M. R. Smith, 1947).

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

tablished 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 Chilsoh (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 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.

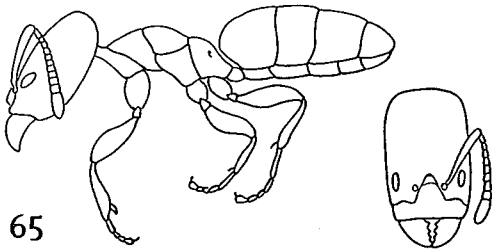


Fig. 65. *Zatapinoma wheeleri* Mann. Syntype soldier (after W. M. Mann).

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

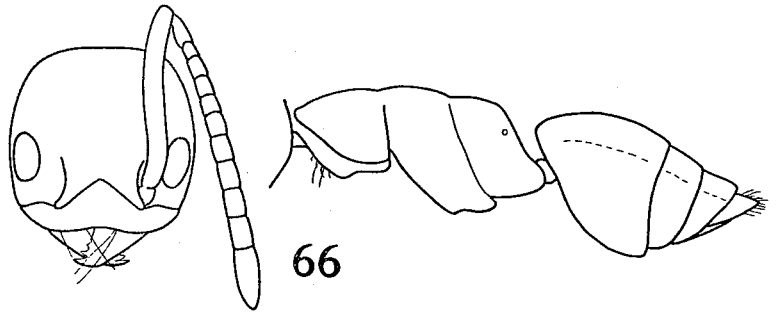


Fig. 66. *Tapinoma melanocephalum* (Fabr.), worker from Opoa, Raiatea (NK, 1955).

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, *fide* 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*: Teanatuhiva, 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. Class (1957)

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.

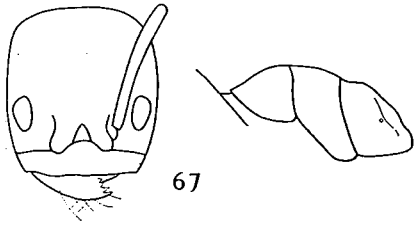


Fig. 67. *Tapinoma minutum* Mayr, worker from Afiamalu, Upolu (ECZ).

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, ♂,

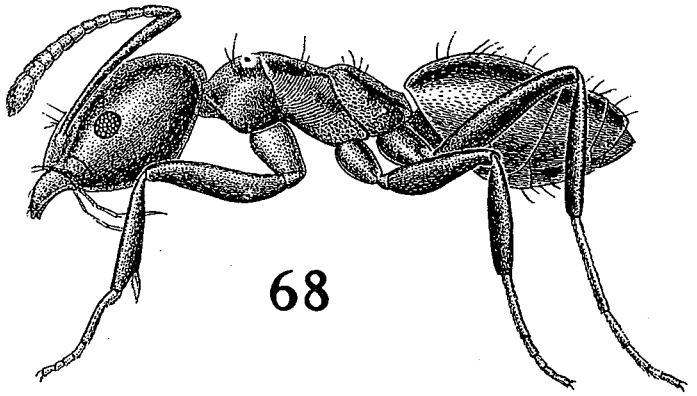


Fig. 68. *Technomyrmex albipes* (Fr. Smith). Worker from Koror (NE), Palau, Micronesia.

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.: *Fakaofo* (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

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). Lauli'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: *Fakaofo* (EHB 1934). COOK IS.: *Rarotonga* (C. E. Clarke 1937). SOCIETY IS.: *Moorea*: Baie de Cook (NK, 1955). *Tehau Pt. (1934). *Tahiti*: *Aribiri, Paro (1934). *Arue (1941). *Blue Lagoon (1934). *Fautaua Valley (1934).

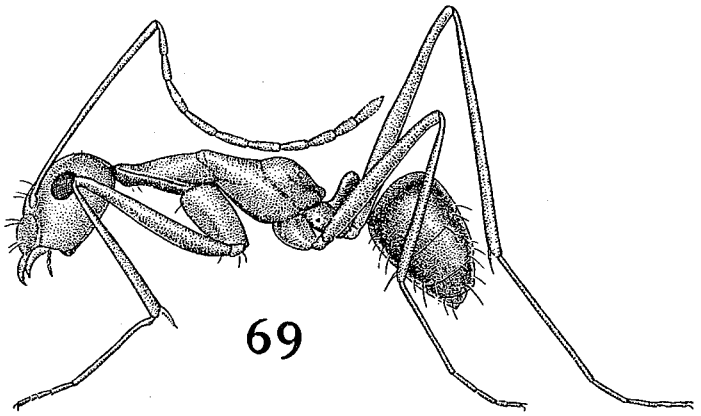


Fig. 69. *Anoplolepis longipes* (Jerdon), worker from Sorol I., Sorol Atoll, W. Caroline Is.

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, figs. J, K, worker (Type locality: Botanical Garden, Zurich, Switzerland).