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A STUDY OF NEW GUINEA ANTS OF THE GENUS *APHAENOGASTER* MAYR
(HYMENOPTERA, FORMICIDAE)

By Marion R. Smith[1]

The genus *Aphaenogaster* Mayr includes some of our most primitive and generalized ants, with fossil representatives even in the Baltic amber. According to Wheeler 1922, p. 24 there are forms in all the faunal regions of the World except the Ethiopian. The ants are especially common in the Holarctic Region. Primarily terrestrial, the ants nest in the soil or in rotting wood in moderate-to-rather-large colonies. In North America many of the forms seem to prefer wooded areas for nesting sites. Our forms are rather docile in nature and some of them, such as *rudis* Emery and *rudis picea* Emery, can easily be kept and reared in artificial nests. There are both diurnal and nocturnal species; Wheeler 1916, p. 216 found *longiceps* (F. Sm.) nocturnal and Wilson in his unpublished notes states that *dromedarius* (Emery) is diurnal. The slender bodies and unusually long legs of such ants as *dromedarius* and *loriai* (Emery) suggest that these ants can not only run rapidly but often must escape enemies by their speed. There may also be other methods of self-protection. Wilson has indicated in his biological notes that the long acute thoracic spines of the workers of *loriai* may protect the ants within their nest from outside invaders such as small rodents, etc. I am not aware of any species that tend honeydew-excreting insects. Apparently the ants feed exclusively or almost exclusively on the flesh of small organisms, particularly arthropods. Ants of the genus *Aphaenogaster* are considered of little or no economic importance. However one species, *pythia* Forel, is a pest in sugarcane fields in Australia. The nature of its damage and importance is discussed

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at length in this paper. Several of the New Guinea species are most unusual in appearance, perhaps the most bizarre of them being the worker of *loriai* with its unusually long occipital neck, legs, and antennae and the presence of a pair of spines on the prothorax and epinotum. It is no wonder that this ant has been figured in more than one periodical.

My attention was first attracted to the New Guinea *Aphaenogaster* Mayr by some evident synonymies that had not been published. Upon investigating the group further I found that the small number of forms recorded from New Guinea were described in several diverse periodicals, some of which are not readily available. It seemed that a comprehensive article was needed on these ants including all known facts pertaining to their taxonomy, biology, and distribution. However, the lack of sufficient individuals, series, or castes makes it impossible to determine correct taxonomic relationships of some of them. For instance, *projectens* Donisthorpe is known only from the male and it will be impossible to recognize the worker until it is collected from a colony in association with the male. It is also impossible to know whether *quadrispina* Emery is a valid species, a subspecies of *loriai* (Emery), or even perhaps its synonym.

Although some of the ants are of most unusual appearance, almost to the point of being bizarre, they are basically only *Aphaenogaster* after all. Their true *Aphaenogaster* habitus is indicated in the worker by the number of segments in the antenna and the shape of certain of these, the slender body, pronounced mesoepinotal impression, epinotum usually bearing a pair of spines or tubercles, and pedunculate petiole. Such characters as the pronounced occipital neck, the pair of spines on the prothorax, and unusually long antennae and legs indicate specialization. This specialization is evident by the anterior wing of the female and male of such primitive subgenera as *Aphaenogaster* and *Attomyrma* having two cubital cells whereas the anterior wing of the more specialized subgenera *Deromyrma* and *Planimyrma* has only one. Donisthorpe 1938, p. 30 has gone so far as to state that when all castes of the ants of the two latter subgenera are known, it may be necessary to erect a new genus for them. However, I fully agree with Viehmeyer 1914a that *Deromyrma* and *Planimyrma* are really only subgenera of *Aphaenogaster* and that when they are retained as such their true taxonomic relationships are best shown. I also agree with Viehmeyer 1914b in his belief that *Planimyrma* contains the most specialized forms and that *Deromyrma* is intermediate between *Planimyrma* and the more primitive subgenera of *Aphaenogaster*

This study has resulted in the elimination of the names of three forms as synonyms ; the vars. *fusca* Emery and *nigra* Donisthorpe under *dromedarius* (Emery) and the var. *atra* Stitz under *loriai* (Emery). The form *quadrispina wheeleri* Donisthorpe is now known as *perplexus*, n. name and n. status. One new species, *lustrans*, has been described.

The following table lists all forms that are recognized as valid in this study and also shows what caste or castes are known for each. Two of the forms are known from a single caste each, *projectens* Donisthorpe from the male and *lustrans*, n. sp. from the worker. Unfortunately neither of these species can be assigned to its proper subgenus until its lacking castes are found in a colony associated with the known caste.

Known Castes of the Various Species of New Guinea *Aphaenogaster*
X = caste known O = caste unknown,

Species	Worker	Female	Male
Aph. (*Deromyrma*) *dromedarius* (Emery)	X	O	X
Aph. (*Planimyrma*) *loriai* (Emery)	X	X	X
Aph. (*Planimyrma*) *quadrispina* Emery	X	O	X
Aph. (*Planimyrma*) *perplexus* n. name, n. status	X	O	O
Aph. (Subgenus?) *projectens* Donisthorpe	O	O	X
Aph. (Subgenus?) *lustrans*, n. sp.	X	O	O
Aph. (*Nystalomyrma*) *pythia* Forel	X	X	X

Material Studied

Although I have made every effort to secure New Guinea specimens from museums, institutions, and private collectors the total number of individuals studied for this paper has been less than 200. I have been fortunate though in having available for study cotypes of all known New Guinea *Aphaenogaster* except those of *pythia* Forel and the holotype of *loriai* var. *atra* Stitz. The forms of which I have seen types are as follows: *dromedarius* (Emery), and its vars. *fusca* (Emery) and *nigra* Donisthorpe, *loriai* (Emery), *quadrispina* (Emery), *perplexus* n. name and n. status for *quadrispina wheeleri* Donisthorpe, and *projectens* Donisthorpe. Apparently my description is the first of a pterergate of *dromedarius*.

Besides types, 171 additional specimens have been studied, these being divided among the forms as follows: *dromedarius*–50 workers, 1 pterergate, 3 males; *loriai* –72 workers, 1 female, 4 males; *perplexus*–12 workers; *pythia*–19 workers, 3 females, 6 males.

Methods of Study

The ants were studied under a small electric light with a binocular microscope at a magnification of 61.2 times. Measurements were as follows: (1) Length of body is the total of the greatest lengths of the head, thorax, petiole, postpetiole and gaster, each measured separately; (2) head length exclusive of body length is the distance measured through the longitudinal axis of the head from the anterior border of the clypeus to the flange or rim of the occipital collar or neck; (3) length of the occipital neck is the distance measured along the longitudinal axis of the head from the point where the occipital neck begins to form to its termination at the flange or rim of the occipital neck; (4) greatest breadth of head is the greatest distance from the external border of one eye to that of the other measured across the head at a right angle to the longitudinal axis of the head; (5) greatest diameter of eye is the greatest length of the eye; (6) length of thoracic spine is the shortest distance from its base to its apex regardless of the curvature of the spine; (7) length from

the posterior border of the eye to the rim of the occipital neck is the shortest distance between these two points; (8) length of scape is the shortest distance from base to apex. The color of the body hairs and the degree of distinctness of the body sculpturing will vary greatly according to the intensity of the artificial light used.

Acknowledgements

I am deeply grateful to all institutions and individuals who have so freely cooperated with me. Material has been secured from the following: Museo Civico di Storia Naturale, Genova, through Delfa Guiglia; the British Museum (Natural History), London, through I. H. Yarrow; the Museum of Comparative Zoology, Cambridge, Massachusetts, through W. L. Brown; the California Academy of Sciences, San Francisco, through C. Don MacNeill; the Museum d'Histoire Naturelle, Geneva, through Chas. Ferrière. In addition to the sources mentioned I have studied types and other specimens belonging to the U. S. National Museum, Washington, D. C.

I should especially like to express my sincere appreciation to E. O. Wilson of the Biological Laboratories, Harvard University and to Dr. Brown at Cambridge. These persons have not only furnished numerous specimens and many helpful biological notes but have also greatly encouraged me at all times.

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Aphaenogaster Mayr

The genus *Aphaenogaster* was erected by Mayr 1853, p. 107 but no type designated until 1903 when Bingham chose *sardoa* Mayr. At present five subgenera are recognized: *Aphaenogaster* Mayr, *Attomyrma* Emery, with its type *subterranea* (Latr.), *Deromyrma* Forel, *Planimyrma* Viehmeyer and *Nystalomyrma* Wheeler. Since only the three latter subgenera are known to occur in New Guinea each of these will be treated in detail. Such treatment will give the following: Original reference to the subgenus, type, general distribution throughout the World, and brief but salient characterizations of the castes. It should be clearly understood that the characters used in the keys to subgenera and species are only for New Guinea ants and may not be applicable to ants from other parts of the world.

Aphaenogaster, subgenus **Deromyrma** Forel

Aphaenogaster, subgenus *Deromyrma* Forel, 1913, Zool. Jahrb. Syst., 36: 49.

Type: *Aphaenogaster* (*Ischnomyrmex*) *swammerdami* Forel. Orig. desig.

Distribution- Mediterranean Region and Central Asia. Insular and Continental India, Madagascar, Mexico and Central America.

Worker.

Body slender, antennae and legs unusually long. Head including mandibles but not the occipital neck, subelliptical; prolonged posteriorly to form a long funnel-like, occipital neck. Antenna 12-segmented; scape curved, slightly enlarged near its apex, approximately as long as the combined lengths of the first 8 or 9 funicular segments. Mandible rather large, subtriangular, the masticatory border bearing 3 distinct teeth followed by a row of smaller and more irregular teeth. Eye protuberant but not strongly convex, not especially large, 0.3-0.4 mm. in its greatest diameter, placed

more than its greatest diameter from the base of the mandible.

Female.

The female of *dromedarius* is unknown, but should be similar to the worker in having a 12-segmented antenna, a pronounced occipital neck, and also a single closed cubital and discoidal cell in the anterior wing.

Male.

Head including mandibles but not the occipital neck, subelliptical, head behind the eyes prolonged posteriorly to form an occipital neck as with the worker. Antenna similar to that of worker but differing in being 13-segmented with a scape approximately as long as the combined lengths of the first 9 or 10 funicular segments; the funiculus filiform and without a perceptible club and with the last funicular segment not as long as the combined lengths of the 2 preceeding segments. Ocelli distinct but not unusually large. Eye unusually large, 0.55 mm. in its greatest diameter. Prothorax and mesothorax each without a pair of spines or protuberances. Anterior wing with a single closed cubital and discoidal cell.

Only a single species, *dromedarius* (Emery), is known to occur in New Guinea.

Aphaenogaster, subgenus **Planimyrma** Viehmeyer

Aphaenogaster, subgenus *Planimyrma* Viehmeyer, 1914, Zool. Jahrb. Syst., 37: 604. Type: *Stenamma* (*Ischnomyrmex*) *loriai* Emery. By monotypy and original desig. Distribution- New Guinea.

Worker.

Body slender, antennae and legs unusually long. Head including mandibles but not the occipital neck, subelliptical; prolonged posteriorly to form a funnel-like occipital neck. Antenna 12-segmented; scape curved, with a distinct enlargement near its apex, approximately as long as the combined lengths of the first 8 or 9 funicular segments; funiculus with all segments distinctly longer than broad, the second segment the shortest, the last 4 segments the longest and together forming a scarcely perceptible club. Mandible subtriangular, the masticatory border bearing 2-4 rather large apical teeth followed by a row of smaller and less regular teeth. Frontal carina somewhat elevated. Eye not large but convex and moderately protuberant. From above the pronotum is subpyriform, narrowest anteriorly, near its midlength there is borne on each side a large, long, acutely tipped spine, the apex of which is directed anterolaterally and often also dorsally. Mesothorax gradually widening posteriorly to its junction with the metathorax, remainder of thorax almost equally broad throughout. Postpetiole from above much larger than the petiole, subpyriform, distinctly longer than broad, narrowest anteriorly. Most of head, much of thorax, the petiole, postpetiole, and gaster smooth and shiny. Mandible and frontal carina longitudinally striated, the clypeus transversely striated. Region around base of antenna longitudinally rugulose, the occipital neck obliquely rugulose on the sides. Body hairs moderately abundant, largely erect, of variable length, grayish or light yellowish depending upon the light. Pilosity on legs and scapes rather abundant, long but largely reclinate; funiculi with short hairs, that of the last 4 segments unusually short and closely appressed. Body pubescence absent or obsolescent.

Female.

Antenna and head similar to that of the worker. Prothorax with a prominent stout spine on each side, epinotum with a pair of large broad spines. Gaster massive. Anterior wing with well pronounced veins and a single closed cubital and discoidal cell. The female of *quadrispina* and of *perplexus*, (n. name, n. status) unknown.

Male.

Antenna 12-segmented, scape short, approximately as long as the combined lengths of the first 3 or 4 funicular segments. Both prothorax and mesothorax bearing on each side a spine or protuberance. Anterior wing as in the female. Male of *perplexus* (n. name and n. status) unknown.

Key to Species for Identification of Workers

1 – Head with a long occipital neck (0.45–0.8 mm.), body of the typical form bicolored, (apparently the most common species of the subgenus *Planimyrma*) .... *loriai* (Emery), pl. 16, fig. 1.
Head with a short occipital neck (0.35–0.45 mm.), body color uniform or varied but not so pronouncedly bicolored 2

2 – Thoracic sculpture coarse, the longitudinal rugulae present on both the dorsum and sides of the prothorax, color of body and appendages highly variable, size smaller (8–9 mm.) ..... *perplexus* n. name and n. status
Thoracic sculpture not so coarse and often lacking on either the dorsum or sides of the prothorax, body and appendages of the typical form uniformly colored, size larger (9–9.5 mm.) ..... *quadrispina* Emery

Key to Species for Identification of Males
(adapted from Viehmeyer, 1914b)

1 – Length 9 mm., mesonotum in profile forming a pronounced but rounded angle, the anterior declivity of the angle straight, eye strongly protuberant, sides of head behind the eyes straight or very slightly concave ..... *loriai* (Emery)
Length 8 mm., mesonotum in profile completely rounded or convex, the anterior declivity convex, eye less protuberant, sides of head behind the eyes weakly convex ..... *quadrispina* Emery

Aphaenogaster, subgenus **Nystalomyrma** Wheeler

Aphaenogaster, subgenus *Nystalomyrma* Wheeler, 1916, Trans. Roy. Soc. So. Austral., 40: 215.

Type: *Myrmica longiceps* F. Sm. Orig. desig.

Distribution– Australia, New Guinea.

Worker.

Head not prolonged posteriorly into a rather long and pronounced occipital neck but with a distinct occipital flange. Eye neither large nor strongly protuberant. Antennae and legs not unusually long and slender. Antenna 12–segmented, the last 4 segments enlarged forming somewhat of a club. Prothorax without a pair of spines, the epinotum usually bearing a pair of distinct spines.

Female.

Body unusually large (9.5–13 mm.). Characters in general similar to those of worker. Anterior wing with a closed cubital and discoidal cell.

Male.

Antenna 13–segmented, the scape approximately as long as the combined lengths of the first 4 or 5 funicular segments. Anterior wing with the same venation as that of the female.

The only species known to occur in New Guinea is *pythia* Forel. This form extends from Australia (Queensland and New South Wales) into New Guinea.

Species Not Yet Assignable to Subgenera

Aphaenogaster (subgenus ?) **lustrans**, n. sp.

Worker.

Head not prolonged into a pronounced occipital neck, the rim of the neck three times as wide as the length of the neck (0.6 to 0.2 mm.). Antenna rather long and slender but not unusually so as in worker of the subgenera *Deromyrma* and *Planimyrma*, 12–segmented; scape curved, slightly enlarged near its apex, approximately as long as the combined lengths of the first 8 or 9 funicular segments. Prothorax without a pair of spines. Epinotum with a pair of spines.

Female and *Male.* Unknown.

Aphaenogaster (subgenus ?) **projectens** Donisthorpe

Male.

According to Donisthorpe the antenna is 13–segmented with the scape exceeding the combined lengths of the first 3 funicular segments. Prothorax without a pair of spines or tuberosities. Mesothorax with a pair of blunt tubercles. Mesonotum greatly flattened and strongly projecting forward over most of the pronotum, without Mayrian furrows but with parapsidal sutures. Anterior wing with a single closed cubital and discoidal cell.

Worker and *Female.* Unknown.

Aphaenogaster (**Deromyrma**) **dromedarius** (Emery)

Ischnomyrmex dromedarius Emery, 1900, Term. Füzet., 23:, 322, pl. 8, figs. 23, 24, worker. Type locs.: Lemien and Tamara Islands, New Guinea. Types in Museo Civico di Storia Naturale, Genoa.

Ischnomyrmex dromedarius var. *fusca* Emery, 1900, Term. Füzet., 23: 322, worker. Type locs.: Lemien and Tamara Islands, New Guinea. Types in Museo Civico di Storia Naturale, Genoa. *New synonymy.*

Aphaenogaster (*Deromyrma*) *dromedarius*, Viehmeyer, 1914, Zool. Jahrb. Syst., 37: 601.

Aphaenogaster (*Planimyrma*) *dromedarius*, Emery, (1914–1915), Rend. Accad. Sci. Bologna 19: 72.

Aphaenogaster (*Planimyrma*) *dromedarius* var. *fusca*, Emery, (1914–1915), Rend. Accad. Sci. Bologna 19: 72.

Aphaenogaster (*Planimyrma*) *dromedarius* var. *nigra* Donisthorpe, 1938, Ent. Month. Mag., 74: 31, worker. Type locs.: Mt. Nomo, 600–1500 ft., and Njau Limon,

300 ft., Dutch Guinea. Types in British Museum Natural History, London and U. S. National Museum, Washington, D. C. *New synonymy.*

Aphaenogaster (*Deromyrma*?) *dromedarius*?, Donisthorpe, 1938, Ent. Month. Mag., 74: 32, male. – Donisthorpe, 1938, Ent. Month. Mag., 74: 52, fig. male (fig. to accompany description of male, p. 32).

Worker. (Pl. 16, fig. 2)

Length 7.5–10 mm.; head length 2.25–2.8 mm., greatest width 1.05–1.4 mm., cheeks subparallel, occipital neck 0.8–1.1 mm. in length, the funnel gradually widening posteriorly and attaining its greatest width at its mouth; funiculus slender and elongate, all segments distinctly longer than broad, the last 4 funicular segments slightly enlarged but not forming a distinct club. Clypeus convex, its anterior border usually with a small but distinct impression or emargination. Thorax in profile with a very prominent angular or subconical pronotal gibbosity which varies noticeably in acuteness; extending from this gibbosity to the base of the epinotal spines is a long and distinct concavity which varies from regular to irregular in outline. Thorax much constricted in the mesothorax, the width here varying from 0.3–0.4 mm. Epinotal spine 0.3–0.5 mm. in length, usually directed more dorsally than posteriorly and united at its base with the other spine to form a prominent and common gibbosity. Petiole in profile with a subangular to slightly subrectangular node; from above, the petiole is slender and not very noticeably widened posteriorly. Postpetiole noticeably more voluminous than the petiole, in profile with a subangular node. Gaster oval or subelliptical, widest near its midlength, the first segment occupying a greater part of the gaster.

Body largely smooth and shiny. Mandible longitudinally and the clypeus transversely striated. Cheek and region between the eye and frontal carina longitudinally rugulose. Side of the occipital neck, mesopleurum, and epinotum obliquely rugulose, the rugulae distinct on some individuals and obsolescent on others.

Body hairs coarse, moderately abundant but not unusually long, their color variable according to the light; blackish in some lights, yellowish in others, and even grayish in others. Pilosity of leg and scape fairly abundant but shorter and more reclinate than the body hairs.

The above description is based on cotypes of *dromedarius* and its varieties *fusca* and *nigra* and also on individuals from the localities listed below.

Body highly variable in color ranging from light reddish brown through reddish brown to fuscous or even blackish; petiole, postpetiole, gaster and appendages often much lighter than the remainder of the body.

As noted there is considerable variation in the length of the occipital neck and epinotal spine and also in the diameter of the eye and width of the mesonotal constriction as well as in the shape and direction of the epinotal spine and the degree of the body sculpturing.

The worker can be readily recognized by the angular or subconical gibbosity of the pronotum, the long funnel-like occipital neck, slender body, unusually long legs and antennae and smooth body with exceptions as noted.

Pterergate.

Length 8.8 mm. Very similar to the worker but with the following exceptions: Scutum of the mesothorax slightly indicated but more worker-like than that of the

typical female; point where the base of each anterior and posterior wing of the female should be located indicated on the pterergate by a small black projection; epinotal spine shorter (0.35 mm. in length), broader and with blunter apex; postpetiolar node larger and with its angular convexity nearer the posterior border than that of the worker; light reddish brown with the gaster and appendages scarcely lighter than the remainder of the body.

This appears to be the first description of a pterergate of *dromedarius*. The pterergate and 4 associated workers were collected in a lowland rain forest on the Busu River, Huon Peninsula, New Guinea by E. O. Wilson (Wilson No. 991).

Female. Unknown.

Male.

Length 7.2–8.2 mm.; head length 1.85–2 mm., greatest width 1.1–1.2 mm., mouth of occipital neck 0.3 mm. wide, nearest distance from the posterior border of the eye to the rim of the occipital neck 1.1 mm. Frontal area distinct. Cheeks subparallel, each short, 0.2 mm. in length. Clypeus convex medianly. Mandible fairly large, subtriangular, the masticatory border with 3 or 4 prominent apical teeth. Thorax in profile with the mesonotum the highest, the scutellum next, and the posterior end of the thorax the lowest. In profile the scutum of the mesonotum is rather massive and bears a somewhat convex anterior border which projects to some extent over the pronotum; a strongly developed concavity lies between the mesonotum and the prominent convex or somewhat globose scutellum; from the scutellum to near the posterior end of the thorax there is a long sloping concavity, which is highest in its anterior half. Anterior wing not large or long, infumated, bearing dark brown veins and stigma. Leg unusually long and slender. Petiole in profile pedunculate, bearing a weakly developed angular node. Postpetiole more voluminous and bearing near its posterior end a more convex node. Gaster subelliptical, the paramere extended as an elongated process.

Body largely smooth and shiny. Mandible longitudinally striated. Side of occipital neck with rather indistinct oblique rugulae. Much of epinotum, except the dorsal surface, and some of the mesopleurum with a sculpture which is largely rugulose but neither strongly developed nor regular in pattern.

Body hairs fairly abundant, yellowish or grayish depending upon the light, rather long but apparently not as coarse as on the worker. Hairs on scape and leg excluding the tarsus, more abundant than on the body, shorter and more reclinate but of about the same color.

Body dark brown; scape black, funiculus and tarsus lighter than the remainder of the body.

Described from 3 males; 2 taken at light from Kokoda, Papua, 1,200 ft., June 1933, L. E. Cheesman, B. M. 1933–427 and 1 male in association with 2 workers from Zingzingu, Mongi watershed, Huon Peninsula, New Guinea, April (9–10), 1955, E. O. Wilson (Wilson No. 759).

The males from Kokoda vary from the Zingzingu individual as follows: Body length 8.2 mm., greatest width of head 1.15–1.20 mm., nearest distance from the posterior border of the eye to the rim of the occipital neck 1.1–1.2 mm., greatest diameter of the eye 0.5 mm., width of the mouth of the occipital neck 0.35 mm.,

mesonotum smaller and less convex, concavity between the mesonotum and scutellum less deep, scutellum less globose, epinotum broader posteriorly, petiolar node more angular, and body a lighter brown.

The male of *dromedarius* can be readily recognized by its unusually long, slender, 13-segmented antenna; occipital neck, lack of paired projections on the thorax, and the noticeable concavities between the mesonotum and scutellum and the scutellum and epinotum.

Donisthorpe 1938, p. 32 was the first person to describe the male. Although he provisionally assigned the male to *dromedarius* and the species to the subgenus *Deromyrma*, he did so with hesitancy because the males he studied were not associated with workers. I have had the good fortune to study a male associated with workers and can definitely state that Donisthorpe was correct in his conjecture. In the same article in which he described the male, Donisthorpe also gave a good illustration of this caste.

Localities from which specimens have been studied are:

NEW GUINEA–Bubia near Lae, 9–?–49, N. L. H. Krauss, 1 worker.– Finsch Harbor, no date, L. Wagner, 3 workers. –Boana to Bandong, Bunbok Valley, 800–1300 m., 5–25–55, E. O. Wilson, No. 1123, 5 workers. – Njau-limon, S. Mt. Bougainville, 300 feet, 11–?–36, L. E. Cheesman, 5 workers. British:– Vicinity Nadzab, 7–?–44, P. J. Darlington, 2 workers. Dutch:– Mt. Nomo, S. Mt. Bougainville, 600–1500 m., 11–?–36, L. E. Cheesman, B. M. 1936–271, 7 workers. Ants collected by E. O. Wilson on Huon Peninsula, N. E. New Guinea:– Lower Busu River, lowland rain forest, 5–12–55, No. 1010, 1 worker.– ibidem, 5–10–55, No. 991, 4 workers, 1 pterergate.– ibidem, 5–8–55, No. 923, 2 workers.– ibidem, 5–15–55, No. 1041, 1 worker.– Zingzingu, Mongi watershed, 1100 m., 4–(9–10)–55, No. 759, 2 workers, 1 male.– Sattelberg vicinity, Mongi Mape watershed, 660 m., 4–4–55, No. 722, 3 workers.–Sattelberg to Maroru, Mongi Mape watershed, 800–900 m., 4–4–55, No. 725, 2 workers.– valley of the Kua River, vicinity of Zengaru, Mongi watershed, 800 m., 4–14–55, No. 796, 1 worker.– Wamuki, Mongi watershed, 800 m., 4–(19–20)–55, No. 853, 1 worker.– Joangeng, Mongi watershed, 1000–1300 m., 4–(7–8)–55, No. 754, 2 workers.– Nganduo, Mongi Mape watershed, 1000 m., 4–(5–6)–55, No. 733, 2 workers. Papua:– Dobodura, 3–7–?–44, P. J. Darlington, 2 workers.– ibidem, 11–?–43, G. M. Kohls, 2 workers.– Kokoda, 1200 m., 5–?–33, L. E. Cheesman, B. M. 1933–577, 2 workers.

Dr. E. O. Wilson, who made a number of observations on the Huon Peninsula of New Guinea, found *dromedarius* distributed from sea level to approximately 4,800 feet. He stated that above 3,000 ft., the species appears to be replaced by *loriai*, the two species apparently having nearly mutually exclusive ranges. *A. dromedarius* may nest within rotting logs, in the soil beneath objects, or freely in the soil. Wilson thought that the species chose rotting logs in the lowlands and the open soil near the upper limits of its elevational range. Workers are diurnal, foraging exclusively on the ground where they probably seek insects or other small arthropods for food. There was no evidence that the ants tended honeydew-excreting insects or gathered seeds for food. Since most of Wilson's collections were of stray workers there is little information to indicate the size of the colonies. The largest colony he found contained a dealated female and 35 workers but this probably represents an unusually small colony. His observations would seem to indicate that the biology of *drome-*

darius is similar to that of our North American *Aphaenogaster* (*Attomyrma*).

Aphaenogaster (Planimyrma) loriai (Emery)

Stenamma (*Ischnomyrmex*) *loriai* Emery, 1897, Ann. Mus. Stor. Nat., Genova 18 (38): 563–564, pl. 1, figs. 9, 10, worker, female. Type loc.: Morocco, 1300 m., S. E. New Guinea. Types in Museo Civico di Storia Naturale, Genoa.

Aphaenogaster (*Planimyrma*) *loriai*, Viehmeyer, 1914, Zool. Jahrb. Syst., 37: 601–606, figs. A (a, b, c), B, female, male.

Aphaenogaster (*Planimyrma*) *loriai*, Viehmeyer, 1914, Deutsch. Ent. Zeitschr., 5: 516–517, male.

Aphaenogaster(*Planimyrma*) *loriai* var. *atra* Stitz, 1938, Ges. Naturf. Fr. Berl., p. 101, worker, (male?). Type loc.: Etappenberg, Dutch New Guinea. Type in Zoological Museum University of Berlin. *New synonymy.*

Planimyrma loriai, Donisthorpe, 1940, Ent. Month. Mag., 76: 254, pl. V, fig. 4, worker (Note on mimicry).

Aphaenogaster (*Planimyrma*) *loriai*, Donisthorpe, 1947 (1946), Ann. and Mag. Nat. Hist., 13: 581, worker.

Worker. (Pl. 16, fig. 1)

Length 9.1–10.3 mm. Head length 2.3–2.7 mm., greatest width 1.35–1.65 mm., cheeks subparallel, occipital neck 0.45–0.8 mm. in length. Greatest diameter of eye 0.3–0.65 mm. Thorax narrowest near the anterior end of the mesothorax slightly posterior to a pair of small but distinct spiracles. Pronotum in profile convex, with a shorter and more abrupt anterior than a posterior slope. Slope from the top of the pronotum to the mesoepinotal suture long and unbroken except for a short distance anterior to the suture. Epinotum with a horizontal or else posteriorly ascending base which terminates at the base of the closely placed but diverging pair of spines, each spine directed more vertically or posteriorly than laterally; the spine smaller, shorter, and often more slender than that of the prothorax. Petiole in profile pedunculate, with a node posteriorly whose slightly convex dorsal surface meets its anterior surface in a rather distinct but somewhat rounded angle. Gaster from above subelliptical, narrowest at the apex.

Mesothorax largely longitudinally rugulose. Rugulae on the epinotum less regular, longitudinal in some places, and oblique or transverse in others. Interrugal punctulations on mesothorax and epinotum.

Body of the typical form with a distinct bicolored appearance. Head largely reddish brown or blackish, thorax blackish or black, petiole, postpetiole and gaster yellowish; thoracic spines reddish brown or yellowish depending upon the light.

The above description is based on a number of cotypes of *loriai* and also on individuals from the localities listed below. I have not seen the type of the var. *atra* Stitz but am synonymizing this form on the basis that at best it represents only a very slight color variant.

The worker of *loriai* is characterized by a high degree of variation. Such variation includes the length of the body, relative body proportions, especially the size and shape of the head and the length of the occipital neck, the depth and direction of the sculpturing, or even the placement of the sculpturing on certain parts of the thorax, the development of the thoracic spines, and the color of the body. The

sculpturing on the prothorax is usually weaker than on the mesothorax and epinotum and is commonly confined to the sides where it may be either weak or coarse; occasionally both the sides and the dorsum of the prothorax may be sculptured. When the dorsum is sculptured, the rugulae do not always necessarily take a longitudinal trend. The head although usually lighter is often as dark as the thorax. The petiole, postpetiole, and gaster may frequently be reddish brown.

The characters which distinguish the worker are its large size, slender elongate, funnel-like occipital neck, the pair of large, long prothoracic spines in addition to the usual pair of spines of the epinotum, and the bicolored body.

The worker of *loriai* is not only a pretty but a most unusual-looking ant because of its slender body, unusually long appendages, long funnel-like occipital neck and thorax bearing two pairs of spines, as well as the bicolored appearance of its body. Donisthorpe 1940, p. 254 briefly mentioned a polyrhachine ant, *Florencea kirkae* Donisth., which he believed to mimic *Aphaenogaster loriai* and the ponerine, *Odontomachus obsolescens* Donisth. On Plate V all of these ants were shown in their natural colors and one must admit there is a striking general similarity among them.

Female.

Length 10.2 mm. Head similar to that of the worker; length 2.4 mm., greatest width 1.65 mm., length of occipital neck 0.5 mm. Eye larger than that of worker, greatest width 0.45 mm. Ocelli small but distinct, the anterior ocellus the largest, each lateral ocellus placed farther from the inner border of the eye than a space equivalent to the greatest diameter of the eye. Thorax slender, narrower than the greatest width of the head ; from above, widest at the pronotal spines where it measures 1.2 mm., narrowest at the constriction on each side between the scutellum and metanotum, its width here 0.9 mm. Prothorax bearing on each side somewhat anterolateral to the mesonotum, a prominent but stout spine, the apex of which is directed anterolaterally and is recurved. Middle of the anterior border of the scutum with a tuberculate protuberance posterior to the spines; extending posteriorly from the protuberance is a longitudinal carina which follows the median plane of the scutum for a considerable length. Epinotum bearing a pair of large, broad spines which are directed more posteriorly than laterally or vertically. The base of each spine with an external angular protuberance apparently formed by a spiracle. The dorsum of the thorax in profile is highest at the anterior border of the mesonotum and lowest at the base of the epinotal spines; the mesonotum, scutellum and metanotum are all higher than the base of the epinotum. Wings lacking on the individual studied. Legs unusually long and slender. Petiole stouter and less pedunculate than that of the worker; in profile the node appears angularly convex; viewed from above and behind the postpetiole is voluminous, subcampanulate, narrowest anteriorly. Gaster massive, viewed from above, oblong in shape.

Sculpturing of head similar to that of worker. Scutum, postpetiole, and gaster smooth and shiny. Side of thorax with coarse longitudinal rugulae; base of epinotum mostly transversely rugulose; posterior surface of petiole rugulose-punctate.

Antenna, head, thorax, petiole, and postpetiole dark reddish-brown but not black, the gaster and legs noticeably lighter.

Hairs not materially different from those of the worker.

Described from a single dealate female associated with 2 workers bearing Wilson No. 792. The female has also been described briefly by Emery 1897 and Viehmeyer 1914a. In the same paper Viehmeyer also figured the female in profile.

The characters which best distinguish the female occur almost exclusively on the thorax and consist of the following: The slenderness of the thorax, the prominent pair of prothoracic spines, the distinct protuberance at the anterior border of the scutum, and the pair of large broad epinotal spines each of which bears near its base a prominent external protuberance. The thorax is highest at the anterior border of the mesonotum and lowest at the base of the epinotal spines, the thorax slopes strongly anteroposteriorly between these points but not in an unbroken line.

Male.

Length 7.3–8.1 mm. Head 1.4–1.6 mm. in length, greatest width 1.25–1.35 mm., nearest distance from the posterior border of the eye to the rim of the occipital neck 0.6–0.7 mm. Antenna 12-segmented; all segments distinctly longer than broad; scape 0.7–0.75 mm. in length, approximately as long as the combined lengths of the first 3 funicular segments; first segment of the funiculus longer than the second segment, second segment with a slight constriction that might erroneously lead one to believe there is an additional segment there, segments toward the apex of the scape noticeably lengthened but not forming a very perceptible club. Anterior border of clypeus weakly curved, dorsal surface of clypeus convex and usually with a longitudinal carina. Cheeks subparallel. Mandible elongate subtriangular, with at least 2 apical teeth followed by a row of smaller and more irregular teeth. Ocelli large, placed as close or closer to each other than to the inner border of the eye. Eye remarkably large, strongly convex, and unusually protuberant, greatest diameter 0.55–0.6 mm. The pronotum in profile extends a slight distance anteriorly beyond the mesonotum, anterior border of mesonotum rounded, the mesonotum higher than the remainder of the thorax, reaching its highest point in an angular-like gibbosity near the midlength of the scutum, from here it descends posteriorly in almost straight line to about the points of insertions of the anterior wings; base of epinotum with a long but weak concavity. Thorax from above widest at approximately the farthest extension of the prothorax on the sides, width 1.1–1.5 mm. Mesonotum apparently without Mayrian furrows or parapsidal sutures. Prothorax bearing somewhat anterolaterally on each side a short thick, upwardly directed protuberance or spine. Mesonotum bearing slightly posterior to each of these spines another very small protuberance often of an irregular shape or size. Anterior wing with a closed cubital and discoidal cell, wing veins well pronounced. Leg unusually long and slender without noticeably enlarged femur. Petiole pedunculate, bearing a node posteriorly which is impressed dorsally; pedicel of the petiole with a protuberant spiracle on each side. Postpetiole longer than wide, subpyriform, narrowest anteriorly. Gaster subelliptical, with protruding but only moderately large paramere.

Body largely smooth and shiny, the front and vertex of the head though with fine punctulate or rugulose sculpturing. The coarse rugulae of the side of the occipital neck and thorax of the worker lacking in the male or else represented on the side of the thorax by weak longitudinal rugulae.

Hairs in general similar to those of the worker.

Thorax and also much of the head black as are usually the scape, femur, and tarsus. Petiole, postpetiole, and gaster brownish. Funiculus, coxa, and apex of gaster usually much lighter.

Described from 4 males collected by E. O. Wilson in New Guinea as follows: A male associated with 3 workers (Wilson No. 713); Hube area, at light, 2 males unassociated with workers (Without number); a male associated with 2 workers (Wilson No. 636).

Viehmeyer has described the male of *loriai* in two papers published in 1914, a and b. In his paper in the Zool. Jahrb. Syst. he not only described the male at length but also gave a figure of it in profile. He also separately illustrated its antennae and genitalia. It was largely, if not almost exclusively, Viehmeyer's study of the male in the latter paper which resulted in his establishment of the then new subgenus, *Planimyrma.*

Except for differences in size there was no appreciable variation among the 4 individuals studied by me.

The male is characterized by its 12-segmented antenna, the scape of which is approximately as long as the combined lengths of the first 3 funicular segments; prothorax and mesonotum each bearing a pair of short irregularly shaped spines or protuberances; veins of the anterior wing well pronounced, forming a closed cubital and discoidal cell; highest point of thorax about the midlength of the scutum; base of epinotum with a long but weak concavity.

The male of this species and *quadrispina* are apparently almost identical, except for a few minor characters which could well be within the range of variation of a species. Concerning this the reader is referred to Viehmeyer 1914b reference under *quadrispina.*

Localities from which specimens have been studied are:

NEW GUINEA– Finsch Harbor, no date, L. Wagner, 24 workers.– Nadzab, Markham River Valley, E. fork Ngafir Creek, 1000–3000 ft., native trail, under stones, 7–16–44, K. V. Krombein, 5 workers.– Morocco, 1,300 m., 11–7–95, Loria, 3 workers.– Boana, Bunbok Valley near Lae, 1100 m., 5–25–55, E. O. Wilson, No. 1121, 2 workers. Ants collected by E. O. Wilson on Huon Peninsula, N. E. New Guinea :– Yunzain to Joangeng, 1,300 m., 4–7–55, No. 713, 3 workers, 1 male.– Hube Area, at light, 4–?–55, no No., 2 males.– Gemeheng, 1300–1500 m., 4–(11–13)–55, No. 792, 2 workers, 1 female.– Ebabaang, 1300–1400 m., 4–(16–18)–55, No. 824, 2 workers.– Wamuki, 800 m., 4–(19–20)–55, No. 853, 1 worker. –Nganduo, 1200 m., 4–(5–6)–55, No. 738, 6 workers. – Boingbongen to Maroru, 900-1000 m., 4–5–55, No. 728, 1 worker.–Sattelberg to Maroru, 800–900 m., 4–4–55, No. 724, 2 workers. Papua :– Mafulu, 4000 ft., 12–?–33, L. E. Cheesman, B. M. 1933–427, 13 workers.– Ibidem, B. M. 1934–321, 3 workers.– Ibidem, no No., 1 worker.– Bisianumu near Sogeri, rain forest, 500 m., 3–(15–20)–55, E. O. Wilson, No. 636, 2 workers, 1 male.– Ibidem, No. 618, 2 workers.

Wilson who made a number of collections and also some observations on the habits of *loriai* stated that all his individuals were collected from the rain forests of New Guinea. According to him, "In the lowlands *Planimyrma* [*loriai*] appears to be limited exclusively to shaded portions of the forest and are most abundant in the least-disturbed parts of the interior; in the highlands they occur also in disturbed

forest and along the edge of clearings." His general remarks indicate that the ants are diurnal foragers. His observations on one nest (Wilson No. 738) are of more than ordinary interest– "Nesting in soil. Single 4 inch wide entrance leading vertically into wet clayey soil, the entrance surrounded by a 6 inch high turret of excavated soil in the form of relatively large pellets. When the nest was disturbed, some of the workers came out of the nest and made feeble attempts to bite the tips of the forceps offered them. When I ran my hand down the entrance shaft I could insert it about the level of my wrist. In so doing I found out the probable significance of the multiple spines that project from the body of this species. The sensation was rather the same received when you put your hand accidentally into the foliage of a spiny bush. The armament of the workers probably in this way discourage incursions of larger animals into their entrance shafts."

Aphaenogaster (Planimyrma) quadrispina Emery

Aphaenogaster (*Ischnomyrmex*) *quadrispina* Emery, 1911, Nova Guinea Zool. 9: 251–252, 258, worker, (male ?). Type loc.: Etna Bay, New Guinea. Types in Museo Civico di Storia Naturale, Genoa.

Aphaenogaster (*Planimyrma*) *quadrispina*, Viehmeyer, 1914, Deutsch. Ent. Zeitschr., 5: 518, male.

Worker.

Length 8.4 mm. Head length 2.2 mm., greatest width 1.5 mm., cheeks weakly converging anteriorly, occipital neck 0.45 mm. in length. Eye 0.35 mm. in its greatest diameter. Pronotum in profile convex, with a shorter and more abrupt anterior slope than a posterior slope; slope from the top of the pronotum to the mesoepinotal suture rather long and with an almost unbroken outline. Epinotum strongly ascending posteriorly, bearing at its apex a pair of prominent, closely placed acute spines, whose apices are directed more dorsally and posteriorly than laterally; the spines smaller, shorter, and more acute than those of the prothorax. Thorax narrowed somewhat posterior to the midlength of the mesothorax. In profile petiole pedunculate bearing posteriorly a node whose anterior surface meets the dorsal surface in a rather distinct angle.

Region around base of antenna longitudinally rugulose, the side of the occipital neck obliquely rugulose. Prothorax almost completely devoid of sculpture except for a few almost indiscernible rugulae on the sides; mesothorax and epinotum with fairly coarse longitudinal-to-oblique rugulae on the side and in addition also interrugal punctulations.

Body dark reddish brown, the appendages scarcely paler.

The above description is drawn from a single cotype worker. Among the limited material studied I can find no other individual which can be assigned to *quadrispina* with any degree of certainty. *Quadrispina* is so close to *loriai* in most respects that its validity may well be questioned; certainly the proportions of the head and the color of the body in *loriai* are subject to much variation and *quadrispina* may well be within the limits of this variation. The exact relationship of these ants can only be determined by an abundance of future material.

The characters which Emery gave for distinguishing the worker of *quadrispina*

from that of *loriai* were the shorter neck, less elongated appendages, and the uniform color of the body.

Female. Unknown.

Male.

Length 8 mm. (according to Viehmeyer). I have not seen the male of this species. Emery 1911, p. 258 described a single male from Sabang Camp, July 7, 1907, which he questionably assigned to *quadrispina.* Apparently the male was not associated with workers. Viehmeyer 1914b, p. 518 was able to secure from de Meijere of Amsterdam what Viehmeyer believed to be true *quadrispina* males (no mention, however, was made of their association with workers). Although he did not give a lengthy specific description of the male, Viehmeyer compared the male with that of *loriai.* The comparison covered such features as the shape of the head behind the eyes, convexity of the eye, length of the neck, shape of the mesonotum, and lengths of the body, wing, scape, and hind tibia. In my opinion the differences mentioned are only very slight and could well be within the range of a single species such as *loriai.*

Aphaenogaster (Planimyrma) perplexus, n. name, n. status

Aphaenogaster (Planimyrma) quadrispina wheeleri Donisthorpe, 1938, Ent. Month. Mag., 74: 31, worker. Type loc.: Kokoda, Papua, 1200 ft. Types in British Museum Natural History, London and the U. S. National Museum, Washington, D. C. Preoccupied by *Aphaenogaster treatae wheeleri* Mann, 1915, Psyche 22: 51.

Worker.

Length 8.1–9 mm. Head length 2–2.5 mm., greatest breadth 1.4–1.5 mm., cheeks faintly concave to straight, noticeably converging anteriorly, occipital neck 0.35–0.45 mm. in length. Greatest diameter of eye 0.3–0.375 mm. Thorax in profile highest and most convex in the prothorax thence it slopes posteriorly to the epinotum whose dorsal surface is almost horizontal or very slightly elevated posteriorly and bears at its posterior margin a pair of moderately large spines which are scarcely elevated above the horizontal plane, the spines are noticeably smaller and shorter than the pronotal spines, they are contiguous or almost contiguous basally, not noticeably divergent posteriorly, and quite commonly with their apices slightly curved ventrally. Thorax narrowest in the anterior part of the mesothorax but slightly posterior to a pair of spiracles. Petiole in profile pedunculate, with a node posteriorly whose slightly convex dorsal surface meets its anterior surface in a rather distinct but somewhat rounded angle. From above the gaster is subelliptical, narrowest posteriorly.

Region between eye and antenna with somewhat curved rugulae. Thorax coarsely sculptured and therefore somewhat subopaque, at least in certain lights; prothorax with coarse longitudinal rugulae both dorsally and laterally, mesothorax coarsely and longitudinally rugulose on the side; the metathorax and epinotum with prominent oblique to transverse rugulae.

Pubescence of body sparse or obsolescent.

Head, scape, and thorax blackish; mandible, clypeus, funiculus, and basal half of the first gastric segment lighter; remainder of gaster, petiole and postpetiole

brownish; prothoracic spines darkest apically.

The description is based on a cotype worker in the U. S. National Museum and 12 other workers from the British Museum Natural History. The latter do not bear type labels; for detailed information on these specimens see data under the localities listed below.

Except for minor variations in body lengths and proportions of the head, the greatest variation is in color. One individual lacking a gaster has an almost uniform light-brown body and legs, blackish scape, and the coxa slightly lighter than the remainder of the leg; other individuals have the head, scape and thorax blackish, the coxa and basal half of the gaster yellowish, and the petiole, postpetiole, most of the leg and the posterior half of the gaster brownish; still other individuals have the head, scape, thorax, and posterior half of the gaster black with the funiculus, leg, petiole, postpetiole and base of the gaster brown. In addition to its normal sculpture one individual has transverse semicircular rugulae on the posterior part of the prothorax. The variation in the sculpture of most individuals is rather negligible.

The characters which distinguish this species are its size, short occipital neck, pronounced sculpture, and a strong tendency to vary greatly in color.

Female and *Male*. Unknown.

So far as I am aware very little is known concerning the biology of *perplexus* except that workers were collected while crawling on tree trunks; presumably the species is diurnal.

Localities from which specimens have been studied are:

NEW GUINEA Papua:- Kokoda, 1200 ft., 4-?-33, L. E. Cheesman, B. M. 1933-577, 10 workers (Note- These specimens apparently belong to the type series, but if so, there are no type labels attached to them-author).- Kokoda, 1200 ft., 10-?-33, L. E. Cheesman, B. M. 1934-321, 1 worker.- Kokoda, 1200 ft., 5-?-33, L. E. Cheesman, B. M. 1933-577, 1 worker.

Aphaenogaster (Nystalomyrma) pythia Forel

Aphaenogaster longiceps F. Smith, Mayr, 1876, Jour. Mus. Godeffroy b. 5, h. 12, p. 96, female, male. Misidentification.

Aphaenogaster (Deromyrma) longiceps F. Smith, Forel, 1915. Arkiv f. Zool., b. 9, h. 3-4, pps. 75-76 (p. 75, worker, male, under *ruginota*), worker, female, male. Misidentification.

Aphaenogaster (Deromyrma) pythia Forel, 1915, Arkiv f. Zool., b. 9, h. 3-4, p. 76.

Aphaenogaster (Nystalomyrma) pythia, Wheeler, 1916. Trans. Roy. Soc. So. Austral., 45: 219-221, pl. 21, figs. 4-5; pl. 22, figs. 5-8, worker, female, male.

Aphaenogaster pythia, Hitchcock, 1958, Queensland Bur. Sugar Expt. Sta. Quart. Bul., 21 (3): 104-105. (Biology).

Worker. (Pl. 16, fig. 4)

Length 4-5.5 mm. Head subrectangular; length 1-1.3 mm., greatest width 0.85-1.15 mm., posterior border of head weakly convex to almost straight, meeting the sides to form subangular occipital lobes, head posteriorly with a distinct but very short occipital flange. Scape slender, curved, slightly enlarged in its apical third-to-fourth, apex of the scape exceeding the posterior border of the head by at least one-fifth to one-third the length of the scape. Frontal area distinct, somewhat subtri-

angular. Clypeus approximately twice as broad as long, with a median lobe which bears a slight impression or emargination at the middle of its anterior border. Mandible moderately large, subtriangular. Eye neither strongly convex nor large, its greatest diameter 0.15–0.17 mm., placed approximately twice its greatest diameter from the base of the mandible. Dorsal surface of the prothorax in profile meeting that of the anterior part of the mesothorax in an almost even convexity except for a slight elevation at the promesonotal suture; posterior half of the mesothorax inclined sharply and almost unbrokenly to meet the well-pronounced mesoepinotal suture which is approximately 0.10 mm. in length and almost equally as deep; epinotum perceptibly but not strongly convex in its basal half, epinotal spines seldom, if ever, as long as the space separating the base of each spine. Anterior surface of petiole in profile meeting the dorsal surface of the petiole to form a subangular node; postpetiole larger and more voluminous than the petiole, also more convex dorsally. Gaster from above oval, narrowest apically.

Body largely smooth and shiny with the following exceptions; mandibles longitudinally striated, cheek longitudinally or circularly rugulose, much of the dorsal surface of the head finely punctulate, especially the anterior half, the punctulate sculpturing extending even between the rugulae of the cheek; mesopleurum and side of epinotum rugulose-punctulate, or punctulate.

Body hairs moderately abundant, long, slender, suberect to erect, yellowish or grayish depending upon the light, the hairs present even on the gula but not forming a beard or psammophore. Pilosity on scape and leg shorter and more reclinate.

Body light brown or pale yellowish brown with apparently even lighter scape and leg, the color somewhat variable according to the density of the light.

There are no cotype workers of this species. My description of the worker is based on individuals from the localities listed below.

Among the individuals studied there was a noticeable amount of variation. The heads of some were longer and more slender than those of others, the occipital lobe and posterior border of the head more rounded, the elevation of the promesonotal suture higher, the basal surface of the epinotum perceptibly but weakly convex throughout, the epinotal spines occasionally nearly as long as the distance separating the base of each, the dorsal surface of the petiolar node more convex, and the dorsal surface of the epinotum faintly punctulate almost subopaque.

At present there is no other New Guinea *Aphaenogaster* whose worker should be mistaken for that of *pythia*. The characters however by which *pythia* and *lustrans* can be distinguished are given in the preceding key. In Australia *pythia* is more apt to be mistaken for *longiceps* (F. Sm.). The worker of *pythia* can be distinguished from that of *longiceps* by its proportionally shorter and more subrectangular head, the occipital lobe of which is subangular, and the posterior border almost straight; and also by its less heavily sculptured epinotum, in addition to other characters.

Female.

Length 10.5 mm. Head similar to that of worker; length 1.6 mm., greatest width 1.7–1.8 mm., occipital rim or flange vestigial. Greatest diameter of eye 0.35–0.40 mm., the eye placed approximately its greatest diameter from the base of the mandible and at a very perceptible angle with the longitudinal axis of the head. Lateral ocellus placed at a space from the inner border of the eye equivalent to four times the greatest

diameter of the ocellus. Frontal area not especially well defined, somewhat subtriangular. Antenna similar to that of the worker; apex of the scape exceeding the posterior border of the head by approximately one-fifth the length of the scape. Mandible moderately large, subtriangular, the masticatory border with 3 large apical teeth followed by a number of smaller and more irregular teeth. Thorax 3.0–3.1 mm. in length from the anterior border of the mesonotum to the posterior border of the scutellum, widest slightly anterior to the base of each anterior wing, where it measures 2.1–2.2 mm. Mesonotum with parapsidal sutures but the Mayrian furrows absent or obsolescent. Thorax in profile massive, 2.7–2.9 mm. at its greatest height and 3.7–3.8 mm. in its greatest length. Epinotal spine short, 0.2–0.25 mm. in length, and apparently as broad basally as long. Base of epinotum in profile forming a sharp and almost straight incline which meets the epinotal declivity at the epinotal spine; epinotal declivity shorter than the base, subvertical, slightly concave. Petiole in profile with a short scale-like node, the dorsal surface of which is almost horizontal or else slightly inclined, ventral surface of petiole without a tooth or spine. Node of postpetiole also short but higher, and also perhaps more convex dorsally than the node of the petiole, ventral surface of the postpetiole with a small but distinct protuberance. Gaster voluminous, larger than the thorax.

Mandible longitudinally and clypeus finely and transversely striated, most of head longitudinally rugulose except sometimes the posterior part, much of the side of the thorax finely and longitudinally striato-punctate, dorsal surface of the epinotum transversely sculptured.

Hairs moderately abundant, apparently absent on the side of the thorax, slender, suberect to erect, yellowish or grayish depending upon the light; more abundant, shorter and more reclinate on the leg and scape.

Body a rich light brown or brown, mesonotum with a median longitudinal dark stripe and a similar dark longitudinal stripe on each side, appendages scarcely lighter than the body.

The description of the female is based on the two New Guinea individuals listed below.

Wheeler 1916, p. 220 gives the length of the female as varying from 9.6–11 mm. The two individuals studied are almost identical except for some slight differences in body proportions.

The female should not be confused with that of any other New Guinea *Aphaenogaster*. The distinctions between it and *loriai* are given in the preceding key. The female is distinguished from that of the Australian *iongiceps* by her more rectangular head, smaller body, shorter appendages, etc.

Male.

Length 4.6–4.8 mm. Head oval, with rounded posterior border and long gradually rounded somewhat posteriorly converging occipital lobes, extreme posterior border of head terminating in a short flange or occipital rim; length of head 0.67–0.75 mm., greatest width 0.67–0.70 mm. Scape 0.4–0.5 mm. in length. The first and last 4 funicular segments enlarged, but the last 4 segments together not forming a well-defined club. Ocelli fairly large and distinct, the lateral ocellus approximately twice its greatest diameter from the inner border of the eye. Frontal area not strongly defined, subtriangular. Eye large, convex, rather strongly protuberant, its

greatest diameter 0.25–0.27 mm. Mandible fully developed, with one large apical and 3 to 4 smaller basal teeth. Thorax 1.4–1.45 mm. in length from the anterior border of the mesonotum to the posterior border of the scutellum, broadest just anterior to the insertions of the first pair of wings whese it measures 1–1.05 mm., Mayrian furrows more or less obsolescent. The thorax in profile (exclusive of the epinotum) is short, high and massive with the mesothoracic segments unusually large and occupying most of the sides of the thorax; the slope preceeding the mescepinotal constriction forms a long and more or less precipitous incline which although often quite subvertical never meets the longitudinal axis of the body in a right angle, the slope may be almost straight or weakly convex; the mesoepinotal suture forms a well-developed constriction or impression which is quite long and deep; the epinotum is small, nodiform or "hump shaped" with its dorsal surface varying from flat or weakly convex to slightly concave. Wings brownish with the veins even darker; the anterior wing with a closed cubital and discoidal cell and an apparently unclosed radial cell. Leg slender, moderately long. Petiole in profile slender and with a low, poorly defined node. Postpetiole larger and more voluminous, dorsal surface of the node gradually ascending posteriorly to form a subangular convexity near the posterior border of the postpetiole. Gaster oval, the genitalia exserted on some individuals, the parameres rather large, stout, subtriangular.

Body largely smooth and shiny except for the rugulose-to-rugulose-punctate sculpturing on the side of the epinotum and a part of the mesopleurum. Dorsal surface of epinotum and declivous surface of the thorax anterior to the epinotum, finely punctulate.

Pilosity similar to that of the worker.

Body rather variable in color, in some specimens the body is almost uniformly light brown and the appendages paler whereas in other individuals the body is a sordid light brown but not uniformly so, with some areas darker than others.

Wheeler gave the length of the male as from 4–5.5 mm., the males I have measured were 4.6–4.8 mm. Variations in body color and in body structures are given in the above description. The wings of some of the individuals studied were pale rather than brownish but this may have been because of fading. The degree of the incline of the thorax preceding the mesoepinotal constriction varies considerably being much more precipitous in some individuals than others, in profile the outline may range from almost straight to weakly convex. Although the mesoepinotal constriction or impression is always pronounced, the degree of development varies noticeably. The variation in the dorsal surface of the epinotum is discussed above.

The male of *pythia* should not be confused with that of any other New Guinea *Aphaenogaster*. The distinctions between it and the male of *dromedarius* are given in the key. The *projectens* male differs from that of *pythia* in having the mesonotum flattened above and extended forward concealing all of the prothorax except a very small part of the neck, it also differs in having a tubercle-like enlargement on each side of the anterior part of the mesonotum, in its enormous eyes which are 0.65 mm. in their greatest diameter and in the lack of a nodiform or hump-shaped epinotum. The *pythia* male however is most apt to be mistaken for that of the Australian *longiceps*. It can be readily distinguished from the *longiceps* male by its peculiar nodiform or hump-shaped epinotum which is preceded by a very pronounced

mesoepinotal constriction or impression. The incline preceding the constriction is also more precipitous and usually with a less concave outline. The distinctions between the male of *pythia* and the male of *loriai* and *quadrispina* are given in the key.

The nomenclatorial history of this species is quite involved. Mayr 1874 described what he thought to be the male and female of *longiceps* (F. Sm.) from specimens in the Museum Godeffroy that came from Gayndah, Peak Downs, Rockhampton and Sydney, Australia. Forel 1915 assigned the provisional name *pythia* to the specimens studied by Mayr should they prove to be not *longiceps* or any previously described species. The Museum Godeffroy individuals which had eventually been placed in the Hamburgisches Zoologisches Museum and Institut were unfortunately destroyed during the First World War. In 1916 Wheeler while revising the Australian *Aphaenogaster* (*Nystalomyrma*) was able to determine with the help of Donisthorpe what the true *longiceps* is and at the same time to establish the validity of *pythia*. Wheeler errored however in designating Herberton, Queensland, as the type locality of *pythia* as none of the specimens studied by Mayr came from there. Since Wheeler has given complete descriptions and figures for all castes of both *pythia* and *longiceps* in his revisionary paper, there cannot be the slightest doubt concerning the identity of these two ants.

Localities from which specimens have been studied are:

AUSTRALIA Queensland:- No. 13539, from Forel collection labeled first as *longiceps* then later erroneously as cotypes of *pythia*, 4 workers, 2 males, 1 female. New South Wales:- Dorrigo, W. Herron, 3 workers.

NEW GUINEA E. Highlands, N. E. New Guinea:- Kainantu air strip, 1-55-56, Dept. Agr., Port Moresby, Papua H. R. 5, 2 workers.- Arona, 4500 ft., 10-10-57, J. H. Barrett, No. 4, 3 workers, 4 males, 1 female; air strip, No. 5, 3 workers.

Wheeler 1916, p. 214 states that *pythia* is a rare and local ant known only from Queensland and northern New South Wales. According to him the species is nocturnal and like other *Aph.* (*Nystalomyrma*) also insectivorous. Nests are constructed freely in the soil or beneath the cover of stones and logs, especially in sandy soil, usually in moderately shady spots. The earth from their nests is distributed above on the soil to form scattered or contiguous craters with large entrance holes which lead perpendicularly into the soil. Although colonies may be populous the ants are timid.

Hitchcock 1958, pps. 104-105 states that there are some localities in north Queensland in which this ant is not only very abundant in cane fields but also a pest. Nests are usually constructed in sandy soil but may also occur in heavy clay. The excavated earth is thrown on the soil above to form funnel shaped mounds as high as 6 inches and these mounds more commonly occur about the base of cane stools or even in the interspaces between plants. Nests commonly extend 15 inches into the soil but have been known to reach depths of 7 feet. Hitchcock thinks that the nests are not only quite populous but may even contain more than one queen. In heavily infested fields the plant crop may be reduced and stunted and death of the ratoon stools occur. Hitchcock states the plants are injured in two ways; one, by the ants removing the soil from around the roots of the plants and two, by the ants gnawing directly into the roots for the juices of the plants.

Aphaenogaster (subgenus ?) **lustrans**, n. sp.

Worker. (Pl. 16, fig. 3)

Length 8 mm. Head including mandibles subelliptical; length 2.6 mm., greatest width 1.45 mm., cheeks slightly converging anteriorly. Frontal area distinct, subtriangular, impressed. Clypeus not especially convex, its anterior border with a somewhat indistinct shallow but broad emargination. Apex of scape surpassing the posterior border of the head by approximately half the length of the scape; all segments of the funiculus longer than broad, the second segment the shortest, the last 4 funicular segments weakly enlarged and together forming a slightly perceptible club. Mandible subtriangular, the masticatory border with at least 6 teeth, the apical tooth the largest. Eye neither very protuberant nor large, its greatest diameter 0.3 mm., placed at least twice its greatest diameter from the base of the mandible. Thorax in profile highest in the pronotum where it forms an angular gibbosity; from the gibbosity to the base of the epinotal spines the thoracic outline forms a long but not deep concavity. The thorax from above is widest through the pronotum (1.1 mm.), remainder of thorax, beginning at the mesonotum, almost the same width throughout, epinotal spine 0.5 mm. in length, the spine directed more dorsally than posteriorly. Leg rather long and slender and without noticeably enlarged femur and tibia. In profile the petiolar node is subrectangular and the postpetiolar node angular. Gaster subelliptical, the first segment occupying most of the gaster.

Mandible, clypeus, antennal fossa and cheek subopaque; remainder of body smooth and shiny. Striae on mandible longitudinal; the rugulae transverse on the clypeus, circular around the antennal fossa, and longitudinal on the cheek.

Body hairs coarse, fairly abundant, long, suberect, grayish in some lights, blackish in others; hairs on most of head and prothorax each arising from a coarse puncture the rim of which is raised and circular. Hairs lacking on most of propleurum, all of mesopleurum, and also side of epinotum. Pilosity of antenna and leg (excluding the funiculus and tarsus) rather abundant and similar to that of the body but perhaps not so long. Pubescence of gaster sparse, closely appressed, apparently absent from the remainder of the body.

Color somewhat reddish brown which is darker in some lights than others. Body but especially the side of the thorax with a pronounced bluish-gray sheen.

Type locality— Hihilai Plantation, Milne Bay, Papua, New Guinea, March-April, 1944, H. R. Roberts.

Described from a holotype and 3 paratype workers (one of the paratypes has the postpetiole and gaster removed and attached to a card point, another paratype lacks a postpetiole and gaster). The holotype and one paratype have been deposited in the California Academy of Sciences, the other two paratypes have been placed in the U. S. National Museum under U. S. N. M. No. *64260.*

I have detected no variation of especial significance among the individuals.

This very striking species can be readily recognized by the peculiar hair-bearing punctures of most of the head and prothorax, the smooth and hairless side of a large portion of the thorax, and by the peculiar bluish-gray sheen which overlies the reddish-brown color of the body, also by the apparent lack of body pubescence except on the gaster where the pubescence is sparse, closely appressed, and scarcely dis-

cernible. The peculiar body sheen has prompted me to name the ant, *lustrans*. Without associated females and males it is impossible to assign this species to its proper subgenus.

The biology of this species is unknown.

Aphaenogaster (subgenus ?) **projectens** Donisthorpe

Aphaenogaster (*Deromyrma*) *projectens* Donisthorpe, 1947 (1946), Ann. and Mag. Nat. Hist., 13: 581–582, worker. Type loc.: Haumo River Valley, Milne Bay, New Guinea. Type in U. S. National Museum, Washington, D. C.

Worker and *Female*. Unknown.

Male.

Length 7.5 mm. Head 1.2 mm. in length, greatest width 1.35 mm., rounded behind on each side from the posterior border of the eye to the occipital neck which is scarcely 0.10 mm. in length but approximately 4 times as wide as long, greatest width of head between the cheeks 0.65 mm. Cheeks short, subparallel. *Antenna missing* (according to Donisthorpe's original description "13 jointed; scape longer than the first three joints of the funiculus taken together; funiculus with the first joint short, shorter than the rest, second joint shorter than the third, last joint not as long as the two preceding joints taken together.") Ocelli moderately large, each lateral ocellus at least its greatest diameter from the inner border of the eye. Eye convex, protuberant, extraordinarily large, the greatest diameter 0.65 mm. Mandible elongate subtriangular, the masticatory border with a large apical and at least 6 smaller, less distinct teeth. Greatest length of thorax 3.3 mm., greatest width 1.1 mm., thorax narrowed both anteriorly and posteriorly, bluntly rounded anteriorly. In profile the mesonotum appears almost flat and also very noticeably extended over the pronotum; scutellum on a lower plane than the mesonotum and with its dorsal surface sloping posteriorly; basal surface of epinotum strongly concave, meeting the shorter slanting and almost straight declivous surface near a prominent spiracle on each side. Mesonotum without Mayrian furrows but with parapsidal sutures, mesonotum with a distinct blunt tuberosity on each side somewhat above and anterior to the coxa of the foreleg. Anterior wing yellowish or very light brown, with slightly darker and more distinct veins, stigma well developed, the radial cell elongate and open. Leg long and slender, the femur scarcely incrassated. From above approximately half of the petiole appears pedunculate; near the midlength of the petiole each side of the petiole begins to gradually diverge posteriorly to form a node in the posterior fourth of the petiole, sides of the petiolar node somewhat subparallel, the node low and elongate. From above the postpetiole is noticeably more voluminous than the petiole, subpyriform, widest toward the posterior end but noticeably constricted at its junction with the base of the first gastric segment; in profile the node is more convex in its anterior half. Gaster from above subpyriform, narrowed at the base, broader and more bluntly rounded posteriorly, the genitalia not exserted.

Most of body smooth and shiny except for the delicate sculpturing near the inner border of each eye, on the frontal carina and on the posterior border of the scutellum, metanotum and also along a number of the thoracic sutures.

Hairs grayish or yellowish according to the light, long, erect or suberect, scattered on the body except on the gaster where they are abundant and noticeably longer; hairs shorter and more reclinate on the legs.

Body reddish brown or brown; the gaster black except for a large oval spot on each side; posterior border of petiole and postpetiole blackish, leg excluding the tarsus, darker than most of body, especially in certain lights.

Described from the holotype male. Donisthorpe's original description gave the type locality as "Hanmor Valley, Milne Bay, New Guinea, K. B. Krombein" which correctly cited should be Haumo River Valley, Milne Bay, New Guinea, K. V. Krombein. The male was collected on March 25, 1944.

The male of *projectens* as the name infers can readily be distinguished by its almost-flat mesonotum which projects strongly forward concealing the pronotum from above, its 13-segmented antenna, the scape of which is longer than the combined lengths of the first 3 funicular segments, unarmed thorax (that is, the lack of two pair of erect spines or tubercles), the long concave, basal surface of the epinotum, and the presence in the anterior wing of a closed cubital and discoidal cell and an elongate open radial cell.

I assume that Donisthorpe assigned this species to the subgenus *Deromyrma* because he thought the male possessed a 13-segmented antenna. I hesitate to do so even granting that the antennal count is correct because *projectens* lacks the unusually long antennal scape which in *dromedarius* is equal to the combined lengths of the first 9 or 10 funicular segments; it also lacks the prominent occipital neck of the latter species. Although *lustrans*, the new species described in this paper from the worker caste is from the same general type locality as *projectens*, I can detect nothing in the habitus of either sex to indicate that they are the same species. It is regrettable that neither of these species can be assigned to their proper subgenus at this time.

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Explanation of Plate 16

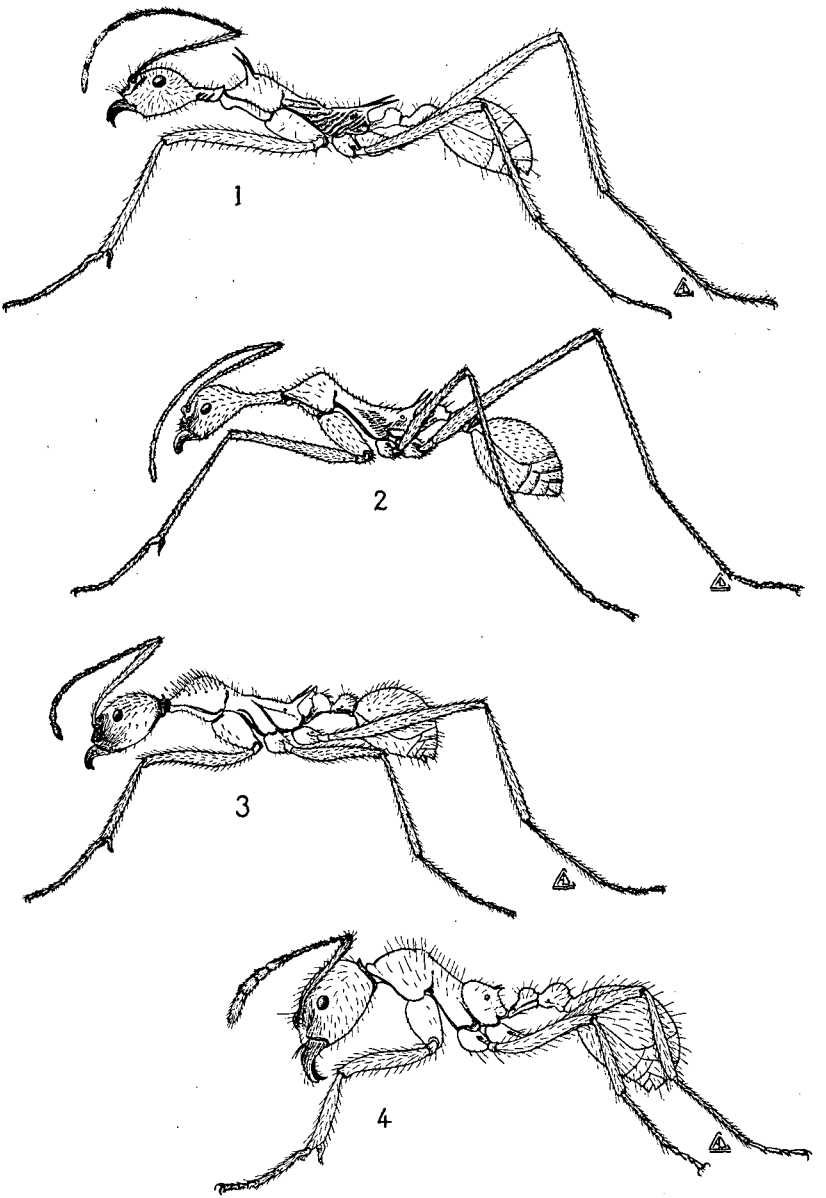
Profile view of the worker of four species of New Guinea *Aphaenogaster* Mayr.

Fig. 1. *Aphaenogaster* (*Planimyrma*) *loriai* (Emery).

Fig. 2. *A.* (*Deromyrma*) *dromedarius* (Emery).

Fig. 3. *A.* (subgenus ?) *lustrans*, n. sp.

Fig. 4. *A.* (*Nystalomyrma*) *pythia* Forel.



New Guinea *Aphaenogaster*