

ON THE TAXONOMIC STATUS OF POLYRHACHIS KIRKAE
DONISTHORPE AND ITS PRESUMED MIMICRY
(HYMENOPTERA: FORMICIDAE)¹

A. Chang-Fu Hung²

In a previous paper (Hung, 1967) I doubted the species distinctness of *Polyrhachis kirkae* Donisthorpe and speculated that it is probably a synonym of *P. nigriceps* Fr. Smith (both known only from New Guinea). This problem was finally solved in January 1969 when I studied the types of both species at the British Museum (Natural History).

Polyrhachis nigriceps was first described as new species from Waigeu by Fr. Smith in 1863. In 1898 Emery described *P. atalanta* from Dorey. Later in 1925 Emery himself synonymized *P. atalanta* under *P. nigriceps*. Smith described *nigriceps* from a single worker. I have carefully examined this specimen and have compared it with the type series of *kirkae* and 12 other specimens identified as *kirkae* by Donisthorpe himself. The first difference I noticed is the color pattern between the types of these two species. They both have black heads and yellow gasters, but the alitrunk and petiole are different in color. The alitrunk and petiole of the type specimen of *kirkae* are almost as black as the head, but they are nearly as yellow as the gaster in *nigriceps*. However, not all *kirkae* have black alitrunk and petiole. One specimen from Waigeu has the color pattern similar to that of *nigriceps* and even two specimens among the type series have heads, alitrunks, and petioles as yellow as the gaster. Actually, only those

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²Department of Biology, University of North Dakota, Grand Forks, ND 58201.

specimens from Mt. Baduri, Japen Is. and one from Mimika R. have the same coloration as the type. Recently, I have also studied one more cotype and an additional specimen from Bisianumu. Their color pattern matches that of the type of *kirkae*. Still it is obvious that the color pattern varies in *kirkae*. Another difference I found between the types of these two species is the anterior border of the clypeus. However, this also shows variation even in *kirkae* itself (Fig. 1).

In addition to the above characters, I have also used the following ten measurements and indices for comparison: head width (HW), head length (HL), cephalic index ($CI = HW \times 100 / HL$), scape length (SL), scape index ($SI = SL \times 100 / HW$), pronotal width (PW), Weber's length of mesosoma (WL), metathoracic tibial length (MTL), pronotal spine length (PnSL), and propodeal spine length (PpSL). As shown in Table 1, the measurements and indices of *nigriceps* fall well within the range of *kirkae* with the exception of the propodeal spines which are shorter in *nigriceps*.

On the evidence given above, I therefore propose that *Polyrhachis kirkae* Donisthorpe 1937 be relegated to the synonymy of *Polyrhachis nigriceps* Fr. Smith 1863. It is interesting to note that *nigriceps* was first placed to the subgenus *Myrmhopla* by Donisthorpe (1932), yet



FIGURE 1. Anterior border of the clypeus in (a) *nigriceps* type, (b) *kirkae* type, (c) *kirkae* cotype, and (d) *kirkae* type series. All drawn to same scale.

TABLE 1.—Ten measurements and indices of *P. kirkae* and *P. nigriceps*. (all measurements are in millimeters).

	<i>kirkae</i>		<i>nigriceps</i>	
	Type	Cotype	Range (n=16)	Type
HW	1.75	1.80	1.62– 1.85	1.67
HL	2.62	2.62	2.55– 2.82	2.62
CI	66.79	68.70	60.28– 70.00	63.74
SL	3.12	3.12	3.00– 3.32	3.12
SI	178.28	173.33	168.68–195.29	186.83
PW	0.75	0.72	0.60– 0.80	0.75
WL	3.85	3.82	3.75– 4.00	3.87
MTL	4.15	4.25	4.05– 4.32	4.25
PnSL	0.50	0.55	0.50– 0.62	0.50
PpSL	0.80	0.80	0.75– 0.87	0.67

five years later he himself described *Polyrhachis (Florencea) kirkae* as *subgen. et sp. nov.* and stated that it comes near to *Polyrhachis (Dolichorhachis) malaënsis* Mann (Donisthorpe, 1937).

Another problem regarding this species is the presumed mimicry involving as models two species of ants in two other subfamilies. In a series of four papers, Donisthorpe (1937, 1940, 1941, 1943) pointed out that this stingless ant mimics both *Aphaenogaster lorai* (a myrmicine ant) and *Odontomachus tyrannicus* (a ponerine ant) in Papua and Waigeu respectively. Both models possess very powerful stings and the mimics were taken with their models in both localities.

I have studied one of the several workers of *kirkae* taken at Camp Nok, Waigeu by L. E. Cheesman which, according to Donisthorpe (1940), were collected with its ponerine model, running together on the same trail. This specimen has the typical black head and yellow gaster. But the alitrunk and the petiole are not entirely black as the head. They are as yellow as the gaster. There is only a small dark area between and at the bases of the two pronotal spines. The rest of the alitrunk and the petiole is the same color as the gaster. I have not seen any *Odontomachus tyrannicus* from Waigeu, but the four specimens I have from Finschhafen and Managalase area all have alitrunk and petiole as dark as the head. Besides, the legs of all *kirkae* are also much lighter than any of the *tyrannicus* I have. Specimens of *kirkae* from Japen Is., Mimika, and Bisanumu do have a color pattern

similar to *tyrannicus*, but no field association of these two species has been reported in those areas.

The case of *kirkae* and *loriai* is again not very convincing. I have all the five workers in the type series of *kirkae* which, according to Donisthorpe (1937, 1940), were taken with its model by Cheesman from Kokoda, Papua. Again, I do not have any specimen of *loriai* from Kokoda, but I do have 17 specimens from Tapini (6), Nadzab (4), Finsch Habor (4), Bisianumu (2), and Moroka (1). They all have black heads and alitrunks. The legs, petioles and gasters are yellow. However, none of the five specimens in the type series of *kirkae* has yellow legs, and as I have already pointed out, only the type and one cotype have the alitrunks and petioles as black as the head. Two other specimens in the type series have almost a uniform yellow all over the body. As to the fifth, it has a gaster as yellow as that of *loriai*, but the legs and the alitrunk and also the petiole are much darker than the gaster (although not as black as the head).

Thus, although this presumed mimicry has been vividly described and illustrated by Donisthorpe, I find it hard to accept. Unfortunately, only Miss Cheesman has had the great opportunity to encounter the species concerned in the field, and no other myrmecologist has ever reported any similar observation since then. Obviously, more field studies of the ants themselves are needed before we can draw any conclusion.

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LITERATURE CITED

- DONISTHORPE, H. 1932. On the identity of Smith's types of Formicidae (Hymenoptera) collected by Alfred Russel Wallace in the Malay Archipelago, with descriptions of two new species. *Ann. Mag. Nat. Hist.* (10) 10: 441-476.
- DONISTHORPE, H. 1937. Some new forms of Formicidae and a correction. *Ann. Mag. Nat. Hist.* (10) 19: 619-628.
- DONISTHORPE, H. 1940. Mimicry in ants. *Ent. Mon. Mag.* 76: 254, pl. V.
- DONISTHORPE, H. 1941. The ants of Japen Island, Dutch New Guinea. *Trans. Roy. Ent. Soc., London* 91: 51-64.
- DONISTHORPE, H. 1943. The ants (Hym., Formicidae) of Waigeu Islands, North Dutch New Guinea. *Ann. Mag. Nat. Hist.* (11) 10: 433-475.

- EMERY, C. 1898. Descrizioni di Formiche nuove malesi e australiane; note sinonimiche. Rend. Accad. Sc. Bologna N. S. 2: 231-245.
- EMERY, C. 1925. Genera Insectorum, Fasc. 183, Formicidae, subfam. Formicinae. (Ed. P. Wytzman, Louis Desmet-Verteneuil: Bruxelles).
- HUNG, A. C. F. 1967. A revision of the ant genus *Polyrhachis* at the subgeneric level (Hymenoptera: Formicidae). Trans. American Ent. Soc. 93: 395-422.
- SMITH, F. 1863. Catalogue of hymenopterous insects collected by Mr. A. R. Wallace in the Islands of Mysol, Ceram, Waigiou, Bouru and Timor. Jour. Proc. Linn. Soc. Zool. 7: 6-48.

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ABSTRACT.—On the taxonomic status of *Polyrhachis kirkae* Donisthorpe and its presumed mimicry (Hymenoptera: Formicidae).—*Polyrhachis nigriceps* Fr. Smith and *Polyrhachis kirkae* Donisthorpe are both known only from New Guinea. The comparison of the types of both species shows that *P. kirkae* Donisthorpe 1937 is a synonymy of *P. nigriceps* Fr. Smith 1863. The presumed mimicry of *kirkae* involving as models two species of ants in two other subfamilies has also been studied. In both cases, the color patterns of the mimics do not seem to match those of their models very well.—A. CHANG-FU HUNG, Department of Biology, University of North Dakota, Grand Forks, ND 58201.

DESCRIPTORS: Hymenoptera; Formicidae; *Polyrhachis nigriceps*; *Polyrhachis kirkae*; synonymy; mimicry.