

A Preliminary Review of the Ponerine Ant Genus *Dinoponera* Roger (Hym. Formicidae)

Walter W. Kempf, O.F.M.

A Preliminary Review of the Ponerine Ant Genus *Dinoponera* Roger (Hymenoptera: Formicidae)

Walter W. Kempf, O.F.M.

Convento S. Francisco, C. P. 5.650, 01000 São Paulo, Brasil

(With 18 figures and 1 map)

The ants of the Neotropical genus *Dinoponera* are among the largest in the family Formicidae, attaining or even surpassing in the worker caste the appreciable length of 3 cm. Yet in spite of their size, they are not too commonly collected, perhaps due to their natural scarcity, although they may be locally very abundant, as for instance in the Belém area. During the last few years, I have been able to see well over 200 specimens from various localities, which gave me an opportunity for casting another look at the species level taxonomy of the genus, the distribution of the various forms, and reappraising the present classification and the characters on which it is based.

Acknowledgements. — I am deeply obliged to my friend Mr. Karol Lenko, presently of the Instituto Biológico de São Paulo, who was extremely helpful in gathering pertinent material and directing other collectors in doing the same. The material, on which this study is based, is in my private collection (WWK) and in the collections of the Museu de Zoologia da Universidade de São Paulo (MZUSP), formerly the Departamento de Zoologia da Secretaria de Agricultura de São Paulo (DZSP). My standing appreciation goes to Fr. Thomas Borgmeier, O.F.M. for the gift of his entire collection of ants, including many specimens of *Dinoponera* (CTB). I am also grateful to several other collectors, who have given me specimens, namely Mr. F. Plaumann, Father Columbano Gilbert, O.F.M., Fr. Luis Herbst, CSSp., the late Fr. Canuto Amann, O.F.M., Mr. Domiciano Dias and Mr. Richard von Diringshofen. This study was made possible through the financial aid given by the Conselho Nacional de Pesquisas of Brasil, in the form of a fellowship.

Genus *Dinoponera* Roger

Ponera (in part): Perty, 1833: 135. — Guérin, 1838: 206. — Fr. Smith, 1858: 95.
Dinoponera Roger, 1861: 37-38; Emery, 1901: 47-48; Emery, 1911b: 63; Gallardo, 1918: 47-51; Bequaert, 1926b: 253-256; Borgmeier, 1937: 223-225; Wheeler & Wheeler, 1952: 607-608, 659 (larvae); Kusnezov, 1957: 205; Wheeler & Wheeler, 1964: 451, 458, 460, 461 (larvae).

Type of the genus: *Ponera grandis* Guérin, 1838 (= *Ponera gigantea* Perty, 1833) (monobasic).

A satisfactory generic diagnosis, both for the worker and the male sex, is contained in Emery (1911b: 63). Kusnezov (1953: 105; 1954: 34) has given the palpal formula, which is 4:4 in the worker and 5:3 in the male. The queen, unknown

but searched for during a long time, was finally believed to be discovered in 1936, in the form of a gynecoid worker from an *australis* nest, dug out in Goiás State. As will be shown below, this specimen is not an ergatoid yet functional female, but a deformed worker due to *Mermis* parasitism (mermithergate). The larval characters have been worked out and presented by the Wheelers (1952, 1964).

Additional characters for the worker, not mentioned so far as I know, consist in the short comb of delicate spines flanking the apex of both the pygidium and hypopygium, and in the presence of a more less developed, stridulatory file on acrotergite of gastric tergum II, variable according to the different forms.

The distribution of the strictly South American genus is shown on the accompanying map. The territory includes southeastern Colombia, eastern Peru, all of Brazil, eastern Bolivia, Paraguay and northeastern Argentina.

The genus, although clearly related to *Pachycondyla* and other large-sized Ponerine allies, is quite distinctive in its own right, the differences, however, that separate the recognizable forms or morphs, are rather subtle but even so satisfactorily constant. At the present time, the accepted classification of the group is as follows:

- australis* Emery, 1901
 - australis australis* Emery, 1901
 - australis* var. *brevis* Santschi, 1928
 - australis bucki* Borgmeier, 1937
 - australis nigricolor* Borgmeier, 1937
- gigantea* (Perty, 1833)
 - = *grandis* (Guérin, 1838)
 - gigantea gigantea* (Perty, 1833)
 - gigantea longipes* Emery, 1901
 - gigantea lucida* Emery, 1901
 - gigantea mutica* Emery, 1901
 - gigantea mutica* var. *opaca* Santschi, 1921
 - gigantea mutica* var. *quadriceps* Santschi, 1921

The material at hand, which covers nearly the entire area of distribution of the genus, yielded upon a more careful analysis of stable characters six recognizable forms, all of which replace each other geographically except for *australis australis* and *gigantea mutica* which have partially overlapping ranges, thus justifying the raising of *australis* to full specific rank (Borgmeier, 1937: 227). The fact that, according to our present collecting records, five definable forms occupy mutually exclusive territories, might incline us to treat them as geographical races of *gigantea*.

But in several instances, some of the forms have come very close to each other (see map), without showing any perceptible intergradation or approximation of characters, so that it seems better to treat them, at least for the time being, as full-fledged species.

The present study makes use of details in sculpture patterns, types of pubescence and pilosity, shape of antero-lateral pronotal corner and pronotal disc, development of a stridulatory file on gaster and shape of petiole. Meristic characters are used solely for separating *australis* from the remaining forms, because measurements, on a cursory examination of samples, provide no easy separation of the latter. More material and a more intensive exploration of quantitative characters may yet give additional help in separating the different forms.

***Dinoponera gigantea* (Perty)**

(Figs. 3, 8-12)

Ponera gigantea Perty, 1833: 135 (Worker; Brasil, Amazonas: Rio Negro).

?*Ponera grandis* Guérin, 1838: 206 (Worker; Brasil: Minas Gerais).

Dinoponera grandis (in part): Roger, 1861: 38 (Worker; North Brasil; Colombia).
Emery, 1901: 47 (Worker; Brasil, Pará: Belém). Mann, 1916: 408 (Worker; Brasil, Pará: Belém).

Dinoponera gigantea: Bequaert, 1926a: 188 (Syn.). Bequaert, 1926b: 254 (Brasil: Pará, Amazonas). Borgmeier, 1937: 225 (Worker; Brasil, Pará: Belém, Santarém). Zahl, 1959: 632-669. Kempf, 1970: 326 (Brasil, Pará: Belém).

Type locality: Brasil, Amazonas State: Rio Negro (exact locality unknown, but presumably at Barcelos).

The original description (reproduced in Roquette Pinto, 1915: 24 and Gallardo, 1918: 52) gives no real clue about what particular form of *Dinoponera* is represented by the type, except for two indications: size (over 30 mm, hence it is not *australis*) and a certain glossiness of the integument, especially on sides of thorax («tota laevis atra, pilosa, thoracis lateribus vix coeruleomicantibus»), which is however not sufficiently defined to discriminate among the forms which enter in consideration.

Roger (1861: 38), when discussing the variation of what he still considers to be just one species, quotes two types of Perty, seen by himself, without giving the respective localities of origin. One has the gaster densely and finely punctate, with the interspaces finely and densely rugulose, giving it a «scaly» appearance, and with isolated larger piligerous pits. The other has the gastric integument finely coriaceous rugulose with simple, scattered piligerous punctulae. Both seem to have the antero-inferior corner of pronotum dentate. The first of these types

agrees with the form common around Belém and occurring alongside the Amazon river, that is presently considered to be *gigantea* in the strict sense. I believe we should abide with this fixation of identity made by Emery, as long as the type has not been reexamined and material from the Rio Negro is not at hand.

Worker. — Total length 30 mm and over. Length of scape exceeding maximum width of head. Pubescence on front of head quite dense yet inconspicuous, not concealing the integument. Gular (ventral) surface of head reticulate-punctate throughout, very finely striate in front, the striae strongly converging mesad toward the anterior border. Sides of head reticulate-punctate, subopaque. Antero-inferior corner of pronotum dentate. Pronotal disc reticulate-punctate, subopaque, the paired swellings rather inconspicuous, but the median impression between swellings distinct, integument irregularly wrinkled. Tarsus I of hind leg longer than maximum head length. Petiole (Fig. 3) reticulate-punctate and subopaque, rectangular in profile, the anterior surface straight to slightly concave; the anterior upper corner more narrowly, the posterior corner more broadly rounded; posterior surface with the vertical sulcus always distinct; in dorsal view the petiole is decidedly longer than broad, width-length proportion below 0.80. Terga I and II of gaster opaque, sharply reticulate-punctate, densely foveolate (from each foveola arises a short decumbent hair), with scattered, bristle-bearing, larger pints. The appressed pubescence, although inconspicuous, is densely spread over the entire terga. Stridulatory file on acrotergite (portion of tergum that is normally concealed under the overlapping preceding tergum) of tergum II short, narrow, inconspicuous, not crossing beyond anterior half of acrotergite (hence not easily seen if entire acrotergite is not exposed).

Male (undescribed). — Measurements in millimeters: total length 22.0; maximum length of head capsule 2.48; maximum width of head (eyes included) 3.10; maximum diameter of eyes 1.86; scape length 0.93; length of funicular articles I: 0.21, II: 1.86; Weber's length of thorax 7.12; hind femur length 5.57; hind tarsus I length 5.38; petiole length 2.16, width 1.24, height 1.76; tergum I of gaster length 3.09, width 2.88; fore wing length 15.6; hind wing length 12.15. Chestnut brown, smooth and shining except funiculi, clypeus, front, tibiae and tarsi which are finely punctate to reticulate-punctate; terga III and following of gaster weakly, superficially and finely reticulate. The entire insect covered with long, subdecumbent, silky pubescence, except

funiculi where the pubescence is minute. Standing hairs long and abundant on body, lacking on middorsum of terga II-V of gaster; long hairs on scapes rather numerous, longest not much longer than twice the diameter of scape (Fig. 8). Head as shown in Fig. 9. Anterior border of labrum rounded, not visibly excised. Petiole as shown in Fig. 10. Pygidial spine long and well developed. Parameres (gonostyli) of genitalia in side-view narrow and spear-pointed (Fig. 12). Hypopygium (subgenital plate or subandrium) apically rounded (Fig. 11).

Distribution. This form is not rare on the south-side of the lower Amazon river, accompanying the same river and its tributaries westward, probably on both sides, to the Loreto Province in Peru. Probably occurs also in the southeastern provinces of Colombia.

Specimens examined: BRASIL, *Pará*: Belém, 1927-1970, Almeida, Carvalho Neto, E. Sefer, A. Campos, A. Martinez, Pereira & Machado, K. Lenço, P. Vanzolini, E. Dente, I. A. Almeida, D. Dias coll., 12 workers, 3 males; Alegre, 15 km NE of Marapanim, 10-IX-1965, Exped. Depart. Zool. Minas Gerais, 2 workers; km 86 Rodovia Belém-Brasília, V-1960, E. Dente, 1 worker; Igarapé Iramim, 40 km from Rio Gurupi, 2-V-1963, J. Carvalho, 1 worker; Canindé, Rio Gurupi, IV-1963, X-1964, II-1966, B. Malkin, 20 workers; Mosqueiro, Barra do Marajó, Austen coll. 1 worker; Santarém, M. P. n. 20.524, 1 worker; Óbidos, 18-IX-1965, Exp. Dep. Zool. S. Paulo, 1 worker. *Maranhão*: Igarapé Gurupi-Una, Aldeia Araçu, 15 km E of Canindé, V-1962, B. Malkin, 1 male; Igarapé Gurupi-Una, Aldeia Yavarahu, 45 km E of Canindé, XII-1964, B. Malkin, 3 workers; Rio Santana, Grajaú, 15-VI-1966, H. Reichardt, 1 worker. *Mato Grosso*: Barra do Tapirapé, XII-1964, B. Malkin, 1 worker. PERU, *Loreto*: Estirón Rio Ampiacu, 15-V-1966, B. Malkin, 3 workers (WWK, MZUSP).

Discussion. — *D. gigantea* differs from its closest neighbors, *quadriceps* in the East, *mutica* in the South, and *longipes* in the West, as follows:

1. *mutica*, presently separated from *gigantea* by approximately 350 km, differs in the worker caste from the latter in the smoothness and glossiness of the integument, especially on sides of head, gular surface of head (but a few vestigial striae present antero-laterally), pronotal disc, petiole and gaster; the pronotal disc lacks wrinkles and the paired swellings are quite conspicuous; antero-inferior pronotal corner obtusely angulate not dentate; vertical sulcus on posterior surface of petiole absent in specimens from localities that are closest to the *gigantea*

area, weak to normal from localities that are far removed (character replacement?); stridulatory file on acrotergite of tergum II of gaster well-developed, broadly triangular.

2. *longipes*, known only in the worker caste, separated from *gigantea* by a distance less than 400 km, differs from the latter as follows: longer and denser pubescence, gold-brown in color, especially striking on front and vertex of head; sides of head, gular surface, pronotal disc, petiole and gaster smooth and highly polished, but pronotal disc and gaster are densely punctured on account of the dense pilosity; striae on anterior corner of gular face of head completely absent; antero-inferior corner of pronotum obtusely angulate, not dentate; stridulatory file on gaster as short as in *gigantea*, but broader, triangular.

3. *quadriceps*, still separated, according to our collecting records, by approximately 700 km, differs in the worker caste as follows: antero-inferior corner of pronotum obtusely angulate, not dentate; gular face of head usually without striae, or if present, confined to very few short ones near base of mandibles; integument on pronotal disc not so coarsely wrinkled; pubescence on terga I and II of gaster very sparse. The male is distinguished by the shallowly excised labrum, the scarcer but longer hairs on antennal scapes, the deeply excised apex of the subgenital plate, the shorter petiole and the still narrower parameres of the genitalia.

Synonymy. Perty's name *gigantea*, overlooked by previous authors, was rediscovered by Roger (1861: 38). Inasmuch as he, in spite of the obvious variation which he discussed extensively, recognized only one species in *Dinoponera*, he placed *gigantea* into synonymy of the already accepted *grandis* Guérin. Bequaert (1926a: 188) solved the priority problem by showing that Perty's name was of 1833, Guérin's name of 1838. Thus *gigantea* takes precedence over *grandis* in the case of synonymy.

When Emery (1901: 47) decided to split the only *Dinoponera* species into several races, he left *gigantea* as a synonym of *grandis* and gave the newly established subspecies new names. Now, there is little doubt left that *grandis sensu* Emery is indeed *gigantea* s. str., i. e. the heavily sculptured form of the lower and middle Amazon valley characterized above. But the problem of the identity of the true *grandis* remains unsolved.

Guérin's description contains two clues. The first is the size of *grandis* which is given 22 mm in total length. This would forcibly incline us toward declaring *grandis* as the older synonym of *australis*, if Roger, who had seen the types, did not state that Guérin's measurements are much too low and that the specimen(s) in question did not differ in this regard from those of Perty. Unfortunately, in the light of modern taxonomic practice, Roger did not select a lectotype nor give the provenance of the two differing "type" specimens of *grandis* he had examined. One was said to have the gastric terga finely coriaceous or rugulose, with scattered larger piligerous pits, and somewhat shiny. The other, to the contrary, had an absolutely smooth gaster, shining as a mirror. One of the types (which one is not clear) is said to have the petiole higher, with a shorter upper surface, which gives it a narrower appearance in side-view. Taking into account the second clue, the type-locality of *grandis*, which is the State of Minas Gerais in Brazil, the solution is narrowed down to two or three possibilities, if the presently proposed classification stands the test of more material and more intensive study. These possibilities, in order of decreasing probability are: *grandis* is either *australis*, or *lucida*, or *quadriceps*.

The best suggestion consists in leaving *grandis* as a synonym of *gigantea*, so that it may qualify as a *nomen oblitum* in a few more years.

***Dinoponera longipes* Emery, n. stat.**

(Fig. 7)

Dinoponera grandis longipes Emery, 1901: 48 (Worker; Peru: Cumbase).

Type locality: Peru: Cumbase.

Emery singled out this form as a close relative of the neighboring *mutica*, but distinct by the copious golden yellow pubescence, the longer antennal scapes and legs, and the shape of the petiole, the dorsum of which, in profile, is slightly slanted backwards. This form is recognizable among the material at hand. But not all characters given in the original description seem to be absolutely valid. This is especially true for the meristic characters, although still true statistically, but leaving doubt in the case of identification of individuals.

Worker. — Size of *gigantea*. Cephalic index 85-88. Antennal scape from slightly shorter to slightly longer than maximum head width (index: scape L/head W \times 100 = 94-103). Pubescence on front of head (as well as on thorax and dorsum of gaster) golden brown, very dense and rather long. Gular face of head smooth and shining, without vestiges of striae antero-laterally. Antero-inferior corner of pronotum obtusely angulate, not dentate. Pronotal disc smooth and shining, but densely covered with piligerous punctulae; paired swellings from faint to distinct; integument not wrinkled. Tarsus I of hind leg decidedly longer than maximum length of head capsule. Petiole smooth and shining; shape resembling that of *quadriceps* (Fig. 7), dorsal surface faintly to distinctly slanted backwards; width-length proportion distinctly lower than 0.80; vertical sulcus on posterior surface present in specimens from Acre Territory, Brasil, absent in specimens seen from Peru. Terga I and II of gaster smooth and shining but densely covered with punctulae from which arises the long and dense pubescence that covers the entire segments. Stridulatory file on acrotergite of Tergum II of gaster very short but broadly triangular, not extending backwards beyond the anterior half of acrotergite.

Distribution: This form is known from eastern Peru and the Acre Territory of Brazil.

Specimens examined: PERU, *Loreto*: Montenegro, Rio Marañon, 350 m, 16-IV-1960, W. Weyrauch, 2 workers;

Huánuco: Tingo Maria, Rio Huallaga, 670 m, 24-XII-1955, W. Weyrauch, 1 worker. BRASIL, *Acre*: Vila Taumaturgo, II-1962, L. Herbst, 1 worker; Cruzeiro do Sul, XII-1963, L. Herbst, 3 workers (WWK).

Discussion. — The characters that help to separate *longipes* from *gigantea* have been discussed under the latter on a preceding page. The differences from *mutica*, which is still separated from *longipes* by a distance of approximately 1000 km, are as follows:

The striking pubescence of brownish golden color on front, vertex and thorax; the complete lack of striae on gular surface of head; the densely punctulate pronotum and terga I and II of gaster; the shorter stridulatory file on acrotergite II of gaster; the shape of the petiole in profile (cf. Figs. 4, 7) which resembles that of *quadriceps*, having anterior surface inclined forward, often slightly excavate, the upper anterior corner more narrowly rounded than the posterior corner. In addition, *longipes* has proportionately longer scapes and probably also hind femora than *mutica*. Nevertheless, both forms are very close and the possibility of both being geographical races of the same form may not be excluded. We need material from the vast area that presently separates the territories of both forms.

Dinoponera lucida Emery, n. stat.

(Figs. 1, 2)

Dinoponera grandis lucida Emery, 1901: 48 (Worker; Brasil, Espírito Santo).
Borgmeier, 1937: 226 (Worker; Brasil, Espírito Santo: Porto Cachoeiro, Rio Itapemirim).
Dinoponera grandis var. *lucida*: Forel, 1907: 1 (Brasil, Espírito Santo).

Type locality: Brasil, Espírito Santo State (no locality given). I propose the homonymous town, Cidade do Espírito Santo, better known under the name of Vila Velha, near Vitória, Espírito Santo State, Brasil.

According to Emery's very brief diagnosis, this form is of the size of *gigantea*, having the antero-inferior corner of pronotum dentate, but the integument, especially on petiole and gaster, mostly smooth and highly polished; the petiole is narrower and, when seen in profile, lower in front than behind. All these characters are valid, except the width-length proportion of the petiole which according to measurements taken of a few samples, fall into the same range as that of *gigantea*.

Worker. — Size and measurements averaging slightly less than in the preceding forms. Antennal scape distinctly longer than head width. Pubescence on front and vertex of head variable, either short and inconspicuous or longer, denser and quite visible. Gular surface of head finely striate either throughout or at least on anterior half; very seldom the striae are confined to a narrow

stripe along the anterior border and obsolescent yet still discernible. Sides of head smooth, not quite glossy but with a silky sheen on account of the superficial reticulate microsculpture. Antero-inferior corner of pronotum dentate. Pronotal disc smooth and shining, lacking wrinkles and dense, fine punctulae; paired swellings quite distinct. Hind tarsus I decidedly longer than head length. Petiole (Fig. 2) smooth and polished, its anterior face not excavate, its dorsal face slanted forward; vertical sulcus on posterior face either present or absent; width-length proportion well under 0.80; anterior face lacking dense pubescence. Terga I and II of gaster smooth, highly shining, lacking dense, fine punctulae; pubescence loosely scattered on sides, entirely absent on disc. Stridulatory file on acrotergite of tergum II well developed, nearly crossing the entire tergite.

Distribution. This form is rather common in Espírito Santo State of Brasil, but also has been found southward, in the Paraíba valley of São Paulo State. Two published records of *lucida* belong to other forms: Argentina, Misiones: Iguazu River on Brazilian border (Santschi, 1921: 84) = *australis*; Brazil, Rondônia: Porto Velho (Mann, 1916: 408) = *mutica*.

Specimens examined: BRASIL, *Espírito Santo*: Linhares, I-1964, 2-II-1965, 19-X-1967, Exp. Dep. Zoologia S. Paulo, H. A. Britski, Rita Kloss coll., 8 workers; Linhares, Parque Sooretama, 30-VIII-1961, X-1962, F. M. de Oliveira and Pe. F. S. Pereira coll., 3 workers; Córrego Itá, I-1960, W. Grossmann, 1 worker; Santa Teresa, I-1964, 27-VIII-1966, Exp. Dep. Zool. S. Paulo, H. Reichardt coll., 2 workers; Porto Cachoeiro, M. P. 16.784, 1 worker; Vila Velha (Cidade do Espírito Santo), I-1954, 25-VIII-1957, R. Mueller, O. Seifert coll., 4 workers; Rio Itapemirim, 5-XII-1908, J. F. Zikán, 1 worker; no locality given, T. Zimmermann coll., 2 workers. *São Paulo* State: Cruzeiro, 26-IX-1933, Pedro S. de Myra, 1 worker; no locality given, M. P. 18.928, 1 worker.

Discussion. — Numerically speaking, the closest relative of *lucida* would be *mutica* since it differs from the former in the lowest number of characters: The latter has the entire gular surface of head smooth and shining; striae, if present, restricted to very few short and vestigial ones behind insertion of mandibles; antero-inferior pronotal corner obtusely angulate or even rounded; petiole (cf. Figs. 2, 4) of different shape, its upper face not slanted forward, anterior and posterior upper corners nearly equally rounded, anterior face with much denser, inclined, pubescence; pubescence on terga I and II of gaster present also on disc. It should be noted, however, that the territories of both forms are separated from each other by almost 1000 km.

The differences of *lucida* from the confining species, *quadriceps* in the north, and *australis* in the south and west, are as follows: a) *australis* is quite distinct by still smaller size; the finely reticulate-punctate and subopaque sides or head, disc of pronotum, petiole, terga I and II of gaster; the shorter antennal scape which never exceeds the head width; hind tarsus I not longer, usually shorter than head length; the shape (Fig. 6) and width-length proportion (over 0.80) of the petiole. b) *quadriceps* is distinguished by the fine, reticulate-punctate sculpture of the integument on sides of head, gular surface of head, disc of pronotum, petiole and terga I and II of gaster; the lack of striae on gular face of head; the obtusely angulate antero-inferior corner of pronotum; the ill-developed pair of swellings and the presence of a few wrinkles on dorsum of pronotum; the shape of the petiole in side-view, with the anterior upper corner narrowly, the posterior broadly rounded, the dorsal face not slanted forward: stridulatory file weak, short, streak-like.

Dinoponera mutica Emery, n. stat.

(Fig. 4)

Dinoponera grandis mutica Emery, 1901: 48 (Worker; Brasil, Mato Grosso). Santschi, 1921: 84 (Worker; Bolivia: Guarayos).
Dinoponera grandis lucida: Mann, 1916: 408 (Worker; Brasil, Rondônia: Porto Velho).
 Bequaert, 1926b: 254 (Brasil, Rondônia: Porto Velho).

Type locality: Brasil, Mato Grosso State (no locality given). I propose the town of Rondonópolis in the center of Mato Grosso State, Brasil.

According to the original description, *mutica* is of the same size as *gigantea*, similar to the latter also in body sculpture; but the petiole is shorter than in *gigantea* and *lucida*, the pubescence is richer and of the color gray; the antero-inferior pronotal corner is edentate. Emery's diagnosis is misleading as regards the body sculpture, as will be shown below. Since the type came from Mato Grosso, there is no doubt about its identity.

Worker. — Size as *gigantea*. Antennal scape remarkably longer than head width. Pubescence on front and vertex generally longer and denser than in *gigantea*, but lacking the golden luster of *longipes*. Gular face smooth and shiny, with fine, more or less distinct striation antero-laterally and antero-mesially (sometimes nearly effaced). Sides of head smooth and shining in spite of the very fine, superficial microsculpture which is reticulate-punctate. Antero-inferior corner of pronotum obtusely angulate or rounded. Pronotal disc smooth and shiny, lacking irregular fossae and wrinkles; the paired swellings rather weakly expressed. Tarsus I of hind leg decidedly longer than head length. Petiole of distinctive shape (Fig. 4), shorter than that of *gigantea* and *longipes*, but width-length proportion still under 0.80; anterior

and posterior upper corners subequally rounded; smooth and shining; vertical sulcus on posterior face usually obsolete, present only in one Bolivian specimen. Terga I and II of gaster very indistinctly, superficially and finely reticulate-punctate yet quite smooth and shining, lacking the dense foveolae of *longipes* on disc where the pubescence is likewise scarce. Stridulatory file well-developed, triangular but short, visible only when acrotergite of tergum II is fully exposed.

Distribution: The present species is known from Central Brasil (Rondônia, Mato Grosso and western Goiás) and from eastern Bolivia.

Specimens examined: BRASIL, *Rondônia*: Forte Príncipe da Beira, XI-1952, 10-XI-1961, F. M. de Oliveira, 6 workers; *Mato Grosso*: Rondonópolis, XI-1950, Diringshofen, 3 workers; Rio Corrente, III-1971, O. Seifert, 1 worker; Rio Verde de Mato Grosso, no date, Diringshofen, 1 worker; Utiariti, Rio Papagaio, 1-XI-1966, K. Lenko & F. S. Pereira, 3 workers; Poconé, V-1948, C. Valette, 1 worker; Município de Camapuã, 16-X-1960, J. Evangelista, 1 worker; Xingu, X-1961, M. Alva-renga & W. Bokermann, 1 worker; *Goiás*: Aragarças, IX-1946, H. Sick, 3 workers. BOLIVIA, *Santa Cruz*: San Ignacio, 1-1963, L. J. Hammerschmidt, O.F.M., 1 worker; entre Puerto Suarez y Cerrito, 1939, Wittmer, 2 workers (WWK, MZUSP).

Discussion. — The differences between *mutica* and *gigantea*, *longipes*, *lucida* have already been given above, on preceding pages. Also the possibility of a closer relationship with *longipes* has already been mentioned under the latter species. It suffices to give here briefly the main distinguishing features that separate *mutica* from *australis* which shares with the former part of its territory in south central Mato Grosso and southern Goiás, as well as in Bolivia. *D. australis* is of smaller size, has the body integument subopaque and more distinctly reticulate-punctate; the antennal scape is not longer than the head width, the same is true for the tarsus I of hind leg. In addition, *australis* has the antero-inferior corner of pronotum dentate, the petiole, although of similar shape, broader and shorter, the width-length proportion being over 0.80.

***Dinoponera opaca* Santschi, n. stat.**

Dinoponera grandis mutica var. *opaca* Santschi, 1921: 84 (Worker; Brasil, Guanabara: Rio de Janeiro).

The original description is as follows:

“La sculpture est aussi mate que chez *grandis* Guér. et la pilosité aussi abondante. Les scapes et les tibias postérieurs également de 6,5 mm. La tête est distinctement plus large derrière (5,4×5,6 mm), le

bord postérieur largement échanuré. L'écaille plus courte que chez *grandis* et plus longue que chez *mutica*, avec l'angle postérieur arrondi. Fait passage à *longipes* Em. par ses longues antennes. Brésil: Rio de Janeiro (Goeldi), reçu par M. Forel 1 ♂".

It is hard to say which form is meant by this insufficient diagnosis, but I feel pretty sure that the specimen is not from Rio de Janeiro (where one would expect to find *lucida* or with lesser probability, *australis*), but possibly from the lower Amazon, especially because Goeldi also collected in the environs of Belém. But speculation is of little help; the solution lies in the examination of the type.

I have raised this form to full specific rank because it is either going to stand as a species or to fall as a synonym.

Dinoponera quadriceps Santschi, n. stat.

(Figs. 5, 13, 14, 15, 16)

- Dinoponera grandis*: Forel, 1908: 64 (Brasil, Ceará). Emery, 1911a: 219 (male; Brasil, Bahia: Vila Nova).
Dinoponera grandis mutica: Mann, 1916: 408 (worker, larva, biol.; Brasil, Rio Grande do Norte: Natal, Ceará-Mirim, Baixa Verde; Paraíba: Independência).
Dinoponera grandis var. Mann, 1916: 409 (male; Brasil, Paraíba: Independência).
Dinoponera grandis mutica var. *quadriceps*: Santschi, 1921: 84 (worker; Brasil, no locality given).
Dinoponera gigantea mutica: Bequaert, 1926b: 254 (Brasil: Rio Grande do Norte, Paraíba, Espírito Santo).
Dinoponera gigantea mutica var. *quadriceps*: Borgmeier, 1937: 226 (male, design. type loc.; Brasil, Pernambuco: Tapera).

Type locality: Brasil, Pernambuco: São Lourenço da Mata, Tapera (designation by Borgmeier, 1937: 226):

Two characters mentioned in Santschi's original diagnosis seem to point out its identity and corroborate Borgmeier's fixation of its type locality. Indeed, *quadriceps* is said to differ from *mutica* in the less shiny gaster and the peculiar shape of the petiole, which has its anterior corner marked and narrowly rounded, its posterior corner broadly rounded.

Worker. — Size and measurements averaging slightly less than in *gigantea*. Antennal scape notably longer than head width. Pubescence on front and vertex of head short and inconspicuous. Gular surface of head reticulate-punctate, subopaque, but lacking arcuate striae except for some cases when a few short and vestigial striae appear antero-laterally, just behind the mandibular insertion. Sides of head reticulate-punctate, subopaque. Antero-lateral corner of pronotum obtusely angulate (very seldom subdentate). Pronotal disc reticulate-punctate, subopaque, occasionally slightly wrinkled, bristle pits irregular in outline; paired swellings very faint or obsolete. Hind

tarsus I longer than head length. Petiole (Fig. 5) of distinctive shape, the anterior surface being slightly inclined forward and often a bit excavate; anterior upper corner narrowly, the posterior corner very broadly rounded; integument minutely reticulate-punctate and subopaque; sulcus on posterior surface always distinct. Terga I and II of gaster reticulate-punctate and opaque; piligerous pits for pubescence discally greatly scattered (in a few southern specimens from Bahia State, these pits are stronger and denser, almost as in *gigantea*); coarse bristle-bearing pits greatly scattered: pubescence rather scarce on dorsum, denser and more conspicuous on sides. Stridulatory file on tergum II of gaster weakly developed, arising from the anterior border of acrotergite and running streak-like across the anterior half of the same (visible only when acrotergite is fully exposed; observed in five specimens).

Male. This caste was described three times (Emery, 1911a; Mann, 1916; Borgmeier, 1937). Borgmeier's description contains an evident mistake: the second funicular article is not only as long as the scape but twice as long as the latter. Very similar to *gigantea*, having the same large eyes and protruding ocelli (Fig. 13). Labrum slightly excised on anterior border (bilobed condition). It is readily distinguishable from *gigantea* by the scarcer but longer hairs on funiculus (Fig. 14), the excised tip of the subgenital plate (Fig. 15), and the lack of standing hairs on dorsum of gaster. The pygidium terminates apically in the same long, drawn-out spine as in *gigantea*. Petiolar node slightly shorter (Fig. 16).

Distribution. The present form inhabits the famous «polygon of drought» in northeastern Brasil, having been collected in the following States: Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas and Bahia.

Specimens examined: BRASIL, Ceará: Chapada do Araripe, 5-IV-1962, D. Zajciw, 1 worker; Rio Grande do Norte: Natal, VIII-X-1954, P. Melo, 2 workers; Macaíba, 28-VII-1957, M. Alvarenga, 2 workers; Paraíba: Tabuleiro ao Norte de Santa Rita, 7-I-1968, Dr. Dardano, 1 worker; Mamanguape, VII-1957, Exp. Dep. Zool. São Paulo, 2 workers; Rio Tino, Piapuçú, 15-II-1963, J. Evangelista, 2 workers; Pernambuco: Olinda (ex coll. Reichensperger) 1 worker; Pesqueira, 5-VI-1928, B. Pickel, 1 worker; Tapera, São Lourenço da Mata, 1929, B. Pickel, 3 workers, 2 males; Recife, 1938, L. Lima Castro, 1 worker; Alagoas: São Miguel dos Campos, XI-1952, Camargo

coll., 1 male; Bahia: Barra, Buritirana, 22-III-1958, E. Dente, 2 workers; Bom Jesus da Lapa, XII-1948, C. R. Gonçalves, 2 workers; Vila Nova (= Bonfim), 1908 (ex coll. Borgmeier, n. 2648), 2 males; Camisão, no date, G. Bondar, 1 worker; Paulo Afonso, IX-1958, T. Tolstenko, 1 male; Bandegó nr. Canudos, 19-22-X-1961, Exp. Dep. Zool. S. Paulo, 1 worker; Amparo nr. Itaberaba, 16) V-1965, R. Grantsau, 1 worker; Barra de S. Francisco, no date, Pirajá da Silva, 1 worker. (WWK, MZUSP).

Discussion. — The differential characters that separate *quadriceps* from *gigantea*, *lucida* have already been given on preceding pages. Following are the differences that distinguish *mutica* and *australis* from the present species: *mutica* has the gular surface of head smooth and shining with well-developed striae in front; sides of head, pronotal disc, petiole, tergum I and II of gaster have the integument smooth and shining; the paired swellings on pronotal disc are more conspicuous and the bristles arise from smaller, circular pits; stridulatory file on acrotergite of tergum II of gaster well-developed; shape of petiole, slightly shorter, anterior upper and posterior angles nearly equally rounded, anterior face not excavate: *australis*, on the other hand, is distinctive by the shorter scape, the shorter hind tarsus I, the shorter and relatively broader, subquadrate petiole (when seen from above); the presence of striae on gular face of head; the well developed stridulatory file.

The closest relative is *gigantea* which is closest also geographically. If material from the hitherto uncollected intervening region between both species, southern Maranhão and Piauí States, should show intergradation as regards the differential characters, *quadriceps* would have to be lowered to a geographical race of *gigantea*.

Dinoponera australis Emery

(Figs. 6, 17, 18)

- Dinoponera grandis* (in part): Roger, 1861: 38 (Worker; Brasil, Rio Grande do Sul: Porto Alegre). Mayr, 1882: 730 (Brasil, Rio Grande do Sul: São Leopoldo). Emery, 1896: 625 (Paraguay: San Salvador). Forel, 1904: 369 (southern Brasil). Luederwaldt, 1918: 35 (Brasil: São Paulo State). Wheeler, 1925: 5 (Brasil, Paraná: Castro). Luederwaldt, 1926: 231 (Biol.; São Paulo: Avanhadava).
- Dinoponera grandis australis* Emery, 1901: 48 (Worker; Brasil: São Paulo State, Argentina: Misiones; Paraguay). Santschi, 1912: 521 (Argentina: Misiones). Santschi, 1921: 85 (Male; Argentina, Misiones: San Ignacio).
- Dinoponera grandis* var. *australis*: Forel, 1907: 1 (Paraguay: Estancia Postillon). Forel, 1909: 266 (Argentina: Misiones). Bruch, 1914: 214 (Argentina: Misiones). Gallardo, 1918: 54, fig. 10 (Worker; Argentina: Misiones).
- Dinoponera grandis lucida*: Santschi, 1921: 84 (Argentina, Misiones: Iguazu).
- Dinoponera gigantea australis*: Bequaert, 1926b: 254 (Brasil: São Paulo; Paraguay; Argentina: Misiones, Corrientes).
- Dinoponera grandis australis* var. *brevis* Santschi, 1928: 416 (Worker; Paraguay). N. o. v. Syn.
- Dinoponera australis*: Borgmeier, 1937: 227 (Worker; Brasil: São Paulo State). Kusnezov, 1953: 105 (palpi of worker and male). Kusnezov, 1954: 34 (palpi of worker and male). Kusnezov, 1956: 14, fig. 42, (worker; Argentina: Misiones, northeastern Corrientes, Formosa, ?Chaco).

Type locality: Brasil, São Paulo State: Avanhadava (by designation of Borgmeier, 1937: 227).

Worker. — Total length 25 mm or less. Antennal scape length equal to, or shorter than head width. Pubescence on front

of head short and inconspicuous. Gular face of head subopaque, finely reticulate-punctate throughout; the fine, arcuate striae variably developed from completely covering the undersurface of head to only vestigially shown antero-laterally or nearly absent. Sides of head reticulate-punctate, subopaque. Antero-inferior corner of pronotum dentate. Pronotal disc superficially reticulate and quite shining; paired swellings either feeble or distinct. Length of hind tibiae equal to or less than head length. Petiole, in dorsal view, subquadrate, width over length proportion always more than 0.80, notably shorter and broader than in the other species; its shape (Fig. 6) resembling that of *mutica* (Fig. 4), with the upper anterior and posterior corners equally rounded; finely reticulate, somewhat shining; vertical sulcus on posterior surface either absent or more rarely vestigial to feebly developed. Terga I and II of gaster either reticulate-punctate or more superficially reticulate (in the southern range of the territory) and accordingly either subopaque or somewhat shining; fine appressed pubescence lacking completely on disc of the terga, present on the sides. Stridulatory file on acrotergite of tergum II of gaster well developed, broad and triangular, extending back of the acrotergite for about one half to two thirds of its length.

Female. — Borgmeier (1937: 224, 228) described as representing this caste of *australis nigricolor* a «gynecoid» worker, dug out from a nest with normal workers by R. Spitz, at Campinas, today a suburb of Goiânia, capital city of Goiás State, Brasil. The abnormal features of the puzzling specimen consist: a) in the presence of a single ocellus on head, a rare development in the genus, because among the many specimens seen, only one, of *australis*, from Corumbatai, São Paulo State, showed this character in an otherwise totally normal worker; b) the underdevelopment of the head, of significantly smaller proportions (microcephaly), and the shorter thorax and petiole; c) the overdeveloped gaster (physogastry) caused not only by longitudinally spreading as much as possible the telescoping rings of the succeeding segments, apparently the only feasible way for a Ponerine ant that has the terga I and II ankylosed with the corresponding sterna to form solid rings, but also by increasing the diameter of the gastric segments beyond the value normal for workers (Tergum I: 5.0 mm as compared with 4.0-4.1 mm; tergum II: 5.5 mm as compared with 4.4-4.6 mm). This swelling just could not have been brought about by the activation of

the ovaries of a tremendously reproducing queen because the solid rings would not permit it and, secondly, the reproductive rate of a *Dinoponera* living in very small colonies speaks against such an enlargement. Consequently, the specimen in question had this abnormal condition since the beginning of its adult stage. The puzzle was solved by remembering that microcephaly and physogastry are signs of *Mermis* parasitism in ants. A simple operation, by softening the insect in Ammonia and making a slit between two gastric segments showed the well-preserved parasite filling completely the enormously enlarged cavity of the gaster. Exit the ergatoid female and enter the mermithergate! I may add that from experiences carried out with living colonies of *D. gigantea* by my friend and colleague Prof. Domiciano Dias, of the University of Brasilia, appears the conclusion that the ants of this genus do not possess a special queen caste; the egg-laying function is taken over by the workers themselves.

Male. — This sex was first described by Santschi (1921: 85) upon two specimens from San Ignacio, Misiones, Argentina. The diagnosis contains an obvious mistake: not the second but the first funicular segment is about twice as broad as long. The male of Borgmeier's *australis bucki* agrees with this description with the exception of the shape of petiole in side-view, instead of having the summit behind the middle, has it at the middle, the anterior and posterior declivity being practically equal. I have, in addition, two specimens from Campinas, Goiás, Brasil, one totally black, the type of *australis nigricolor*, the other entirely amber-colored, and a third, equally amber-colored from Maracaju, Mato Grosso, Brasil. The difference between these individuals, each representing a different morph, is rather striking. They agree, on the other hand, in several outstanding characters by which they differ from *gigantea* and *quadriceps*, and which constitute additional prove that at least *australis* is a separate species. These characters are the following:

Head (Fig. 18) with smaller eyes, the maximum interocular width being greater than their diameter; with smaller ocelli not protruding above the posterior border of head when seen in full-face view; antennal scape very short, less than twice as long as broad; funiculi without standing hairs; petiole distinctly shorter although variable in outline (Fig. 17); pygidium with a very short spine, not projecting beyond the long cerci; hypopygium apically broadly truncate, the truncation either straight, or convex, or concave.

Distribution. *D. australis* is known from southeastern Bolivia, from the Brazilian States Mato Grosso, Goiás, Minas Gerais, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul, from Paraguay, from Misiones, Corrientes and Formosa in the Argentina.

Specimens examined: BOLIVIA, *Santa Cruz*: San José de Chiquitos, III-1954, C. Gans & F. Pereira, 4 workers; Peia, Ichilo, Buenavista, I-1950, A. Martinez, 1 worker; Nueva Moka, III-1956, A. Martinez, 2 workers. BRASIL, *Mato Grosso*: Chapada dos Guimarães, V-1959 and I-1960; C. Amann and XI-1963, M. Alvarenga & W. Bokermann, 7 workers, Xavantina, 28-XI-1949, W. Bokermann, 2 workers; Bodoquienua, II-1941, I. R. Dufaux, 1 worker; Maracaju, III-1937, Shannon & J. Lane, 1 male; Jardim, I-1962, R. Mueller, O.F.M., 1 worker; *Goiás*: Anápolis, XI-1935, M. Souza and 12-II-1958 and 18-III-1964, W. W. Kempf, 6 workers; Piranhas, 2-XI-1961, W. Bokermann, 1 worker; Goiânia, Campinas, 1935, R. Spitz, 1 male; same locality, 8-II-1936, R. Spitz, 6 workers and 1 mermithergate (types of *australis nigricolor*); same locality, 4-XI-1937 and 6-III-1936, S. Schwarzmaier, 38 workers; 5-V-1933, S. Schwarzmaier, 1 male (type of *australis nigricolor*); *Minas Gerais*: Campo Florido, 12-II-1964, H. M. Canter, 6 workers; Brilhante, 18-XI-1931, M. C. Pereira, 1 worker; *São Paulo*: loc., date and coll. unknown, M. P. 5377, 1 worker (Emery det., probably the type of *australis* s. str.); Boa Esperança do Sul, Fazenda Itaquerê, 28-XI-1963, K. Lenko, 1 worker; Corumbatai, 30-XII-1963, H. A. Britski, 3 workers; Agudos, V-1959, III-1960, C. Gilbert, 4 workers; Lençóis Paulista, 16-3-1962; W. W. Kempf, 3 workers; Itirapina, 27-II-1968, D. Dias, 3 workers; Botucatu; 1-IX-1969, Mantovan, 1 worker; Juquiá, XI-1929, J. Lane, 1 worker; *Paraná*: Palmas, XII-1928, F. Schroer, O.F.M., 1 worker; *Santa Catarina*: Seara, Nova Teutônia, no date, F. Plaumann, 4 workers; *Rio Grande do Sul*: Uruguaiana, M. P. 19.053, 1 worker; Palmeira das Missões, 27-I-1929, P. Buck, S.J., 2 workers, 1 male (types of *australis bucki*). PARAGUAY: Encarnación, M. P. 11.358, 1 worker. ARGENTINA, *Misiones*: loc. unknown, Steiger, C. Bruch, R. Mueller, O.F.M., 3 workers; Iguazu, X-1964, A. Martinez, 1 worker (WWK, MZUSP).

Discussion. — The differences that separate the *australis* worker from *lucida*, *mutica* and *quadriceps* have already been given on preceding pages. It suffices to add that the scape length as compared with the

head width, the length of hind tarsus I as compared with head length, the width of the petiole as compared with its length are characters that distinguish the present species from all the others in the worker caste. The differential characters for the male are contained in the diagnosis of this sex.

The examination of more than 100 workers, from 30 nest series and 27 different localities, representing practically the entire territory occupied by the species illustrates the intraspecific variation but did not bring to light usable characters that would allow for the distinction of geographical races. The only character that varies geographically is the sculpture of the gaster, which tends to become superficial in southeastern populations (Brasil: Rio Grande do Sul, western Santa Catarina and Paraná; Argentina: Misiones; Paraguay), leaving the integument quite shiny. Borgmeier's races *nigricolor* and *bucki* are indistinguishable in the worker caste, the difference given — the more or less convex dorsal surface of the petiolar node — is quite useless. Were it not for the discordant males, these forms would not escape synonymy. Santschi's var. *brevis* from Paraguay, according to the description, has the antennal scape as long as the head length, an unusual condition for an *australis* which has the scape always shorter than the head length and equal to, or even shorter than, the head width. I believe, this must be a mistake. The remaining characters stated in the diagnosis of var. *brevis* do not help to bring out its peculiarity. Inasmuch as it is based solely on workers, I relegate it into synonymy. If future studies based on much more copious material should succeed in establishing a southern race of *australis*, Santschi's name *brevis* will probably have preference over Borgmeier's *bucki*.

***Dinoponera australis bucki* Borgmeier**

Dinoponera australis bucki Borgmeier, 1937: 228, figs. 7, 9 (Worker, male: Brasil, Rio Grande do Sul: Palmeira das Missões).

Type material: 1 male and 2 workers, collected by Father Pio Buck, S.J., on 27-I-1929.

The workers are characterized by the smoother type of the integument, especially on gaster. Otherwise perfectly similar to the general *australis* pattern.

The male, as already said above, agrees with the description of the males from San Ignacio, Misiones, Argentina by Santschi (1921: 85) except for the shape of the petiole. It is remarkable by its bicolored condition: thorax, coxae, femora black; the rest ferruginous: head fuscous brown, lighter on vertex. Long erect hairs practically only on apical gastric sterna, genitalia. Summit of petiolar node at the middle of its length. Subgenital plate apically broadly truncate with rounded corners.

Dinoponera australis nigricolor Borgmeier

Dinoponera australis nigricolor Borgmeier, 1937: 228, figs. 5, 6, 8 (Worker, "female", male: Brasil, Goiás: Goiânia, Campinas).

Type material: 1 male, taken separately by J. S. Schwarzmaier, in the evening at light, on May 5, 1933, at Campinas, Goiânia, Goiás. The 6 workers and the «female» (= mermithergate, see above), were taken from a nest at Campinas, on February 6, 1936 by R. Spitz. Spitz had taken a lone morphologically discrepant male at light at the same locality in the previous year, of which Borgmeier did not have knowledge when describing his *nigricolor*. Since we do know now that there occur two morphs of males in the Campinas area, and since the male type of *nigricolor* is not of the same nest series as the workers, the association between the two is extremely doubtful. I propose to restrict the type to the male taken by Schwarzmaier in 1933, which becomes the lectotype.

Male (lectotype). Entirely black, except for funiculi and apical tarsi. Strongly pubescent. Standing hairs present on head, thorax, petiole and gastric sterna. Petiolar summit behind middle. Subgenital plate apically broadly truncate, slightly excised in the middle, lateral corners broadly rounded. Parameres (gonostyli) of genitalia distinctly broader than in *bucki*.

The other specimen, taken by Spitz at Campinas in 1935, is entirely amber-colored; head shown in Fig. 18, petiole in Fig. 17. Pubescence less woolly, standing hairs as in *nigricolor*. Parameres identical, but subgenital plate is more deeply excised at apex.

As illustrated by these males, the *australis*-complex of *Dinoponera* is still an unsolved problem. We need numbers of males from different nest series in order to ascertain the stability and variation of the characters. It remains to be seen if *australis* will fall into nicely distinguishable geographical races or even contains different yet closely related species. So far, the evidence at hand is not conclusive either way.

Key to the species for workers

1. Petiole relatively broad and short, width over length proportion above 0.80; antennal scape scarcely longer, usually distinctly shorter than maximum head width; hind tarsus I usually shorter, never longer than head length *australis* Emery
- Petiole longer and narrower, width over length proportion below 0.80; antennal scape notably longer than head width; hind tarsus I notably longer than head length 2

2. Sides of head, disc of pronotum, petiole and terga I and II of gaster smooth and shining, microsculpture either totally absent or at best superficial and obsolescent 3
- Sides of head, disc of pronotum, petiole and terga I and II of gaster reticulate-punctate and subopaque, microsculpture well-developed ... 5
3. Antero-inferior corner of pronotum dentate; discal portion of terga I and II of gaster without appressed pubescence ... *lucida* Emery
- Antero-inferior corner of pronotum obtusely angulate or rounded; appressed pubescence present on discal portions of terga I and II of gaster 4
4. Dorsum of head and thorax with dense, long, golden brown pubescence; gular surface of head without striae; disc of pronotum and terga I and II of gaster densely covered with piligerous punctulae *longipes* Emery
- Dorsum of head and thorax with drab-colored, shorter and less dense pubescence; striae on gular surface of head present; disc of pronotum and terga I and II of gaster without piligerous punctulae *mutica* Emery
5. Antero-inferior corner of pronotum dentate; gular surface of head very finely striate in front; pubescence on terga I and II of gaster dense *gigantea* (Perty)
- Antero-inferior corner of pronotum obtusely angulate; gular surface of head practically lacking striation; pubescence on terga I and II of gaster loosely scattered *quadriiceps* Santschi

Key to the species for males

1. Minimum interocular distance at least as great as maximum diameter of eyes; ocelli not protruding on vertex in full face-view (Fig. 18); antennal funiculi without standing hairs; pygidial spine very short .. *australis* Emery
- Minimum interocular distance always distinctly shorter than maximum diameter of eyes; ocelli greatly protruding on vertex (Figs. 9, 13); antennal funiculi with standing hairs (Figs. 8, 14); pygidial spine very long (Fig. 12) 2
2. Hypopygium apically deeply excised (Fig. 15); labrum bilobate; dorsum of gaster lacking standing hairs *quadriiceps* Santschi
- Hypopygium apically rounded (Fig. 11); labrum not excised on anterior border; standing hairs present on gastric dorsum ... *gigantea* (Perty)

References

- Bequaert, J. C., 1926a. The date of publication of the Hymenoptera and Diptera described in Duperrey's "Voyage de la Coquille". — Ent. Mitt. 15 (2): 186-195.
- 1926b. Part II. Medical and economic entomology (pp. 155-257, 9 figs.) in: Medical report of the Hamilton Rice seventh expedition to the Amazon, in conjunction with the Department of Tropical Medicine of Harvard University, 1924-1925. — Harvard University Press, Cambridge, XVI+313 pp.
- Borgmeier, T., 1937. Formigas novas ou pouco conhecidas da América do Sul e Central, principalmente do Brasil. — Arch. Inst. Biol. Veget. Rio de Janeiro, 3 (2): 217-255, 38 figs., 6 pls.
- Bruch, C., 1914. Catálogo sistemático de los formicidos argentinos. — Rev. Mus. La Plata, 19: 211-234.

- Emery, C., 1896. Formiciden gesammelt in Paraguay von Dr. J. Bohls. — Zool. Jahrb. Syst. 9: 625-638.
- 1901. Notes sur les sous-familles des Dorylines et Ponérines. — Ann. Soc. Ent. Belg. 45: 32-54.
- 1911a. Fragments myrmécologiques. I-V. — Ann. Soc. Ent. Belg. 55: 213-225, 2 figs.
- 1911b. Subfam. Ponerinae. — Gen. Insect. fasc. 118, 125 pp., 3 pls.
- Forel, A., 1904. Note sur les fourmis du Musée Zoologique de l'Académie Impériale des Sciences à St. Pétersbourg. — Ann. Mus. Zool. Acad. Imp. Sci. St. Pétersbourg, 8: 368-388 (1903).
- 1907. Formiciden aus dem naturhistorischen Museum in Hamburg. II. Teil. — Mitt. Naturhist. Mus. Hamburg, 24: 1-20.
- 1908. Catalogo systematico da coleção de formigas do Ceará. — Bol. Mus. Rocha, Fortaleza, 1: 61-69.
- 1909. Ameisen aus Guatemala usw., Paraguay und Argentinien. — Deutsch. Ent. Zeitschr. pp. 239-269.
- Gallardo, A., 1918. Las hormigas de la República Argentina. Subfamilia Ponerinas. — An. Mus. Nac. Hist. Nat. B. Aires, 30: 1-112, 23 figs.
- Guérin-Méneville, F. E., 1838. In: Duperrey: Voyage de la Coquille. Zool. II (2): 57-302.
- Jhering, H. von, 1894. Die Ameisen von Rio Grande do Sul. — Berl. Ent. Zeitschr. 39 (3): 321-447, 7 figs., 1 pl.
- Kempf, W. W., 1970. Levantamento das formigas da mata amazônica, nos arredores de Belém do Pará, Brasil. — Studia Ent. 13: 321-344.
- Kusnezov, N., 1953. Tendencias evolutivas de las hormigas en la parte austral de Sud America. — Fol. Univ. Cochabamba, 6 (6): 86-210, 55 figs.
- 1954. Phyletische Bedeutung der Maxillar- und Labialtaster der Ameisen. — Zool. Anz. 153 (1-2): 28-38, 1 table.
- 1956. Claves para la identificación de las hormigas de la fauna argentina. — Idia, agosto-setiembre, Min. Agric. Ganad. Argent. n. 104-105, pp. 1-56, 98 figs.
- 1957. Suedamerikanische Ameisengattungen (Ceraphachyinae. und Ponerinae). — Zool. Anz. 158 (9-10): 196-208, 24 figs.
- Luederwaldt, H., 1918. Notas myrmecologicas. — Rev. Mus. Paulista, 10: 29-64, 1 pl.
- 1926. Observações biológicas sobre formigas brasileiras, especialmente do Estado do São Paulo. — Rev. Mus. Paulista, 14: 185-304, 4 pls.
- Mann, W. M., 1916. The ants of Brazil. (The Stanford Expedition to Brazil, 1911). — Bull. Mus. Comp. Zool Harvard, 60 (11): 399-490, 7 pls.
- Mayr, G. L., 1862. Myrmecologische Studien. — Verh. zool.-bot. Ges. Wien, 12: 649-776, 1 pl.
- Perty, M., 1833. Delectus animalium articulorum quae in itinere per Brasiliam collegerunt Spix et Martius. — Muenchen, pp. 134-136 (1830-1834).
- Roger, J., 1861. Die *Ponera*-artigen Ameisen (Schluss). — Berl. Ent. Zeitschr. 5: 1-54.
- Roquette-Pinto, E., 1915. *Dinoponera grandis*. Memória de Livre Docência da Cadeira de História Natural. — Rio de Janeiro, 38 pp., 1 est.
- Santschi, F., 1912. Quelques fourmis de l'Amérique australe. — Rev. Suisse Zool. 20: 519-534, 4 figs.
- 1921. Ponerinae, Dorylinae et quelques autres formicides néotropiques. — Bull. Soc. Vaud. Sc. Nat. 54 (200): 81-103.

- 1928. Sur quelques nouvelles fourmis du Brésil. — *Deutsch. Ent. Zeitschr.* pp. 414-416, 1 fig.
- Smith, Fr., 1958. Catalogue of hymenopterous insects in the collection of the British Museum. Part. VI. Formicidae. — London, 216 pp., 14 pls.
- Wheeler, G. C. & Jeanette Wheeler, 1952. The ant larvae of the subfamily Ponerinae. — *Amer. Midl. Nat.* 48: 111-144, 604-672, 11 pls., 4 figs.
- 1964. The ant larvae of the subfamily Ponerinae: Supplement. — *Ann. Soc. Ent. Amer.* 57: 443-462, 19 figs.
- Wheeler, W. M., 1925. Neotropical ants in the collections of the Royal Museum of Stockholm. — *Ark. f. Zool.* 17A (8): 1-55.
- Zahl, P. A., 1959. Giant insects of the Amazon. — *Natl. Geogr. Mag.* 115: 632-669.

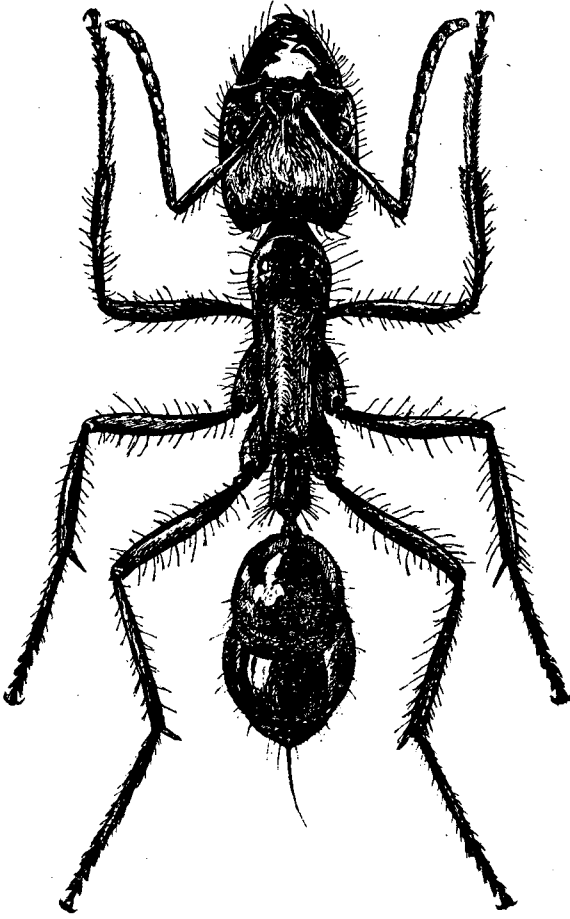
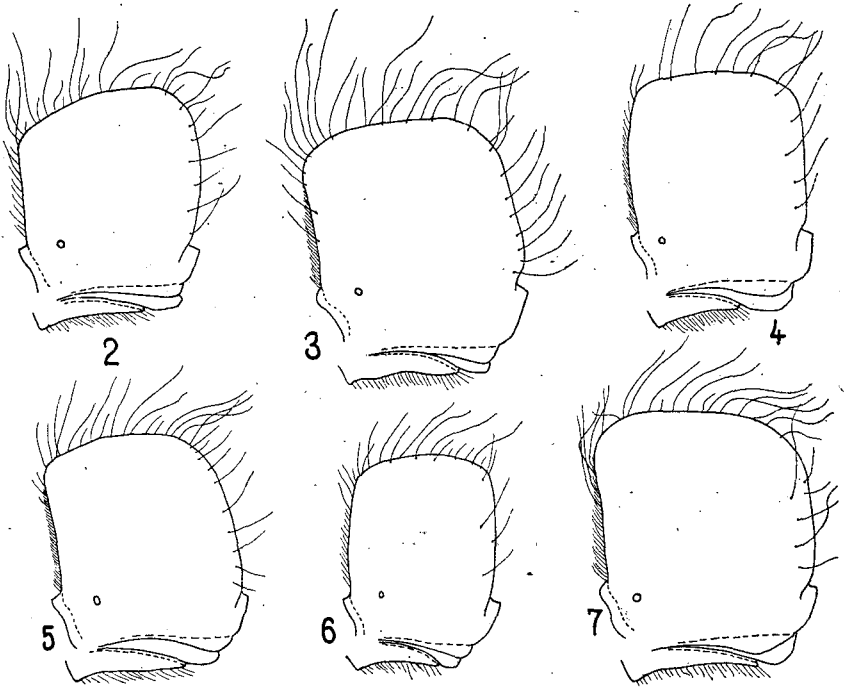
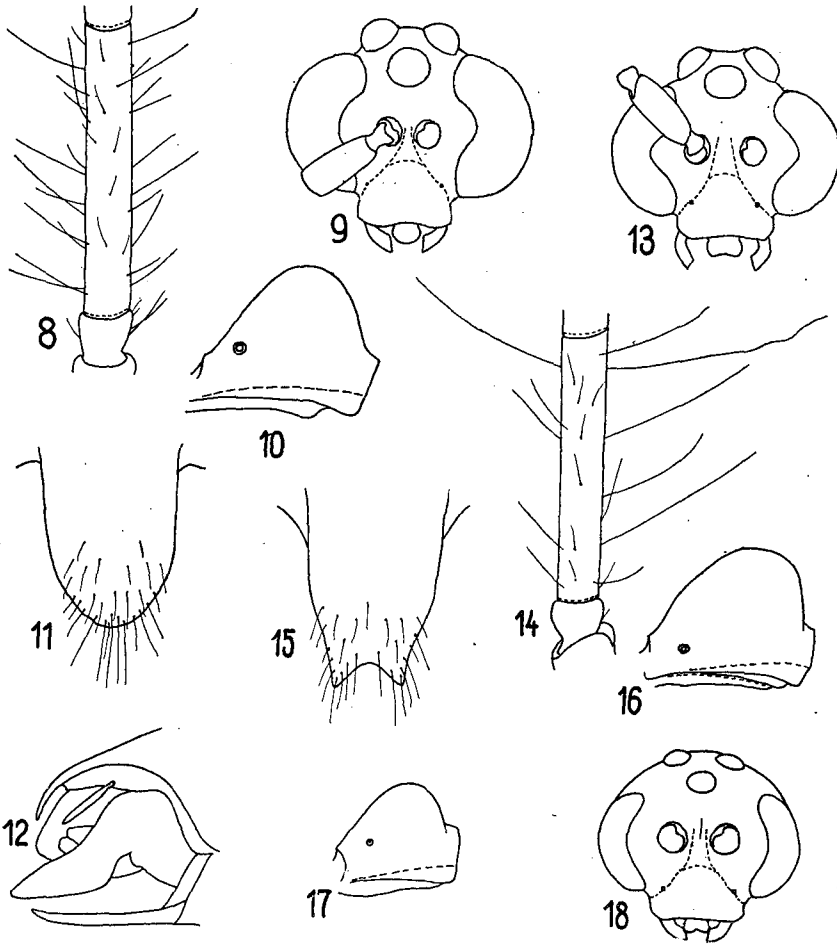


Fig. 1. *Dinoponera lucida* Emery, worker (specimen from Linhares, ES; R. Grantsau del.).

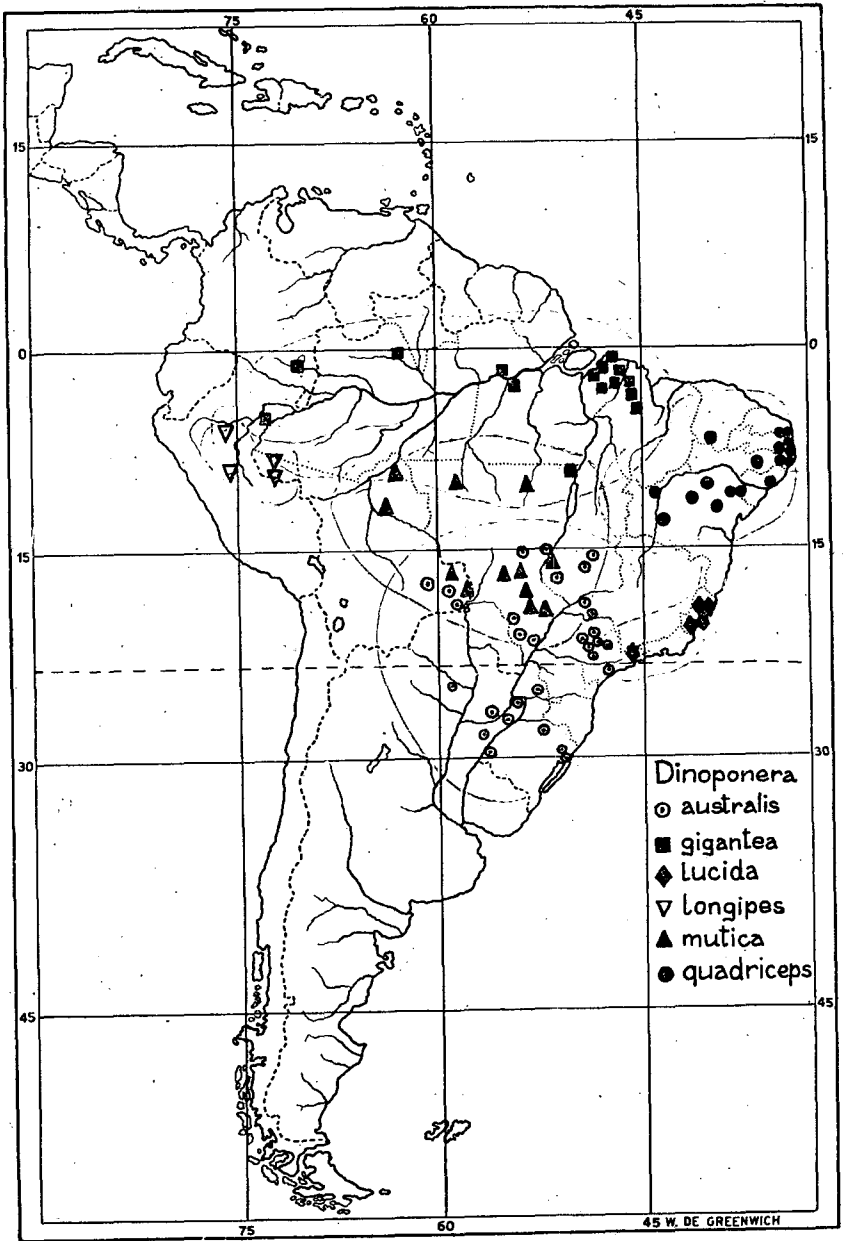


Dinoponera: petiole of worker in side-view.
 Fig. 2. *D. lucida* Em. (Vila Velha, ES). Fig. 3. *D. gigantea* (Perty) (Belém, PA).
 Fig. 4. *D. mutica* Em. (Príncipe da Beira, RD). Fig. 5. *D. quadriceps* Sant. (Natal,
 RN). Fig. 6. *D. australis* Em. (Campinas, GO). Fig. 7. *D. longipes* Em. (Peru:
 Montenegro). (Kempf del.).



Dinoponera Males

Figs. 8-12. *D. gigantea* (Perty): 8. First and second funicular segment of antennae (Belém, PA). 9. Head in full-face view (Belém, PA). 10. Petiole in side-view (Belém, PA). 11. Subgenital plate (Belém, PA). 12. Genitalia *in situ*, side-view (Belém, PA). Figs. 13-16. *D. quadriceps* Sant.: 13. Head in full-face view (Paulo Afonso, BA). 14. First and second funicular segment of antennae (S. Miguel, AL). 15. Subgenital plate (Vila Nova, BA). 16. Petiole in side-view (Vila Nova, BA). Figs. 17-18. *D. australis* Em: 17. Petiole in side-view (Campinas, GO). 18. Head in full-face view (Campinas, GO). (Kempf del.).

Distribution of *Dinoponera* in South America.