

A Review of the Wasp Genus *Tachytes* Panzer, 1806 of Madagascar (Hymenoptera: Crabronidae)

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Two new species from Madagascar, *Tachytes galeatus* and *Tachytes melanogaster*, are described. An original key to all eight species of Madagascan *Tachytes* is provided, including several previously unobserved characters. The identity of *Tachytes oviventris* de Saussure, 1891 is discussed and its generic position remains uncertain.

The first person to study *Tachytes* of Madagascar was de Saussure who described *T. argyropis* in 1887 and *T. oviventris* in 1891 (the identity of the latter remains a mystery). Subsequently Arnold (1945) included *Tachytes* in his revision of the Malagasy sphecid wasps. He treated all Madagascan species of this genus known to him (including five new ones), and provided a key for their determination. The key allows recognition of the vast majority of specimens except for some females of *T. rufomarginatus*. Arnold, who saw only two, thought that all specimens of that species can be recognized by a partly ferruginous gaster, although the gaster is all black in some females.

The Malagasy *Tachytes* were studied by Dana A. Jensen during her stay at the California Academy of Sciences as a student of the Summer Systematic Institute program in 2009. She correctly recognized the two new species, discovered some new characters, and developed a preliminary key for species discrimination. The present paper completes the study, including a number of previously unobserved recognition characters.

MORPHOLOGICAL TERMINOLOGY.— I follow Bohart and Menke (1976) in their morphological terminology, except I use gonocoxite for their gonostyle. Tergum and sternum refer to gastral tergum and sternum.

ORIGIN OF MATERIAL.— I collected a number of specimens during a 1994 expedition to Madagascar. Since 1998 California Academy of Sciences has been conducting an intense insect collecting program there, providing a total of 472 Madagascan *Tachytes* to our collection, representing all the species treated by Arnold (1945) and two new ones (as compared with 95 specimens seen by Arnold). Some specimens were also borrowed from the Muséum National d'Histoire Naturelle, Paris, France, and Musée d'Histoire Naturelle, Genève, Switzerland.

INSTITUTIONAL ABBREVIATIONS.— The following are the abbreviations by which institutions housing the Madagascan *Tachytes* are designated below (the name of the contact person is given in parentheses):

CAS: California Academy of Sciences, San Francisco, California, USA.

MHNG: Musée d'Histoire Naturelle, Genève, Switzerland (Bernard Landry).

MNHN: Muséum National d'Histoire Naturelle, Paris, France (Claire Villemant).

Key to species

1. Galea longer than scape, not separated from stipes by sulcus (Figs. 1, 2); first article of labial palpus approximately as long as scape (Fig. 3) 2
— Galea shorter than scape, separated from stipes by transverse sulcus; first article of labial palpus less than half as long as scape 3
2. Maxillary palpus with five articles, labial palpus with three articles (Fig. 3). Female: tergum IV with silvery, apical fascia, as on preceding terga (fascia visible at least from certain angles). Male: midbasitarsus with ventral projection at about two thirds of length, looking emarginate in profile (Fig. 4); setae of hindfemoral venter shorter than half of maximum hindfemoral width (Fig. 5) *argyropis* de Saussure, p. 00
— Maxillary palpus with six articles, labial palpus with four articles. Female: tergum IV without silvery, apical fascia, contrasting with preceding terga. Male: midbasitarsus without ventral projection, not emarginate in profile; setae of hindfemoral venter longer than half of maximum hindfemoral width (Fig. 19). *galeatus* sp. nov., p. 00
3. Tergal setae all dark (Fig. 27), those of terga II-IV all oriented posteriorly. *melanogaster* sp. nov., p. 00
— Terga with silvery apical fasciae (visible at least from certain angles), setae of terga II-IV divergent posteriorly from midline on apical depressions 4
4. Females 5
— Males. 9
5. Sternum II finely punctate throughout, apical depressions of sterna III-V finely punctate; postocellar punctures large, without micropunctures (Fig. 30); galea slightly longer than wide *picticornis* Arnold, p. 00
— Apical depression of sternum II impunctate mesally (only next to posterior margin in some *T. rufomarginatus*), apical depressions of sterna III-V impunctate; postocellar punctures either partially or uniformly minute; galea varying 6
6. Postocellar punctures uniformly fine (Fig. 21); antenna all black; mid- and hindfemora all ferruginous *indifferens* Arnold, p. 00
— Postocellar punctures of two distinct sizes; antenna partly ferruginous (only scape in many *T. rufomarginatus*); femora all or largely black 7
7. Scutum anterolaterally with ill-defined (almost absent) patch of silvery appressed pilosity (Fig. 33); gaster in most specimens partly reddish (especially apical segments) *rufomarginatus* Arnold, p. 00
— Scutum anterolaterally with well-defined patch of silvery appressed pilosity, best seen in dorsal view (Fig. 14); gaster black 8
8. Clypeal lamella not emarginate mesally (Fig. 12); galea slightly longer than wide (Fig. 13); admedian scutal line not concealed by vestiture; scutal punctures not excessively fine (Fig. 15) *flavocinereus* Arnold, p. 00
— Clypeal lamella in most specimens emarginate mesally, inconspicuously so in some; galea shorter than wide; admedian scutal line concealed by vestiture; scutal punctures excessively fine (Fig. 7). *copiosus* Arnold, p. 00
9. Flagellum all black 10
— Flagellum partly brown or reddish brown ventrally (at least slightly so). 11

10. Postocellar punctures of two distinct sizes; scutal punctures larger (Fig. 8); sterna without fringes of preapical setae, only with a few stiff preapical setae *copiosus* Arnold, p. 00
 — Postocellar punctures uniformly fine (Fig. 21); scutal punctures minute (Fig. 22); sterna III-VI with preapical fringes of loose setae (Fig. 23). *indifferens* Arnold, p. 00
11. Scape all or predominantly brown ferruginous (black dorsally in some specimens); gaster partly ferruginous (especially apical segments); galea shorter than wide
 *rufomarginatus* Arnold, p. 00
 — Scape all black or (*T. flavocinereus*) translucent ferruginous apicoventrally; gaster black; galea slightly longer than wide. 12
12. Scape all black; apical two or three flagellomeres all black at least ventrally, contrasting with more basal ones, which are ferruginous; volsella shorter than penis valve and than gonocoxite (Fig. 31) *picticornis* Arnold, p. 00
 — Scape translucent ferruginous apicoventrally; apical three flagellomeres same color as more basal ones; volsella about as long as penis valve and as gonocoxite (Fig. 16)
 *flavocinereus* Arnold, p. 00

REVIEW OF SPECIES

All the Malagasy *Tachytes* recognized here share the following: propodeal side microscopically areolate and with fine, sparse punctures, not ridged; scape, vertex, and tergum I (at least posterolaterally) with erect setae; apical hindfemoral lobe narrow, parallel-sided or nearly so; female clypeus with bevel not differentiated, two or three inconspicuous teeth on each side of the clypeal lamella, and apical depression of tergum V all punctate and setose (very narrowly impunctate and asetose adjacent to posterior margin in some species).

All species of *Tachytes* occurring in Madagascar are endemics of that island.

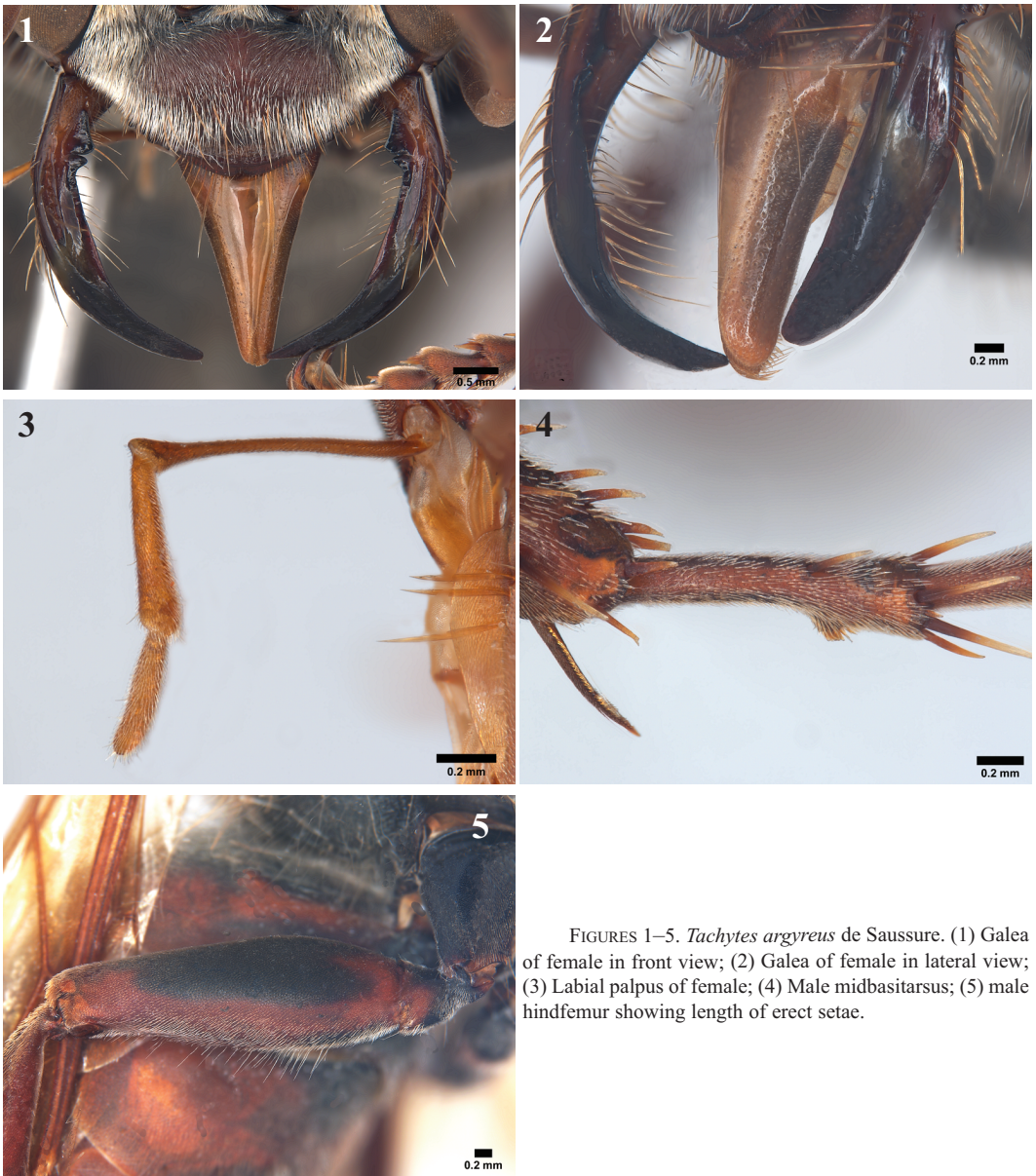
Tachytes argyropis de Saussure

Figures 1–6.

Tachytes argyropis de Saussure, 1887:18, ♀. Lectotype: ♀, Madagascar: no specific locality (MHNG), **present designation**, examined. — de Saussure, 1890:pl. 10, fig. 8a and pl. 11, figs. 8 and 8m), 1892:476 (Madagascar, redescription); Dalla Torre, 1897:687 (in catalog of world Hymenoptera); Kohl, 1909:372 (Madagascar: Imerina, Toamasina, Toliara); von Schulthess in Friederichs, 1918a:47 (Madagascar: Antananarivo); Arnold, 1945:108 (in revision of *Tachytes* of Madagascar); Leclercq, 1960:99 (Madagascar: locality records), 1961:111 (Madagascar: locality records); R. Bohart and Menke, 1976:263 (in checklist of world Sphecidae); Leclercq, 1990:118 (Madagascar: locality records); Pulawski, 2003:798 (in checklist of Malagasy Sphecidae); Madl, 2014:986 (in catalog of Ampulicidae, Crabronidae, and Sphecidae of Madagascar, with synonymy and locality records).

LECTOTYPE SELECTION.— Owing to the kindness of Monsieur Bernard Landry, I was able to examine two female and two male syntypes of this species, bearing the original name labels by de Saussure, and preserved in the MHNG. The labels read “Madagascar, Sikora”, with no specific locality (Franz Sikora was a renowned collector). I have selected a female as the lectotype of this species. It agrees perfectly well with the current interpretation of this species.

COMPARISON WITH SIMILAR SPECIES.— *Tachytes argyropis* shares the reduced number of palpomeres (palpal formula 5 + 3), and closely resembles, three species from continental Africa: *T. admirabilis* Turner, 1916, *T. danae* Arnold, 1923, and *T. marshalli* Turner, 1912 (that were placed by Turner, 1917 in his subgenus *Calotachytes*). All three species have an elongate galea (Figs. 1, 2), longer than the scape, markedly elongate basal segment of the labial palpus (Fig. 3), and the



FIGURES 1–5. *Tachytes argyreus* de Saussure. (1) Galea of female in front view; (2) Galea of female in lateral view; (3) Labial palpus of female; (4) Male midbasitarsus; (5) male hindfemur showing length of erect setae.

male midbasitarsus, looking emarginate in profile (Fig. 4). *Tachytes argyropis* differs from *T. admirabilis* and *T. danae* in having well-defined silvery fasciae on the preapical depressions of terga I–IV (the setae on the remaining parts of terga appear dark from most angles, but silvery from some angles). In the other two species the gastral setae are uniformly golden; also, in *T. admirabilis* the forewing is markedly infumate (yellowish in *T. argyropis*). *T. argyropis* differs from *T. marshalli* by a number of characters: the wing membrane is yellowish, darkened along the apical margin, in the female the postocellar area is longer than wide and the setae of tergum V are the same color as on the preceding terga, and in the male the basal emargination on the venter of midbasitarsus is about twice as long as the nonemarginate apical part, which is less prominent, and

the venter of flagellomeres II and III has no erect setae (in *T. marshalli* the wing membrane is conspicuously infumate, in the female the postocellar area is about as wide as long and the setae of tergum V are black, clearly contrasting with the setae on the preceding terga; in the male the basal emargination on the venter of midbasitarsus is about as long as the nonemarginate apical part, which is more prominent, and the venter of flagellomeres II and III has silvery, erect setae whose length is up to about 0.5 of midocellar diameter).

The elongate galea (longer than the scape) and the markedly elongate basal segment of the labial palpus are also found in *T. galeatus* and in the Saharan species *T. basilicus* Guérin Méneville and its Afrotropical relatives. The palpal formula of these species, however, is 6 + 4.

RECORDS.— (Fig. 6; M: from Madl, 2014).—

Antananarivo Province: Ambatoloana (M), Ampefy at Lac Kavitaha (M), Analavory (M), Antananarivo (1 ♀, 2 ♂, CAS), Imerina (Kohl, 1909). **Antsirana** (= Diego Suarez) **Province:** Montagne des Français at 12°19'22"S 49°20'17"E (1 ♀, CAS), Parc National Montagne d'Ambre at 12°30'52"S 49°10'53"E (1 ♀, CAS). **Fianarantsoa Province:** Ambalavao (M), Ambositra (M), Ampitavananima Forest 50 km S Farafangana at 23°7.79'S 47°43.02'E (15 ♀, 9 ♂, CAS), Fianarantsoa (Leclercq, 1990), Ifaty: coastal dunes at 23°10.78'S 43°37.01'E (1 ♂, CAS), Ihosy (M), 40 road km W Ihosy at 22°28'S 45°49'E (13 ♀, CAS), 22 km SW Ilakaka at 22°46.75'S 45°1.50'E (16 ♀, 12 ♂, CAS), Isalo National Park at 22°36'S 45°10'E (1 ♀, 2 ♂, CAS), near Isalo National Park at 22°37.60'S 45°21.49'E (3 ♀, 13 ♂, CAS), Italaviana 35 km SSE Antsirabe at 20°10.40'S 47°05.16'E (1 ♀, 5 ♂, CAS), Mananjary (M), Ranohira (M), Ranomafana National Park at 21°15'05"S 47°24'43"E (6 ♀, 3 ♂, CAS), 21°15.99'S 47°25.21'E (1 ♀, CAS), and 21.25537°S 47.45515°E (1 ♀, CAS), 7 km W Sendrisoa at 21°57.96'S 46°55.95'E (3 ♀, 1 ♂, CAS). **Toamasina Province:** Andasibe National Park (1 ♀, CAS), Fampanambo (M), Toamasina (Kohl, 1909), 20 road km SW Toamasina at 18°15'S 49°16'E (1 ♀, 1 ♂, CAS). **Toliara Province:** Ambohimahavelona village 33 km NE Toliara at 23°26.45'S 43°53.98'E (1 ♀, 1 ♂, CAS), Ambovombe (M), Andohahela National Park at 24°56.21'S 46°37.60'E (2 ♀, CAS), Antanimora (Arnold, 1945), Behara (Arnold, 1945), Bekily (Arnold, 1945), Betroka (M), Beza Mahafaly Réserve at 23°41.19'S 44°35.46'E (1 ♀, CAS), Cap Sainte Marie Special Reserve at 25°35.26'S 45°09.78'E (1 ♀, CAS), Lake Ranobe at 23°02.468'S 43°36.607'E (1 ♀, CAS), Réserve Privée Berenty at 25°00.40'S 46°18.20'E (2 ♀, 3 ♂, CAS), Sakaraha (M), Taolagnaro (Leclercq, 1960, as Fort Dauphin), Toliara (Kohl, 1909), Tsiamanampetsotsa National Park at 23°59'32"S 43°52'50"E (2 ♂, CAS). **Locality unknown** ([F.] Sikora collector): 2 ♀, 1 ♂, CAS, determined by F. Kohl; 2 ♀, 2 ♂, Muséum d'Histoire Naturelle, Genève, Switzerland, determined by H. de Saussure, including female lectotype of *T. argyropis*.

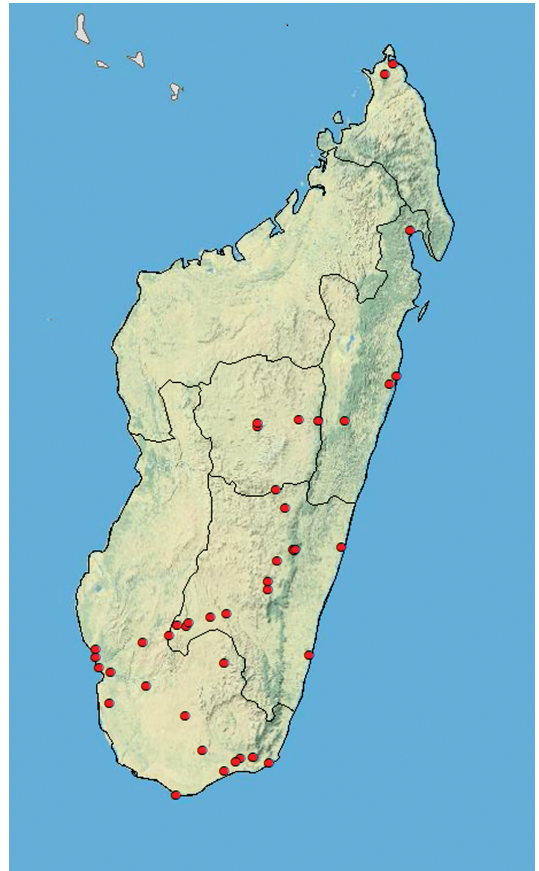


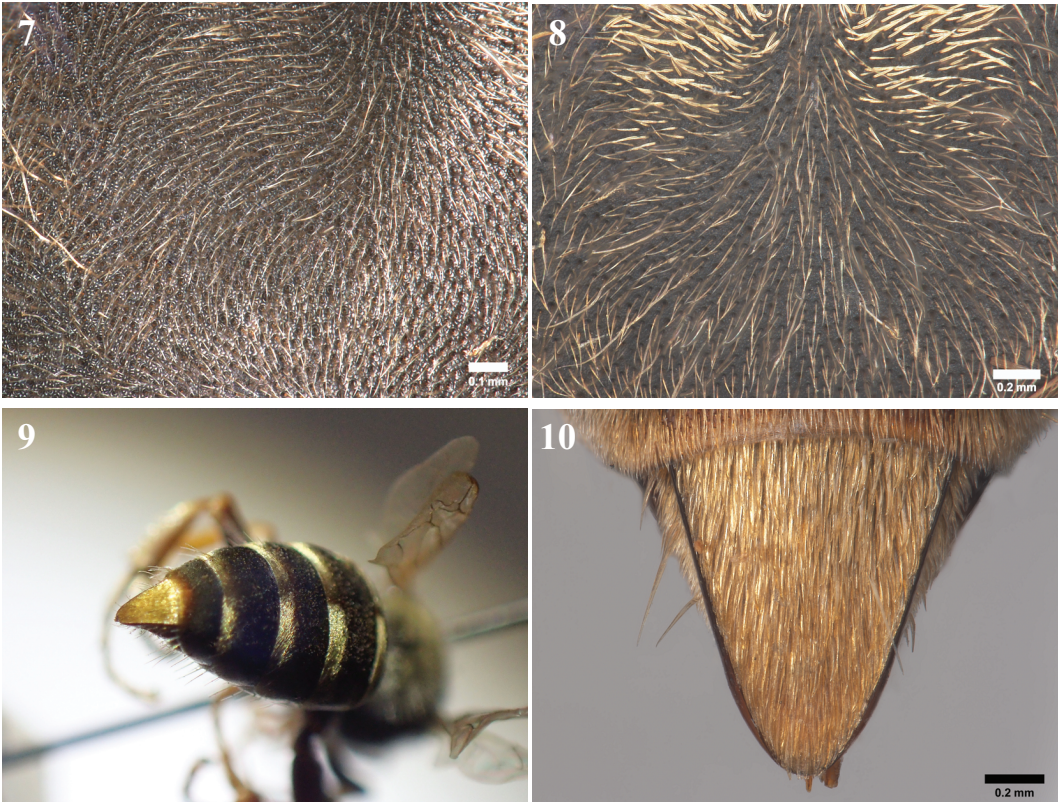
FIGURE 6. Collecting localities of *Tachytes argyreus* de Saussure.

***Tachytes copiosus* Arnold**

Figures 7–11.

Tachytes copiosus Arnold, 1945:111, ♀, ♂ (as *copiosa*, incorrect original termination). Syntypes: Madagascar: Behara (MNHN). – R. Bohart and Menke, 1976:264 (in checklist of world Sphecidae); Pulawski, 2003:798 (in checklist of Malagasy Sphecidae); Madl, 2014:986 (in catalog of Ampulicidae, Crabronidae, and Sphecidae of Madagascar, with synonymy and locality records).

RECOGNITION.— The female of *Tachytes copiosus* lacks unique diagnostic features, therefore it can be recognized only by a long suite of characters that eliminate the other species. So, its galea is shorter than wide and the gaster is all black, with silvery, apical fasciae of setae on the terga.



FIGURES 7–10. *Tachytes copiosus* Arnold. (7). Scutal punctures of female; (8) Scutal punctures of male; (9) Gaster of syntype female showing color of pygidial plate, image generated by Madame Claire Villemant (Muséum National d’Histoire Naturelle, Paris, France); (10) Pygidial plate of female with silvery setae.

Unlike *T. picticornis*, the apical depressions of its sterna II–V are impunctate (rather than punctate). Unlike *T. indifferens* the postocellar punctures are of two distinct sizes (the dense minute punctures are interspersed with larger, sparser punctures) rather than being uniformly small, the flagellum is partly ferruginous (rather than all black), and the femora are largely black (whereas the mid- and hindfemora are ferruginous in *T. indifferens*). It differs from *T. rufomarginatus* in having a well-defined patch of appressed setae anterolaterally on the scutum (rather than the patch ill defined, almost absent), and in having the setae on the hindfemoral venter sparser and less dense. Finally, unlike *T. flavocinereus*, the clypeal lamella is emarginate mesally, although only inconspicuously so in some specimens (rather than non-emarginate), the admedian scutal line is concealed by the

vestiture (rather than not concealed), and the scutal punctures are excessively fine (rather than not excessively fine).

The male shares an all black flagellum with *T. indifferens*, from which it differs in having the postocellar punctures of two distinct sizes, the scutal punctures larger (Fig. 8), and the sterna without fringes of preapical setae. In *T. indifferens*, the postocellar punctures are uniformly small, the scutal punctures are minute (Fig. 22), and sterna III-VI have preapical fringes of loose setae (Fig. 23).

COLOR VARIATION.— Arnold described the setae of the female pygidial plate as being bright golden, which I confirmed from an image of one of the syntypes kindly sent by Madame Claire Villemant (Fig. 9). The specimens in the California Academy of Sciences collection, however, have the setae of the pygidial plate either pure silver or silver with a golden tinge (Fig. 10). As all other characters agree perfectly well with the original description, I conclude that the color of these setae vary among individuals.

RECORDS (Fig. 11).— **Antsiranana** (= Diego Suarez) **Province**: Parc National Montagne d’Ambre at 12°30’52’’S 49°10’53’’E (1 ♂, CAS), 1 km W Sakalava Beach at 12°15’59’’S 49°23’42’’E (1 ♂, CAS), 3 km W Sakalava Beach at 12°17.17’S 49°22.00’E (2 ♂, CAS). **Fianarantsoa Province**: near Isalo National Park at 22°37.60’S 45°21.49’E (1 ♀, CAS). **Majunga Province**: Ambovomamy Belambo at 15°27.07’S 47°36.80’E (2 ♀, 1 ♂, CAS). **Toliara Province**: Behara (Arnold, 1945), Bereboka village at 19°58.65’S 44°39.92’E (1 ♀, CAS), Beza Mahafaly Reserve at 23°41.19’S 44°35.46’E (1 ♀, CAS), Forêt de Kirindy at 20°02’42’’S 44°39’44’’E (1 ♀, CAS), Parc National Zombitsy at 22°53’10’’S 44°41’30’’E (1 ♀, CAS).

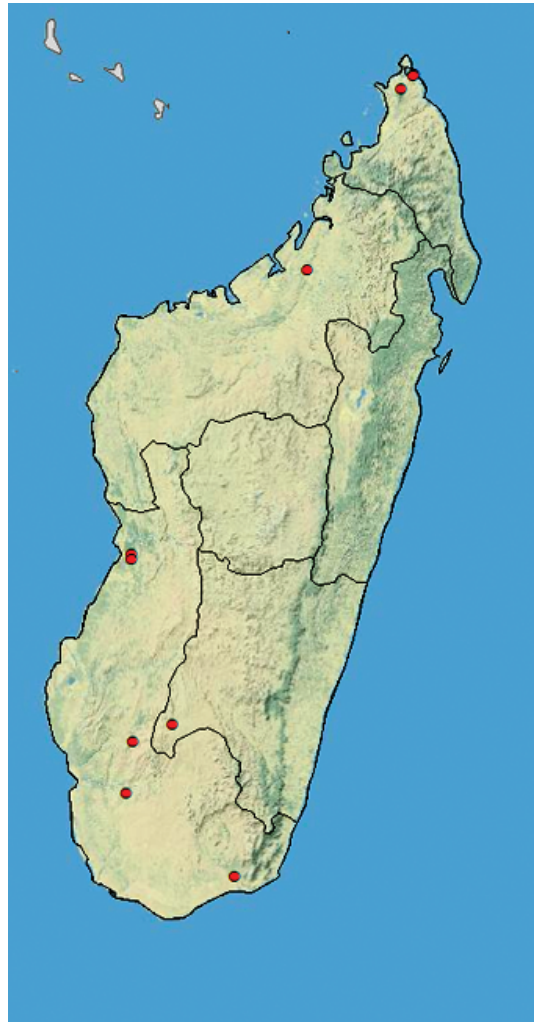


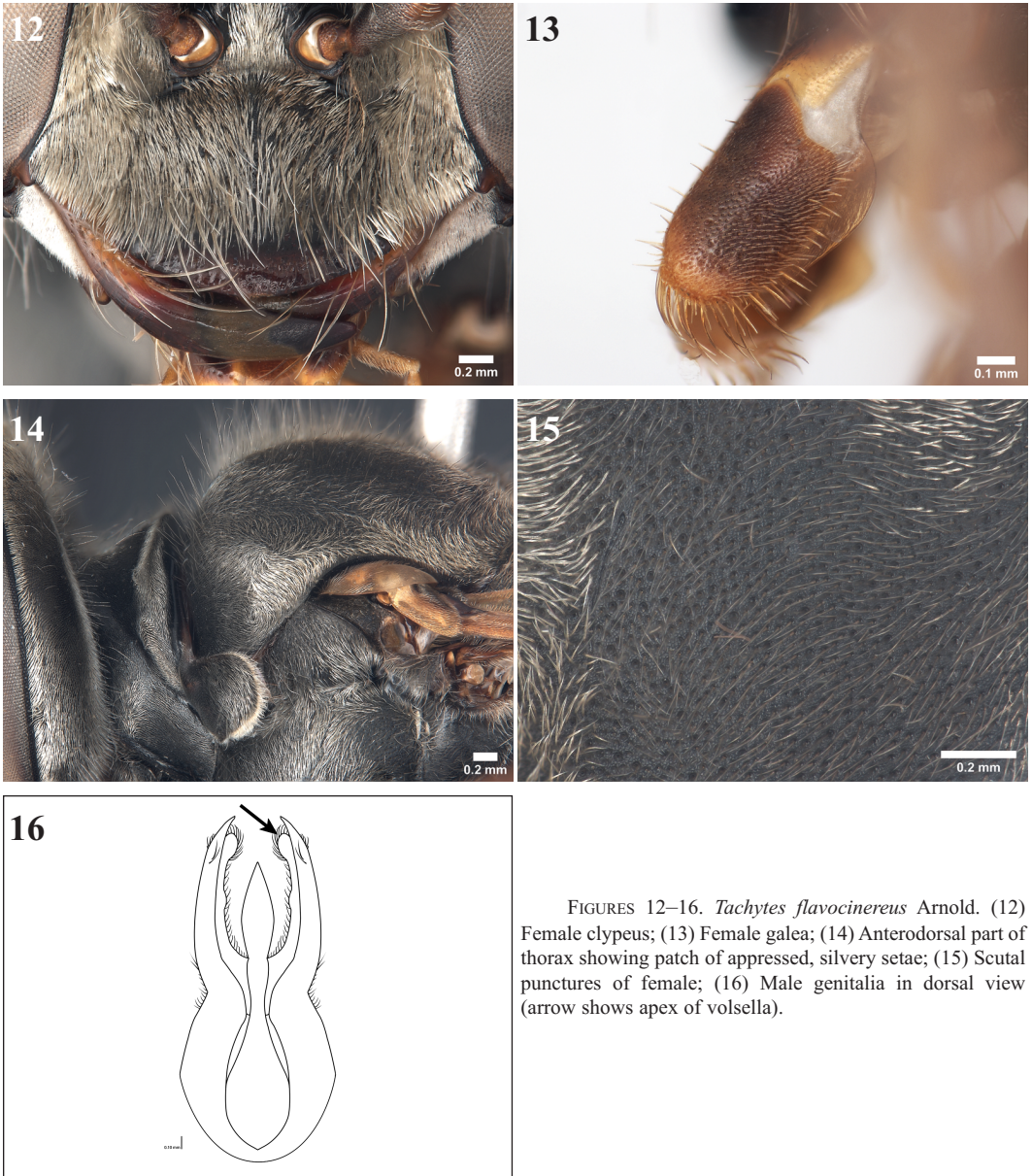
FIGURE 11. Collecting localities of *Tachytes copiosus* Arnold.

Tachytes flavocinereus Arnold

Figures 12–17.

Tachytes flavocinereus Arnold, 1945:112, ♀, ♂ (as *flavocinerea*, incorrect original termination). Lectotype: ♂, Madagascar: Bekily (MNHN), **present designation**. – Leclercq, 1961:112 (Madagascar: locality records). – As *Tachytes flavocinereus*: R. Bohart and Menke, 1976:265 (in checklist of world Sphecidae); Leclercq, 1990:118 (Madagascar: locality records); Pulawski, 2003:798 (in checklist of Malagasy Sphecidae); Madl, 2014:986 (in catalog of Ampulicidae, Crabronidae, and Sphecidae of Madagascar, with synonymy and locality records).

LECTOTYPE SELECTION.— Madame Claire Villemant of the MNHN kindly sent me, in 2009,



FIGURES 12–16. *Tachytes flavocinereus* Arnold. (12) Female clypeus; (13) Female galea; (14) Anterodorsal part of thorax showing patch of appressed, silvery setae; (15) Scutal punctures of female; (16) Male genitalia in dorsal view (arrow shows apex of volsella).

a pair of Arnold's syntypes of *Tachytes flavocinereus*, both collected at Bekily, Madagascar. I have selected the male as the lectotype, and the female as a paralectotype.

RECOGNITION.— Among the species with the galea shorter than the scape, the female of *T. flavocinereus* can be recognized by the non-emarginate clypeal lamella (Fig. 12). Subsidiary recognition features are: apical depressions of terga I–IV with silvery setal fasciae; galea slightly longer than wide (Fig. 13); admedian scutal line not concealed by vestiture; scutal punctures not excessively fine (Fig. 15); setae of the pygidial plate cupreous. In the other such species, the clypeal lamella is emarginate mesally, although the emargination is inconspicuous in some

T. copiosus and some *T. melanogaster*. The latter differs in having the gastral setae all black, the former in having the galea slightly shorter than wide, admedian scutal line concealed by vestiture, scutal punctures excessively fine, and in some specimens the setae of the pygidial plate silvery.

In the male, the flagellum is partly brown or reddish brown ventrally, although only slightly so in some specimens. *Tachytes picticornis* and *T. rufomarginatus* are similar, but *T. flavocinereus* can be recognized by the following combination: scape translucent ferruginous apicoventrally, galea slightly longer than wide, apical three flagellomeres same color as more basal ones, gaster all black, and volsella about as long as penis valve and as gonocoxite (Fig. 16). In *T. picticornis*, the scape is all black, and the two or three apical flagellomeres are all black (at least ventrally), contrasting with the more basal flagellomeres which are ferruginous, and the volsella is shorter than the penis valve and the gonocoxite (Fig. 31). In *T. rufomarginatus*, the scape is all or predominantly brown ferruginous, the galea is shorter than wide, and the gaster is partly ferruginous, especially on the apical segments.

RECORDS (Fig. 17; M: from Madl, 2014)..—

Antsiranana (= Diego Suarez) Province: Forêt d'Ampondrabe at 12°58'12"S 49°42'00"E (1 ♀, CAS), Montagne des Français at 12°19'22"S 49°20'17"E (1 ♂, CAS), Parc National de Marojejy at 14°26'12"S 49°46'30"E (1 ♀, CAS), Parc National Montagne d'Ambre at 12°31'13"S 49°10'45"E (1 ♀, CAS). **Fianarantsoa Province:** Ihosy (M), Ranomafana National Park at 21°15.99'S 47°25.21'E (1 ♂, CAS). **Majunga Province:** Ambovomamy Belambo at 15°27.07'S 47°36.80'E (2 ♂, CAS), Forêt d'Analamanitra at 16°8'S 45°42'E (1 ♀, 2 ♂, CAS), Forêt de Tsimembo at 19°01'17"S 44°26'26"E (1 ♀, CAS), Namoroka at 16°28.4'S 45°23.48'E (2 ♀, CAS), Parc National d'Ankarafantsika at 16°13'41"S 46°08'37"E (1 ♂, CAS). **Toamasina Province:** Fampanambo (Leclercq, 1990), Ivondro (Arnold, 1945, M), Mahavelona (M), Soanierana-Ivongo (M). **Toliara Province:** Antanimora (Arnold, 1945), Bekily (1 ♀, 1 ♂ lectotype of *Tachytes flavocinereus*, MNHN), Bereboka at 19°58.65'S 44°39.92'E (1 ♀, CAS), Beza Mahafaly Reserve at 23°41.19'S 44°35.46'E (1 ♀, 1 ♂, CAS), Parc National d'Andohahela at 24°56.21'S 46°37.60'E (1 ♀, 1 ♂, CAS).

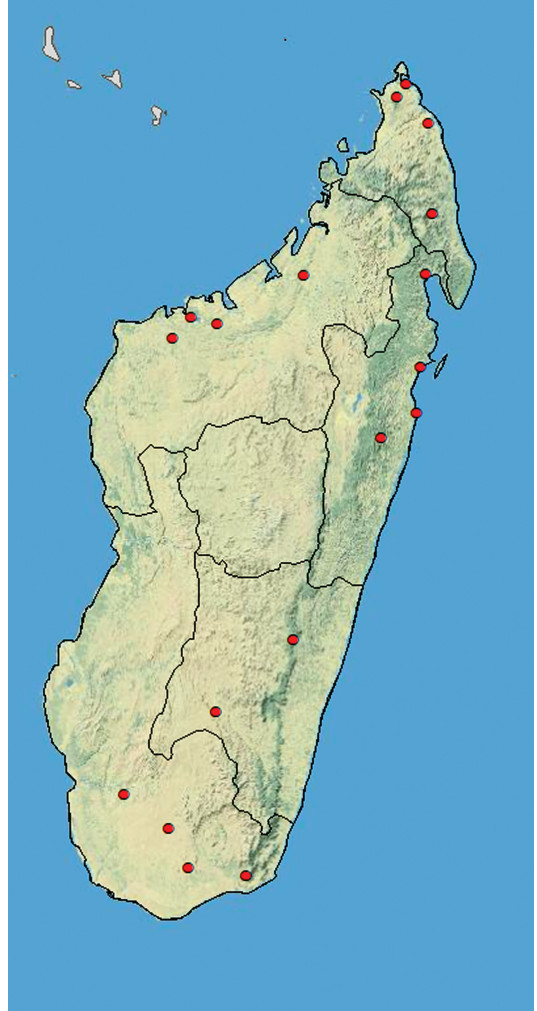


FIGURE 17. Collecting localities of *Tachytes flavocinereus* Arnold.

***Tachytes galeatus* Pulawski, species nova**

Figures 18–20.

NAME DERIVATION.— *Galeatus* is an adjective derived from *galea*, which is unusually long in this species.

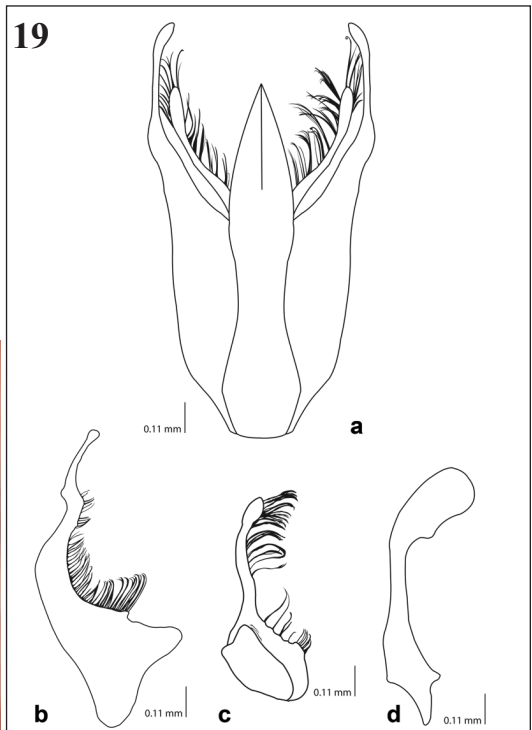
RECOGNITION.— Like *T. argyropis* and unlike all other Madagascan *Tachytes*, the galea of this species is longer than the scape, as in Figs. 1 and 2 (rather than shorter) and the first article of the labial palpus is about as long as the scape, as in Fig. 3 (rather than markedly shorter). Unlike *T. argyropis*, the palpal formula of *T. galeatus* is 6+4 (rather than 5+3); see the key for other differences.

Tachytes galeatus resembles several continental African species in having an elongate galea and the first article of the labial palpus and in lacking the golden setae arranged in a checkered pattern on the gastral terga (these setae are present in *T. basilicus* Guérin-Ménéville and its relatives). It differs from all these species in having the gaster dark reddish or at least with dark reddish zones rather than all black.

DESCRIPTION.— Head round in frontal view. Gena in dorsal view slightly narrower than in *T. panzeri* (Dufour). Galea $1.5 \times$ as long as scape. First article of labial palpus about as long as scape.

Appressed silvery pilosity concealing integument on pronotal collar, sparse and not concealing integument on remaining thorax and propodeum (scutum anterolaterally without conspicuous appressed pilosity). Setae of postocellar area as long as $0.5\text{--}0.6 \times$ scape, those on scutum $0.4 \times$ scape in female, $0.5 \times$ in male; sternum II without erect setae in female, in male with erect setae posteromedially (setal length about $2.0 \times$ midocellar diameter).

Head, thorax and propodeum black; male mandible yellowish reddish in basal half or only mesally; scape dark ferruginous except black dorsally. Gaster dark reddish except tergum I black basally, terga I–IV in some males only with dark reddish preapical zones. Female femora all black or forefemur largely brown; male femora partly to largely brown; female foretibia brown, midtibia brown or black, hindtibia black; male tibiae ferruginous to brown (hindtibia the darkest); tarsi dark to



FIGURES 18–19. *Tachytes galeatus* sp. nov. (18) Male hindfemur showing length of erect setae; (19) Male genitalia: a – genitalia in dorsal view, b – right gonocoxite in lateral view; c – volsella, d – penis valve.

partly ferruginous in female, ferruginous in male. Pilosity of frons and clypeus silvery.

♀.— Minimum interocular distance equal to $0.30\text{--}0.32 \times$ clypeal width and to $1.2\text{--}1.4 \times$ of dorsal length of flagellomere I; the latter $1.9\text{--}2.1 \times$ apical width. Postocellar punctures of two distinct sizes: relatively large (averaging more than one diameter apart) and minute (averaging about one diameter apart). Sternum II minutely, closely punctate except apical depression impunctate. Forebasitarsus with six rake spines.

♂.— Minimum interocular distance equal to $0.30 \times$ clypeal width and to $1.3 \times$ of dorsal length of flagellomere I; the latter $1.8\text{--}2.2 \times$ apical width. Postocellar punctures of uneven size, approximately one diameter apart. Genitalia: Fig. 19.

RECORDS (Fig. 20).— Holotype: ♀, Majunga Province: Ambovomamy Belambo at $15^{\circ}27.07'S$ $47^{\circ}36.80'E$, 22-27 Jan 2007, R. Harin 'Hala, M. Irwin, and F.D. Parker (CAS).

Paratypes: **Antsiranana** (= Diego Suarez) **Province**: Forêt d' Orangéa at $15^{\circ}15'32''S$ $49^{\circ}22'29''E$, 22-28 Feb 2001, B. Fisher, Ch. Griswold et al. (1 ♂, CAS). **Fianarantsoa Province**: Isalo National Park at $22^{\circ}36'S$ $45^{\circ}10'E$, 18-19 Mar 1994, W.J. Pulawski (1 ♂, CAS). **Majunga Province**: same locality and collectors as holotype: 4-14 Jan 2007 (1 ♂, CAS), 22-27 Jan 2007 (1 ♀, CAS), 11-20 Dec 2007 (1 ♀, CAS). **Toliara**: Zombitsy National Park at $22^{\circ}50.43'S$ $44^{\circ}43.87'E$, 13-20 Mar 2002, R. Harin 'Hala (1 ♀, CAS).

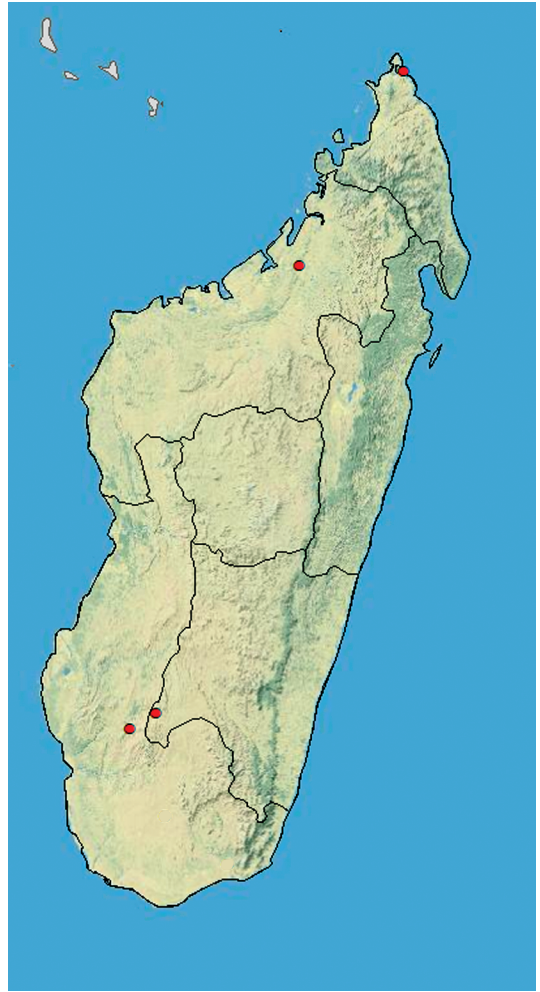


FIGURE 20. Collecting localities of *Tachytes galeatus* sp. nov.

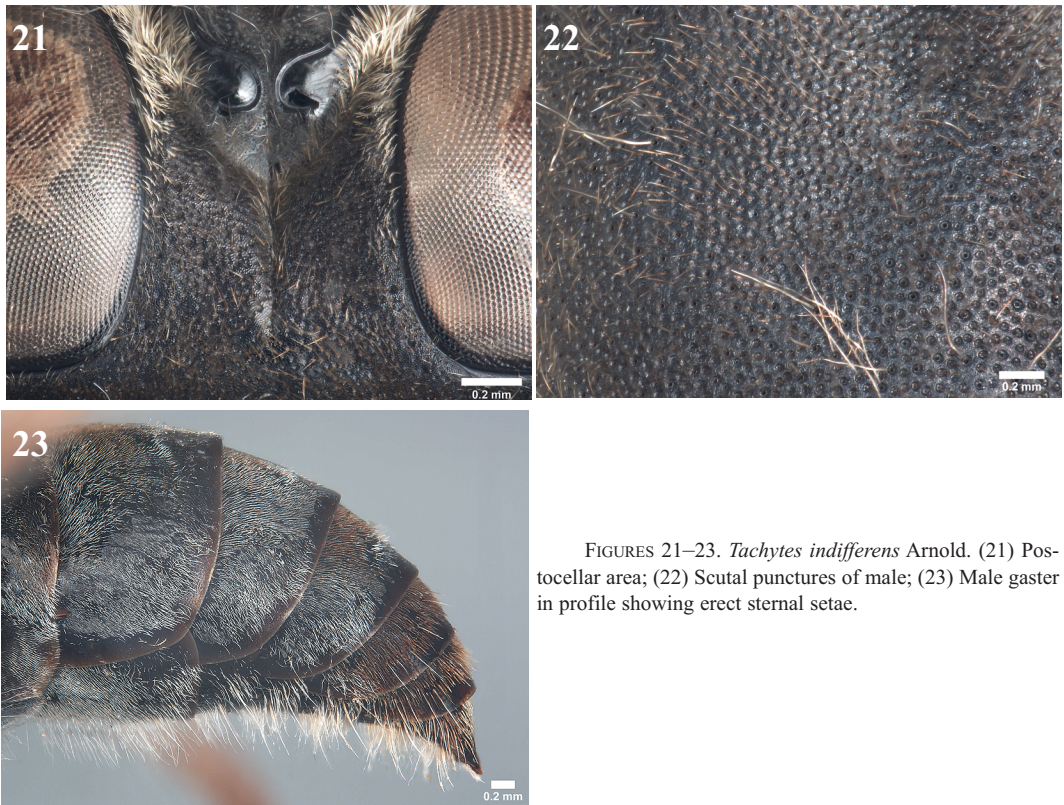
Tachytes indifferens Arnold

Figures 21–24.

Tachytes indifferens Arnold, 1945:110, ♀, ♂. Syntypes: Madagascar: Behara, Bekily (MNHN). – Leclercq, 1960:99 (Madagascar: locality records), 1961:111 (Madagascar: locality records); R. Bohart and Menke, 1976:265 (in checklist of world Sphecidae); Leclercq, 1990:118 (Madagascar: locality records); Madl, 1997:820 (Madagascar: Nosy Boraha Island), 821 (in checklist of Nosy Boraha Sphecidae); Pulawski, 2003:798 (in checklist of Malagasy Sphecidae); Madl, 2014:986 (in catalog of Ampulicidae, Crabronidae, and Sphecidae of Madagascar, with synonymy and locality records).

RECOGNITION.— The female of *T. indifferens* is characterized by the uniform, minute punctures of the postocellar area, all black antenna, and ferruginous mid- and hind femora and all tibiae. In all other species the postocellar punctures are of two distinct sizes (the small punctures are absent in *T. picticornis*), and the femora (except some *T. argyropis*) are all or largely black.

The male is unique among its Madagascan congeners in having preapical fringes of loose setae on sterna III–VI (Fig. 23); it can also be recognized by the all black antenna combined with the uni-



FIGURES 21–23. *Tachytes indifferens* Arnold. (21) Postocellar area; (22) Scutal punctures of male; (23) Male gaster in profile showing erect sternal setae.

form, minute postocellar punctures. It differs from *T. copiosus* by much smaller scutal punctures (Fig. 22).

RECORDS (Fig. 24).—**Antsiranana** (= Diego Suarez) **Province**: Forêt d'Orangéa at 12°15'32"S 49°22'29"E (1 ♂, CAS), 7 km N Joffreville at 12°20'S 49°15'E (1 ♀, CAS), Parc National Montagne d'Ambre at 12°30'52"S 49°10'53"E (4 ♀, 5 ♂, CAS), 12°31'13"S 49°10'45"E (1 ♀, 1 ♂, CAS), and 12°31'S 49°11'E (1 ♀, CAS), 1 km W Sakalava Beach at 12°15'59"S 49°23'42"E (2 ♀, 2 ♂, CAS), 3 km W Sakalava Beach at 12°17'10"S 49°22'00"E (2 ♀, 1 ♂, CAS). **Fianarantsoa Province**: Ambinany 7 km W Manombo (1 ♀, CAS), Forêt d'Ampitavananima at 23°7.79'S 47°43.02'E (4 ♀, CAS), Ihosy (Leclercq, 1990), Isalo National Park at 22°36'S 45°10'E (4 ♀, 14 ♂, CAS), near Isalo National Park at 22°37.60'S 45°21.49'E (3 ♂, CAS), 2 km SW Manakara at 22.168°S 48.00°E (1 ♀, 1 ♂, CAS). **Majunga Province**: Ambato-Boena (Madl, 2014), Amborovy 8 km NE Majunga at 15°40'S 46°20'E (3 ♂, CAS), Ambovomamy Belambo at 15°27.07'S 47°36.80'E (16 ♀, 6 ♂, CAS), 10 km E Majunga at 15°43'S 46°25'E (1 ♀, 5 ♂, CAS). **Toamasina Province**: Island of Nosy Boraha (Madl, 2014), Mahavelona (Madl, 2014), near entrance to Parc National d'Andasibe at 18°55'58"S 48°24'47"E (1 ♀, CAS), Toamasina at 18°07'S 49°24'E (1 ♂, CAS). **Toliara Province**: 22 km E Ampanihy at 24°41'S 44°46'E (1 ♂, CAS), Behara (Arnold, 1945), Bekily (Arnold, 1945), 2 km N Betioky at 23°21'S 44°20'E (2 ♂, CAS), Beza Mahfaly Reserve at 23°41.19'S 44°35.46'E (1 ♀, 1 ♂, CAS), Parc National d'Andohahela at 24°56.21'S 46°37.60'E (2 ♀, CAS), Réserve Privée Berenty at 24°57'25"S 46°16'17"E (1 ♀, CAS), 25°00'S 46°18'E (12 ♂, CAS), 25°00'40"S 46°18'20"E (5 ♀, CAS), 38 km E Sakaraha at 22°46'S 44°51'E (3 ♂, CAS), Taolagnaro (Leclercq, 1960, 1990, as Fort Dauphin), Toliara (Leclercq, 1990, as Tuléar), 10 km NE Toliara at 23°18'S 43°45'E (13 ♂, CAS), and 12 km SE Toliara at 23°25'S 43°45'E (2 ♀, 21 ♂, CAS).

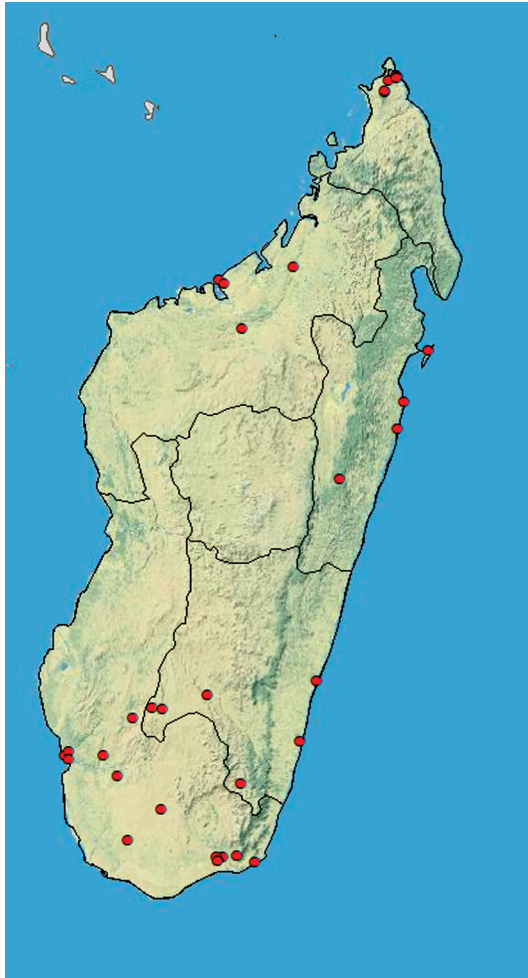


FIGURE 24. Collecting localities of *Tachytes indifferens* Arnold.

***Tachytes melanogaster* Pulawski, species nova**

Figures 26–29.

NAME DERIVATION.— *Melanogaster* is derived from two Greek words: *μελανός* (black, dark) and *γαστήρ* (gaster); with reference to the presence of black setae only on this species terga I–V.

RECOGNITION.— Only the female of this species is known. Unlike all other Madagascan species, and like *T. nigropilosellus* (Cameron) and *T. nudiventris* Turner from the continental Africa, *T. melanogaster* has the setae of terga I–V all black (Fig. 27) and directed posteriorly (rather than all golden or silvery on apical depression and diverging posteriorly on the apical depressions of at least terga IV and V). Unlike these two species, the female of *T. melanogaster* has five rather than six rake spines on the forebasitarsus and the setae of the pygidial plate (Fig. 28) cupreous (rather than black). The postocellar punctures in *T. melanogaster* are mainly large and sparse, intermixed with smaller and denser punctures (Fig. 26), whereas in *T. nudiventris* the fine punctures are absent and only the larger, sparse punctures are present (Fig. 25); also, the wing veins are light

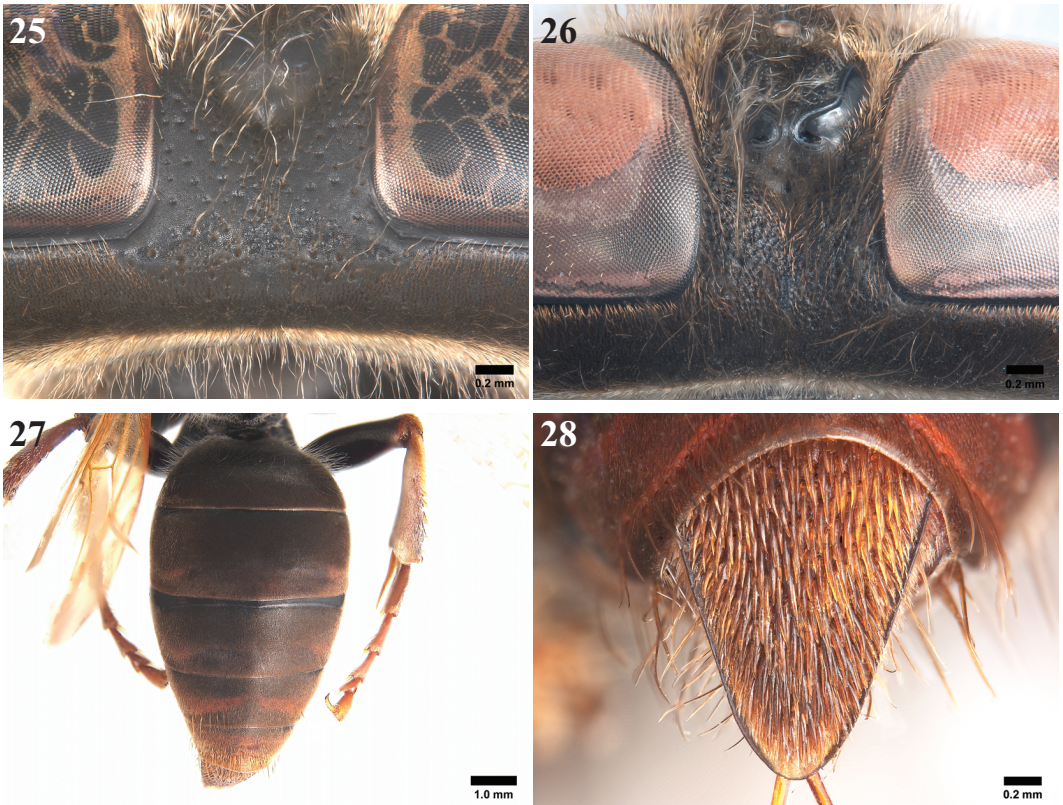


FIGURE 25. *Tachytes nudiventris* Turner. Postocellar area of female.

FIGURES 26-28. *Tachytes melanogaster* sp. nov. (26) Postocellar area of female; (27) Female gaster in dorsal view; (28) Pygidial plate of female showing color of setae.

brown in *T. melanogaster*, but the costal and subcostal veins are black in *T. nudiventris*. *T. nigropilosellus* differs conspicuously in having the erect setae of the head, thorax, and propodeum black (rather than silvery), the wings deep black with violet shimmer (rather than nearly hyaline, with yellow tinge), and by its much larger size (the female length is 23-30 mm, while 14.5-15.0 mm in *T. melanogaster*).

DESCRIPTION.—♀. Head nearly round in front view; minimum interocular distance equal to 0.32-0.34 of the clypeal width and to 1.4 × of dorsal length of flagellomere I; the latter 2.3-2.4 × apical width. Postocellar punctures mainly large, sparse, intermixed with smaller and denser punctures (Fig. 26). Gena narrow in dorsal view, narrower than in *T. panzeri*. Sternum II minutely, closely punctate throughout except narrowly impunctate apicomeresally in one specimen. Forebasitarsus with five rake spines.

Pronotal collar posteriorly with appressed silvery setae, remaining thorax and propodeum without such setae. Setae of postocellar area about as long as 0.5 × scape; scutum anterolaterally without conspicuous appressed pilosity; scutal setae about as long as 0.4 × scape; sternum II anterolaterally with sparse, inconspicuous erect setae whose length is up to about 2 × midocellar width; longest setae of hindfemoral venter equal to about 0.4 × hindfemur greatest width. Setae of terga I-V all black and directed posteriorly; setae of pygidial plate cupreous (Fig. 28).

Head, thorax, and gaster all black; scape ferruginous (except partly or all black dorsally), fla-

gellum black. Femora all black or forefemur ferruginous in apicoventral half; foretibia brown or ferruginous, midtibia brown ferruginous, hindtibia brown; tarsi varying from brown to ferruginous.

♂.— Unknown.

GEOGRAPHIC DISTRIBUTION.— Known only from higher elevations (1020–1130 m above sea level) of Ranomafana National Park, Madagascar.

RECORDS (Fig. 29).— All specimens were collected in Ranomafana National Park, Fianarantsoa Province.

Holotype: ♀, Belle Vue at Talatakely at 21°15.99'S 47°25.21'E, alt. 1020 m, 14–21 Jan 2002, M. Irwin and R. Harin 'Hala (CAS).

Paratypes: Radio tower at forest edge at 21°15.05'S 47°24.43'E, alt. 1130 m, 23 Aug–7 Sept 2006 and 1–11 Nov 2006, M. Irwin and R. Harin 'Hala (2 ♀, CAS); same data as holotype except 22–28 Nov 2001 and R. Harin 'Hala alone (1 ♀, CAS); Vohiparara at 21°13.57'S 47°22.19'E, alt. 1110 m, 22–28 Nov 2001, R. Harin 'Hala (1 ♀, CAS).

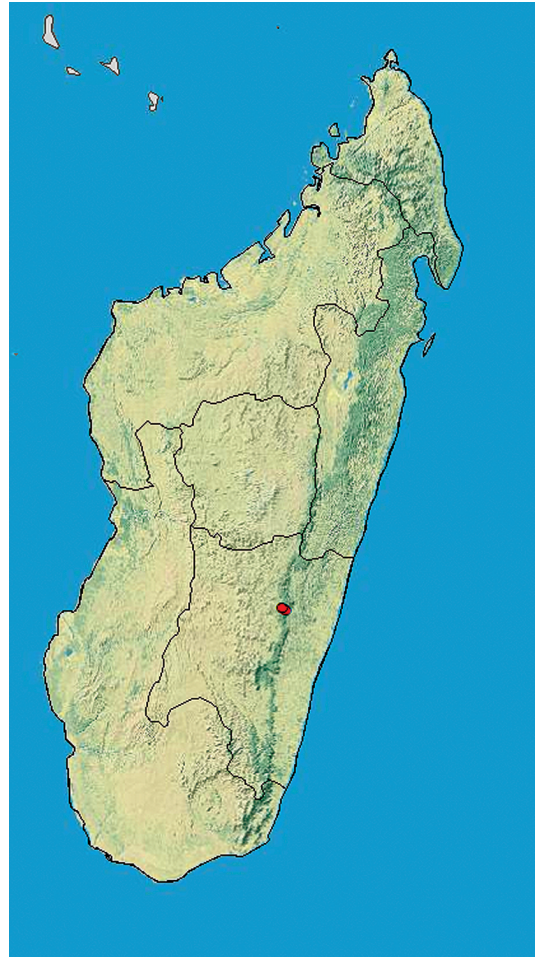


FIGURE 29. Collecting localities of *Tachytes melanogaster* sp. nov.

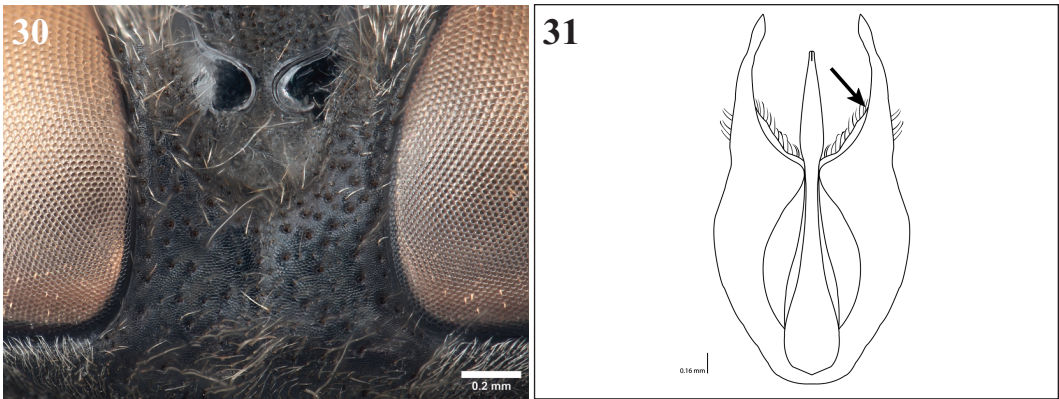
Tachytes picticornis Arnold

Figures 30–32.

Tachytes picticornis Arnold, 1945:111, ♀, ♂. Lectotype: ♂, Madagascar: Bekily (MNHN), **present designation.** — R. Bohart and Menke, 1976:266 (in checklist of world Sphecidae); Leclercq, 1990:118 (Madagascar: locality records); Pulawski, 2003:798 (in checklist of Malagasy Sphecidae); Madl, 2014:987 (in catalog of Ampulicidae, Crabronidae, and Sphecidae of Madagascar, with synonymy and locality records).

LECTOTYPE SELECTION.— Through the kindness of Madame Claire Villemant of the MNHN, I received for examination in 2009 a pair of Arnold's syntypes of *Tachytes picticornis*, both collected at Bekily, Madagascar. I have selected the male as the lectotype, and the female as a paralectotype.

RECOGNITION.— Like most *Tachytes melanogaster*, the female of *T. picticornis* has the apical depressions of sterna II–V finely punctate. Also, it has the postocellar punctures large, without micropunctures there (Fig. 30). In the other species the depression of sternum II is impunctate mesally (only next to posterior margin in some *T. rufomarginatus*), the depressions of sterna III–V



FIGURES 30-31. *Tachytes picticornis* Arnold. (30) Postocellar area of female; (31) Male genitalia in dorsal view (arrow shows apex of volsella).

are impunctate, and the postocellar punctures are either of two distinct sizes or uniformly minute. The male can be recognized by the following color combination: scape black, apical two or three flagellomeres black at least ventrally and contrasting with the middle flagellomeres which are ferruginous. In addition, the volsella is shorter than the penis valve or the gonocoxite (Fig. 31).

RECORDS (Fig. 32).— **Antsiranana** (= Diego Suarez) **Province**: Parc National Montagne d'Ambré at 12°30'52''S 49°10'53''E (3 ♂, CAS) and 12°31'13''S 49°10'45''E (2 ♂, CAS), Réserve Spéciale d'Ankarana at 12°55'S 49°3'E (4 ♀, CAS), Sakalava Beach at 12°15'46''S 49°23'42''E (1 ♂, CAS), 1 km W Sakalava Beach at 12°15'59''S 49°23'42''E (1 ♂, CAS). **Fianarantsoa Province**: Forêt d'Ampitavananima at 23°7.79'S 47°43.02'E (3 ♀, CAS), 22 km SW Ilakaka at 22°46.75'S 45°1.50'E (14 ♀, 11 ♂, CAS), Isalo National Park at 22°36'S 45°10'E (1 ♂, CAS), near Isalo National Park at 22°37.60'S 45°21.49'E (3 ♀, 1 ♂, CAS), 7 km W Sendrisoa at 21°57.96'S 46°55.95'E (2 ♀, 1 ♂, CAS). **Majunga Province**: Ambovomamy Belambo at 15°27.07'S 47°36.80'E (3 ♀, 4 ♂, CAS), Forêt d'Analamanitra at 16°8'S 45°42'E (3 ♂, CAS). **Toliara Province**: Antanimora (Arnold, 1945), Bekily (1 ♀, 1 ♂ lectotype of *Tachytes picticornis*, MNHN), Bereboka village at 19°58.65'S 44°39.92'E (1 ♂, CAS), Beza Mahafaly Reserve at 23°41.19'S 44°35.46'E (4 ♂, CAS), Forêt de Mite at 23°31'27''S 44°7'17''E (1 ♀, CAS), Parc National d'Andohahela at 24°56.21'S 46°37.60'E (2 ♀, 2 ♂, CAS), Réserve Privée Berenty at 25°00'40''S 46°18'20''E (1 ♀, 3 ♂, CAS).

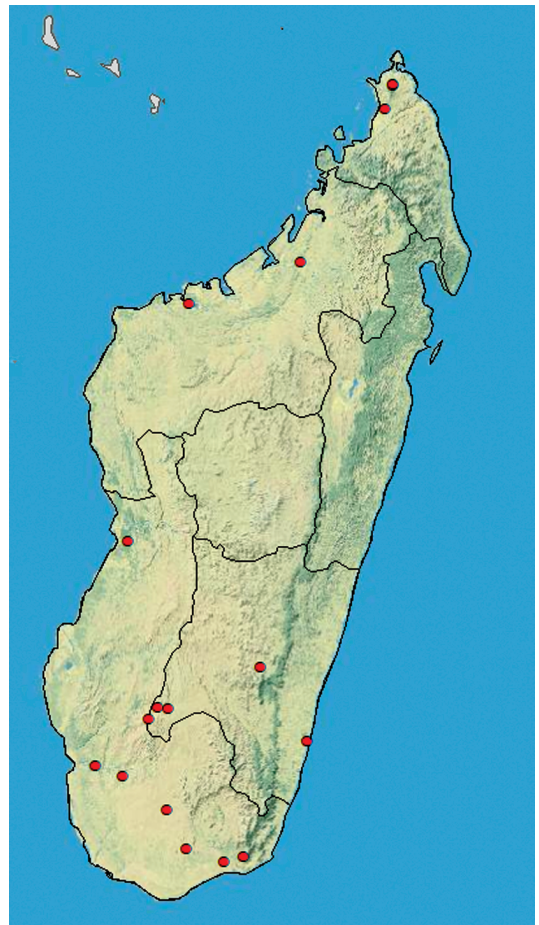


FIGURE 32. Collecting localities of *Tachytes picticornis* Arnold.

***Tachytes rufomarginatus* Arnold**

Figures 33–34.

Tachytes rufomarginatus Arnold, 1945:109, ♀, ♂ (as *rufomarginata*, incorrect original termination). Syntypes: Madagascar: Bekily (MNHN). – As *Tachytes rufomarginatus*: R. Bohart and Menke, 1976:266 (in checklist of world Sphecidae); Nilsson, Jonsson, Rason, and Randrianjohany, 1986:412 (Madagascar: Toamasina: 4 km S Mahavelona, as Foulpointe, as *rufomarginata*); Pulawski, 2003:798 (in checklist of Malagasy Sphecidae); Madl, 2014:987 (in catalog of Ampulicidae, Crabronidae, and Sphecidae of Madagascar, with synonymy and locality records).

RECOGNITION.— The galea of *T. rufomarginatus* is slightly shorter than wide and terga I-III (I-IV in some specimens) are silvery fasciate apically. The female differs from similar species (*T. copiosus*, *T. flavocinereus*, *T. indifferens*, and *T. picticornis*) in having an ill-defined (almost absent) patch of silvery, appressed setae anterolaterally on the scutum (Fig. 33); the patch is well defined in the other species (e.g., Fig. 14). The males and most females differ from them by a partly reddish gaster, especially the apical segments. In the four other species, the gaster is all black. Subsidiary recognition features of *T. rufomarginatus* are: the scape all or predominantly ferruginous, and in the male a partly reddish brown flagellum.

RECORDS (Fig. 34).— **Antsiranana** (= Diego Suarez) **Province**: Montagne des Français at 12°18'8"S 49°38'51"E (1 ♀, CAS), Sakalava Beach at 12°15'46"S 49°23'51"E (1 ♀, CAS), 3 km W Sakalava Beach at 12°17.17'S 49°22.00'E (1 ♂, CAS). **Fianarantsoa Province**: Forêt d'Ampitananima at 23°7.79'S 47°43.02'E (1 ♀, CAS), near Isalo National Park at 22°37.60'S 45°21.49'E (3 ♀, 13 ♂, CAS), Réserve Spéciale Manombo at 23°01.31'S 47°43.20'E (2 ♀, 1 ♂, CAS). **Majunga Province**: Ambovomamy Belambo at 15°27.07'S 47°36.80'E (1 ♀, CAS), Forêt d'Analamanitra at 16°8'S 45°42'E (2 ♀, CAS). **Toamasina Province**: Forêt d'Analava Mandrisy at 16°29'08"S



Figure 33. *Tachytes rufomarginatus* Arnold. Anterodorsal part of thorax showing ill-defined patch of appressed, silvery setae.



FIGURE 34. Collecting localities of *Tachytes rufmarginatus* Arnold.

49°50'49"E (1 ♀, CAS), 4 km S Mahavelona (Nilsson, Jonsson, Rason, and Randrianjohany, 1986, as Foulpointe). **Toliara Province:** Bekily (Arnold, 1945), Parc National d'Andohahela at 24°56.21'S 46.37.60'E (3 ♀, 2 ♂, CAS).

Unrecognizable Species

Tachytes oviventris de Saussure

Tachytes oviventris de Saussure, 1891:260, ♀. Holotype or syntypes: ♀, Madagascar: no specific locality (originally A. von Schulthess collection, now destroyed). – de Saussure, 1892:478 (Madagascar, redescription); Dalla Torre, 1897:693 (in catalog of world Hymenoptera); Arnold, 1945:109 (unrecognizable species); R. Bohart and Menke, 1976:266 (in checklist of world Sphecidae); Pulawski, 2003:798 (in checklist of Malagasy Sphecidae); Madl, 2014:987 (in catalog of Ampulicidae, Crabronidae, and Sphecidae of Madagascar, with synonymy and locality records).

Tachytes oviventris de Saussure, 1892:478, ♀. Objective synonym of *Tachytes oviventris* de Saussure, 1891.

DISCUSSION OF SPECIES IDENTITY.—The species was described rather concisely in 1891, in Latin only. In 1882, de Saussure repeated the Latin diagnosis almost verbatim, but provided a much more detailed description in French. Arnold (1945) commented about its unusual gaster coloration (he was not able to recognize the species). Indeed, the 1892 description mentions three characters unusual for a *Tachytes*: the gaster with bluish reflexes (*abdomine coerulescente* in Latin, *abdomen ... brillant de reflets bleuâtres et pourprés* in the French text), the postscutellum somewhat reddish mesally (*postécusson un peu roux au milieu*), and the recurrent veins attaining the 2nd submarginal cell very close to each other (*très près l'une de l'autre*). Evidently, none of the Madagascan *Tachytes* show this unusual character combination, and it is unclear, what other genus might be involved. Unfortunately, the holotype seems to be lost. De Saussure (1892) said that the specimen belonged to A. von Schulthess, whose collection is now housed in the Eidgenössische Technische Hochschule in Zurich, Switzerland. Ms. Franziska Schmid of that institution wrote the following on 23 June 2009:

“Unfortunately I only found two types of *Tachytes argyropis* from Madagascar in the Schulthess collection. Because the Schulthess collection had passed a serious pest damage about 50 years ago, the individuals of *Tachytes oviventris* might have been lost”.

As Monsieur Bernard Landry kindly informed me (his e-mail of 13 September 2018), no specimen of *T. oviventris* can be found in de Saussure's collection in the Muséum d'Histoire Naturelle de Genève, Switzerland, either. In conclusion, the species identity remains a mystery.

ACKNOWLEDGMENTS

I am greatly indebted to Monsieur Bernard Landry (Musée d'Histoire Naturelle, Genève, Switzerland) and Madame Claire Villemant (Muséum National d'Histoire Naturelle, Paris, France) for sending specimens under their care, Madame Villemant also for sending images of a syntype of *Tachytes copiosus*. I sincerely thank Robert L. Zuparko (California Academy of Sciences) for having critically reviewed the manuscript. Erin Prado (San Leandro, California) generated color illustrations using the Automontage software package by Syncroscopy, and Corinne Fuchs (Goleta, California) drew the male genitalia. Jere Schweikert (San Rafael, California) generated a database of all the localities mentioned here with their latitudes and longitudes, and Erika Garcia (Denver, Colorado) used it to produce the distribution maps.

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