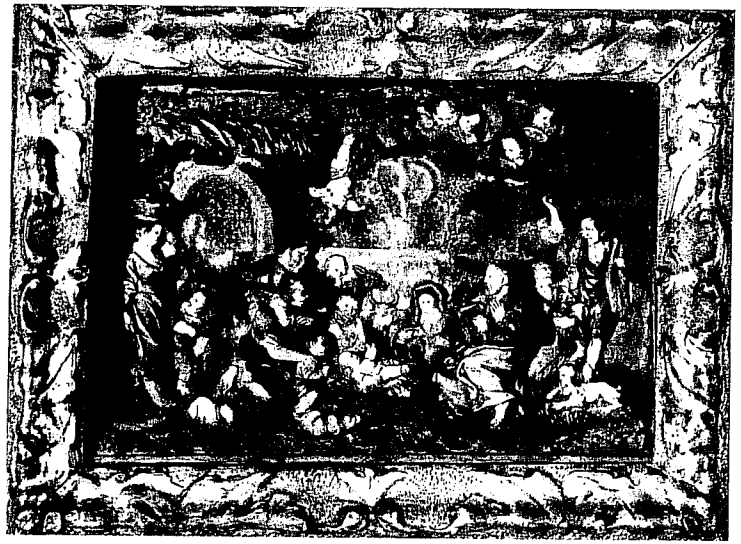


Weihnachtskrippe. Wachsbossierung eines unbekannten venezianischen Meisters, 17. Jahrhundert.
Venedig. VI 28117 Photo H. Weber

The type of *Libellula hova* Rambur, 1842, with notes on the other species of *Zygonyx* Selys from Madagascar (Odonata)

by

M. A. Lieftinck

Rijksmuseum van Natuurlijke Historie, Leiden

With 8 figures

In the notes that follow I have dealt with a fragment only of a rather large and very interesting collection of dragonflies brought together by Dr. F. Keiser, of the Naturhistorisches Museum in Basle, during an expedition to Madagascar in 1957–58[1]. The present account only contains redescriptions and figures of Madagascan species of *Zygonyx* Selys, an Old World genus of stream-dwelling *Libellulidae*, which comprises a fair number of large-sized dragonflies resembling certain *Corduliidae* in general appearance, habits and habitats.

Three species were known to occur in the island, namely *Z. hova* (Rambur), *viridescens* (Martin), and *ranavalonae* Fraser. Dr. Keiser succeeded in capturing all three species; but, while studying his specimens, it soon became evident that two of these had to be investigated more carefully before definitely naming them. It is certainly a grievous drawback that in studying structure, one has so often to spend a considerable amount of time in nomenclatorial research. It will be seen that this became nevertheless necessary to ensure the proper identification of the regional species, one of which having been misinterpreted and requires a new name.

It is now fifty years since F. Ris, in his classical monograph (loc. cit., 1912), drew special attention to Rambur's type of *Libellula hova* by writing of it: "Ob diese Art tatsächlich die *L. hova* Rambur ist, bleibt durch eine erneute Untersuchung der Type festzustellen. Sicher ist sie R. Martin's und Calvert's *Pseudomacromia hova*". The main purpose of this paper is to ascertain that the insect which stands in all collections as *hova* is not that insect and does not correspond with Rambur's description.

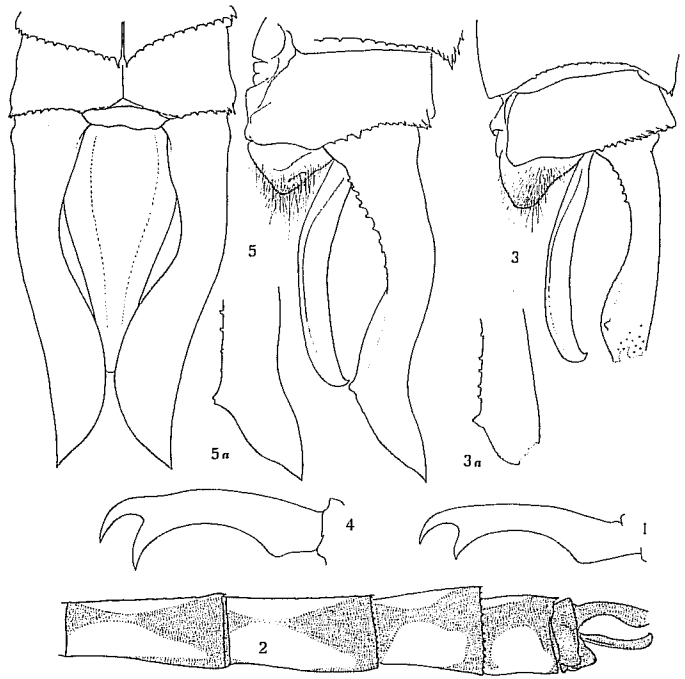
Through the kindness of Professor G. C. Varley and Mr. E. Taylor, I have been able to examine carefully the type of *Libellula hova* Rambur, now again preserved in the Hope Department at Oxford. From all I could learn about it, there seems to be no doubt but that Rambur's *hova* is abundantly distinct from the insect generally known under that name. Curiously enough, whereas the latter appears to be a common species all over the island in suitable places, the true *hova* seems to be a much scarcer insect, only the type being known so far.

[1] Voyage to Madagascar, with help from the Swiss National Fund for scientific research.

It has been my privilege also to study the alleged examples of *Z. hova*—and other regional species as well—represented in the "Collection E. DE SELYS LONGCHAMPS" at Brussels (Institut Royal des Sciences Naturelles).

In view of the fact that some of the published illustrations of Madagascan *Zygonyx* are inaccurate, I have thought it indispensable to supply, where necessary, new figures of the male genital organs. It is hoped that the present account clears up some doubtful points and will be of assistance to future workers.

I am much indebted to Dr. F. KEISER for the opportunity of studying his valuable collection and for arranging to have some of the results published in this journal.



Figs. 1–3. *Zygonyx hova* (Rambur), ♂ holotype from "Madagascar" (Hope Mus., Oxford); fig. 1, side view of tarsal claw of left middle leg; fig. 2, left side view of terminal segments of abdomen; fig. 3, left side view of 10th segment and anal appendages, and 3a, dorso-lateral view of left sup. app. Figs. 4–5. *Z. elisabethae* sp. nov., ♂ from Joffreville; fig. 4, side view of tarsal claw of left middle leg; fig. 5, dorsal and left lateral view of anal appendages, and 5a, dorso-lateral view of left sup. app. Pubescence mostly omitted.

Zygonyx hova (Rambur) (figs. 1–3)

1842. RAMBUR, Hist. Nat. Ins. Névropt.: 92. – ♂ Madagascar (*Libellula hova*, mihi).
1899. CALVERT, Proc. Acad. Nat. Sci. Philad.: 250–251 (notes on type) [*Pseudomacromia hova* (Ramb.)].

Material.—Madagascar: ♂ (holotype), with two labels in Rambur's handwriting, "Madagascar" (green cadre) and "Libellula hova Ramb.", and a printed label "TYPE ♂/Rambur/"Hist. Nat. des Insectes Névroptères"/Paris 1842 Page 92/ Marchal Coll./ Coll. Hope Oxon." (red cadre), in the Oxford University Museum, Hope Department of Entomology, Oxford.

Original description:

"86. LIBELLULA HOVA, *mihi.*

Villosa, rufescens flavo nigroque variegata; thorace lateribus strigis confluentibus obscure coeruleis; abdomine segmentis maculis posticis geminatis nigris, appendicibus nigris inferiori angusto, acuto ♂.

De la taille de la *Cancellata*, mais plus grêle, et ayant un peu l'aspect d'une *Cordulia*. Tête d'un jaune un peu obscur, avec le vertex et le sommet du front d'un bleu violet brillant. Thorax un peu velu, d'un brun roux à sa partie antérieure, jaune sur les côtés, où il y a trois bandes d'un bleu verdâtre brillant, s'anastomosant ensemble. Abdomen jaune, d'un roux obscur en dessus de chaque côté, ayant la partie postérieure des segments noire en dessus et en dessous, formant en dessus une tache double ou fortement bifide; styles noirs, fortement en massue, aigus, munis en dessous et un peu latéralement, à l'endroit de leur épaisseur, d'une pointe très-courte; pièce sous-stylaire étroite, presque aussi longue qu'eux, pointue, noire. Pattes noires; les quatre premières ayant la plus grande partie des cuisses d'un jaune roussâtre. Ailes assez larges, surtout les postérieures, légèrement teintés de jaune roussâtre, moins sensible à l'extrémité, à la base et au bord postérieur; réseau large, dix à douze nervules au premier espace huméral; triangle traversé par une nervule; ptérostigma petit, brun; hameçons courts, épais, non divisés, comme tuberculeux, avec une petite pointe crochue à leur extrémité.

Habite Madagascar; je n'ai vu que le mâle qui m'a été communiqué par M. MARCHAL."

Only the late Prof. P. P. CALVERT appears to have examined the type, on which the following remarks were made by him (loc. cit.: 251):

"I examined RAMBUR's type, now in the University Museum, Oxford, England, September 3, 1896, and made some notes upon its venation, some of which are incorporated in the above table, while the others follow here:

Front wings with 10 (right), 11 (left) antenodals, the last one not continued to the median vein, 7 postnodals. Hind wings with 7 antenodals, 8 postnodals, inner (basal) side of the triangle a little nearer than the arculus with which, if produced, it would form a small angle; two or three posttriangular rows, rather irregular and not symmetrically developed on right and left wings. Total length of body 47 mm., abdomen 32, front wing 38, pterostigma 3.5.

The data given for *hova* in the table are based on the type male and on a male from Nossi-Bé, Madagascar coast, given me by Baron de Selys Longchamps."

The type is at present in a very dilapidated condition, most parts of the body being damaged, portions of the wings are missing, while only the intermediate pair of legs have remained intact. The specimen is not quite mature, as is evident from the general colour of the body, which varies from light to dark brown on the thoracic and first five abdominal segments.

Head brownish yellow; labium slightly paler, bases of the lateral lobes brownish obscured along inner margin (median lobe distorted); black are: a narrow line roundabout the labrum save at its base, and a metallic blue transverse patch on the frons, which occupies approximately the basal two-thirds of its horizontal surface, extending a short way down along the eye-margin, but ill-defined along anterior border. Vertex (crushed) metallic blue anteriorly, brown posteriorly; rest of the head in poor condition.

Pro- and synthorax damaged and poorly preserved. Mesepisterna light brown with faint metallic blue sheen, but marked with bright yellow laterally: a thick S-shaped spot along lower half of the humeral suture followed by a small dot near the upper end of it. Sides variegated with metallic blue and bright yellow in about equal proportion; yellow are: two large elongate mesepimeral spots, one just anterior to (above) the spiracle, and a second, narrowly separated from the first, filling out the postero-dorsal edge; two equally large metepisternal spots placed in a row, the uppermost of these broadly confluent with the largest of the two mesepimeral spots; four less distinctly outlined spots on the metepimeron: one very small dot antero-ventrally, a thick stripe along middle portion of latero-ventral margin, and two ill-defined dots filling out the upper (posterior) edges. Ventral surface of thorax pale.

Coxae, trochanters and femora, except apically, pale brown; tibiae and tarsi dark brown to black; tarsal claws reddish brown (fig. 1). Hinder pair of legs missing.

Wing-membrane palely saffronated, except the extreme base and the apices, which are perfectly hyaline; pterostigma brown.

First four segments of abdomen in poor condition, and accessory genitalia destroyed; these segments brownish, but with the yellow dorsal and lateral markings preponderating. Segm. 5–9 with fairly well defined orange and black markings, as shown in fig. 2 (5 crushed), the dorsal lanceolate marks widest on 7 and partly coalescent with the band at the sides; the lateral marks of 6-9 pass down across the latero-ventral carina on the ventral surface of the tergites, which are accordingly also partly orange.

Anal appendages black, shaped as in fig. 3, the tips of the superior pair being broken off.

This very distinct species runs out in RIS's key (loc. cit.: 802) to *natalensis* (Martin) and *hova* auct., but, as is now clear, is abundantly distinguished from both.

The main difference between the males of *elisabethae* sp. nov. and RAMBUR's insect may be tabulated as follows:

Z. elisabethae sp. n.	*Z. hova* Ramb.
Larger: abd. + app. 37–41, hw. 39–44 mm.	Smaller: abd. + app. 32, hw. 37 mm.
Labrum black with two small basal yellow spots. Frons entirely purplish metallic black above, this colour distinctly surpassing the crest at the middle and sharply defined anteriorly. Yellow marks at thoracic sides more restricted, the metallic blue areas preponderating.	Labrum yellow, its free margin narrowly bordered with black. Frons metallic blue-black, this colour not surpassing the crest at the middle and not sharply delimited anteriorly. Sides of thorax conspicuously marked with yellow; dark and light areas in about equal proportion.
Wings long, more densely reticulated; Cu_1 of fore wing only slightly anteriorly convex; distal side of fore wing triangle straight; *Mspl* of hind wing distinct.	Wings relatively broader, venation more open; Cu_1 of fore wing markedly anteriorly convex; distal side of fore wing triangle slightly angulated; *Mspl* of hind wing poorly developed (fractured).
Abdominal segments 1–3 with lateral spots of yellow, and vestiges only of transverse streaks at extreme base of 3–4; abdomen for the rest black dorsally.	All abdominal segments (except 10) with conspicuous and partly anastomosing dorsal and lateral orange marks, which are even more extensive than in *Z. torrida* (Kirby).

Zygonyx elisabethae sp. nov. (figs. 4–6)

1912. RIS, Cat. Coll. Selys, fasc. XIV, Lib. 6: 802 (key), 809–810 (incl. references), figs. 465–466 (app. and genit., Nossi Bé). – ♂ ♀ Madagascar (*Z. hova* Ramb.).
1949. FRASER, Mém. Inst. Sci. Madagascar, sér. A, *3*: 36 (note). – ♂ ♀ Tananarive (*Z. hova* Ramb.).
1956. FRASER, Faune de Madagascar (Tananarive), *I*, Ins., Odonates Anisoptères: 57 (key), 108–109, fig. 38b (♂ genit.). – ♂ ♀ Madagascar (*Z. hova* Ramb.).

Material. – Madagascar: 1 ♂ 1 ♀ (semiad.), Ampefy-Itasy, 120 km from Tananarive, 7. 2. 1930, leg. OLSUFIEFF, ex coll. E. SCHMIDT. 1 ♂ (ad.), prov. Tananarive, Ampefy, Chute de la Lily, 26. 3. 1958, F. KEISER; 3 ♂ 1 ♀ (ad.), prov. Diégo-Suarez, Joffreville, 8. and 22.5.1958, and Montagne d'Ambre, 21. and 23.5.1958, all collected by Dr. FRED and Mrs. LILI KEISER. Holotype ♂ and allotype ♀, Mtge. d'Ambre, 21. and 23.5.1958, as well as two paratypes, in the Naturhistorisches Museum, Basle; one paratype in the Leiden Museum. – Further material: 4 ♂, 1 ♀ (abdomen of one ♂ and head of ♀ wanting), labelled "Nossibe"; 3 ♂, "Ramena Mayanga"[2], and 1 ♀, "Madagascar, R. MARTIN", all in DE SELYS' writing, in the Institut Royal des Sciences Naturelles, Brussels (coll. SELYS).

This species has been well characterized by RIS and other authors and needs no further description. The insect shows little or no variation. In October 1962, I had an opportunity to examine the series in DE SELYS' collection, treated by RIS in the monograph and still figuring under the name of *hova*. A comparison of these specimens with those collected by Mr. and Mrs. KEISER, has confirmed my previous supposition that they are conspecific. All individuals are adult, or nearly so, some of the males having the dorsum of the thorax overlaid with the thin bluish-white pruinescence characteristic of this and some other Ethiopian species of *Zygonyx*.

There remains one discrepancy worthy of attention. This refers to MENGER's figure 465 accompanying the account of this species in the monograph. According to an indication on the pin-label, the illustrations of appendages and genitalia were prepared from one of the males from Nosy Bé. The actual shape of the appendages of this species is, however, quite different from what is shown in the picture just mentioned, the curvature of the superior appendage being exaggerated while the subapical tubercle of the latter has been overlooked. In view of this, I here offer camera lucida sketches showing the appendages in dorsal and lateral view (fig. 5). Also, the artist's drawing of the accessory genitalia differs somewhat from the real shape of

[2] The correctness of the orthography of the name Ramena seems beyond doubt; this locality is situated in the province of Majunga. (See also R. PAULIAN, 1956, Faune de Madagascar, *I*, Ins., Odonates: 27, footnote.)

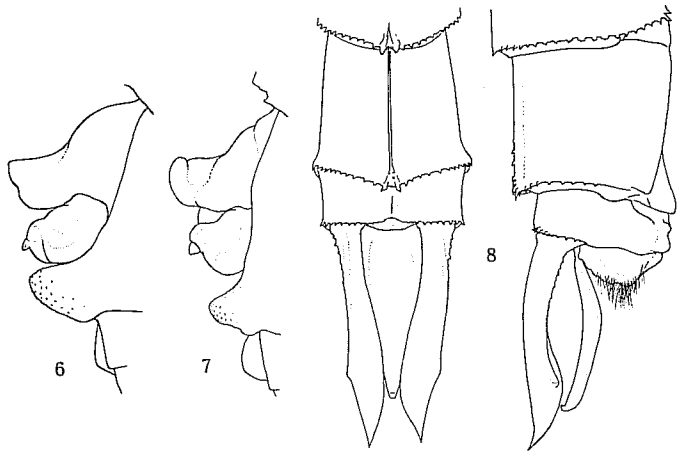


Fig. 6. *Zygonyx elisabethae* sp. nov., ♂ from Joffreville; genitalia, left side view.
Figs. 7–8. *Z. ranavalonae* Fraser, supposition, ♂ from Ranomafana; left side view of genitalia (7), and dorsal and right side view of anal appendages (8). Pubescence mostly omitted.

these organs: the inner branch of the hamule being reduced to a tiny, subacute, black tubercle, which is slightly curved laterad, whereas the depression separating it from the swollen glossy black outer branch is contrastingly pale-coloured so as to accentuate the little hook representing the inner branch. In MENGER's fig. 466 the latter is rendered too narrow, and since FRASER's figure 38b (loc. cit., 1956) of the same structure is only a crude copy of MENGER's picture, it seems best to replace both sketches by figs. 5–6 of the present paper.

I have much pleasure to name this handsome insect in honour of Mrs. ELISABETH KEISER, who as a constant companion of her husband did so much to enrich our knowledge of the insect fauna of Madagascar.

Zygonyx viridescens (Martin)

1900. MARTIN, Bull. Mus. Hist. Nat., Année *1900*, no. 3: 106–107. – ♂ ♀ Diégo Suarez (*Pseudomacromia viridescens* nov. sp.).
1912. RIS, Cat. Coll. Selys, fasc. XIV, Lib. 6: 802 (key), 810–811, fig. 467 (♂ genit.). – ♂ ♀ Madagascar (*Pseudomacromia viridescens* Martin).
1956. FRASER, Faune de Madagascar (Tananarive), *1*, Ins., Odonates Anisoptères: 106–107 (addit. descr.), fig. 38a (♂ genit.). – ♂ ♀ Madagascar.

Material.—Madagascar: 1 ♂ (juv.) 1 ♀ (semiad.), prov. Fianarantsoa, Ranomafana, 22. I. 1958, F. KEISER, both in the Naturhistorisches Museum, Basle.

Both sexes of this large species correspond with the existing descriptions. The male has $11^1/_2$ Ax in the fore wing, 8–9 in hinder pair; female with $12^1/_2$ and 9, respectively.

Measurements: ♂ abd. + app. 42.0 mm, hind wing 44.5 mm, pterostigma 2.8 mm; ♀ 46.0, 47.0, 3.0 mm.

Zygonyx ranavalonae Fraser, supposition (figs. 7–8)

1949. FRASER, Mém. Inst. Sci. Madagascar, sér. A, *3*: 26, 36–38, fig. 11 (♂ genit.). – ♂ ♀ Mandote, Madagascar (*Z. ranavalonae* sp. n.).
1956. FRASER, Faune de Madagascar (Tananarive), *1*, Ins., Odonates Anisoptères: 109 (compar. notes), fig. 38b (♂ genit.), not fig. 37! (wings). – ♂ ♀ Madagascar.

Material.—Madagascar: 1 ♂ 1 ♀ (ad.), prov. Fianarantosa, Ranomafana, 22. and 23.1.1958, F. KEISER, both in the Naturhistorisches Museum, Basle.—Further material: 1 ♂ (ad.), labelled "Nossibe", in DE SELYS' writing, unidentified, in the Institut Royal des Sciences Naturelles, Brussels (coll. SELYS).

I have long been in doubt whether the present specimens might belong to a species distinct from *ranavalonae* Fras., the type of which is inaccessible for comparison. There are several controversial points in the original diagnosis of that species as compared with our three specimens, but I have arrived at the most likely conclusion, viz., that the insects are conspecific. The following differential features of typical *ranavalonae* may be emphasized: (1) labrum of ♂ black marked with two basal spots, of ♀ predominantly yellow; (2) prothorax of ♂ with a pair of dorsal yellow spots and the border of posterior lobe ochreous; (3) pterostigma shorter, 2.0–2.5 mm; (4) vein Cu_1 "very flat"; (5) ♂ anal app. "with apical end thickened, pointed beneath where are found 4 small spines, and ending apically in a point which is directed straight posteriorwards; inf. app. triangular, extending to as far as the ventral spine of superiors". FRASER (loc. cit.) gives two totally different sketches of the ♂ genitalia, in both of which the hamule is shown to bear a well-developed end hook, which is absent in our specimens. Moreover, in the original figure the anterior lamina is strongly protuberant, as it is in our males, whereas in the 1956 drawing the same structure is small and not at all hooded. The crude picture of the wings of "*ranavalonae*" (fig. 37) does not in any way correspond with the description of the neuration and evidently applies to another species with much denser venation. In view of the fact that so many of FRASER's descriptions are inadequate, the majority of his illustrations being unreliable and misleading, I prefer to give full descriptions and camera lucida sketches of structural details of what I suppose is *ranavalonae*, rather than introduce another new name for a closely similar species.

Male: Labrum and mandibles deep black. Labium pale ochreous, the median lobe and a thick stripe bordering the adjacent and inner margins of the lateral lobes black, the free margin of the latter with a fine black line only, and fringed with golden yellow bristles. Anteclypeus and postclypeus pallid greenish yellow, the latter with a diffuse transverse central spot of brownish black. Frons above, as well as the vertex, black with brilliant metallic blue lustre, the anterior limit of the frontal patch evenly convex, approaching fronto-clypeal suture (0.5 mm) in the middle, but curving back laterally so as to leave a conspicuous citron yellow area on either side. Occipital triangle brown anteriorly, yellowish posteriorly and behind; rear of the head black with three fairly well defined elongate yellow spots placed in a row along margin of compound eyes.

Prothorax dull black, only the anterior lobe narrowly bordered with citron yellow. Synthorax predominantly dark metallic greenish black, the lower portion of meso- and

metepimera rather shiny by absence of a thin grey-blue pruinescence which otherwise covers the thoracic segments throughout. Yellow markings of small size and all of them isolated: mesepisterna with a comma-shaped spot about half-way down along humeral suture; a somewhat larger dot occupying posterior half of mesinfraepisternum; a lanceolate streak bordering first lateral suture on mesepimerum and placed anterior to the spiracle; three isolated metepisternal dots: one (diffuse) near upper end of first suture, a second roundish spot bordering second suture upwards to level of spiracle, and a third, largest and almost circular, spot occupying most of the metinfraepisternum, bright chrome; metepimerum with a yellow band, abbreviated on both ends, along the latero-ventral carina; ventral surface dull yellow between the dark metepimeral portions, the poststernal surface remaining pale-coloured.

Legs black; coxae and trochanters with some specks of yellow interiorly and anterior femur with a longitudinal streak of the same colour. Femoral teeth all directed towards apex, 26–28 on posterior femur followed by three spines. Tarsal claws bifid, acute, the robust inferior tooth less curved, much broader than, but subequal in length to, the apex itself.

Wings with black neuration; membrane hyaline, but distal portion, from level of fore wing triangle as far as the apex, faintly tinged with yellow. Three rows of cells between anal loop and margin of hind wing. Triangle of fore wing narrow, regular, once traversed, that of hind wing uncrossed, its proximal side distinctly proximal to the areulus. One cubito-anal cross-vein. Discoidal field of fore wing commencing with 2×3, thence 2×2 and finally again with 3 rows of cells; Rspl and Mspl both distinct and subtending one cell-row. Nodal index $\frac{6\,.\,9\frac{1}{2}\,.\,9\frac{1}{2}\,.\,5}{8\,.\,6\,.\,6\,.\,7}$. Cu_1 of fore wing rather strongly convex. Pterostigma long, covering more than one cell, colour brown, its costal half almost black.

Abdomen shorter than hind wing, with basal segments scarcely expanded lateral, moderately inflated dorso-ventrally, thereafter hardly noticeably constricted, parallel sided almost to segm. 8, the apical segments slightly narrower. Colour dull black, the basal segments thinly pruinescent; markings restricted and poorly defined. Middorsal carina finely yellow from segm. 2–8; a diffuse yellowish mid-lateral streak at base and a large dot above genitalia at sides of 2; a similar, but larger, transverse mid-lateral streak at base of 3; narrow transverse lateral yellow annules (interrupted dorsally) at extreme base of 4 and 5; segm. 7 and 8 each with a longitudinal, lanceolate, orangish spot just above the lateral carina but tapered on either end, and largest on 8; ventral surface of the tergites 7 and 8 also yellowish in the middle. Genitalia obscured, but anterior lamina yellowish (fig. 7).

Anal appendages black, superior pair a little longer than 9th segment, shaped as shown in fig. 8.

The ♂ from Nosy Bé resembles the first closely in size and markings, but the thorax and basal abdominal segments are more densely overled with chalky blue-white pruinescence, only the conspicuous subcircular infraepisternal yellow spots of the meso- and metapleurae standing out clearly. The labrum is wholly black, as in the first specimen. Discoidal field of fore wing with 1×3 or 3×3, then with 3×2 or 2×2, and finally with 3 rows of cells. Nodal index $\frac{-\,.\,10\frac{1}{2}\,.\,10\,.\,7}{8\,.\,7\,.\,7\,.\,8}$.

Female: Agreeing with the male in most respects, also by having the labrum entirely black, but differs as follows. An additional brown streak at base of anteclypeus; anterior limit of metallic blue-green frontal mark slightly farther distant from clypeal suture (about as wide as depth of postclypeus); yellow mesepisternal spot along humeral suture greatly enlarged, extending diffusely inward and occupying lower one-third of outer half, the upper portion of this space with additional yellowish spot immediately below ante-alar triangles; metepisternum with additional yellow dot below dorsal margin; also, an additional undulated band on the metepimerum, which runs along the dorsal ridge under the axillaries of hind wing almost for its whole length.

Wings more strongly flavescent beyond level of triangles; base of fore and hind wings with small, indefinite, amber-coloured spots. Discoidal field of fore wing with 3 rows of cells throughout; Mspl unapparent (broken) in hind wing.

Abdomen almost parallel-sided, with paired lateral spots of segm. 2 and 3 enlarged and better defined, but elongate lateral spots of 7 and 8 smaller than in male; basal yellow annules at segm. 4–6 narrow but well defined.

Valvula vulvae undeveloped, hind margin of sternite scarcely thickened, very slightly concave on each side of a feebly indicated median prominence. Appendages a little shorter than segm. 9, simply cylindrical, apices rather abruptly tapering, acuminate.

Measurements: ♂ abd. + app. 30.0–30.5 mm, hind wing 34.3–34.5 mm, pterostigma 2.5 mm; ♀ 32.3, 36.3, 3.0 mm.

Manuskript eingegangen am 30. Oktober 1962.