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<https://doi.org/10.5109/2364>

出版情報 : ESAKIA. 9, pp.1-14, 1975-12-15. Hikosan biological laboratory, Faculty of
Agriculture, Kyushu University
バージョン :
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REVISION OF THE BEE GENUS *XENORHIZA* MICHENER
OF NEW GUINEA, WITH DESCRIPTIONS OF
TWO NEW SPECIES
(HYMENOPTERA, COLLETIDAE)*

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Synopsis *Xenorhiza*, which was originally proposed as a subgenus of the genus *Palaeorhiza*, is regarded as a distinct genus of bees occurring in New Guinea. Reason of the new treatment, together with the description of the genus, is given and descriptions of two new taxa, *Xenorhiza carinata* sp. n. and *Xenorhiza cylindrica* sp. n., are presented.

Xenorhiza was proposed as a subgenus of *Palaeorhiza* Perkins, 1908, by Michener in 1965, based on a single New Guinean species *Palaeorhiza hamada* Cheesman, 1948.

As a result of my recent studies on *Xenorhiza* involving two new species, it becomes clear that *Xenorhiza* should be regarded as a distinct genus because of the male glossa being bifid, unlike *Palaeorhiza*, at the apex like the female. This finding is important for *Xenorhiza*. Characters given by Michener to *Xenorhiza* are here regarded as generic. In addition, I detect a few other characters, one

* Contribution from the Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka (Ser. 3, No. 28), and that from the Hikosan Biological Laboratory, Faculty of Agriculture, Kyushu University, Hikosan (Ser. 2, No. 48).

of which is the shortened intermediate segments of the fore tarsi. This is more pronounced in the female than in the male.

Xenorhiza is placed next to **Palaeorhiza**, and includes three bright metallic green or blue species

Now, the subfamily Hylaeinae of New Guinea and Australia contain a dozen genera, i.e., *Hylaeus*, **Heterapoides**, *Gephyrohylaeus*, *Analastoroides*, *Pharohylaeus*, *Hylaeorhiza*, **Palaeorhiza**, **Xenorhiza**, *Hemirhiza*, *Amphylaeus*, *Meroglossa* and *Hyleoides*.

Acknowledgements : I am grateful to Dr. J. Linsley Gressitt, Wau Ecology Institute, Wau, Papua New Guinea, and Dr. M. A. Lieftinck, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands for their support of my study on New Guinean bees.

Genus **Xenorhiza** Michener, 1965

Xenorhiza Michener, 1965, Bull. Amer. Mus. Nat. Hist., 130: 146. Proposed as a subgenus of **Palaeorhiza** Perkins, 1908.

Type-species : **Palaeorhiza hamada** Cheesman, 1948 (Monobasic and original designation).

Description: Bright metallic green or blue like members of the subgenus **Palaeorhiza**, *sensu stricto* (sensu Hirashima, unpublished),

Glossa of male bifid as in female ; mandibles of female narrowed and bidentate (or only notched) at apices, of male simple; mandibles of female longitudinally sulcate in middle; ocelli small (smaller than in **Palaeorhiza**) ; preoccipital carina more or less obtuse (sharp in **Palaeorhiza**),

Propodeum with various strong carinae including one that separates the dorsal from the posterior surfaces; enclosure of propodeum horizontal, also strongly carinate laterally in addition to a median longitudinal carina which meets with the transverse carina behind; sutures between mesepisternum (mesopleuron) and metepisternum (mctepleuron) and between the latter and propodeum are carinate below; *strong projection on lower portion of mesepisternum in front of middle coxa in female*.

Wings with 2nd submarginal cell small, about or less than one-half of 1st along lower margin, *receiving both recurrent veins just outside the limits of cell*.

Legs rather robust; hind tibiae thick at each base when seen from

above, without basitibial plate: **intermediate segments of fore tarsi shortened, especially in female.**

Metasoma subtriangular in female (broadest basally), cylindrical in male, without strong punctures; 2nd tergum of male with a lateral fovea large and oblong; **1st sternum strongly elongate, longitudinally convex**, with a median longitudinal sulcus; **apical margin of 1st sternum triangularly strongly convex apically** ; 3rd sternum of female with a transverse ridge in middle.

Gonocoxite and gonostylus of male genitalia with dense, long, black hairs; gonostylus elongate, slender, much exceeding tip of penis valve.

Included species : *Xenorhiza hamada* (Cheesman), *X. carinata* sp. n. and *X. cylindrica* sp. n.

Distribution : New Guinea.

Key to the species

1. Males * 2
 Females 3
2. Outline of head rather round in front view (because of rather large eyes) ; inner eye margins converging below; malar space very short, almost linear; upper portion of supraclypeal area longitudinally carinate, sharply defined from frons; metasoma cylindrical; 1st tergum slightly longer than broad, smooth and impunctate; head and thorax dark blue-green with yellow markings or portions as follows : mandibles, labrum, clypeus except for lateral margins, longitudinal mark on supraclypeal area, paraclypeal area, broad band on genal area behind eye, band on pronotum, axilla, band on metanotum, spot on tegula, tubercle, and spot on upper portion of prepisternum (an evanescent yellow line present on mesoscutum along the right tegula in the holotype); metasoma piceous with purple and blue or blue-green reflections; length about or slightly over 6 mm; West New Guinea *cylindrica*
- Head strongly receding on lower portion when seen in front; inner eye margins strongly converging below; malar space narrow but well indicated: upper portion of supraclypeal area not sharply defined from frons; meta-

soma subcylindrical, dorsoventrally slightly compressed; 1st tergum transversely finely lineolate, scattered with very weak punctures; mandibles without yellow marking; yellow marking on genal area along eye margin linear and not extending below; mesoscutum with longitudinal yellow lines at sides; scutellum also with a pair of yellow markings; head and thorax dark steel blue, metasomal terga more bluish (1st tergum distinctly shining) with slight purple reflections, metasomal sterna piceous with distinct purple reflections ; length about or slightly over 7 mm: N. E. New Guinea * * * * * *carinata*

3. Projection on lower portion of mesepisternum enormous; mandibles distinctly narrowed and bidentate at each apex; mesoscutum exceedingly densely, finely punctured with interspaces linear ; 3rd sternum with a median transverse ridge not highly elevating; head and thorax with yellow markings as follows: three lines on face, longitudinal line on genal area, band on pronotum, axillae, and tubercles; mid and hind legs without yellow marking: Northern Territory, New Guinea *hamada*

- Projection on lower portion of mesepisternum not specially large; mandibles gently narrowed and weakly notched at each apex ; mesoscutum densely punctured, punctures contiguous to two puncture widths apart in median portion: 3rd sternum with a median transverse ridge strong and highly elevating; head and thorax with yellow markings as follows : three lines on face, longitudinal line on genal area, band on pronotum, lateral longitudinal lines on mesoscutum along tegulae, axillae, band on metanotum (which is interrupted in middle), tubercles, and a spot on upper portion of prepisternum; mid and hind tibiae with basal yellow markings in addition to the corresponding ones on fore tibiae; length about 8 mm; N. E. New Guinea *carinata*

***Xenorhiza hamada* (Cheesman)**

Palaeorhiza hamada Cheesman, 1948, Ann. Mag. Nat. Hist., (12)1: 330-331.

Palaeorhiza (Xenorhiza) hamada: Michener, 1965, Bull. Amer. Mus. Nat. Hist., 130: 146-147.

This species was described from, and is still known by, a holotype female (Northern Territory, Diene (a day's journey south of Mafulu), 3000 ft. (indicated as 4000 ft. on the label attached to the type specimen), New Guinea). I have seen the type of this species which is preserved in the Department of Entomology, British Museum (Natural History), London. The interesting characters which are neglected by the previous authors are as follows: 3rd sternum is provided with a transverse ridge like *carinata* sp. n., although it is weaker than in the latter; mandibles are distinctly narrowed and distinctly bidentate at apices whereas they are gently narrowed and only notched in *carinata* sp. n.; and intermediate segments of the fore tarsus are very short like *carinata* sp. n. It seems probable that the last character may be generic rather than specific.

This species is also distinct in having the mesoscutum being finely and exceedingly densely punctured with the interspaces linear (the original description says that the mesonotum densely, reticulate-punctate, punctures not coarse), and the yellow markings on the thorax are limited to the pronotum, axillae and tubercles only.

Distribution : Northern Territory, Papua New Guinea,

***Xenorhiza carinata* sp. n.**

The female of this species is easily distinguished from that of *Xenorhiza hamada* (Cheesman) in having a much smaller projection on the mesepisternum (enormous in *hamada*), yellow markings on the mesoscutum and metanotum (no yellow mark on the mesoscutum and metanotum in *hamada*), and other characters indicated in the key.

This species is described from three specimens (a female and two males).

Female: Length about 8 mm.

Relative head measurements: Length of head, 33 (vertex to antennal sockets, 13; the latter to upper margin of clypeus, 5; length of clypeus, 15) ; length of eye, 27; distance between a tangent to bottoms of eyes and apex of clypeus, **3.5**; width of head, 36; width of face, **24.5**; upper interocular distance, 21.5; lower interocular distance, 16; width of clypeus, 13.

Head receding below as seen in front; inner eye margins distinctly converging below except for upper one-fifth which converges toward ocelli; vertex well convex, arched in front view; mandibles slightly

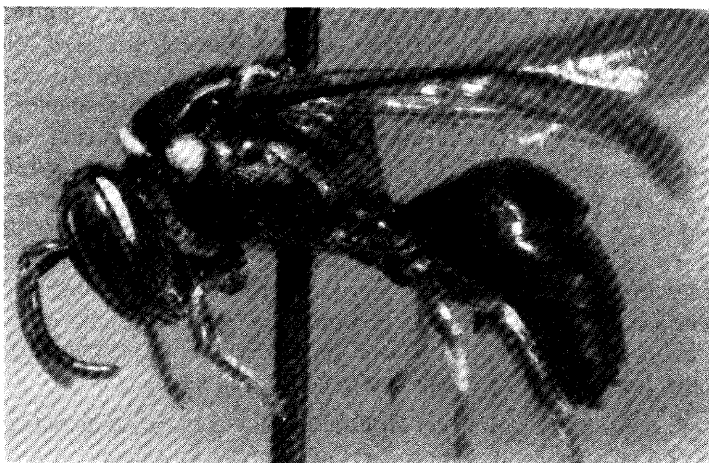


Fig. 1. Side view of the holotype female of *Xenorhiza carinata* sp. n.

tapering toward apex, nearly simple with a weak notch at each apex ; mandibles longitudinally sulcate in middle ; malar space evident, distinctly widened posteriorly, shortest line of malar space about equal to width of mid ocellus which is rather small for the size of head; clypeus well convex, median portion longitudinally obscurely concave; supraclypeal area more convex than in clypeus when seen from side, broad as seen in front, upper portion well confluent to frons (therefore not sharply separated from the latter) which is well convex longitudinally (space just in front of mid ocellus indistinctly concave, however) ; genal area receding below, upper portion only slightly convex.

Antennae not specially modified ; flagellum short and somewhat thick ; 1st flagellar segment much broader than long; 2nd segment also much broader than long.

Collar of pronotum strongly convex, arched as seen in front, more or less thick laterally, only slightly narrowed in middle as seen from above ; mesoscutum not specially convex ; propodeal enclosure strongly carinate; lateral and posterior margins of propodeal enclosure defined by very strong carinae and a longitudinal carina of same type in middle of enclosure; mesepisternum with a small subconical projection in front of mid coxa.

Wings not specially elongate ; stigma more or less narrow, not large ;

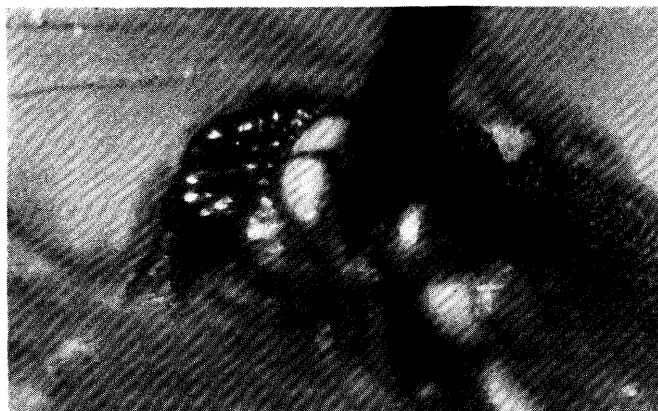


Fig. 2. Posterior part of the thorax (dorso-lateral view) of the holotype female of *Xenorhiza carinata* sp. n., showing the characteristic propodeal enclosure.

2nd submarginal cell small, about one-half as long as 1st along lower margin; basal vein well curved.

Legs rather robust, more or less short; hind tibia robust as seen from above, dorso-basal portion smooth and shining; fore tarsus with intermediate segments very short respectively, about equal to claw segment (excepting claws) in length when three are taken together.

Metasoma widest basally, strongly tapering posteriorly; 1st tergum large, with basal face steep; 2nd tergum also largely exposed, with basal portion just apical to gradulus transversely concave; 1st tergum long, apical margin triangularly convex apically; 1st sternum distinctly longitudinally convex; 3rd sternum with a very large transverse keel or lamella-like projection in middle.

Clypeus longitudinally finely lineolate, scattered with very weak punctures; supraclypeal area more densely lineolate, impunctate; paraocular areas below antennae also finely lineolate, with indication of microscopical punctures; frons very densely rugoso-punctate, punctures small, becoming slightly coarser toward facial fovea; vertex densely and finely punctured; genal areas longitudinally finely lineolate with sparse and weak punctures which are longitudinal below. Mesoscutum finely tessellate, not specially shining, densely punctured, punctures rather small, contiguous to two punctures' widths apart in middle; scutellum less tessellate (therefore slightly more shining) and slightly more weakly punctured than in mesoscutum; propodeal

enclosure strongly shining ; lateral face of propodeum rather dull, minutely roughened, with indication of very weak punctures; mesoepisternum densely and finely reticulate, with sparse and weak punctures which are sparser than those on prepisternum. First tergum weakly shining, transversely lineolate like *hamada*, with very sparse and weak punctures; 2nd and following terga minutely roughened or aciculate with indication of very weak punctures until apical margins.

Colour : Head and thorax dark green (with slight bluish tints) with following exceptions : mandibles, labrum, clypeus, malar space, lower paraocular area (except for yellow marking) and genal area (except for upper portion) piceous, pronotum (except for yellow band) darker piceous with slight metallic tints, and propodeum, especially enclosure, shining dark steel blue (lateral face of propodeum blackish with weak blue reflections). Head and thorax with yellow markings as follows: three longitudinal lines on face, the middle one of which is not reaching the apex of clypeus below and not reaching the mid-ocellus above, longitudinal line on upper portion of genal area along orbit, broad band on collar of pronotum, longitudinal line along posterior half of lateral margin of mesoscutum, axilla, band on metanotum which is interrupted in middle, apical half of tubercle, and transverse spot on prepisternum just below tegula. Antennae piceous, reddish brown beneath. Wings subhyaline, slightly darkened apically; veins and stigma brown: tegulae also brown. Legs piceous with slight purple reflections; anterior stripes on fore tibiae basally, small basal marks on mid tibiae and larger basal marks on hind tibiae pale yellow; apices of basitarsi and 2nd and following segments of fore tarsi ferruginous. Metasoma dark purple with delicate blue and green reflections ; blue-green reflections strong on 1st tergum, especially at sides.

Pubescence : Not hairy; hairs on frons, vertex, mesoscutum, and scutellum fuscous, those on rest of head and thorax whitish; lateral face of propodeum covered with very short, not very dense grey hairs; hairs on metasoma very short and fine except for those on apical segments (especially 6th tergum and sternum) long and fuscous.

Male: Length about or slightly over 7 mm.

General appearance much slenderer than female. Head shorter and more strongly receding below; eyes rather large as seen in front, with inner margins very strongly converging below; malar space narrow, about one-third as long as basal width of mandible; space

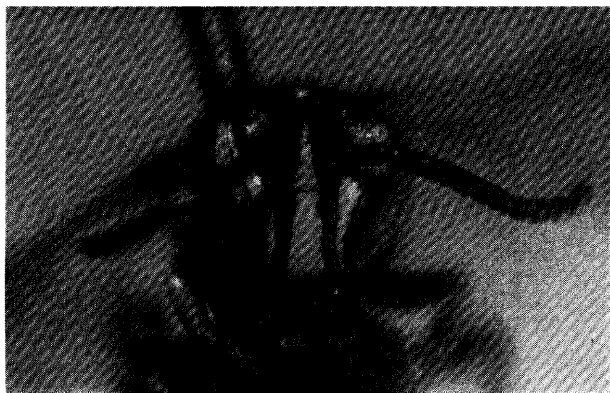


Fig. 3. Front view of the male head of *Xenorhiza carinata* sp. n.

between clypeus and lower eye margin also narrow, about as broad as malar space; clypeus largely flat above; supraclypeal area less convex than in female, lower portion largely flat in middle; genal area more receding than in female.

Antennae not specially long; scape short and robust, about twice as long as broad at apex; 1st flagellar segment short, much broader than long; 2nd segment about as long as broad; 3rd very slightly longer than broad.

Collar of pronotum distinctly convex as in female but more narrowed, therefore more or less ridged, in middle; rest of thorax similar to female except for propodeal enclosure slightly more deeply excavated and mesoscutum slightly more densely punctured with punctures contiguous to subcontiguous.

Legs similar to female ; median segments of fore tarsus also very short but 2nd segment as long as broad.

Metasoma almost cylindrical, gently tapering posteriorly, slightly dorso-ventrally compressed ; 2nd tergum distinctly concave at base like female; lateral fovea of 2nd tergum large, oblong; 1st sternum much longer than broad and longitudinally distinctly convex as in female ; unlike female, 3rd sternum normal.

Genitalia : Gonostylus with long and dense black hairs, elongate with narrow and pointed apex, much exceeding tip of penis valve.

Colour : Yellow coloration of face more developed than in female;

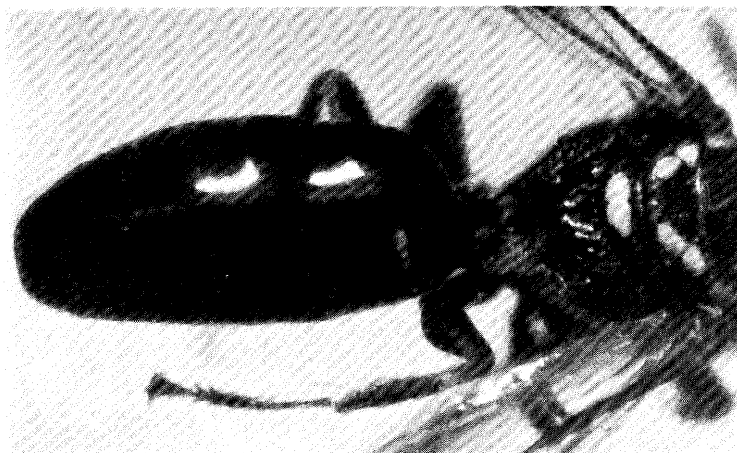


Fig. 4. Dorsal view of the male thorax (posterior part) and metasoma of *Xenorhiza carinata* sp. n.

clypeus yellow except lateral margins or yellow portion more reduced, yellow marking on paraocular area extending above in narrow line; yellow marking on thorax similar to that of female except for scutellum which is decorated with a pair of yellow marks and for metanotum whose yellow band is not interrupted in middle.

Head and thorax dark steel blue, metasomal terga more bluish with slight purple reflections (1st tergum distinctly shining), metasomal sterna piceous with strong purple reflections.

Pubescence : Hairs similar to female except for those on 2nd and following terga more fuscous.

Type material : Holotype female (BISHOP 10,474) Eliptamin Valley, 1,200-1,350 m, N. E. New Guinea, 1-15. vii. 1959 (W. W. Brandt) ; 1 paratopotype male, same data as holotype; 1 paratype male, Swart Valley : Karubaka, 1,400 m, 6. xi. 1958 (J. L. Gressitt).

Type depository : Entomology Department, B. P. Bishop Museum, Honolulu, Hawaii.

***Xenorhiza cylindrica* sp. n.**

The male of this species is easily separable from that of *carinata* in having the body slenderer, the inner margins of eyes less strongly

converging below, the clypeus less convex and more flat, the upper portion of supraclypeal area sharply elevating, the flagellum slender, the propodeal enclosure longer, the first tergum polished, etc. In addition, the mesoscutum and scutellum are without the yellow maculation.

This species is also separable from *hamada* in having the first tergum polished (finely transversely aciculate in *hamada*) and the 2nd submarginal cell of the fore wing longer.

This species is described from the holotype male only.

Male: Slender, length slightly over 6 mm; length of fore wing 5.5 mm.

Relative head measurements: Length of head, 23 (vertex to antennal sockets, 9; the latter to upper margin of clypeus, 3.8; length of clypeus, 10.2) ; length of eye, 19; distance between vertex and a tangent to summits of eyes, 2.5; distance between a tangent to bottoms of eyes and apex of clypeus, 1.5 (length of malar space, 0.5) ; width of head, 24; width of face, 15.9; upper interocular distance, 15; lower interocular distance, 9; width of clypeus, 7.3.

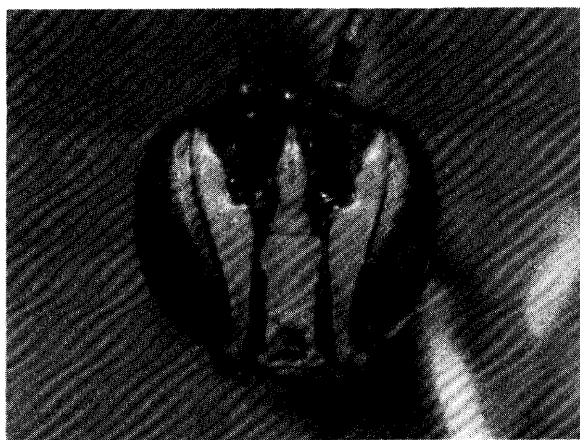


Fig. 5. Front view of the male head of
Xenorhiza cylindrica sp. n.

Outline of head round in front view; eyes rather large; inner eye margins distinctly converging below except for upper one-fourth which slightly converges toward ocelli; vertex, when seen in front,

well beyond a tangent to summits of eyes; malar space very narrow ; space between clypeus and lower eye margin narrow, narrower than width of pedicel, but broader than malar space; clypeus scarcely convex, broadly flat, portion slightly beyond the middle slightly transversely concave ; unlike *carinata*, upper portion of supraclypeal area distinctly elevating (although narrow), longitudinally carinate, sharply defined from frons; median sulcus of supraclypeal area distinct ; frontal line short and obscure; ocelli small like *carinata* ; genal area receding, much narrower than eyes as seen from side, upper portion only slightly roundly convex.

Scape short, about twice as long as broad (broader than in *carinata*) ; flagellum slender and somewhat elongate (slenderer and slightly longer than in *carinata*) ; 1st segment of flagellum broader than long, 2nd longer than broad, 3rd and following segments much longer than broad.

Thorax long and slender; collar of pronotum distinctly elevating, slightly thick laterally, narrowed and subcarinate in middle; median portion of collar of pronotum obscurely notched; mesoscutum moderately convex; scutellum well convex, median line longitudinally slightly concave ; propodeum long, strongly carinate laterally and posteriorly; propodeal enclosure long, as long as scutellum, well defined by strong carinae laterally and posteriorly, median portion of enclosure concave, with a longitudinal, more or less weak carina

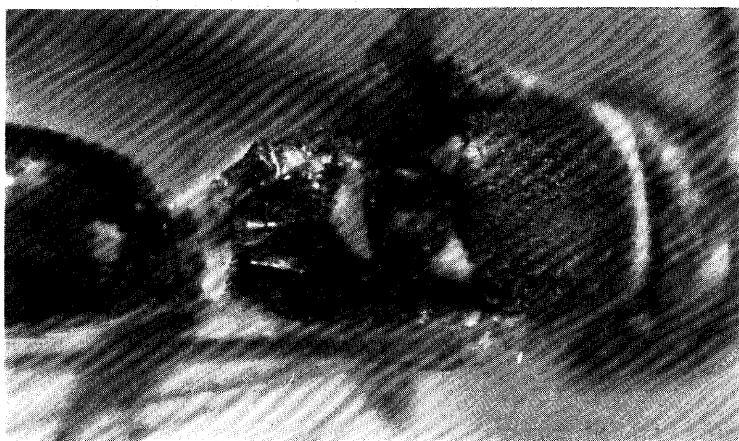


Fig. 6. Dorsal view of the male thorax (head and basal part of the metasoma are included) of *Xenorhiza cylindrica* sp. n.

in middle, basal portion of enclosure longitudinally weakly carinate or strongly wrinkled,

Wings slender ; stigma moderate in size; 2nd submarginal cell about one-half as long as 1st submarginal cell along lower margin.

Legs slender ; claws rather large; fore tarsi slender with 2nd segment about as long as broad, 3rd slightly shorter than broad and cylindrical; 4th much shorter than broad.

Metasoma longer than head and thorax together, cylindrical; 1st tergum slightly longer than broad, well convex; 2nd tergum distinctly constricted basally (basal portion of 2nd tergum largely exposed in the holotype), with fovea on the lateral portion distinct (elliptical) as in *carinata*; 1st sternum much longer than broad, distinctly convex and ridged longitudinally, with a median longitudinal sulcus; following exposed sterna without special modification.

Genitalia : Very hairy like *carinata* ; gonostylus long and slender, much exceeding tip of penis valve which is short and small

Sculpture: Clypeus and lower portion of supraclypeal area longitudinally very finely lineolate, impunctate ; colored portions of paraocular areas (in yellow) like clypeus but more shining; frons and vertex densely rugoso-punctate with small punctures ; colored portions of genal areas (in yellow) nearly smooth or very finely lineolate with microscopical fine punctures, shining. Mesoscutum nearly dull, finely reticulate, densely punctured but punctures very small; scutellum like mesoscutum but punctures smaller and sparser; enclosure of propodeum very slightly reticulate, slightly shining; mesepisternum finely reticulate with very shallow, microscopical punctures, general appearance not roughened; metepisternum smoother than in mesepisternum, with a few, weak, transverse carinae on upper portion (just below hind wing base) ; lateral face of propodeum minutely roughened or reticulate. First tergum nearly polished (smooth and impunctate) including ventral portions; 2nd tergum transversely microscopically lineolate with sparse microscopical fine punctures; 3rd and following terga minutely roughened as in *carinata* ; 2nd and following sterna transversely microscopically lineolate with sparse, more or less coarse punctures, more shining than in terga.

Colour : Head and thorax dark greenish blue, with yellow markings or portions as follows: mandibles, labrum, clypeus except for piceous lateral stripes, longitudinal mark on supraclypeal area, paraocular areas, genal areas broadly, collar of pronotum, axillae, band on

metanotum, tubercles, anterior mark on tegula, and sopt on upper portion of prepisternum (an evanescent short yellow line present on the right lateral margin of mesoscutum along tegula in the holotype) ; antennae piceous; flagellum beneath ferruginous. Wings dusky, veins and stigma brown; tegulae yellowish subhyaline. Legs reddish brown with rich yellow markings. Metasoma delicate in colour; first tergum deep reddish brown with weak blue and purple reflections ; 2nd tergum darker with stronger blue and purple reflections; following terga dark greenish blue with slight purple tints; sterna with stronger purple reflections than in terga.

Pubescence.: Hairs on head and thorax short and whitish; lateral faces of propodeum more or less densely covered with short grey hairs; hairs on metasoma very short and brown except for 1st tergum and basal portion of 2nd nearly bare.

Type material: Holotype male, Paniai 1750 m, Wisselmeren, W. C. New Guinea, IX-XI, 1939 (H. Boschma).

Type depository: Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

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