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STUDIES ON THE GENUS *TRYPOXYLON* LATREILLE
OF THE ORIENTAL AND AUSTRALIAN REGIONS
(HYMENOPTERA, SPHECIDAE)

I. GROUP OF *TRYPOXYLON* SCUTATUM CHEVRIER
with Some Species from
Madagascar and the Adjacent Islands

By K. TSUNEMI

M I S H I M A

APRIL 20, 1978

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5	B-4	Madagascar	Makassar (Celebes)
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85	1	Description on <i>Trypoxylon scutifrons</i> sp. nov. should be transferred to p. 76, before "ON SOME SPECIES FROM MADAGASCAR AND ADJACENT ISLANDS".	
86	26	Mak (= Madagascar)	Mak (Makassar)

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The aim of the present paper is to register the hitherto uninvestigated forms of the genus *Trypoxylon* collected in the Oriental and Australian Regions and to give further information on the species described from the two Regions.

In connection with the work it was attempted to reconfirm the characters of the known forms from the Regions and to readjust the taxonomic names of the species or subspecies described up to the present.

In carrying out the present study I am much indebted to Dr. A. S. Menke, Systematic Entomology Laboratory, ARS, U. S. Department of Agriculture, Washington, D. C. for his kind support in relation to the literature and specimens. My cordial thanks are also due to Dr. K. V. Krombein and Dr. D. R. Davis, Smithsonian Institution, Washington, D. C.; Dr. P. H. Arnaud, Jr., California Academy of Sciences, San Francisco, Curator of Department of Entomology, Bernice P. Bishop Museum, Honolulu, Mr. C. R. Vardy, British Museum (Natural History), London, Dr. M. W. R. de V. Graham, Hope Department of Entomology, University Museum, Oxford, Dr. J. van der Vecht and Dr. I. C. van Achterberg, Rijksmuseum van Natuurlijke Historie, Leiden, Dr. C. Baroni Urbani, Naturhistorisches Museum Basel, Dr. J. Pepp, Hungarian Natural History Museum, Budapest and Dr. B. Petersen, Zoological Museum, University of Copenhagen, for the loan of the valuable specimens.

Finally I express my sincere gratitude to Dr. Y. Tazima, Director of National Institute of Genetics at Mishima, who kindly lends his aid to me in relation to the loan of the material.

The types and other specimens dealt with in the present investigation, except for those of my own, are preserved in the following Museums that are abbreviated in the list of the material examined as follows:

- BMNH = British Museum (Natural History), London.
- EPBM = Bernice P. Bishop Museum, Honolulu.
- CAS = California Academy of Sciences, San Francisco.
- HNHM = Hungarian Natural History Museum, Budapest.
- NHMB = Naturhistorisches Museum Basels.
- RMNH = Rijksmuseum van Natuurlijke Historie, Leiden.
- UMO = University Museum of Oxford, Hope Department of Entomology.
- USNM = National Museum of Natural History, Smithsonian Institution (= U. S. National Museum), Washington, D. C.
- ZMUC = Zoological Museum, University of Copenhagen.

I. GROUP OF TRYPXILON SCUTATUM SHEVRIER
with Some Species from
Madagascar and the Adjacent Islands

General characters

The species that belong to the present group possess the shield-shaped enclosure on the frons (= frontal shield), varying in form with the species and always including anterior ocellus in it (Fig. 1). The shield connects at its lower end through the more or less elongated medio-apical carina with the interantennal transverse carina at its middle. The transverse carina connects at each end with the upper lateral part of the socket rim of the antenna and forms, together with the roundly convergent inner socket rims of antennae, the triangular interantennal area. The transverse carina raised in a minute triangle at its middle to join to the end of the medio-apical carina of frontal shield and branches out the other carina downwards from each lateral corner of the triangle. The carinae soon meet with each other, forming a rhombic enclosed space at the upper middle part of interantennal area, and then extend as a single carina or a narrow, laterally carinated canal further downwards till upper part of the supraclypeal area and disappeared. From this interantennal median structure, from both the upper enclosed space and lower narrow line, a series of long curved silky white bristles grow out. Similar but shorter curved bristles also scattered on the disc of the clypeus. Frontal shield is usually provided with the outward branch carina from each lateral angle and rarely also the inward branch carina from upper part of each upper lateral carina (Fig. 1). Sometimes upper lateral carinae partly weakened or broadly vanished, rarely the outward branch carina lacking. The scutum-group can easily be separated from others by the presence of the above mentioned frontal shield and the peculiar interantennal structure. But the members of the group possess, furthermore, the following common characters:

Antennae and gaster completely black, mandibles except base and tegulae of wings brownish, legs usually black, sometimes partly brownish, tibial spurs always pale. Hairs and pubescence on body and legs rather sparse, area dorsalis glabrous, sternites 1, 2 and 3 sometimes partly lacking pubescence. Posterior ocelli each in an impression on vertex, interocellar longitudinal ridge usually distinct, subcarinated, but sometimes broadly rounded or nearly flattened and indistinct, clypeus roundly subtriangularly produced anteriorly, in males slightly shorter than in females and more or less recurved on anterior margin, antennal joint 1 (scape) broadly excavated on inner margin in adaptation for the presence of the highly raised interantennal transverse carina; pronotal lamina on side not well developed, bluntly angulated or simply rounded and only slightly produced; on mesopleuron anterior subalar lamina always lacking, mesopleural flange narrow, only the posterior end of subalar area triangularly produced posteriorly, metapleural flange also narrow, at most slightly roundly raised on posterior portion. Propodeum provided with distinct lateral carinae, with area dorsalis gently raised and distinctly margined by broad

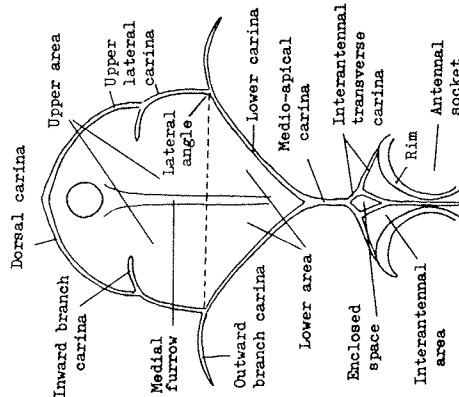


Fig. 1. Frontal shield and interantennal area. Terms of the parts.

(2)

furrows and medianly also broadly canalculated, on posterior inclination median furrow deeply excavated at base, V-shaped in cross section and gradually narrowed and shallowed posteriorly, ending at the upper margin of the smooth, somewhat impressed, comparatively large space located in front of the ligament socket of gaster, the upper rim of which (Richards' dorsal margin of orifice) always roundly, almost semi-circularly expanded posteriorly; on side of propodeum intercoxal calina only gently incurved; gastral petiole bat-shaped (never flask-shaped), gradually widening posteriorly, most usually narrowed just behind basal condyle (apophyses), often constricted there, then subparallel or slightly widening till spiracular site where the segment slightly enlarged and thence directly or after a short parallel-sided running, gradually widening till just before apex; the site of spiracles rather constant to the species, but regret to say, difference between species is slight; dorsal side of petiole from ligament attaching point till spiracular site more or less impressed, sometimes subcanaliculate, narrowing posteriorly, sometimes broadly shallowly impressed; hind coxal process present in females, short tooth-shaped or minutely tuberculate, but absent in males, hind tibia with narrow longitudinal impressed line on inner side, the following metatarsus provided with a line of short dense hairs running from base beneath to apex of outer side; in fore wing costa only very slightly produced beyond the apex of radial cell, cubital vein with abscissa 2 curved up at apex and slightly longer than or nearly equal to transverse cubital vein.

Explanation to table of measurement

In studying the members of the present group stress was placed upon the variation of characters and the numerous measurements were made with each species to find out the range of variation within a certain locality and the difference of variation between localities. The results were given in tables per species. For tabulation the following abbreviations were employed:

- IODv = Interocular distance at vertex
- IODc = Interocular distance at base of clypeus
- POD = Ocellular distance
- POD = Postocellar distance
- FSL = Length of frontal shield
- UAl or UL = Length of upper area (of frontal shield - Fig. 1)
- U/L = Length ratio of upper area to lower area (of frontal shield)
- A5 = Length of antennal joint 5
- L/W = Length to maximum width --- Width
- Ant = Length of ultimate antennal joint
- Pet = Length of gastral petiole
- Ma = Maximum width (relative)
- MI = Minimum width (do.)
- Sp = Location of spiracles (relative distance from base)
- 2 = Relative length of tergite 2
- 3 = Relative length of tergite 3

Besides the above HW (= head width) and IODs (= IODv : IODc, namely 10 : X) are often used in connection with the measurements. As to other abbreviations used for the table explanations are made in the remarks given to each table.

In the tables items without parenthesis, namely, IODv, A5, Ant and Pet, are shown by percentage to the head width of each specimen, while those within parentheses are given by the respective scale: (IODc : Od : POD). Usually OOD, sometimes Od, is taken as standard and two others are shown by the ratio to it. (FSL UAl U/L). FSL and UAl are shown by the scale of the width at lateral angles (Fig. 1) as 10. Actual measurement was made under the scale of the width as 20 in order to make the values more accurate and U/L was counted from the values. In the table for simplifying the result values of FSL and UAl are divided (counting fractions of .5 and over as a whole and disregarding the rest) so as to make the standard value of the width as 10. As a result frequent disagreements between values UAl/FSL-UAl and U/L, or different values of U/L under the same values of FSL and UAl are brought about in the tables. In such a case it should be understood that FSL and UAl are rather approximate and U/L is more accurate. (Ma MI Sp 2 3). All are relative values to the length of petiole as 100, namely

(3)

they are shown by percentage to the length of petiole.

Mode of measurement

IODw. The minimum distance between eyes at vertex is measured at the extreme margins of eyes. Frequently the eye margin is not clear on vertex, especially when the eye becomes faded in colour to brownish. While IODc (minimum distance at basal area of clypeus) is more easily measurable, only by avoiding error based on the covering silvery hairs.

OOD : Od : POD. OOD : POD is usually used to show one of the characters of the species in aculeate Hymenoptera in general. In the strict sense, however, the values are considerably variable according to the investigators, because the exact margins of both the eye and ocellus are frequently indistinct and frequently they are confused with other outlines, for instance, the bright coloured margin of the eye which is usually not reached the exact margin of the eye, or the so-called pupil of the ocellus, a brightly glittering part of the ocellus which is also not the true margin of the ocellus and which is not always distinctly seen in every specimen. Especially when OOD is very small, that is to say, ocellus is located very close to eye, as in the case of females in most of the species of the present group, slight difference in the measurement of OOD (partly due to the thickness of the scale line of the micrometer) brings about a great difference to relative value of POD. In the present paper it was taken care to measure them at the exact margins under the high magnification (as a result OOD and POD become smaller and Od becomes greater than the apparent value based on the pupil etc.).

FSL and UAL. Width at lateral angles and total length at median line of frontal shield are measured between the inner margins of the related angular parts of the enclosing carinae and UAL is measured by placing the longer scale line on the transverse line that crosses the lateral angles of frontal shield.

Al. Antennal joint 3 is compressed slightly in the female and considerably in the male dorso-ventrally and somewhat longer on the dorsal side than on the ventral. Measurement is always made in the widest view at the maximum length. The relative length to maximum width is considerably different according to the side observed and the value without comment on the side viewed is practically almost of no use. Furthermore, special care was taken to exclude the apparent additional width due to pubescence.

Ant. When stretched out laterally and horizontally the length of the ultimate joint viewed from above and from beneath is somewhat different, especially in the male. Care is taken when the antenna is twisted to measure it from the normal dorsal side. Usually the apical part of antenna is considerably strongly curved and longer on the anterior side than on the posterior, with the base line laid oblique to the length axis of the joint. In measurement the length from mid point of the base line to apex is taken.

Petiole. Hitherto I have measured the length from the attaching point of gastral ligament to the apex. In the present study I took the complete length of the segment, namely measured it from extreme base, including the enlarged basal condyle (apophyses of Richards) till its apex.

Gastral tergites 2 and 3. The segments are respectively telescoped into the preceding one. Sometimes it is too strongly inserted and sometimes very loosely exerted. In both cases the apparent length is different from the normal state. In the former case the normal length was sometimes presumed from the state of the ventral side, but when impossible the length observed was recorded and remarked with an asterisk. In the latter case the basal usually inserted smooth and glabrous part appears. In measurement the smooth part was excluded.

Species separating clues

In order to distinguish the members of the present group from each other the characters of the frontal shield are the most important clues. To indicate the parts of the shield correctly the terms as given in Fig. 1 are used in the present paper.

Besides the characters of the frontal shield these of interantennal structure including the bristles, gastral petiole, sternite 8 (δ), antennal joint 13 (δ) and genital organs (δ), ratio of interocular distances above and below, ocellar location and punctation on mesoscutum are also sometimes of use to distinguish a certain species from others. While, the form of clypeus and relative length of antennal joint 3 are almost of no use in the present group, because they are closely similar in all species. On the other hand, ratio of interocular distance on vertex to width of head, ratio of gastral petiole length to head width, length ratio between petiole and com-

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binated length of tergites 2 and 3 and sculpture on propodeum are sometimes so widely variable within the same species that it is not safe to use such characters to separate species from each other, except for some special cases. These facts are made clear by only the statistic results.

KEY TO THE SPECIES (δ & δ)

- 1 Upper lateral carinae of frontal shield broadly interrupted, dorsal carina distinct (without inward branch carinae) 2
- Upper lateral carinae complete, when partly interrupted the interruption only slight 3
- 2 Length 9, 3-9.5 mm (δ & δ), lower carinae curved upwards (Fig. 310), OOD : POD = 1 : 1.3 (δ) or 1 : 2 (δ), pronotum with posterior area discoloured, gastral petiole markedly long, appr. 7 times as long as its maximum width (ultimate antennal joint in δ slightly longer than 3 preceding joints united, gently curved and bent at apex), Thailand Tsunaki Tsuneki, 1963
- Length 13-16 mm (δ), lower carinae straight (Fig. 290), OOD : POD most usually 1 : 2, pronotum not discoloured on posterior area, gastral petiole usually 5 times as long as its maximum width (Fig. 297) (long curved bristles on interantennal area markedly abundant - Fig. 292), δ unknown, Burma, Thailand Laos, Malaya, Java and Borneo interrumpum Tsuneki, sp. nov.
- 3 Frontal shield with distinct inward branch carinae 4
- Frontal shield without inward branch carinae 7
- 4 Lower area of frontal shield distinctly wider than upper area (Fig. 301), with surface very shallowly excavated, nearly flattened, mesoscutum rather sparsely and weakly punctured (OOD : POD = 1 : 2 in δ and 1 : 1 in δ , IODs 1 : 1 in δ and 4 : 3 in δ , antennal joint 13 as long as 3 preceding joints united, gently curved and bent at apex, sternite 8 in δ with apex nearly rounded, without latero-apical arms, paramere of male genitalia without lamellate lobe at apex - Fig. 298). Length 9-11 (δ), 8.5-9.5 (δ) mm, Thailand, Sumba (Lesser Sunda Is.), Celebes and Formosa tainanense Strand, 1922
- Lower area not wider than upper area, with surface distinctly inclined backwards median line and deeply hollowed near apex, mesoscutum transversely rugose-punctate at least in part 5
- 5 Dorsal carina of frontal shield nearly straight, at each end forming distinct angle with upper lateral carina (Fig. 286) (lower area deeply excavated, pronotum not discoloured on posterior area, mesoscutum finely closely, partly subrugosely punctured, large species, 13-15 mm, Philippines bakerei Tsuneki, sp. nov.
- Dorsal carina of frontal shield rounded, not forming angle with upper lateral carina (Figs. 330 or 335) 6
- 6 Frontal shield appr. 1.5 times as long as wide at lateral angles (Fig. 335), with short medio-apical carina, pronotum on posterior area discoloured, mesoscutum medio-posteriorly with a large ovoid depression which is transversely striated (IODw as long as antennal joints 2+3+4, OOD equal to ocellar diameter, gastral petiole 7 times longer than maximum width, puncture-interspaces on mesoscutum twice as large as puncture-diameter, on scutellum punctures finer and closer than on scutum, sides of propodeum microreticulate, dull and transversely closely striate, ultimate antennal joint in δ as long as 4 preceding joints united, paramere of genitalia with apex bifurcate and bristled lobe not dilated (after the figure by Arnold), 10.5-12 mm, Madagascar and South Africa punctatissimum Arnold, 1924
- Frontal shield appr. twice as long as wide at lateral angles (Fig. 330), with medio-apical carina lacking, almost directly connected with the median angle of interantennal transverse carina which is turned posteriorly at the end to enclose a deep hollow inside (Fig. 331), mesoscutum without noteworthy large depression medio-posteriorly (IODw much shorter than antennal joints 2+3+4, OOD distinctly smaller than postocellar diameter, gastral petiole appr. 5 times as long as its maximum width, punctures on mesoscutum finer and closer, rugose-subreticulate, on scutellum much sparser, sides of propodeum without microsculpture, simply obliquely closely striate, δ unknown, 10 mm, Madagascar longiscutis Tsuneki, sp. nov.
- 7 Frontal shield without outward branch carinae (Fig. 336) (interantennal area: Fig. 340, in δ ultimate antennal joint as long as 4 preceding joints united, 8th sternite: Fig. 341, genitalia: Fig. 342, fore and mid tibiae

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- 8 Broadly ferruginous), 10-12 mm, Madagascar *sinuoscutis* Arnold, 1945
- 9 Frontal shield with distinct outward branch carinae
- 10 1.5 times longer than upper area, if somewhat over it the surface broadly rounded excavated
- 11 Frontal shield with upper area more than 1.5 times as long as lower area
- 12 Frontal shield in ♀ broadly rounded concave, lower carinae (sometimes except basal part) broadly curved out, with apical angle never pointed (Fig. 169-174), in ♂ lower carinae only gently sinuate, never strongly bent near lateral angles, with apical angle broadly rounded, 8.5-10 mm, India, Bangla Desh, Chagos and Maldives
- 13 Frontal shield more or less inclined towards median line, lower carinae never broadly rounded out, stimate or straight (Figs. 73-92), apical angle pointed, at most narrowly rounded, 10-12 mm *schmiedeknechti* Kohl, 1906
- 14 Frontal shield with lower carinae sinuate, distinctly curved up near lateral angles, outward branch carinae comparatively long, penetrated into eye incisions, surface excavation variable in depth (Figs. 73-84), mesoscutum smooth, sometimes microcoriaceous, superimposed punctures fine - medium-sized, ultimate antennal joint in ♂ most usually longer than 5 but shorter than 4 preceding joints united (Fig. 70), India, Nepal, Ceylon, Thailand, Cambodia, Viet-Nam, Laos, Hainan, Macao, Hongkong, Malaya, Indonesia, Borneo, Philippines and Formosa
- 15 Frontal shield with lower carinae nearly straight (Figs. 85-95), ultimate joint of antenna in ♂ as long as 4 preceding joints united (Figs. 71-72) *schmiedeknechti* connexum Turner, 1908
- 16 Frontal shield with outward branch carinae short, usually not entering eye incisions, and with surface excavation shallow, mesothorax distinctly microcoriaceous and superimposed with comparatively large punctures, Anstralia
- 17 *g.* Connexum Australian Strain
- 18 Outward branch carinae rather long, distinctly entering eye incisions, surface excavation deep, mesothorax usually without microsculpture, with punctures fine to medium-sized, Sumba I., New Guinea and Bismarck Archip. (Lavongai I.)
- 19 *g.* Connexum New Guinea Strain
- 20 Frontal shield: Figs. 4 and 5, with surface of lower half very shallow, nearly flattened and upper half distinctly inclined posteriorly (Figs. 3 and 6) and deeply hollowed around ocellus (mesoscutum weakly microcoriaceous, interantennal structure: Fig. 8, with bristles few in number, gastral petiole: Fig. 4, ♂ unknown), 8-9 mm, India (Madras and Bombay), 9.5, ♂ 6.5-9 mm, Pakistan (Quetta)
- 21 Lower carinae more strongly inclined medio-anteriorly, medio-apical carina shorter (gastral petiole not so thick and robust) (Figs. 275-276), ♀ 9.5, ♂ 6.5-9 mm, Pakistan (Quetta)
- 22 Frontal shield comparatively broad and short, length ratio to width at lateral angles rather nearer to 1.5, upper lateral carinae mostly not constricted, if constricted the constriction small and slight
- 23 Frontal shield comparatively narrow and long, length ratio to width at lateral angles rather close to 2, upper lateral carinae broadly constricted
- 24 Interantennal transverse carina ended at dorso-lateral part of antennal socket-rim, not turned posteriorly to enclose the hollow at the side of medio-apical carina of frontal shield (the shield: Figs. 311-312, interantennal area: Fig. 314, male genitalia: Fig. 320, paramere with apical bristled branch also somewhat dilated, sternite 8: Fig. 323 or 324), ♀ 10-13, ♂ 6.5-11 mm, Madagascar and adjacent Islands
- 25 Interantennal transverse carina from its lateral apex turned posteriorly as a thick ridge to enclose a deep hollow at the side of medio-apical carina of frontal shield (Figs. 213-214) (the shield: Figs. 201-212, interantennal area: Fig. 213, male genitalia: Fig. 237, apical bristled branch of paramere stick-like, not dilated, sternite 8 in ♂: Figs. 228-236), 8-12 mm, widely spread over the Oriental Region and Peking *thaiannum* Tsuneki, 1961
- 26 Frontal shield with upper area more than 1.5 times as long as lower area
- 27 Frontal shield in ♀ broadly rounded concave, lower carinae (sometimes except basal part) broadly curved out, with apical angle never pointed (Fig. 169-174), in ♂ lower carinae only gently sinuate, never strongly bent near lateral angles, with apical angle broadly rounded, 8.5-10 mm, India, Bangla Desh, Chagos and Maldives
- 28 Frontal shield more or less inclined towards median line, lower carinae never broadly rounded out, stimate or straight (Figs. 73-92), apical angle pointed, at most narrowly rounded, 10-12 mm *schmiedeknechti* Kohl, 1906
- 29 Frontal shield with lower carinae sinuate, distinctly curved up near lateral angles, outward branch carinae comparatively long, penetrated into eye incisions, surface excavation variable in depth (Figs. 73-84), mesoscutum smooth, sometimes microcoriaceous, superimposed punctures fine - medium-sized, ultimate antennal joint in ♂ most usually longer than 5 but shorter than 4 preceding joints united (Fig. 70), India, Nepal, Ceylon, Thailand, Cambodia, Viet-Nam, Laos, Hainan, Macao, Hongkong, Malaya, Indonesia, Borneo, Philippines and Formosa
- 30 Frontal shield with lower carinae nearly straight (Figs. 85-95), ultimate joint of antenna in ♂ as long as 4 preceding joints united (Figs. 71-72) *schmiedeknechti* connexum Turner, 1908
- 31 Outward branch carinae rather long, distinctly entering eye incisions, surface excavation deep, mesothorax usually without microsculpture, with punctures fine to medium-sized, Sumba I., New Guinea and Bismarck Archip. (Lavongai I.)
- 32 *g.* Connexum New Guinea Strain
- 33 Frontal shield: Figs. 4 and 5, with surface of lower half very shallow, nearly flattened and upper half distinctly inclined posteriorly (Figs. 3 and 6) and deeply hollowed around ocellus (mesoscutum weakly microcoriaceous, interantennal structure: Fig. 8, with bristles few in number, gastral petiole: Fig. 4, ♂ unknown), 8-9 mm, India (Madras and Bombay), 9.5, ♂ 6.5-9 mm, Pakistan (Quetta)
- 34 Lower carinae more strongly inclined medio-anteriorly, medio-apical carina shorter (gastral petiole not so thick and robust) (Figs. 275-276), ♀ 9.5, ♂ 6.5-9 mm, Pakistan (Quetta)
- 35 Frontal shield comparatively broad and short, length ratio to width at lateral angles rather nearer to 1.5, upper lateral carinae mostly not constricted, if constricted the constriction small and slight
- 36 Frontal shield comparatively narrow and long, length ratio to width at lateral angles rather close to 2, upper lateral carinae broadly constricted
- 37 Interantennal transverse carina ended at dorso-lateral part of antennal socket-rim, not turned posteriorly to enclose the hollow at the side of medio-apical carina of frontal shield (the shield: Figs. 311-312, interantennal area: Fig. 314, male genitalia: Fig. 320, paramere with apical bristled branch also somewhat dilated, sternite 8: Fig. 323 or 324), ♀ 10-13, ♂ 6.5-11 mm, Madagascar and adjacent Islands
- 38 Interantennal transverse carina from its lateral apex turned posteriorly as a thick ridge to enclose a deep hollow at the side of medio-apical carina of frontal shield (Figs. 213-214) (the shield: Figs. 201-212, interantennal area: Fig. 213, male genitalia: Fig. 237, apical bristled branch of paramere stick-like, not dilated, sternite 8 in ♂: Figs. 228-236), 8-12 mm, widely spread over the Oriental Region and Peking *thaiannum* Tsuneki, 1961
- 39 Comparatively larger form, 12-13 mm (♀), mesoscutum fairly closely punctured, punctures in front of parapsidal sutures as large as puncture interspaces, on median area much sparser, punctures distinctly separated from each other, interapace without microsculpture, fairly well shining, Madagascar *scutifrons* Sausseure, 1890
- 40 Smaller, 9-10 mm (♀) *scutifrons* Sausseure, 1890
- 41 Mesoscutum weakly microcoriaceous (♀) or not (♂) and superimposed with coarser but shallower punctures, punctures confluent or subconfluent and surface irregularly rugoso-punctate, Aldabras
- 42 Mesoscutum without microsculpture, punctures not confluent with each other, but distinctly larger and closer than in typical race and fore tibia and tarsus more broadly ferruginous than in this, Seychelles
- 43 Mesoscutum very strongly microcoriaceous, with punctures large, close and strong, partly confluent, Mauritius *scutifrons* mauritianum Tsuneki, ssp. nov.
- 44 Ultimate antennal joint in ♂ longer than 2 but shorter than 3 preceding joints united (Figs. 215, 217), mesoscutum with more or less plumbeous shine, with punctures fine - medium-sized, petiole normally slender, appr. 5 times as long as its maximum width (sternite 8 with apical emargination comparatively shallow, broadly rounded at the sinus - Fig. 228, apical part of penis valve: Fig. 251), India, Sri Lanka (?), Thailand, Laos, Malaya, Sumatra, Java, (Sumbawa?) *thaiannum* *thaiannum* Tsuneki, 1961
- 45 Ultimate antennal joint in ♂ as long as 3 preceding joints united (Fig. 218), mesoscutum without plumbeous shine, with punctures as in typical race, gastral petiole normal (sternite 8 in ♂ with latero-apical arms slender and long, with emargination broad, deep and rounded at the bottom - Fig. 230, apical part of penis valve: Fig. 253), Moluccas (Ambon I.)
- 46 Ultimate antennal joint in ♂ as long as 3 preceding joints united (Fig. 219), mesoscutum and gastral petiole as in typical race (sternite 8 with apical emargination shallower than in typical race - Fig. 231, apical part of penis valve: Fig. 256), Borneo (Sarawaku and N. Borneo)
- 47 Ultimate antennal joint in ♂ as long as, or shorter than 2 preceding joints united (Fig. 220), mesoscutum and gastral petiole as in typical race (sternite 8 in ♂ with apical arms narrow, moderately long, with emargination deep and rounded - Fig. 232-234, apical part of penis valve: Fig. 258), Philippines
- 48 Ultimate antennal joint in ♂ as long as 3 preceding joints united (Fig. 221), punctures on mesoscutum larger than in typical race, gastral petiole markedly robust, only 4 times as long as its maximum width (Figs. 222-223) (sternite 8 in ♂ with apical emargination shallow and broad, truncate and minutely waved at the bottom, apical part of penis valve: Figs. 259-262), Ryukyus (Amami I.) and N. China (Peking)
- 49 Upper lateral and dorsal carinae of frontal shield not acute, microsculptured and dull (Figs. 34-48), punctures on mesoscutum close and frequently rugosely confluent (100s = 3 : 2 ~ 5 : 4 in ♀ and appr. 3 : 2 in ♂, ultimate antennal joint in ♂ as long as 3 preceding joints united (Figs. 31-33), interantennal structure: Fig. 19, sternite 8 in ♂: Fig. 49, male genitalia: Figs. 50-51), 8-12 mm, Australia, Solomon Is., New Guinea and Philippines
- 50 Upper lateral and dorsal carinae (often except medio-dorsal area) acute and shining, punctures on mesoscutum comparatively sparse, not rugosely confluent
- 51 Length 9 mm, puncture-interspaces in front of parapsidal sutures of mesoscutum 1-2 times larger than puncture-diameter, on median lobe much sparser, 100s = 10 : 9, POD = Od : 1 : 6 : 7, gastral petiole about 5 times as long as its maximum width (frontal shield: Fig. 283, interantennal structure: Fig. 284, with only two bristles, ♂ unknown), India (Deesa)
- 52 Length 15.5 mm, puncture-interspaces on mesoscutum much wider, at the side and in front about 4 times wider than punctures, 100s = 5 : 2, OOD : Od = 1 : 2, gastral petiole 5-6.5 times as long as its maximum width (interantennal structure unknown, ♂ unknown), Madagascar *seyrigi* Arnold, 1945

TRYPHOXYLON PILEATUM F. SMITH, 1856

Trypoxylon pileatum F. Smith, Cat. Hym. Ins. Coll. Brit. Mus., 4: 377, 1856 (♀, India Madras)

Trypoxylon pileatum Smith is the first of the shield-bearing species that have been described from the Oriental Region and as the description is so simple that it can agree with the characters of many of the allied species some of the succeeding authors identified various species erroneously with Pileatum Smith. For instance, T. pileatum (?) Cameron (1889) is, according to the reexamination of the specimens dealt with by him, the same species as that which was intended by Cameron to describe his phantom species "nigrificans" (nom. nud.) and quite different from true Pileatum and T. pileatum: Bingham (1897) is, judging from the distribution records of the species given by him - possibly based in the main upon the collection of UMO -, considered to be a complex of various species (his description is essentially a reproduction of the Smith's one). Furthermore, T. pileatum: LeRoy (1909, p. 202) and T. pileatum: Datt (1912, p. 200), both treated its biology and were later cited by Richards (1974 p. 344), are quite uncertain, possibly a complex of species, because T. pileatum is considered not so common as mentioned by them. Kohl prudently avoided to treat this uncertain species in his "Hymenopteren Südabisiens" (1906), though he arranged all the shield-bearing species known to him in an annotated key and gave a comment on Pileatum in connection with the description of his Schmidtknechtii. On the other hand, E. Strand in his treatment of the Formosan relative compared it with the description of Pileatum: Cameron as well as with the figure of Kohl's Schmidtknechtii that he considered as identical with Pileatum created a new subspecies (var.) and named it subpileatum.

The present reexamination of the type of T. pileatum F. Smith reveals that it is doubtlessly different not only from Pileatum: Cameron, 1889, but also from Schmidtknechtii Kohl, 1906, and that it is rather close to T. scutiformis Samsure, 1890 known from Madagascar. According to the knowledge obtained through the present investigation it is a rare species restricted in distribution to some certain districts of India only. Except for the type (♀ from Madras) I could not observe any other specimen of this species than two females from Bombay collected in 1902.

Observation of the type of Trypoxylon pileatum Smith, 1856

The state of the specimen

The body is pinned at the mesoscutum and as the pin is comparatively thick the greater part of the scutum is broken. The specimen is, therefore, glued beneath to a small piece of card paper and it is pierced, together with the insect by the pin that is cut at 4 mm above the specimen and is stabbed below in the pinned polyethylenefoam pedestal. The head of the specimen is glued to the fore side of the pronotum, covering the greater part of it; the gaster has been dropped during the present shipment and glued by me by the right side to the bent apex of a slit of triangle card paper and is attached to the pin of the pedestal; left fore leg is in the glue beneath the insect body, greater part of the right mid leg which is detached from the body at 2/3 from base of coxa is also in the glue, apical joint of right hind tarsus is lacking, other legs complete; antennae are produced anteriorly and opened in a V-shape; wings are opened, left hind wing alone standing, the right fore wing is partly broken (possibly some one opened them to observe the sculpture of the propodeum).

The labels attached are from above: (1) circular one, 7 mm in diameter, encircled with red ring, with the printed letters, Type: (2) a slit, 7 x 16 mm, with handwritten "Pileatum, Sm. Type" in two lines; (3) a slit of common paper, 7 x 20 mm, (4) a square card 10 x 10 mm:

(3)	Lo Elliot Esq. Madras	handwritten	pressed	B.M. TYPE HYM.	21,444
		handwritten	handwritten		

Redescription of the species:

♀. Head and thorax-complex 3.5 mm, gaster 5 mm. Black, anterior glabrous margin of clypeus carrying near each side a semitransparent yellowish spot (as frequently

(8)

the case in this group), pronotal tubercle posteriorly slightly brownish, tegula ferruginous, legs dark brown with articulations paler, tibial spurs whitish, wings hyaline, stigma and veins castaneous. Hairs on inner orbits from eye incisions to sides of antennal sockets, supra-clypeal area and clypeus silvery, on clypeus all directing forwards.

H. 1.00 mm. (10Ds), A3, AL2, P = 100, 70, (4 : 3), 20, 16, 120. Head from above with OOD : POD = 2 : 5, POD nearly as wide as postcellular diameter, head seen in fr- Fig. 2, frontal shield seen vertically: Fig. 4, lower area very shallow, nearly flattened, very feebly inclined towards median line, with a small oval impression on lower medial angle, upper area at medio-lateral parts somewhat raised and thence upwards inclined posteriorly as a whole (Fig. 3, in profile) and the surface deeply hollowed towards anterior ocellus, general contour lines of the shield (somewhat densely given) as in Fig. 4, medio-apical carina of the shield at the end split into two short branches and perpendicularly inclined to interantennal area (detailed structure of which can not be observed due to the state of antennae, but) one (constant?) long curved bristle arising from upper part of the area, the area at side below of highly raised medio-apical carina and behind interantennal transverse carina deeply impressed, but the impression not embraced at the outer side by the back turned carina of the latter (as done in T. thalium). Antennal joint 1 deeply excavated on inner side, joints 3, 4, 5 with relative length appr. 6, 5, 4, joint 3 approx. 3.5 times as long as broad at apex, clypeus rounded out anteriorly and medianly gently recurved (in Fig. 2), disc weakly roundly tuberculate. Pronotum inobservable, propodeum: Fig. 14, area dorsalis with lateral and medial furrows broad and considerably deep, at base of posterior inclination a large, deep hollow present, thence a narrow canal runs down, but not reaching apex, dorsal rim of ligament socket of gaster roundly produced posteriorly, ferruginous and semitransparent. Gastral petiole with relative length, maximum and minimum widths = 100 : 21 : 7.5, with relative width at spiracles 9.5 which are at 27 (relatively) from base and located on dorsal side close to median line, thence posteriorly for some distance subparallel and then gradually enlarged to clavate; relative length to width of tergites 2 and 3 respectively 48 : 26 and 50 : 36. Hind coxal organ shortly toothed, venation of fore wing as in Fig. 12.

Frontal shield microcoriaceous and closely superimposed with fine punctures, intervals of punctures slightly narrower than the width of punctures, but towards the median line punctures gradually sparser, frons outside the shield more weakly microcoriaceous and very sparsely punctured, on vertex microsculpture much weaker, a few punctures in a line along the posterior margin of frontal shield and on both sides of interocellar ridge. Mesoscutum on antero-lateral area finely sparsely punctured, puncture-intervals 1.5-5 times as wide as puncture-diameters, with surface much more minutely and feebly microcoriaceous (under 64 x), showing somewhat a plumbeous shine, mesopleuron with similar punctation and plumbeous shine, but except prepectus punctures sparser and finer upwards and closer and larger downwards, scutellum and postscutellum finely and rather sparsely punctured, metapleuron smooth and polished, propodeum transversely coarsely striate (Fig. 14), sides obliquely finely and closely striate, only on anterior portion narrowly without striae and shining petiole before spiracles with slightly impressed oblong area and medianly finely grooved, whole the surface till spiracles half-mat, closely covered with very fine and very short pubescence, following tergites covered with much longer pubescence.

Observation on two other specimens

2 ♀, India, Bombay, 5.VII.1902, Biró leg. (RNMH).

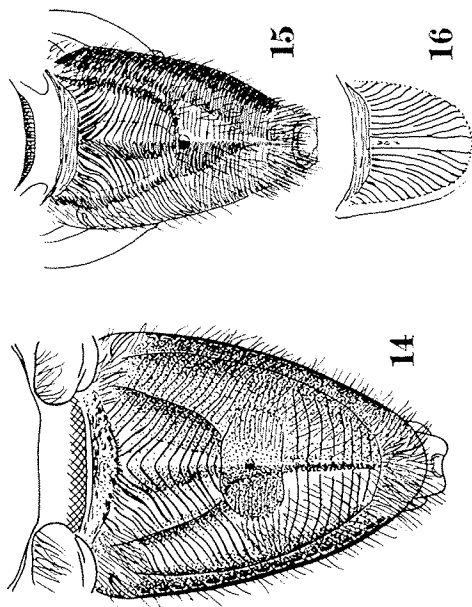
The head and legs of both specimens are considerably damaged by the noxious insects and measurement of the head width was done in one of the specimens through the intact half and in the other it was unable even to do so, and here the relative length of other parts were measured under the standard which was taken as the same as in the other:

Items	HW	IODv	(IODs)	A3	(L/W)	AL2	Pet	Ma	MI	2	3
Ex. 1	100	30	(10 : 8.0)	18.0	(3.0)	15.0	110	(100	21	8	50
Ex. 2	100	30	(10 : 7.5)	18.6	(3.1)	14.4	112	(100	22	8	50

♀. Length 8-9 mm. Black, mandible with apical 2/3 ferruginous red, tegula semitransparent ferruginous, clypeus on each side of anterior margin with a pale brown spot, palpi and tibial spurs light ochreous, articulations of legs brownish, wings

(9)

hyaline, veins and stigma dark brown. Hairs on head and thorax-complex silvery or silky white, long curved bristles on interantennal area and shorter curved erected bristles on clypeus also silky white, transversely arranged bristles on apical margin of sternites 2-5 (4 in number and medial 2 longer) and scattered ones on 6 dark brown. Frontal shield sparsely covered with short greyish pubescence, mixed with sparse short silvery hairs which are in one of the specimens concentrated on medial line, in the other scattered over a certain central area.
Vertex without interocellar ridge, the area only gently rounded, OOD :

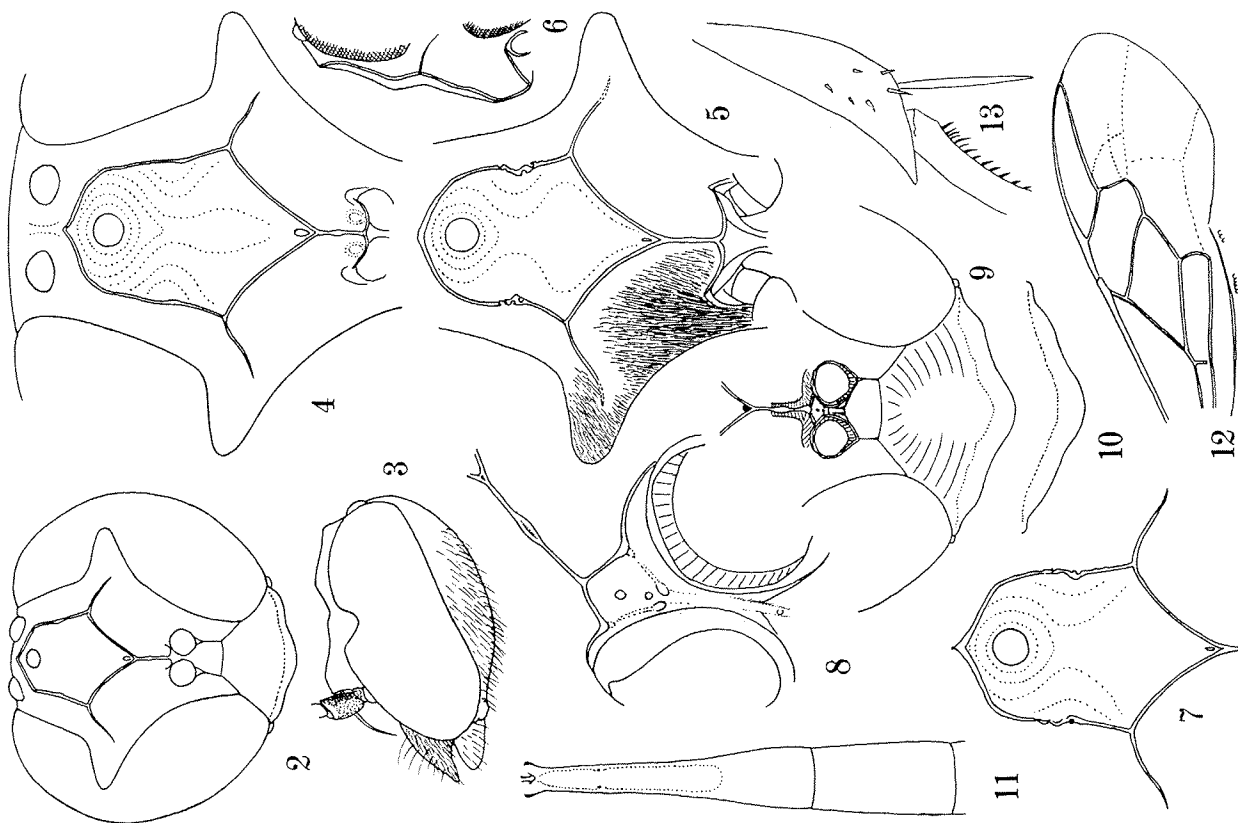


Figs. 14-16. 14, 15: Propodeum. 16: Area dorsalis.
14: Type specimen. 15: Bombay specimen No. 1 (different magnification). 16: Bombay specimen No. 2.

POD = 1 : 3 and 2 : 5, POD equal to width of postocellus, frontal shield; Figs. 5 and 7, completely enclosed by carinae, relative lengths of total area and upper area and width at lateral angles in one specimen 29, 18 and 20, in the other 31, 20 and 20, marginal carinae very low, surface on lower half of the shield broad and very weakly excavated, in one specimen nearly flattened, on upper half more deeply inclined towards ocellus (Fig. 6), lateral parts of the shield above middle slightly rounded, elevated, medio-apical carina comparatively long, slightly more than half the length of lower carina and as long as antennal joint 7, interantennal structure as given in Fig. 8, the part of dotted lines, as to whether there are elevated lines or not, can not be confirmed, but the long curved bristles are distinctly 2 in number from upper

Explanation to Figs. 2-13

Figs. 2-13. *Trypoxylon pileatum* F. Smith, ♀. 2-4, type; 5-13, Bombay specimens.
2: Head in frontal view. 3: Head in lateral view. 4, 5: Frontal shield in vertical view. 6: Frontal shield in lateral view. 8: Interantennal structure (circlets: bristle pores). 9: Clypeus. 10: Ditto in the other specimen. 11: Gastral segments 1 and 2. 12: Fore wing venation. 13: Right mid tibia and metatarsus.



area; IOv: IOpc = 5 : 4 or 4 : 3, clypeus: Fig. 9 or 10, apical glabrous marginal area in one specimen distinctly, in the other less distinctly reflected, antennal joints 3, 4, 5 with relative length appr. 10, 8, 7, joints 3, 4, 7 appr. 2.8- (widest view, in narrowest view 3-), 2.3- (2.5) and 1.8-times as long as wide at apex respectively. Collar of pronotum medially narrowed and laterally roundly incrassate, the part posterior to transverse furrow discoloured, appearing yellowish brown, lamina on side broad triangular, with apex obtusely pointed. Propodeum: Fig. 15, upper rim of ligament socket of gaster roundly produced posteriorly, intercoxal carina gently upcurved. Gastral petiole: Fig. 11 and in the above measurement, spiracles at about 1/4 from base, relative width of tergites 2 and 3 at each apex respectively 26 and 34 (ref. above measurements). In fore wing radial cell not closely approaching apex of wing, abscissa 2 of cubital vein appr. half the length of abscissa 1, transverse cubital vein gently curved inwardly, postero-distal angle of cubital cell less than 90°, not pointed; mid tibia at above apical spur provided with short white spinules arranged in a ring (Fig. 13), hind coxal tubercle very short, but distinctly toothed.

Vertex very delicately microcoriaceous and finely closely punctured, toothed intervals as large as punctures, frontal shield similarly microcoriaceous and more finely and closely punctured, punctures outside shield and above outward branch carina much finer and closer, below the carina turning into close hair-bearing points. Mesoscutum and scutellum with ground microsculpture much weaker than on head and nearly uniformly and closely superimposed with fine punctures, interspaces as large as puncture-diameter, not larger toward median area, mesopleuron finely punctured, on prepectus punctures sparse, on epimeral area very fine and sparse, but gradually larger and closer below; sculpture on propodeum: Fig. 15, difficult to observe due to fairly close, reversely directed hairs, area dorsalis at base obliquely and posteriorly transversely very coarsely striated with about 10 carinae, with interspaces delicately rugulose (rugulae parallel to carinae), the striae run across lateral marginal furrow, but not all of them reaching lateral carinae, thus the areas along lateral carinae very coarsely transversely striate, posterior inclination transversely more closely striate, sides transversely, somewhat arcuately, anteriorly obliquely, finely and closely striate, the striae anteriorly weaker; gaster covered with hair-bearing fine punctules.

Remarks. The sculpture on area dorsalis of propodeum markedly different in one of the specimens from the other as given in Fig. 16; but as the sculpture of propodeum is considerably variable between specimens of a species no important taxonomic significance can be considered in relation to this variation.

The Bombay specimens above observed differ from the type from Madras in that the longitudinal ridge between ocelli is lacking and that the punctures on vertex and mesoscutum are uniformly and closely distributed (on vertex almost without smooth space around postocelli). The former variation is sometimes met with in other species, but the latter is exceptional and may have some taxonomic significance to be studied with sufficient material in future.

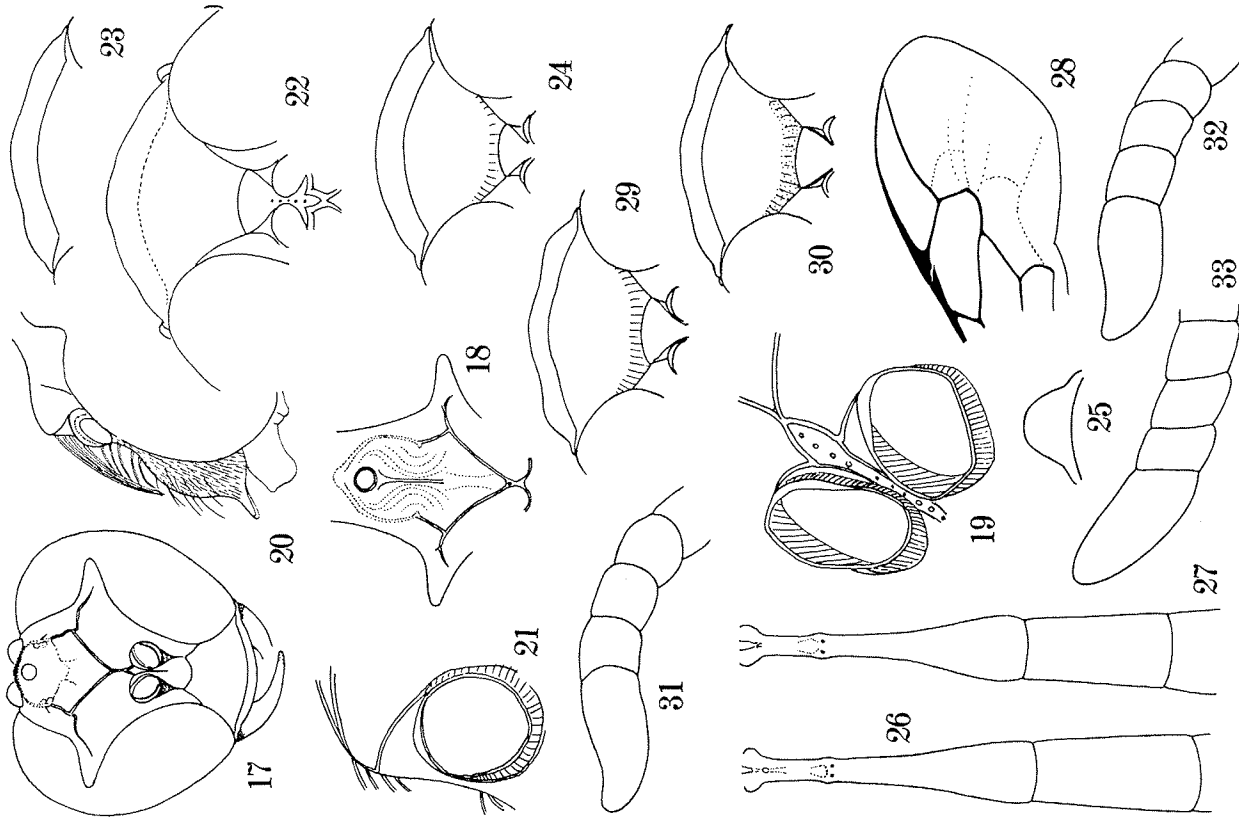
TRYPOXYLON PAPUANUM TSUNEMI, 1977

Trypoxylon papuanum Tsuneki, Spec. Publ. Jap. Hym. Ass., 6: 2, 1977 (6 ♀, New Guinea Hono Golf, Simbang).

Explanation to Figs. 17-33

Figs. 17-33. *Trypoxylon papuanum* Tsuneki, 1-28... ♀, 29-33... ♂

17: Head. 18: Frontal shield in vertical view (with dotted contour lines). 19: Interantennal structure, with bristle pores (circlets). 20: Antennal area and clypeus seen in profile. 21: Interantennal area in profile. 22-24, 29-30: Clypeus, variation (22-24: New Guinea specimens, 29-30: Australian, 22: Nabire. 23: Mawai. 24: Cape Rodney. 29: N. Queensland. 30: Cape York). 25: Upper rim of ligament socket of gaster. 26, 27: Gastral petiole (26: usual form. 27: exceptional form). 28: Fore wing venation. 31-33: Apical part of antenna in different direction and condition (Australian specimens).



Specimens examined: 4

5 ♀ ♀, Australia (3 ♀ ♀, BPRM; 2 ♀ ♀, N. Queensland (Babinda), 12. IV. 1919, F. X. Williams; 1 ♀ ♀, N. Queensland (Cape York, Stewart Range, 500 m), 29. IV. - 5. V. 1961, L. & M. Gressitt (BPRM). 1 ♀ ♀, N. Queensland (Carross), date unknown (19187), J. F. Illingworth; 1 ♀ ♀, N. Queensland (Kuranda), 3. XI. 1972, O. W. Richards; 1 ♀ ♀, N. Queensland, date unknown, R. C. L. Perkins Coll. (BMNH).

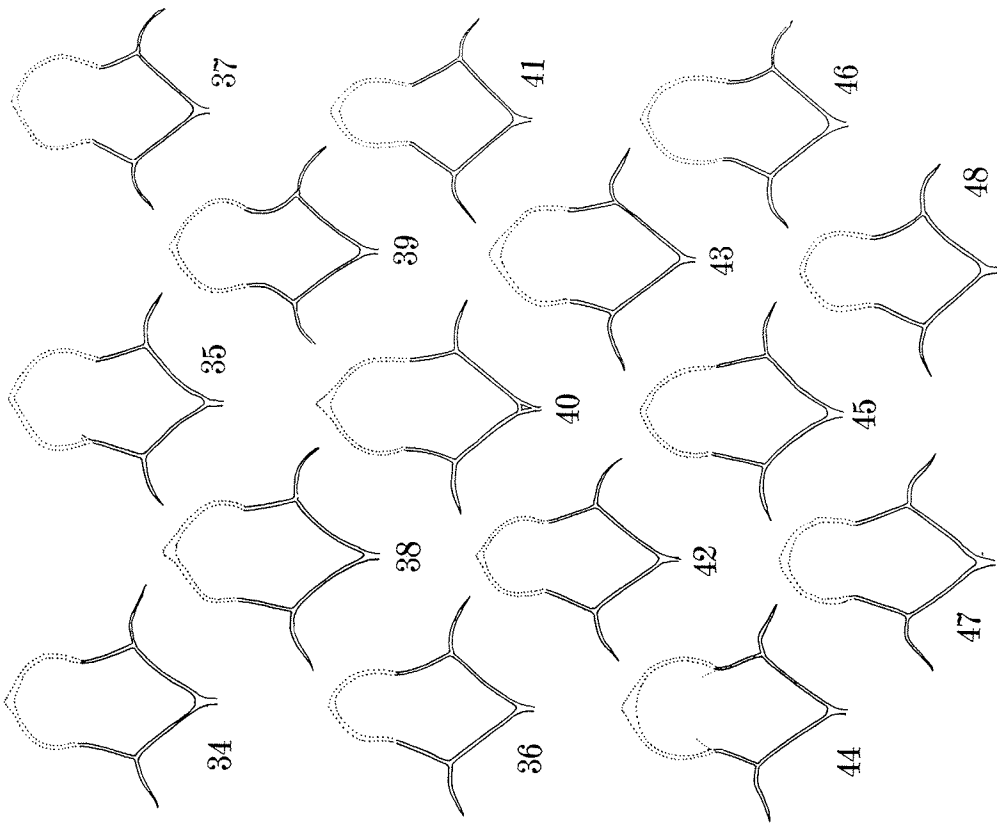
110 ♀, Solomon Is. (103 ♀, BPRM, mainly with Malaise trap; 1 ♀ ♀, CAS; 5 ♀ ♀, BMNH; 1 ♀ ♀, BPRM). 1 ♀ ♀, Bougainville I. (South, Kieta), 27. XI. 1959, T. C. Maa. 5 ♀ ♀, Choiseul I.: 5 ♀ ♀ (Malangona, 10 m), 8, 14, III. 1964; 1 ♀ ♀ (Kitipi Range, 80 m) 13. III. 1964; 1 ♀ ♀ (Kolombangara Range, 80 m), 20. III. 1964, P. Shanshan. 7 ♀ ♀, Vella Lavella I.: 5 ♀ ♀ (Kow, 30 m), 28. XI. 1963; 2 ♀ ♀ (Pusisama), 17. XI. 1963, P. Shanshan. 6 ♀ ♀, Kolombangara I. (Penela, 30 m), 7, 9, II. 1964, P. Shanshan. 6 ♀ ♀, New Georgia Group: 5 ♀ ♀ (Gizo I., 100 m), 17, 20. VII. 1964, J. & M. Sedlacek; 1 ♀ ♀, (Munda Pt. Area), 8. XII. 1945, Franclemont (USNM). 5 ♀ ♀, Russel Is. (Pavavu I. Peperala, 0-100 m), 18, 20. VII. 1964, R. Straatman. 7 ♀ ♀, Florida Is.: 5 ♀ ♀ (Tulagi, Jun-gle or Sasepi cutting), 25. XI. 16, 25. XII. 1974; 26. I. 1935; 1 ♀ ♀ collecting mid. H. T. Pagden (BMNH); 1 ♀ ♀ (Nggela I., Haeleta, 250 m), 17. X. 1964, R. Straatman; 1 ♀ ♀ (Soita) III. 1945, G. E. Bebbart (CAS). 69 ♀ ♀, Malaita I.: 31 ♀ ♀ (Dala), 8, 11, 13, 14, 19, 20, 24, 25, 30. VI. 1964 and 5. VII. 1964, R. Straatman; 31 ♀ ♀ (Dalla), 50 m) 6-8, 9-13, 9-14, 15-19, 22. VI. 1964, J. & M. Sedlacek. 5 ♀ ♀, Guadalcanal I. (Tumba-110, 30-40 km W. of Honiara), 21-25, 27. V. 1964, J. Sedlacek & R. Straatman.

38 ♀, New Guinea (20 ♀ ♀, BPRM - Malaise trap; 1 ♀ ♀, USNM; 8 ♀ ♀, BMNH; 6 ♀ ♀, BPRM). 1 ♀ ♀, Vogelkop, Kebar Valley, west of Manokwari, 550, 4-31. I. 1962, L. W. Quate. 1 ♀ ♀, Koba Nica, 3. III. 1959, R. T. Simon Thomas (BMNH). Northwestern Region: 3 ♀ ♀, Nabire, S. Geelvink Bay, 10-40 m, 2. VII. - 2. IX. 1962 & 2. X. 1962, H. Holtmann; 1 ♀ ♀, Japen I., SSE of Sumburaba, Davai Range, 28. X. 1962, H. Holtmann. Eastern Region: 6 ♀ ♀, Huon Golf, Simbang, Bir6 (BMNH); 2 ♀ ♀, Huon Peninsula, Binschhafen, 80 m, 16. IV. 1963, J. Sedlacek; 1 ♀ ♀, Zensag-Lae road, 200 m, 17. I. 1965; 1 ♀ ♀, Lae, 10 m, 27. I. 1970, J. Sedlacek; 1 ♀ ♀, Bainingk, 150 m, S of Maprik, 12. I. 1960, T. C. Maa (non Malaise trap); 2 ♀ ♀, Mau, 1200 m, 21. VIII. 27. X. 1965, J. Sedlacek; 1 ♀ ♀, Markham Range Valley, Nadzab, 14, V. 1944, K. V. Krombein (USNM); 1 ♀ ♀, Markham Range, 60 m, 8. VIII. 1964, J. Sedlacek. Southeastern Region: 1 ♀ ♀, Cape Rodney, 4. XI. 1960, L. & M. Gressitt (non Malaise trap); 1 ♀ ♀, Mami Pitu., E. of Port Glasgow, 150 m, 3. II. 1965, R. Straatman; 1 ♀ ♀, Biak Airport, 19-24. V. 1959, T. C. Maa (non Malaise trap); 4 ♀ ♀, Popondeta, 60 m, (2 ♀ ♀) 30-31. VIII. 2-4. IX. 1963, J. Sedlacek; (2 ♀ ♀), 26. IX. 1963, P. Shanshan. Central Region: 7 ♀ ♀, Brown River, 1 mile DASF "Block", 31. V. 1966, Coll. J. J. H. Szent Iwany. Ex. Coll. Dept. Agr. Pt. Moreaby, "in large numbers on moist road in rain forest". (BMNH). 2 ♀ ♀, Philippine Is. Luzon: Camaitenes Sur, Mt. Isarog, 800 m, 1. V. 1965, H. M. Torrevelles (BPRM).

Main characters

♀. Length 8-12 mm, most usually 10 mm or so. Black, mesoscutum with or without plumbeous shine, half mat or fairly shining, palpi and tibial spurs pale ochreous, mandible ferruginous, at extreme base black and at apex castaneous, tegula and wing veins blackish brown, sometimes clypeus on anterior margin and articulations of tarsi brownish; wings hyaline, very slightly clouded apically. Hairs on eye incisions, lower inner orbits and clypeus silvery, dense; pubescence on frontal shield greyish, mixed with silvery hairs on and along median line, long curved bristles on interantennal area and somewhat shorter erect scattered ones on clypeus silky white, hairs on temples, sides of thorax (metapleura glabrous) and whole of propodeum also silvery, thick, particularly abundant on posterior inclination of propodeum just above ligament socket of gaster, those on dorsum of thorax and whole of gaster very fine and short, greyish white, area dorsalis glabrous as usually the case in this group.

Head from above with width to length at eye appr. 2 : 1, seen in front; Fig. 17 eye incision rather narrow, sinus rounded, frontal shield most usually as in Fig. 18, but considerably variable in form (Figs. 34-48), always lower carinae and lower half of upper lateral carinae acute, distinct and shining, while rest of upper lateral and dorsal carinae only bluntly ridged, macrocaraceous, not shining, sometimes partly interrupted by irregular impression or punctures, medio-apical carina short, about a third the length of lower carina and triangularly attenuated apically, always excavated medially on upper part, surface of the shield very shallow on lower half and medially weakly canalulate, on upper part deeply inclined towards ocellus; general contour lines rather densely given as in Fig. 18, interantennal structure; Fig. 19, seen in profile; Fig. 21, from upper enclosed area & long curved bristles (shown by



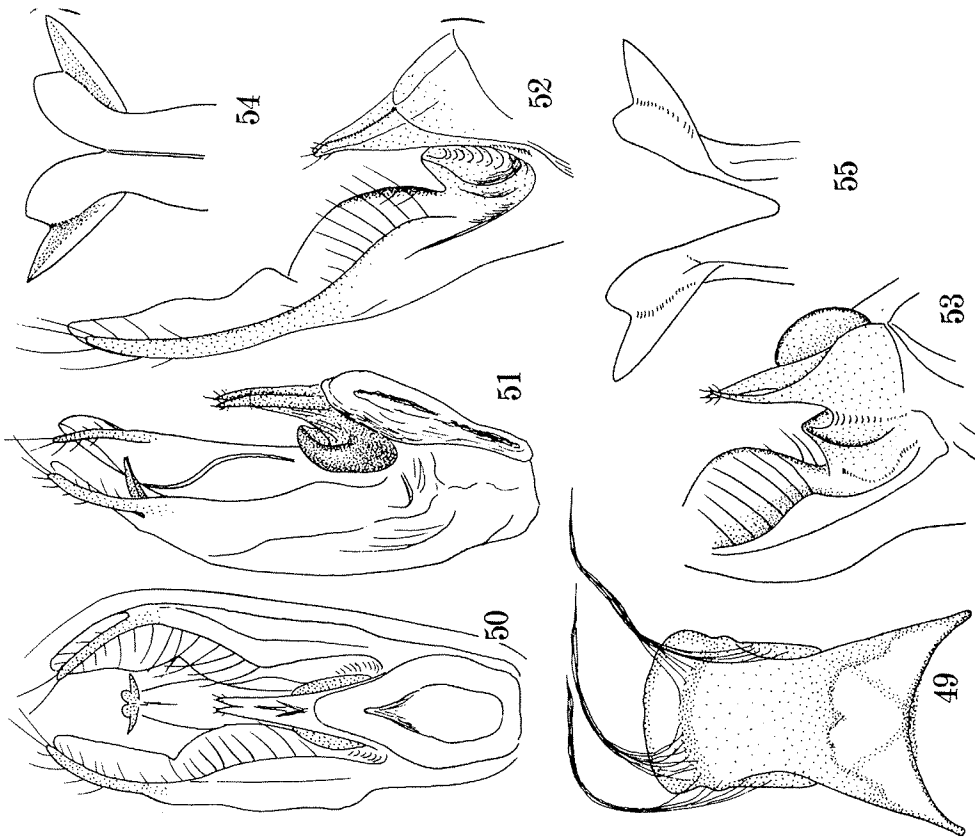
Figs. 34-48. Trypoxylon papuanum Tsunekii, variation in form of frontal shield. 34-39...3, all others ♀. 36-37: Central Queensland. 42-46: Solomon Is.: 42: Choiseul. 43: Russel. 44: Vella Lavella. 45: Kolombangara. 46: Guadalcanal. 47-48: Philippines (Luzon).

circlets in Fig. 19) and from lower carinate area 6 similar but shorter ones, varied in thickness, arising (the bristles likely to drop off). Clypeus with apical margin rounded out, sometimes weakly recurved in middle (Figs. 22-24). Disc gently roundly elevated from base (Fig. 20, in profile), not tectate. Antennal joint 1 with inner side below deeply excavated, joints 3, 4, 5 with relative lengths approx. 10, 8 and 7, joint 5 in broadest view (dorsal) subparallel, 2.7-2.8 times as long as broad at apex, in narrow view (lateral) slightly divergent apically, amply thrice as long as broad at apex, ultimate joint equal in length to joint 5 and twice as long as broad at base. Collar of pronotum with anterior part very narrow, weakly roundly enlarged laterally, posterior part broad, half discoloured, dark brownish, lamina on side wide triangular, only slightly produced, with apex obtuse; meso- and metathorax normal in structure, propodeum also normal (lateral carinae strong, area dorsalis inverted tra-

Table 1. Measurements on *Trypoxylon papuanum* Tsunekii, ♀ ♂.

Loco.	♀	♂	IODv(10Dc)	(OOD Od	POD)	(FSL UL U/L)	A3	(L/W)	Aul	Pet	(Ma MI	Sp	2	3)
S. Bougainville	26	7.7	1	6.7	5.0	18	12	1.8	16	2.8	16	128	19	7 30 48 50
Choiseul	26	7.5	1	6.7	5.0	18	12	1.9	16	2.8	16	128	22	7 30 46 52
Choiseul	26	7.8	1	6.0	4.0	18	12	1.9	16	2.8	16	126	23	7 30 45 52
Vel. Lavella	26	8.0	1	4.8	4.0	17	11	1.8	16	2.8	16	122	21	7 30 45 48
Kolombangara	25	8.2	1	4.6	4.0	18	12	1.9	16	2.8	15	120	26	9 30 56 60
Kolombangara	26	8.0	1	8.0	6.0	18	11	1.9	16	2.7	16	120	24	7 30 46 52
Russel	26	7.3	1	5.0	4.0	17	11	1.7	15	2.6	16	130	20	7 30 44 46
Florida	24	8.0	1	5.0	5.0	17	11	1.7	15	2.6	16	126	20	7 32 45 46
Malaita	26	6.7	1	4.0	4.0	17	12	2.1	14	2.6	16	122	22	8 32 50 50
Malaita	28	6.5	1	4.4	4.0	17	12	2.3	16	2.8	16	120	22	8 30 48 52
Malaita	26	7.0	1	6.3	5.0	18	12	1.9	15	2.7	15	120	20	7 32 46 50
Malaita	27	7.0	1	6.6	5.0	18	12	1.8	16	2.8	16	120	21	7 30 50 52
Guadalcanal	27	7.0	1	4.0	4.0	18	12	2.0	16	2.8	16	120	20	7 30 52 58
N.C. Nabire	26	7.8	1	6.0	5.0	18	11	1.7	16	2.8	16	128	20	7 30 44 44
Huon Penins.	26	7.5	1	6.0	4.0	18	12	1.9	17	3.0	16	126	20	7 30 48 50
Bainyik	26	7.8	1	6.0	4.0	18	12	1.8	16	3.0	16	130	19	7 30 44 46
Wau	27	8.0	1	6.0	5.0	18	11	1.6	16	2.9	16	132	20	7 30 44 44
Wau	28	8.0	1	5.0	4.0	18	12	1.8	16	2.7	16	130	21	8 30 44 48
Zenag. Lae	27	8.0	1	5.0	5.0	18	12	1.9	16	2.7	15	130	19	7 30 48 50
Zenag. Lae	26	8.0	1	6.7	5.0	17	11	1.8	16	2.6	17	126	22	8 30 45 50
Martham R.	26	7.8	1	6.7	5.0	18	12	1.7	16	2.7	16	130	19	7 32 46 48
Fopondetta	26	7.5	1	4.4	4.0	17	12	2.1	16	2.7	16	136	20	7 30 44 46
Biak Air Port	26	7.4	1	3.0	3.0	17	11	1.8	15	2.6	-	126	20	7 30 46 50
Cape Rodney	28	7.3	1	5.0	5.0	19	12	1.8	16	2.7	16	120	22	8 30 52 54
Mamai	25	8.0	1	7.5	5.0	18	12	1.8	16	2.8	15	138	18	7 30 44 44
Brown River	26	7.8	1	8.0	6.0	17	11	1.7	16	2.8	16	122	21	8 32 48 50
Brown River	27	7.7	1	5.0	4.0	18	12	1.8	16	2.8	16	128	18	8 30 46 48
Brown River	27	7.8	1	7.5	5.0	18	12	2.0	16	2.8	16	126	19	7 32 48 50
Brown River	24	8.0	1	7.5	6.0	17	11	1.8	16	2.7	15	130	18	7 30 50 50
Brown River	26	8.0	1	7.5	6.0	17	11	1.8	16	2.7	16	130	20	7 32 45 50
Brown River	26	7.7	1	6.5	5.0	18	12	1.9	16	2.7	16	130	20	7 30 46 46
Brown River	26	7.7	1	6.5	5.0	17	11	1.8	16	2.8	16	130	18	7 30 46 46
A. N.Q. Cap.Yk.	26	7.7	1	4.0	4.0	18	12	1.8	16	2.8	-	128	22	8 30 44 44
Babinda	26	7.6	1	4.8	4.0	17	11	1.8	17	2.8	16	126	21	7 30 48 52
Babinda	26	8.2	1	8.0	6.0	18	12	1.8	16	2.4	16	124	22	8 32 48 48
Cairns	28	7.7	1	4.8	4.0	18	11	1.5	16	2.8	15	126	19	7 32 44 48
Kuranda	26	7.7	1	4.0	4.0	17	11	1.8	15	2.6	16	126	20	7 32 44 44
P. Luzon	26	7.5	1	6.0	4.0	16	11	1.9	16	2.8	16	120	22	8 30 46 50
Luzon	27	7.4	1	5.0	4.0	18	12	1.9	16	2.8	16	122	22	8 29 46 48
A. N.Q. Rabinda	29	7.0	2	3.8	3.0	17	11	1.6	15	1.7	-	126	18	7 32 50 52
Cape York	33	7.0	2	4.2	3.5	17	11	1.8	16	1.7	18	130	18	7 30 46 50
M. Queensland	32	7.0	2	3.0	3.0	17	11	2.0	15	1.8	20	128	18	6 30 48 50

Abbreviation: S. = Solomon Islands, N.G. = New Guinea, A. = Australia, P. = Philippines, N.Q. = North Queensland.



Figs. 49-55. *Trypoxylon papuanum* Tsunekii, ♀.

49: Sternite 8. 50: Genital organs seen from beneath. 51: Ditto seen in profile. 52: Paramere and volsella (digitus and cuspis). 53: Volsella. 54: Apical part of penis valve (dorsal view). 55: Ditto (ventral view).

periform, width at base, at apex and length in middle relatively 4, 2 and 3, medial and lateral furrows broad, with bottom shallowly rounded in cross section, apical excavation very large and deep, whence medial furrow of posterior inclination runs to apical smooth area, the furrow shallower than the basal excavation and narrowed towards apex, triangular in cross section). Upper rim of ligament socket of gaster subsemicircular, obliquely highly produced (Fig. 25), intercoxal carina gently incurved. Petiole usually: Fig. 26, sometimes Fig. 27, spiracles at about 3/10 from base. Coxal organ of hind leg located on inner ventral ridge, slightly before apex and slightly produced into a short tooth. Fore wing venation: Fig. 28.

Vertex and upper frons microcoriaceous and scattered with comparatively large punctures along posterior margin of frontal shield and intercellular blunt ridges, on upper inner orbits punctures somewhat closer, shield more strongly microcoriaceous except median line and around ocellus and superimposed with punctures, punctures usually large and somewhat sparse on medio-lateral raised areas and finer and closer on lower concave area, but the size and density of punctures considerably varied among specimens; anterior flattened marginal area of clypeus glabrous, delicately rugosely micropunctulate, not shining; anterior inclination of pronotal collar covered with medium-sized punctures with varied density, sometimes punctures subrugosely confluent, sides smooth and radially strongly striate, but lamina finely closely punctured, not shining; mesoscutum covered with comparatively large punctures, punctures on mid-lateral area in front of parapsidal suture fairly close, with puncture-interspaces mostly as large as puncture diameter, on central area, especially posteriorly somewhat sparser, but the density of punctures individually and locally variable, in specimens from certain areas of New Guinea punctures closer and transversely or obliquely subrugosely confluent, ground surface usually smooth and shining, sometimes mat or half mat and sometimes distinctly or vaguely microcoriaceous, sometimes and shining, scattered with fine punctures, mesopleuron always without microsculpture, on prepectus punctation as on scutum, on epimeral area finer, closer, but gradually larger and sparser below (notwithstanding interspaces not larger than punctures), mesopleuron smooth and polished except longitudinally striolated and punctulated upper swollen area; propodeum transversely, very coarsely striate, at base sometimes obliquely striate and sometimes coarsely foveolate, sides transversely, sometimes obliquely and acutely strongly coarsely or finely closely striate, most usually the area covered with strong coarse striae and mixed with fine rugose ones, frequently further mixed with punctures, usually antero-ventral area along metapleural suture without striae and shining and antero-dorsal area just below epineclore more or less punctured, but the sculpture of the side markedly variable; gaster covered with pile-bearing punctules, sternites also pubescent.

♂. (hitherto undescribed, known from Australia only). Length 10.0-10.5 mm. Similar in general to ♀, differing in the following respects:

1 : 2-5, POD ≠ postocellar diameter, IODs = 10 : 7, antoma thicker, joint 3 in width view 1.7-1.8 times as long as broad at apex, joints 3, 4, 5 with relative length 10, 8.5, 7.5, ultimate joint 2-2.2 times as long as broad at base, apically attenuate and curved at apex (Figs. 31 and 32), but in one of three specimens not curved (Fig. 33), it is nearly as long as 5 preceding joints united. Clypeus less strongly produced anteriorly, with apical margin weakly or considerably recurved (Figs. 29 and 30) (disc as in ♀), frontal shield as in ♀ (Figs. 34-48). Sternite 8: Fig. 49. Genitalia from beneath: Fig. 50, from side: Fig. 51, paramere with apical fission about 1/7 the total length of the organ, one of the divided parts stick-like, sparsely fringed with long bristles and the other lobiform, colourless and almost completely transparent; detailed structure of volsella: Figs. 52 and 53 (different specimens, seen obliquely from beneath), digitus comparatively short, cuspis with apical area sparsely covered with a few short stiff hairs, apical structure of penis valve in two specimens: Figs. 54 and 55, apical arms very short. Punctures and striae generally larger and stronger than in ♀, especially marked on prepectus of mesopleuron and sides of propodeum.

Variation in characters

In order to find out local variations some representative specimens of each locality were measured and compared (Tables 1 and 2). Of the results a brief comment to each item will be given in the following:

(1) OOD at vertex as against head width.

At the standard of head width 100 it varies between 24 and 28 in ♀, frequencies

(18)

(within parenthesis): 24 (2), 25 (2), 26 (24), 27 (7), 28 (4); in ♂ 29, 32 and 33 respectively.

(2) IODs. Ratio of IOD at base of clypeus to IOD at vertex (10) varies from 6.5 to 8.2 in ♀, frequencies: 6.5 (2), 7 (2), 7.5 (17), 8 (18), namely, ratio of 7.5-8.0 is most frequent, while in 3 males it is all 7.0.

(3) OOD : POD. When OOD is very narrow the exact measurement of OOD : POD is very difficult, because the exact margin of the eye and the ocellus is indistinct and the width of the scale of the micrometer also interferes the measurement. The slight difference in OOD brings about a great difference to ratio of POD, because POD is several times broader than OOD. The difference between 1:4 and 1:6, for instance, is, therefore, not so large as impressed by the figure. In ♀ it varies between 1.3 and 1.6, frequencies: 1.3 (1), 1.4 (18), 1.5 (15) and 1.6 (5); in ♂ 4:6, 4:7 and 4:6 respectively.

(4) Od : POD. In ♀ ocellar diameter is either larger than POD or equal to it, frequencies: 3:2 (8), 4:3 (6), 5:4 (9), 6:5 (8) and 1:1 (8); in ♂ 6:5, 5:4 and 1:1.

(5) Frontal shield. The form is considerably variable as given in Figs. 34-48. Ratio of its length to width at lateral angles (standard 10) varies in ♀ between 16 and 19, frequencies: 16 (1), 16.5 (4), 17 (10), 17.5 (11), 18 (11), 18.5 (1) and 19 (1); in ♂ 16.5, 17 and 17.

Length ratio of upper area to lower area varies in ♀ from 1.5 to 2.3, frequencies: 1.5 (1), 1.6 (1), 1.7 (6), 1.8 (17), 1.9 (9), 2.0 (2), 2.1 (2), 2.2 (0), 2.3 (1); in ♂ 1.6, 1.8 and 2.0 respectively.

(6) Antennal joint 3. Length ratio to width of head (standard 100) and to width at apex is given respectively in Table 1.

(7) Ultimate antennal joint. See Table 1. As to joint 13 (♂) remarkable is the fact that in one of the specimens it is not bent at apex.

(8) Gaster petiole. It is usually from behind spiracles gradually enlarged posteriorly, namely, clavate, but sometimes subflask-shaped, from spiracles for some distance parallel and then gradually thickened posteriorly. Length ratio to width of head (100) varies between 120 and 138, frequencies: 120 (8), 122 (4), 126 (9), 128 (5), 130 (9), 132 (1), 134 (0), 136 (1), 138 (1), comparatively stable, mostly at 120-130; in ♂ 126, 128 and 130 respectively.

Relative maximum width to total length varies in ♀ between 18 and 26 (standard length 100), frequencies: 18 (4), 20 (18), 22 (13), 24 (2), 26 (1), in ♂ narrower, all at 18.

Location of spiracles is very constant, they are at 30-32 from base.

(9) Gaster segments 2 and 3. Length ratio of each to petiole (100). Segment 2 in ♀ varies between 44-56, frequencies: 44 (9), 46 (16), 48 (8), 50 (3), 52 (2), 54 (0), 56 (1); in ♂ 46, 48 and 50. Segment 3 in ♀ varies between 44-60, frequencies: 44 (5), 46 (6), 48 (7), 50 (12), 52 (6), 54 (1), 58 (1), 60 (1). Difference of relative

Table 2. *Typosylon papuanum* Tsuneki, ♀ ♂. Variation in surface characters of mesoscutum and propodeum.

Location	Microsculpture of mesoscutum		Punctation of mesoscutum			Aeneous lustre of mesoscutum		Striation on side of propodeum				
	Str	Wea No.	C	sC	sS	Rg	Pre	Abs	Wh	Pa	sC	sS
Australia ♀	0	2	3	4	1	0	0	4	1	4	1	4
Solomon Is. ♀	0	3	10	10	1	2	2	12	1	0	13	8
New Guinea ♀	8	5	6	12	1	6	14	1	18	7	12	8
Philippines ♀	0	1	1	0	0	2	0	2	0	2	0	2
Australia ♂	1	2	0	1	1	1	0	0	3	0	0	3

Abbreviation: Str = strong, Wea = weak, C = close, sC = somewhat close, sS = somewhat sparse, Rg = rugose more or less, Pre = present, Abs = absent. Wh = whole of the surface, Pa = greater part of the surface (except antero-ventral area).

(19)

tive length between segments 2 and 3 varies between 0 and 6 in ♀, frequencies: 0(11), 2(15), 4(9), 6(4), in ♂ 2(2) and 4(1).

Ratio of combined length of 2 and 3 to length of petiole (standard 100, longer is shown by + and shorter by -), in ♀ varies from +16 to -12, frequencies: +16(1), +10(11), +6(1), 0(4), -2(8), -4(6), -6(5), -10(5), -12(5); in ♂ +2, -1 and -2 respectively. According to the result in this species the gastral petiole in ♀ is in about 80% slightly longer than the length of 2 + 3, in about 10% equal to and in about 10% shorter than the length combined. Under the eye measurement, however, excluding few exceptions it can be said that the petiole is appr. as long as the two following segments united.

(10) Surface condition of mesoscutum and propodeum (cf. Table 2). In ♀ mesoscutum with distinct plumbeous shine; 18, without the shine or with very weak plumbeous shine; 21; with microsculpture; 22, of which distinct; 9, rather feeble; 13, without microsculpture; 17; with surface nearly mat; 3, half mat; 19 and fairly shining; 17. Punctures on mid lateral area in front of parapsidal suture close interspaces as large as or smaller than puncture diameter; 20, fairly close (as larger than puncture) or smaller than puncture; 9, somewhat sparse (mostly slightly larger than puncture); 10, punctures partly rugosely confluent; 13, non rugose; 26. As to ♂ see Table 2.

Of the variations above given the rugose-punctate condition is confined to the specimens from New Guinea, but those from Brown-river district are mostly without such. Further, the New Guinea specimens are mostly without plumbeous shine, but the same occurs also in other regions. The condition of microsculpture is without connection with the localities.

Side of propodeum is transversely somewhat obliquely and arcuately striate, antero-dorsal area mixed with a more or less punctate. Striae expanded all over the area including antero-ventral part; 9, antero-ventral area along metapleural suture alone without sculpture and shining; 30, striae strong and coarse, mixed with a more or less punctate; 16, striae similar, mixed with fine rugae; 9, striae close and strong, mixed with punctures; 12, simply strongly and closely striate; 2. In ♂ always with sparse and strong striae.

TRYPOXYLON CUCURBITINUM SP. NOV.

Closely resembles *Trypoxylon papuanum* m. in the form of frontal shield, but is distinguished from it in that the body is smaller, frontal shield much shallower, with upper lateral and dorsal carinae (except medio-dorsal area) sharply keeled, medio-apical carina much longer, upper enclosed part of interantennal area markedly produced over lower perpendicularly inclined carinate part, with the long curved bristles much shorter and punctures on mesoscutum much finer, sparser and not confluent with the neighbouring ones.

♀. Length 9.0 mm. Black, mandible ferruginous, tegula transparent ferruginous, mouth parts except basal part of palpi and tibial spurs ochraceous yellow, legs considerably brownish (possibly faded), knees and articulations of tarsi paler; wings hyaline, somewhat clouded throughout, veins and stigma dark brown, basally ferruginous; pilosity normal in distribution, on head, sides of thorax and dorsal aspect of propodeum except area dorsalis silvery, considerably abundant, on posterior inclination of propodeum reversely directing forwards, hairs on median area of frontal shield also silvery and conspicuous, long curved bristles on interantennal area and erect curved bristles on disc of clypeus pale yellowish white, gaster wholly covered with short somewhat yellowish white pubescence.

Measurements (standard scale: HW = 100): 10Dv = 30, A3 = 16.6, Al2 = 16, P = 11.0, 10Ds = 10 : 9, OOD : Od = 6 : 7, l/W of A3 = 2.7, l/W of Al2 = 2.2, relative length of total area and upper area and width at lateral angles of frontal shield 13.5, 6.5 and 10; Petiole with relative length and maximum and minimum width 100 : 22 : 8, 2nd and 3rd tergites equal in length, both relatively 52.

Head above without interocular elevation, seen in front with lateral margins roundly convergent below, frontal shield vertically seen: Fig. 283, upper lateral carinae not highly raised and partly disturbed or interrupted by punctures, dorsal carina broadly vanished in middle, outward branch carinae considerably long, upper area above the constriction somewhat inclined posteriorly, forming a slight angle with the

(20)

rest of the shield, the surface shallowly excavated as roughly given by dotted contour lines in Fig. 283; medio-apical carina narrowed anteriorly, medianly with impressed line which is broadened upwards and without interruption connected with the excavation of the frontal shield, at apex the carina widened and bifurcated into the enclosed area of interantennal structure, till its base the carina appr. half the length of lower carina which is nearly straight; the enclosed area very broad and short, not spindle-shaped as usual, but in a subequilateral pentagon which is marked with a gentle tubercle at each angle and open to narrow interantennal space, lateral carinae of the pentagon weak, defined only with difficulty; interantennal space below the enclosed area not distinctly raised into a carina and from near the end of which the other curved bristle erected (the number of the bristles uncertain, since they are easily dropped off).

Clypeus similar in form to that of *T. scutatum*, antenna with relative length of joints 3, 4, 5 appr. 10, 8, 7, joint 3 about 2.7 times as long as broad at apex in broadest view; pronotal collar with anterior part very narrow and enlarged laterally, posterior part broad and completely discoloured, lamina at side slightly produced, with apex bluntly rounded; mesoscutum with parapsidal sutures rather indistinct; propodeum and gastral petiole as in the compared species; in fore wing abscissa 2 of cubital vein slightly longer than transverse cubital vein; hind coxal organ not tooth-like, but the area minutely orally outlined, with basal margin somewhat raised.

Vertex weakly microcoriaceous and finely, fairly closely punctured, with puncture-interspaces as large as puncture-diameter, frontal shield and its outer marginal areas strongly microcoriaceous and superimposed with fine irregular-shaped punctures, punctures on the shield along marginal carinae at and below constriction slightly larger, stronger and close, partly rugosely confluent, but upwards and towards median line finer, weaker and sparser. Mesoscutum very feebly microcoriaceous, superimposed punctures fine, somewhat sparse, on the area in front of parapsidal suture puncture-interspaces 1-2 times as wide as puncture-diameter, on median area sparser; scutellum more finely and more sparsely punctured, mesopleuron above scrobe without microsculpture and finely sparsely, below and prepectus distinctly microcoriaceous and more grossly, strongly and somewhat closely punctured; propodeum on area dorsalis obliquely, strongly and coarsely, only on apical area transversely striate, on the areas outside area-dorsalis till lateral carinae transversely coarsely striate, sides transversely, somewhat arcuately, finely and closely striate except anterior narrow smooth area along metapleural suture, the surface near the upper carina mixed with sparse fine punctures.

♂, unknown.

Holotype: ♀, India, Deesa, X. 1898 (possibly Coll. C. G. Nurse) (IRNH).

TRYPOXYLON SCHMIEDENECHTII KOHL, 1906

Trypoxylon schmiedenechtii Kohl, Denks. Math.-Naturw. Kl. k. Akad. Wiss., 71: 34, 1906 (♂, Java).
Trypoxylon conexus Turner, Proc. Zool. Soc. London, 30: 522, 1908 (♀ ♂, Australia) (asp.) (stat. nov.).

Trypoxylon subpileatum Strand, Internat. Ent. Zeitschr., 16 (19): 163, 1922 (♀ ♂, Formosa) (syn. nov.).

? *Trypoxylon chinense* Gussakovskij, Trav. Inst. Zool. Acad. Sci. URSS, 3: 648, 1936.
? *Trypoxylon arabicum* Gussakovskij, Ibid., p. 649, 1936.

Trypoxylon subpileatum: Tanecki, Etizenia, 22: 3, 1967 (Formosa); Ibid., 54: 1, 1971-a (Formosa); Ibid., 60: 1, 1972 (Formosa).

Trypoxylon subpileatum of Japanese authors (Haseeda, 1971, p. 30; 1972, p. 4; Harota, 1973, p. 117; 1977, p. 19; Tano and Harota, 1977, p. 32; Sabi et al., 1977, p. 9 - all Formosa).

Trypoxylon conexus, *schmiedenechtii* and *subpileatum*: Bohart & Menke, World Sphecid, p. 346, 347 and 348, 1976 (listed).

Trypoxylon lavonzianum Tanecki, Spec. Publ. Jap. Hym. Ass., 6: 1, 1977 (♀, Bismarck Is.) (asp.) (stat. nov.).

(21)

Trypoxylon subpileatum huntonense Tsuneki, *Ibid.*, 2: 7, 1977 (Formosa - Botel Tobago I.)

Specimens examined:

India 5 ♀ 5 ♂: 1 ♀ 1 ♂, Punjab (Kangra Valley, 4500 ft), VI (♀), VII (♂), 1899, G. C. Dudgeon leg. Coll. C. G. Nurse (BMNH); 1 ♀, Deesa, IX, 1901 (with label "under pileatum") (Abern.); 1 ♀, Barrackpore, date undescribed (with label: "nigriceps") (UMG); 1 ♀, S. India, Nigiri Hills, Gadalur, 3500, IV, 1949, P. S. Nathan (USNM); 1 ♀ 2 ♂, S. India, Anamarai Hills, Cinchona, 3500 ft, V, 1960, P. Susai Nathan (BMNH).

Nepal 1 ♀, Pokhara, 910 m, 18-27. IX, 1965, L. W. Quate (BMNH).

Ceylon (Sri Lanka) 1 ♀, date unknown, Coll. Smith (BMNH).

Thailand 5 ♀: NKN. Ratcha, Prov. Nakhon Ratchasima 60 km S., 2-4. III, 1971, P. & P. Spangler (USNM).

Cambodia 1 ♀, Kiri Kom, 700 m, 31. III. - 7. IV, 1961, N. R. Spencer (BPM).

Laos 16 ♀ 4 ♂: 13 ♀, Vientiane Prov. (Ban Van Sue), 15. I., 15. II., 30. III, 1965, 67; (Giston Vill. de Tha Neone), 5-19, 19-26, XII, 1965; 21-28. II, 1966; Ron-dou, native collector; 1 ♀, Don Dog, 17. XI, 1965; 2 ♀ 1 ♂, Sayaboury Prov. (Sayaboury), 15. I., 13. IV, 1966; 1 ♂, Wapikhamthony Prov. (Wapi), 30. III, 1967; 2 ♂, Sedone Prov. (Pakse), 31. V, 1967 (all but 3 ♀ collected by Malaise trap) (BPM).

Viet-Nam 1 ♀ 1 ♂, Trang Bom, 30 miles NW of Saigon, 16. VII, 1932, M. Poilane (USNM); 1 ♀, M. Drak, E of Ban Me Thour, 4-600 m, 8-19. XII, 1960, C. M. Yoshimoto (BPM).

Hainan I. 1 ♀, Kachek, VIII, 1922, S. F. Light (USNM).

Macao 1 ♂, F. Mair leg. (BMNH).

Hongkong 12 ♀ 1 ♂: 1 ♀, Shek Pik Reservoir area, 27. VII, 1964, W. J. Voss; 3 ♀, Lantau Is. Trappist Monastery to Silver Mine Bay (over Hills), 22, 24, 27. VII, 1964; W. J. Voss; 2 ♀, N. T. Castel Peak, 6-9. VII, 1964, L. K. & H. W. Ming (Li-ght trap); 4 ♀, N. T. Taipokau Kowloon, 21, 22. VI, 1964, 6, 18. VIII, 1965, K. L. & H. W. Ming (Malaise trap); 1 ♀, N. T. Taipok District, 15-16. VI, 1964, N. W. Walls (sweeping); 1 ♀, N. T. Yuen Long District, Castel Peak, For Sta Area, 10. VII, 1964, W. J. Voss (BPM).

Ningpo 1 ♀, 1. IX, 1925, J. T. Chu (USNM).

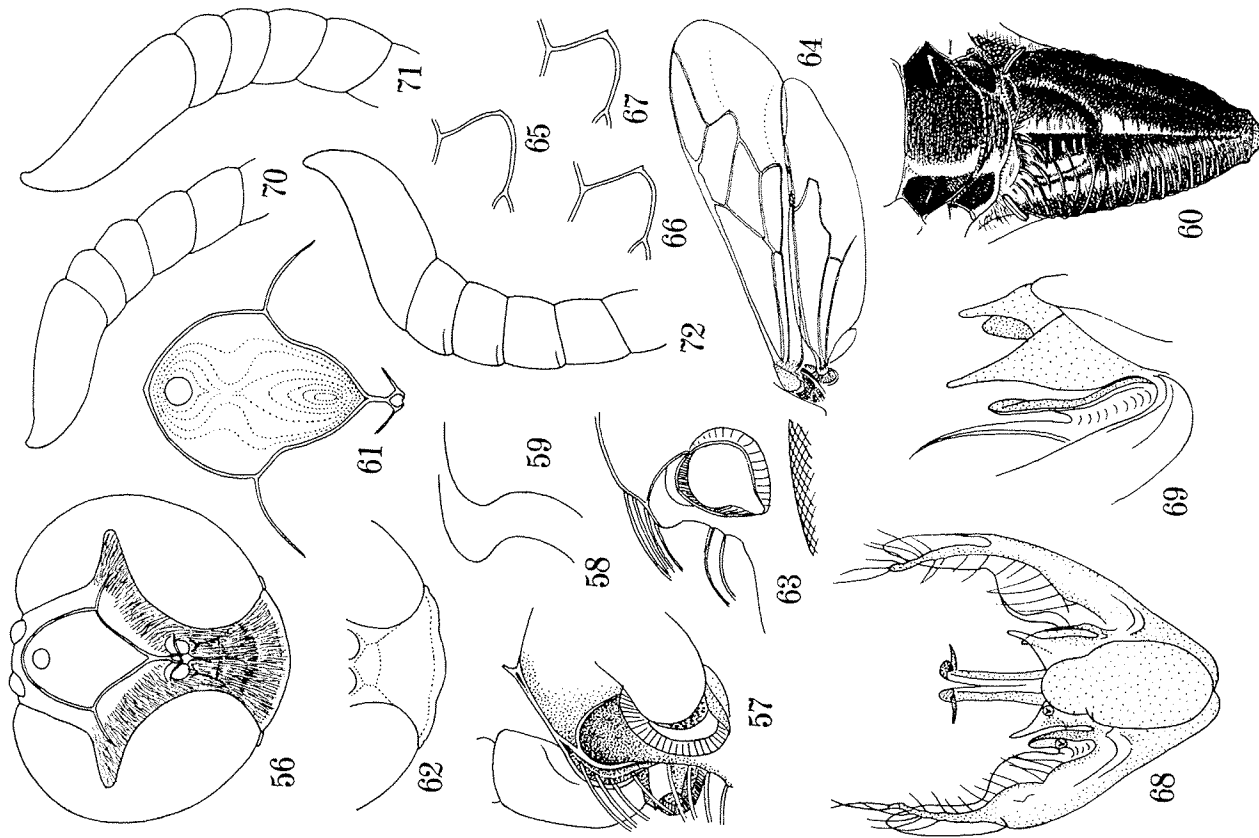
Borneo 12 ♀ 2 ♂: 1 ♀, Saravak, Sarikei District, Bajang Delta, 15-26. VII, 1958; 1 ♀, Saravak, Santubong, 27. X. - 3. XI, 1967, P. S. Cranston (BMNH); 6 ♀, N. Borneo, Forest Camp, 19 km N of Kalabakan, 3. X., 1, 10, 17, 19. XI, 1962, Y. Hirashima & K. J. Kuncheria (BPM); 1 ♀ 2 ♂, Sandakan, Baker leg. (USNM); 3 ♀, N. Borneo, Labuan Is., 23. IX, 1927, G. R. K. & H. M. P. (BMNH).

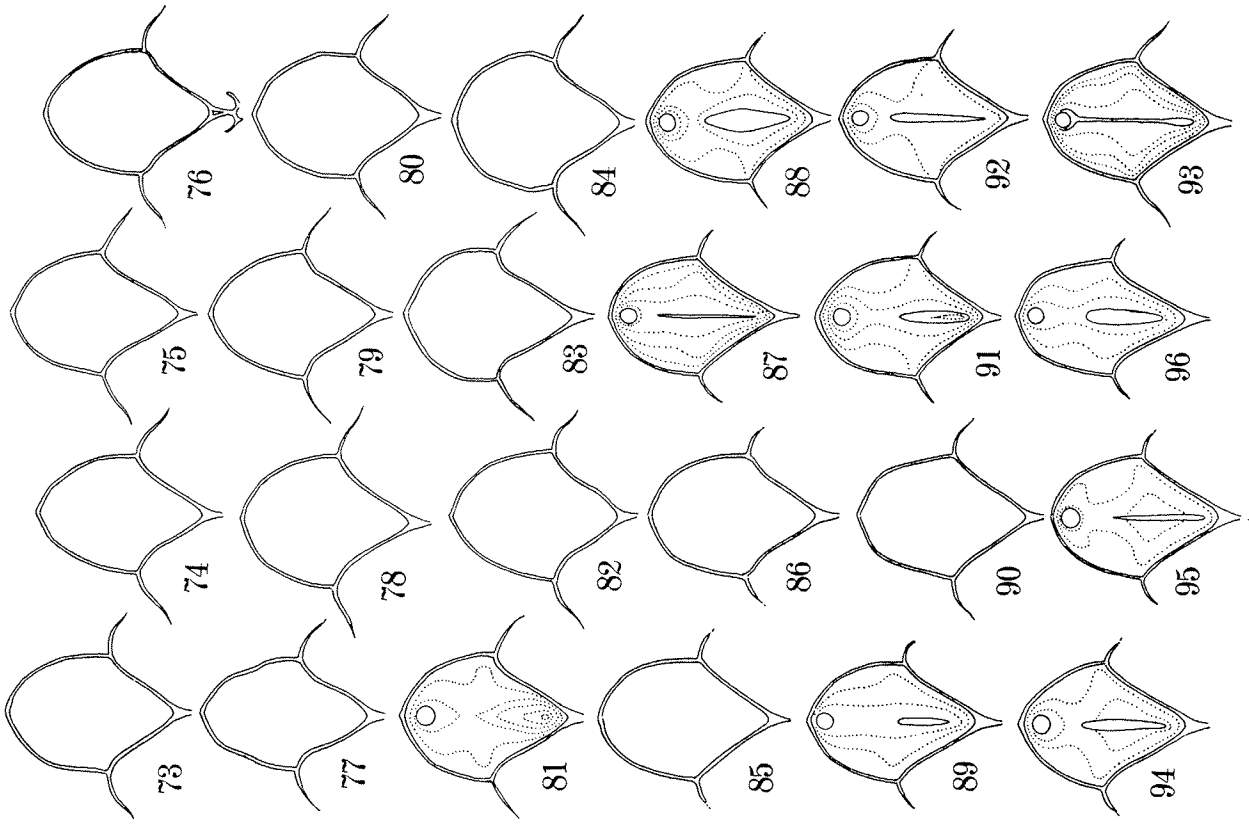
Philippines 13 ♀ 2 ♂: 2 ♀ 3 ♂, Palawan: 1 ♀ 1 ♂, Puerto Princessa, Baker 1. (USNM); 1 ♀ 1 ♂, 3 km NE of Tinabog, 12. V, 1963, H. Holttmann; 1 ♂, Irawan River, 21 km N of Puerto Princessa, 16. IV, 1968, D. E. Hardy (BPM); 1 ♀, Calion I., 6 km W of Calion, 9. VI, 1962, H. Holttmann (Malaise trap) (BPM); 1 ♀ 3 ♂, Mindanao: 1 ♀ 2 ♂, Dapitan, Baker leg. (USNM); 1 ♂, Manait Str., 24. IV, 1968, N. D. Delfinado (BPM); 2 ♀, Busuanga, 4 km N of San Nicolas, 22, 31. V, 1962, H. Holttmann (Malaise trap) (BPM); 1 ♀, Samar, Baker (USNM); 1 ♀, Mindoro, XII, 1921, F. X. Williams (BPM).

Explanation to Figs. 56-72

Figs. 56-72. *Trypoxylon schmieckneechti* Kohl, (56-60...♀, 61-72...♂).

56: Head (Laotian specimen). 57: Interantennal structure seen obliquely in front (Formosan). 58-59: Variation in curvature of interantennal area seen in profile (Formosan). 60: Propodeum (penang). 61: Instance of strong situation of lower carinae of frontal shield (W. Java). 62: Clypeus. 63: Interantennal area in profile (Formosa). 64: Wing venation. 65-67: Variation in the form of apical part of cubital cell (Viet-Nam, Laos, Hongkong). 68: Genitalia from beneath. 69: Volvella (cusps and digitus). 70: Apical part of antenna (Laos). 71-72: Ditto (Australia, 71 from above, 72 the same antenna from beneath).





(EPFM); 6 ♀ 14 ♂, Luzon: 1 ♀ 5 ♂, Rizal Prov. (Mt. Montalban, Wa-wa-Dam, 150-200 m Quezon City), 25. II, 2. III. (♀); 19, 22. III. 1965, L. M. Torreillas, H. M. Torreillas, N. L. H. Krauss separately (EPFM); 1 ♀ 2 ♂, Mt. Makiling, Baker (USNM); 2 ♂, Baguio, Benget, Baker (USNM, No. 4978); 2 ♀ 5 ♂, Los Banos, VII, VIII, IX, 1916, 17, F. X. Williams (EPFM); 1 ♂, Dumaguette, 3. X. ? (EPFM); 1 ♀, Acc. No. 743, Bar. Ag. C. R. Jones (USNM).

[Formosa] 42 ♀ 20 ♂, VI-VII. 1966, 68, K. Tanneki (Coll. Tanneki, detailed data previously recorded); 3 ♂, Botal Tobago I., VIII. 1976, T. Tano leg. (Coll. Tano).

[Malaya] 1 ♀ 4 ♂: 1 ♂, Kuala Lumpur, 27. X. 1924, H. M. Pendleburg; 1 ♂, Serdang, Selangor, I. II. 1929; 1 ♂, Selayang, 10 miles near Kuala Lumpur, 12. X. 1929; 1 ♀ 1 ♂, Penang, I. VI. 1956 (♀), 15. III. 1956 (♂), all leg. H. T. Fagden (BMNH).

[Singapore] 1 ♂, 26. I. 1902, Biró leg. (NHM).

[Sumatra] 1 ♂, Padang, VIII. 1918, S. Leeftmans (with label, pileatum det. Schulthess, 91) (BMNH).

[Bangka I.] 2 ♂: 1 ♂, Aer Mesoe, 15. III. 1931, J. v. d. Vecht; 1 ♂, Aer Itam, 26. XI. 1956, J. v. d. Vecht (BMNH).

[Java] 4 ♀ 11 ♂: 1 ♂, Buitenzorg, F. Muir (EPFM); 1 ♂, Radjmandula, 1200 ft., III. 1957, D. Wetan (BMNH); 1 ♂, Buitenzorg, 30. XII. 1954, J. v. d. Vecht; 1 ♂, E. Priangan, Rava Lakbok Mrs. M. E. Walsh; 1 ♀, Bogor, 1957, Hamann; 1 ♂, Bogor (Jikaret), 400 m, 20. IX. 1953, J. v. d. Vecht; 1 ♂, Tjiboerjal, 3. IV. 1952, J. v. d. Vecht; 1 ♂, Soekaboemi, 500-600 m, 1953, Verbeek; 1 ♂, Wangoen, I. 1938, J. v. d. Vecht; 5 ♀, Malang, III, IV. 1935, 35, J. G. Betrem (BMNH); 1 ♂, Bogor, 250 m, 10. VIII. 1972, J. v. d. Vecht (NHMB); 2 ♂, Kaliwengoe, VIII. 1910, K. Jacobson (BMNH).

[Sumba I.] 2 ♀ 1 ♂: 2 ♀, E. Sumba, Baing, 26, 29. VI. 1949; 1 ♂, W. Sumba, 31. VII. 1949, Drs. Bühler & Satter (ssp. connerum Turner) (NHMB).

[Australia] 18 ♀ 14 ♂: 2 ♀, W. Australia: 1 ♀, Elephant King Leopold Range (Kimberley), 2. VIII. 1968, G. F. Neer; 1 ♀, Derby, 18. III. 1962, P. Slater (BMNH); 2 ♀ 5 ♂, N. Territory: 1 ♂, Arnhem Land, Maningrida, 5 m, 17. III. 1961, J. L. & M. Gressitt; 2 ♀ 4 ♂, Darwin, 6-9. XII. 1965, J. Sedlacek (EPFM); 1 ♀ 8 ♂, Queensland: 1 ♂, N. Qld., Halifax, 12. V. 1919, F. X. Williams (EPFM); 1 ♀, N. Qld., Kuranda, 12. XI. 1972, O. W. Richards (BMNH); 5 ♀ 2 ♂, M. Qld., R. C. L. Perkins Coll. (BMNH); 4 ♀ 4 ♂, C. E. Qld., Mackay, II. 1991, R. E. Turner; III. 1892; II. 1899, Ridgelande (BMNH); 5 ♀ 1 ♂, S. E. Qld., Brisbane, 24. XI. 1914, R. C. L. Perkins Coll. (BMNH); (4 ♀ 1 ♂), W. of Brisbane, Meggill Farm, 25 m, 25-27. I., 27. I. - I. II. 1961, J. L. & M. Gressitt (EPFM); 1 ♀, Victoria, Melbourne District (BMNH) (ssp. connerum Turner).

[New Guinea] 10 ♀: 9 ♀, NE Region: Wem, Hospital KK, 1200-1300 m, 7-13. XII. 1964; 1200 m, 26. VI. 1965, J. Sedlacek (Malaise trap); 1200 m, 18. XII. 1965, J. & M. Sedlacek (Malaise trap); 5 ♀, Sepik, Angoram, 20-30 m, 14-16. VIII. 1969, J. L. Gressitt; 1 ♀, Marrik, 150 m, 29. XII. - 17. I. 1960, T. C. Mead; 1 ♀, SE Region, Popondetta, 60 m, 26. IX. 1965, P. S. (Malaise trap) (All EPFM) (ssp. connerum).

[Bismarck Is.] 4 ♀: Lavongai I., Benatam, 18, 22, 25, 26. III. 1962, Neona Ben Exped. (Malaise trap) (ZAC) (ssp. connerum)

Characters in General

♀. Length 10-12 mm. Black; mandible except blackish base ferruginous, palpi ex-

Explanation to Figs. 73-96

Figs. 73-96. *Trypoxylon schmidcknechti* Kohl (s. l.). Variation in the form of frontal shield. 73-84: ssp. *schmidcknechti* Kohl. 85-96: ssp. *connerum* Turner. 81-84 and 94-96... ♂, all others ♀.

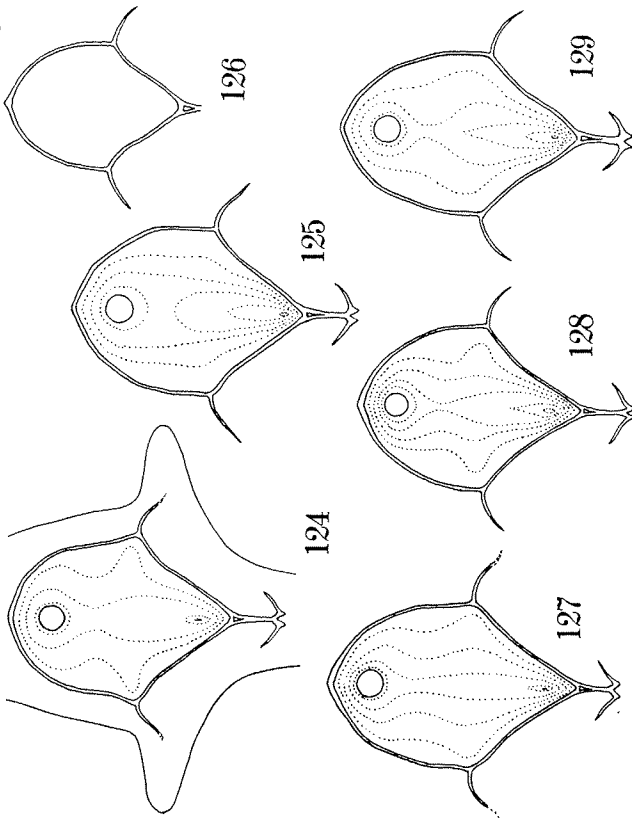
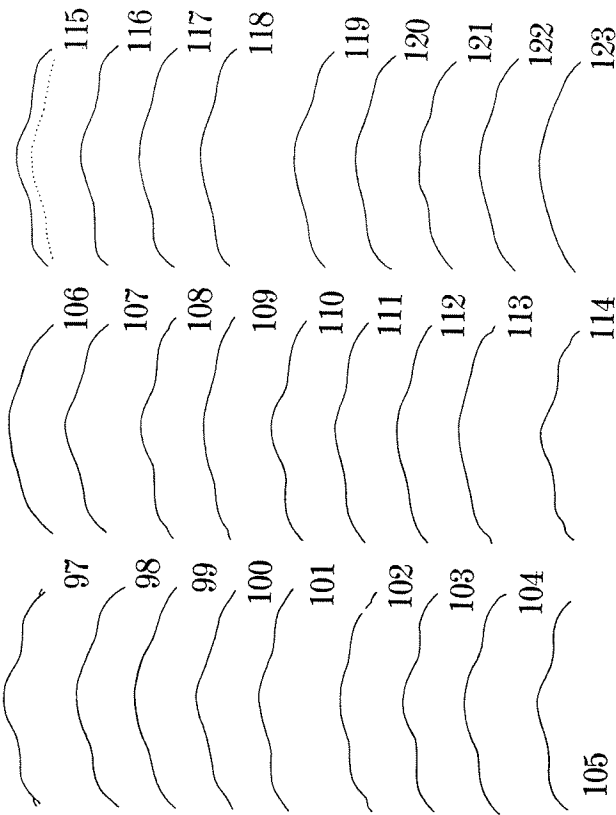
73: Nepal. 74-75: Laos. 76-77, 82: Philippines. 78: Hongkong. 79-80, 84: Formosa. 81: West Java. 82: Cambodia. 85-96 excluding 90 and 93: Australia (85, 88, 91-92, 94: West of Brisbane. 86: the same as 85, seen somewhat from beneath, lower carinae appear somewhat bent near base. 87, 89, 92, 95 and 96: Darwin). 90: New Guinea (Wau). 93: Bismarck Arch. (Lavongai I.).

cept basal joints and tibial spurs ochreous yellow, in some specimens bases of metatarsi considerably whitish, base and apex of tarsal joints somewhat ferruginous; pronotum posteriorly discoloured, appearing pale yellowish, tegra semitransparent pale brown; wings hyaline, slightly clouded throughout, apically somewhat darker, veins and stigma brownish black. Hairs on head in front silvery, long curved bristles on interantennal area and short curved erect hairs on disc of clypeus white; hairs on frontal shield fine and greyish white, but on about median third thick, appressed and silvery, on thorax and gaster white, in some direction silverly glittering gasteral sternites also covered with short pubescence.

OOD : POD exactly measured 1 : 4-5 (if measured at the margins of brownish part of the eye and the so-called pupil of postocellus it becomes 1 : 3 to 2 : 5); POD usually nearly equal to postocellar diameter, interocellar ridge sometimes fairly distinct, sometimes almost lacking, 100s most usually 4 : 5; head seen in front; Fig. 56, curvature of outer margins very constant. Frontal shield considerably variable in form (Figs. 75-93) and in depth of excavation, usually with upper area longer than lower area (Table 5), with upper carina subsemicircular, sometimes more or less angulate at the top, lower carina curved inwards (upwards) in varied degrees near the lateral angles and curved outwards on lower portion, hence as a whole the carina sinuate, usually upper inward curving is stronger than the lower outward swelling (Figs. 73-80), sometimes the carina angularly bent near the lateral angle (Figs. 77, 79), sometimes without swelling on lower portion and in the specimens from certain regions always nearly straight as a whole (Figs. 85-93); outward branch carina at lateral angle varied in length considerably and distinctly curved, medio-apical carina highly raised, first thick, then narrowed anteriorly, bearing fine wedge-shaped impression on upper portion, usually somewhat shorter than half the length of lower carina, at apical end it is bifurcated to form elliptic enclosed space at upper part of interantennal area (Fig. 57 or 131), from about middle of lateral carinae of the enclosed space emitted transverse carina laterally to upper outer rim of antennal sockets, below the enclosed space the lateral carinae united to be a somewhat broad raised line which is extended till upper part of supraclypeal area; from the surface of enclosed space 4 and from the lower carinate area 4-5 long curved bristles arising, some lower ones of the latter forming a pair of interantennal area seen in profile; Fig. 63 or 132, anterior curvature somewhat variable (Figs. 58, 59), at the lower side of medio-apical carina of frontal shield, just behind interantennal transverse carina a small impression present, but it is not enclosed on outer side by the back-turned extension of interantennal transverse carina as done in *T. thaimum*; surface of frontal shield rounded inclined towards median line and deeply excavated around ocellus included and lengthwise hollowed medially on lower area. Clypeus at base gently rounded elevated, with apical margin simply rounded, somewhat triangularly produced anteriorly (Fig. 56) antennal joint 1 deeply excavated on inner side below to adjust expansion of interantennal transverse carina, joints 3, 4, 5 with relative length approx. 10, 8, 7, joint 3 about 2.8-3 times (broadest view) or 3.3 times (narrowest view) as long as wide at apex (Table 3), ultimate joint nearly twice as long as broad at base. Pronotum with lamina on side nearly simply arched, not strongly produced, scutellum, postscutellum and propodeum in dorsal view: Fig. 60, dorsal rim of ligament socket of gaster rounded produced, intercoxal carina below side of propodeum gently curved upward. Gasteral petiole more or less varied in form (Figs. 142-147), generally say, clavate, with spiracles at about 1/4 from base, usually more or less longer than segments 2

Explanation to Figs. 97-129

Figs. 97-129. *Typroxyton schmiedeknechti* Kohl (s. l.). 97-118: ssp. *schmiedeknechti* Kohl. 119-129: ssp. *connexum* Turner.
97-123: Anterior margin of clypeus in δ . Locality and frequency (within parentheses): 97: Nepal (1). 98: Cambodia (1). 99-100 (1), 101 (2): Laos. 102 (1), 103 (2), 104 (1): Malaya. 105: Singapore (1). 106-107: Java (1). 108: Borneo (2). 109 (2), 110 (4), 111 (5), 112 (5), 113 (4): Philippines. 114: Hongkong (1). 115 (2), 116 (8), 117 (5), 118 (1): Formosa. 119 (2), 120 (4), 121 (2), 122 (3), 123 (5): Australia.
124-129: Frontal shield with contour lines, vertically seen, including some problematical instances from Australia. 128... δ , others δ .
124: W. Australia (Elephant King Leopold Range). 126: Queensland (W. of Brisbane, notice curvature of lower carinae!). 127: W. Australia (Berby). 125, 128 and 129: Lesser Sunda Is. (Sumba I.).



and 3 combined, rarely as long as and very rarely slightly shorter than the combined length (Table 5). Wing venation: Fig. 64, with abscissa 2 of cubital vein subequal to (slightly longer than) transverse cubital vein, the former distinctly curved (Figs. 65-65).

Vertex weakly microcoriaceous and comparatively grossly punctured along posterior margin of frontal shield and along median line or ridge between ocelli, frontal shield more distinctly microcoriaceous and superimposed with fine punctures, puncture variable considerably in density, sometimes partly subrugosely confluent, in general sparser towards median line; mesoscutum usually half-mat, sometimes deeply mat, but sometimes fairly shining, always with more or less plumbeous shine, usually without microsculpture, but sometimes or geographically delicately microcoriaceous and on mid-lateral area in front of parapsidal suture fairly closely interspaces = puncture-dimater) and comparatively grossly punctured, punctures generally sparser on median area and finer and weaker on extreme lateral area, but the size and density of punctures considerably varied individually or geographically (Table 7); mesopleuron half mat or mat, covered with sparse fine pile-bearing punctures, punctures on prepectus as on scutum, on epimeral area much finer and sparser, but by degrees larger and closer downwards, subalar fossa and mesosternal sulcus weakly crenate, metapleuron smooth and polished, sculpture of propodeum: Fig. 60, side fairly well shining and obliquely, finely and closely striate, sometimes mixed with punctures, antero-ventral area along metapleural suture frequently without striae and shining, occasionally the non-striated area more broadly extended posteriorly till central part of the side.

♂. Similar to ♀, but with body somewhat smaller, 7-10 mm, mostly 8-9 mm; head seen in front slightly shorter and wider, OOD: POD usually 2: 3, sometimes 3: 5 or 1: 2, IOBs mostly 10: 7, rarely 10: 6 or 8 (Table 4), frontal shield with lower carina strongly curved near lateral angle (Figs. 81-84) and with surface generally shallower, clypeus somewhat shorter and wider, with anterior margin less markedly produced anteriorly and more strongly recurved (Fig. 62), antennal joints except the ultimate shorter and thicker, joint 5 slightly compressed dorso-ventrally, 1.6-1.8 times (widest view) as long as wide at apex (Table 4), ultimate joint long, curved and distinctly bent at apex (Figs. 70-72), most usually slightly longer than 3, but shorter than 4 preceding joints united, in some condition appearing as long as 5 or 4 preceding joints combined; sternite 8: Figs. 148-156 and 155-157, more or less varied individually or geographically. Genitalia seen from beneath: Fig. 68 (Formosan specimen) or Figs. 138-139 (Australian); paramere bifurcate at apex into a strongly bristled stick-like branch and a lamellate colourless lobe, the split part slightly more than 1/4 (strictly 2/7) the total length of the organ (in closely related *Thaibannum* it is about 1/5), at the median area paramere thinly expanded and rolled into a subsylindric form and characteristic is the fact that the scroll is blocked at the upper orifice by a layer of ochre yellow substance; volsella seen obliquely from the side: Fig. 69 or Figs. 140-141, consisting of two parts, elongated triangular and apically slenderly attenuated cuspis and ligulate and lamellate digitus behind it, the latter comparatively well developed and long; penis valve without shoulder near apex but with a pair of sickle-shaped appendages before apex, the form of apical lobes somewhat varied geographically (Figs. 158-168).

Variation in characters

(1) Body size. Generally the female is somewhat larger and robuster than the male. There is no decided tendency to become larger as the locality goes northwards. This may be due to that all the localities lie under tropical or subtropical regions.

Explanations to Figs. 130-141

Figs. 130-141. 130-133, 135-141: *Trypoxylon schmidedeknechti* Kohl (s. str.) - *Carvaneum Tunker*
 134: *Trypoxylon schmidedeknechti* *ponaxum* *Turner* *Kuhl* (s. str.)
 130-134... ♀, 135-141... ♂.

130: Head. 131: Interantennal structure, bristles removed. 132 Ditto, with bristles, seen in profile. 133: Frontal shield (Bismarck Is.: Lavongai). 134: Abnormal frontal shield (Java). 135, 136, 137: Sternite 8 (Australia: Bundaberg, Darwin, W. of Brisbane). 138: Genitalia from beneath. 139: Ditto somewhat from side. 140: Volsella (cuspis and digitus). 141: Ditto, separated.

(28)

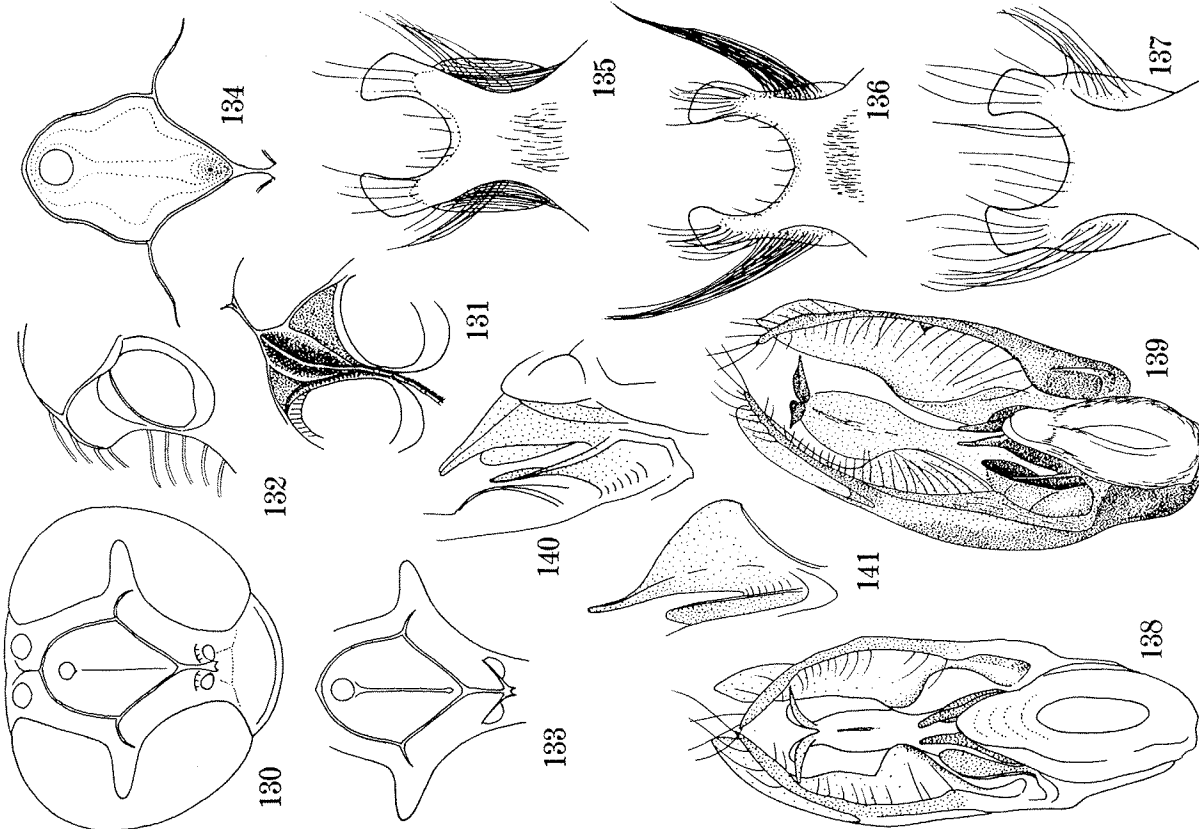


Table 3. Measurements on *Tyropylon schmiedeknechti* Kohl, ♀.

Locality	IODv	IODe	A3	(L/W)	Al2	Pet	Ma	Mi	2nd	3rd
India Punjab	26	7.3	18	3.0	15	128	20	8	42	46
Deesa	29	7.0	16	2.5	15	114	18	9	50	48
Anamalai	26	7.5	18	3.0	15	132	20	8	44	46
Nepal	26	7.2	15	3.0	14	132	19	7	44	46
Sri Lanka	27	7.5	16	2.8	15	136	21	8	40	42
Thailand	26	8.0	18	3.0	15	130	18	8	44	44
Viet-Nam	28	7.5	17	3.2	16	134	19	7	42	46
Laos	26	7.5	18	3.0	14	132	19	7	38	46
Hainan Is.	27	7.8	18	3.0	14	140	19	7	44	48
Hongkong Is.	27	7.5	16	2.8	14	138	18	7	43	44
Hongkong Is.	28	7.7	17	2.9	16	132	20	6	42	44
M.China Ningpo	28	7.5	16	3.0	15	128	18	7	44	48
N. Borneo	28	7.8	17	2.7	14	124	19	7	42	46
N. Borneo	28	7.7	16	2.7	15	128	18	7	44	42
Phil. Palawan	26	8.0	16	3.0	16	124	20	7	42	42
Mindanao	26	8.0	17	3.0	16	134	18	7	44	42
Mindanao	26	7.5	17	2.8	16	116	22	8	46	50
Busuanga	26	7.7	15	3.0	16	130	20	8	42	44
Samar	27	7.5	17	3.0	15	128	19	7	44	46
Mindoro	26	7.3	17	2.8	15	120	21	8	47	48
Luzon	26	7.5	16	3.0	14	126	19	7	46	48
Luzon	28	7.5	16	2.9	16	116	19	8	46	46
Formosa	27	7.7	17	2.7	15	132	19	8	44	50
Formosa	26	8.0	17	2.7	15	120	22	8	46	48
Malaya Penang	28	7.2	16	3.3	16	134	20	7	38	42
Java Bogor	28	7.5	18	3.0	15	136	19	7	44	44
Malang	28	7.5	16	2.8	16	132	20	8	40	42
Malang	28	7.8	16	3.1	16	134	18	7	40	44
Malang	28	7.3	16	3.0	15	132	18	6	44	46
Sumba Is.	28	7.3	16	3.0	14	120	20	8	44	50
Sumba Is.	28	7.3	16	3.0	15	124	19	8	46	48
Australia W.A.	32	6.8	16	3.0	16	132	20	7	46	46
Derby	32	7.0	16	3.0	16	130	20	7	46	50
N.T. Darwin	30	7.4	18	2.9	15	136	18	7	46	38
Q. Mackey	30	7.5	18	2.9	15	134	19	7	48	50
Brisbane W.	31	7.0	18	2.9	15	136	19	7	46	46
Brisbane	31	7.3	16	2.8	16	126	20	7	46	48
New Guinea Wau	28	7.5	16	2.9	16	124	19	8	48	46
Waprik	29	7.0	16	3.0	16	132	18	7	46	48
Bismarck Is. Lav.29	29	7.5	16	3.0	14	128	18	7	46	44
Lavongai	28	7.5	16	2.7	16	128	18	7	44	48
Lavongai	28	7.5	16	2.7	14	124	21	7	48	50

Abbreviation: Phil. = Philippines. W.A. = Western Australia (Elephant Kimberley). N.T. = Northern Territory. Q. = Queensland. Lav. = Lavongai.

Explanations to Figs. 142-156

Figs. 142-156. *Tyropylon schmiedeknechti* Kohl (s. l.). 143, 145, 147... 9, all others ♂.

142-147: Basal part of gaster (142; Malaya - Selangor. 143; Nepal, commonest form. 144; Formosa. 145-146; Australia, Mackey. 147; Do., Darwin). 148-156: Sternite 8 (148; S. India, Anamalai Hills. 149; N. India, Kangra Valley. 150; Java, Bangka I. 151; W. Java, Bogor. 152; Do. 153; Laos, Vientiane. 154; Philippines, Mindanao. 155; Do., Luzon. 156; Formosa, Puli).

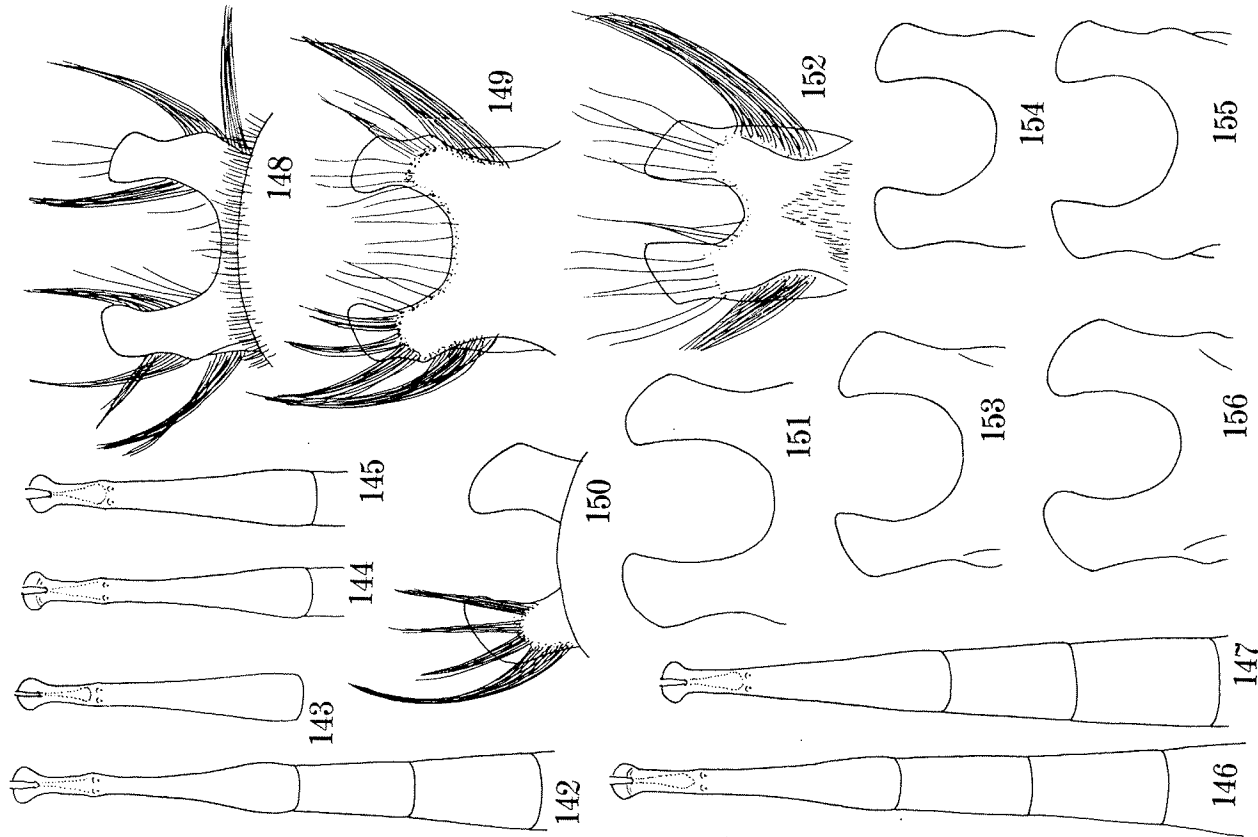


Table 4. Measurements on *Trypoxylon schmiedeknechti* Kohl, ♂.

Locality	IDW	(IODe)	A5	(L/W)	AL3	(L/W)	Pet	(Wa	Mi	2nd	3rd
India Kangra V.	32	7.0	12	1.7	25	2.5	124	16	8	44	44
Anamalai	33	7.0	14	1.8	25	2.6	128	16	6	42	44
Anamalai	32	7.0	14	1.9	24	2.5	130	20	7	42	42
Cambodia	33	7.0	12	1.6	25	2.5	122	20	8	52	52
Viet-Nam	34	7.0	14	1.8	24	2.7	126	19	7	46	46
Laos	34	7.0	14	1.8	26	2.7	126	18	7	46	48
Laos	34	7.0	14	1.8	25	2.7	124	17	7	44	40
S. China Macao	35	7.2	14	1.8	24	2.5	128	18	7	46	40
Hongkong	34	7.0	14	1.8	23	2.6	124	17	7	42	40
Borneo	34	7.0	14	1.7	25	2.6	118	18	7	48	44
Borneo	34	7.2	14	1.8	25	2.6	-	-	-	-	-
Phil. Mindanao	32	7.0	14	1.8	25	2.7	124	18	7	42	42
Mindanao	32	7.2	14	1.9	24	2.4	124	18	7	42	38
Palawan	32	7.2	13	1.8	26	2.6	120	16	8	44	44
Palawan	34	7.0	14	1.8	26	2.6	122	16	6	50	50
Luzon	33	7.0	14	2.0	26	2.8	122	16	6	48	48
Luzon	32	7.0	14	1.8	26	2.8	120	17	7	44	44
Luzon	34	7.0	14	1.8	26	2.7	128	18	7	44	44
Luzon	31	8.0	14	1.8	26	2.8	128	17	7	44	44
Luzon	35	7.2	12	1.5	26	2.8	116	21	10	46	50
Luzon	32	7.3	14	2.0	25	2.6	122	18	8	44	46
Formosa Puli	33	7.2	13	1.8	25	2.8	128	16	7	42	42
Puli	33	7.0	13	1.8	25	2.8	126	18	7	46	48
Lan Hsu Is.	34	7.5	14	1.8	24	2.8	128	16	6	44	43
Lan Hsu	34	7.0	14	2.0	24	2.6	126	15	8	43	45
Lan Hsu	34	7.5	13	1.7	25	2.0	122	16	7	46	42
Malaya Kuala Lumpur	33	7.0	14	1.8	25	2.7	132	16	6	42	42
Fenang Is.	34	7.0	13	1.8	25	2.5	128	15	6	42	44
Selangor	35	6.7	14	1.9	26	2.7	116	18	7	42	46
Selangor	34	7.0	14	1.9	23	2.5	130	18	6	36	44
Singapore	34	6.5	13	1.9	26	2.7	130	14	6	42	42
Sumatra	35	7.5	13	1.8	24	2.5	128	18	7	42	44
Bangka Is.	34	7.0	14	1.8	24	2.5	132	16	6	44	44
Bangka Is.	37	7.0	14	1.9	-	-	122	17	7	50	48
Java W. Bogor	35	7.0	13	1.9	23	2.4	122	17	6	40	47
Bogor	36	6.8	13	1.6	24	2.3	128	16	8	-	-
Bogor	34	6.8	14	2.0	24	2.6	130	16	6	42	42
Bogor	34	7.2	14	1.8	25	2.6	120	19	7	44	44
Wangon	34	6.7	14	2.0	24	2.6	132	16	6	42	42
Ruitenzorg	36	6.5	13	1.9	24	2.7	140	15	5	42	42
Tijbaerial	35	7.5	13	1.8	26	2.9	126	17	7	40	40
Soekah.	36	7.1	13	1.7	-	-	128	18	7	40	40
P. Pringian	35	6.9	13	1.8	25	2.5	134	18	7	36	32
Kaliow	36	7.0	14	1.4	28	2.8	128	16	7	44	44
Kaliow	36	6.8	14	1.5	27	2.5	120	17	7	44	44
Sumba Is.	34	7.0	14	1.9	25	2.6	-	-	-	-	-
Australia Darwin	34	7.7	14	1.8	29	2.9	128	17	7	48	44
Darwin	33	7.0	13	1.8	29	2.9	134	15	6	46	46
Darwin	35	7.0	14	1.8	26	2.8	134	16	6	48	42
Darwin	34	7.0	15	1.7	27	2.8	126	15	7	-	-
Arnhem	35	7.2	13	1.7	26	2.8	134	16	6	44	40
Hallifax	36	6.8	13	1.5	28	3.1	116	17	7	50	54
Brisbane	38	6.7	14	1.8	28	2.9	120	17	6	46	48
N. Queensl.	36	7.0	14	1.8	29	2.9	-	-	-	-	-
Mackey	36	7.0	14	1.8	27	2.8	130	17	6	48	46
Mackey	37	6.5	14	1.8	29	3.1	128	17	6	48	48
Mackey	34	7.0	14	1.8	27	2.8	128	16	7	-	-
Mackey	35	6.8	14	1.8	27	2.7	128	16	6	44	48
Queensl.	38	6.8	13	1.7	28	2.8	126	19	7	50	44
Queensl.	36	6.8	14	1.8	28	2.8	130	18	7	42	48

Table 5. *Trypoxylon schmiedeknechti* Kohl, ♀ (♂ within parentheses).

Locality	Total area to width at lateral angles (%)										Upper area to lower area				
	120	125	130	135	140	145	150	155	100	110	120	130	140	150	160
India			1(3)	2	1	1	1				(2)	2(1)	2	1	
Nepal			1										1		
Sri Lanka					3	2						3	2		
Thailand					5	10(2)						5	10(2)		
Cambodia			1(3)	6	5(1)	2	1	1				1	(1)	1(1)	
Laos					1										
Viet-Nam															
Hainan I.															
Macao			(1)												1
Hongkong				1(1)	5	4	1	1				1	8	3(1)	
Mingpo															
Borneo				2(2)	1	6	2	1							
Philipp.			(1)	(4)	1(4)	2(8)	2(1)	3(2)	5			7	5(2)	1(2)	2(1)
Formosa			(1)	2(8)	8(6)	16(3)	8(2)	6	2			(1)	7(6)	3(7)	1(2)
Malaya			(1)	2(8)	8(6)	16(3)	8(2)	6	2			7(4)	21(9)	6(4)	8(3)
Singapore			(1)	(1)	1	(1)	(1)	(1)				1(1)	1(1)	(2)	(1)
Sumat.-Java												(1)	(2)	1(3)	3(6)
Sumba I.															
Australia			(3)	(1)	2(8)	4(1)	9(1)	3				1(3)	9(6)	8(4)	(1)
New Guinea			2	4	3	1						1	4	5	
Bismarck Is.			1	1	2										4

(2) Anterior margin of clypeus. In my previous paper I pointed out that one of the distinctions of the Formosan population (known as subilestium Strand) from Southeast Asiatic ones lies in that the anterior margin of clypeus in the male is more strongly recurved. This is, however, an error based on insufficient material used for the comparison. As given in Figs. 97-123 and Table 6 a considerable variation in the strength of recurving is observed within each population. As a general tendency, however, it can be said that recurving is weaker and less distinct in the specimens from the Indian and Indo-Chinese regions than those from Borneo, Philippines and Formosa. Interesting is the fact that the specimens from the Malay Peninsula have the strongly recurved clypeus as in the Island populations above mentioned but in those from the Sunda Islands recurving becomes weaker as locality goes eastwards and it reaches the utmost state in the Australian population (Figs. 119-123).

(3) The form of frontal shield. Some representative or distinctive instances from various regions are given in Figs. 73-93 and 124-129. Notice the variation in the following characters: Curvature or sinuation of upper and lower carinae, length of outward branch carinae, relative length to width (in the stantly drawn). The length relation of the shield is relatively shorter and wider than in the female and the curvature of the lower carinae is comparatively stronger.

(4) Excavation and silvery hairs inside frontal shield. In general in the male

Table 6. Recurving degrees of anterior margin of clypeus in *T. schmiedeknechti* Kohl ♂

Locality	Str.	Mod.	Weak
India	1	2	-
Cambodia	-	1	-
Laos	-	2	2
Viet-Nam	-	1	-
Macao	1	1	-
Hongkong	1	1	-
Borneo	1	1	-
Philippines	8	6	6
Palawan	-	2	2
Mindanao	1	2	1
Luzon	7	4	3
Formosa	11	7	2
Malaya	2	2	-
Singapore	1	1	-
Sumat.-Java	1	3	8
Sumba	-	1	-
Australia	-	2	12

Abbreviation: Str. = Strong. Mod. = Moderate.

the gentle elevation along lateral carinae at slightly above lateral angles is somewhat more distinct and slightly broader than in the female. The depth of excavation in the shield is considerably varied within each population as given roughly in three

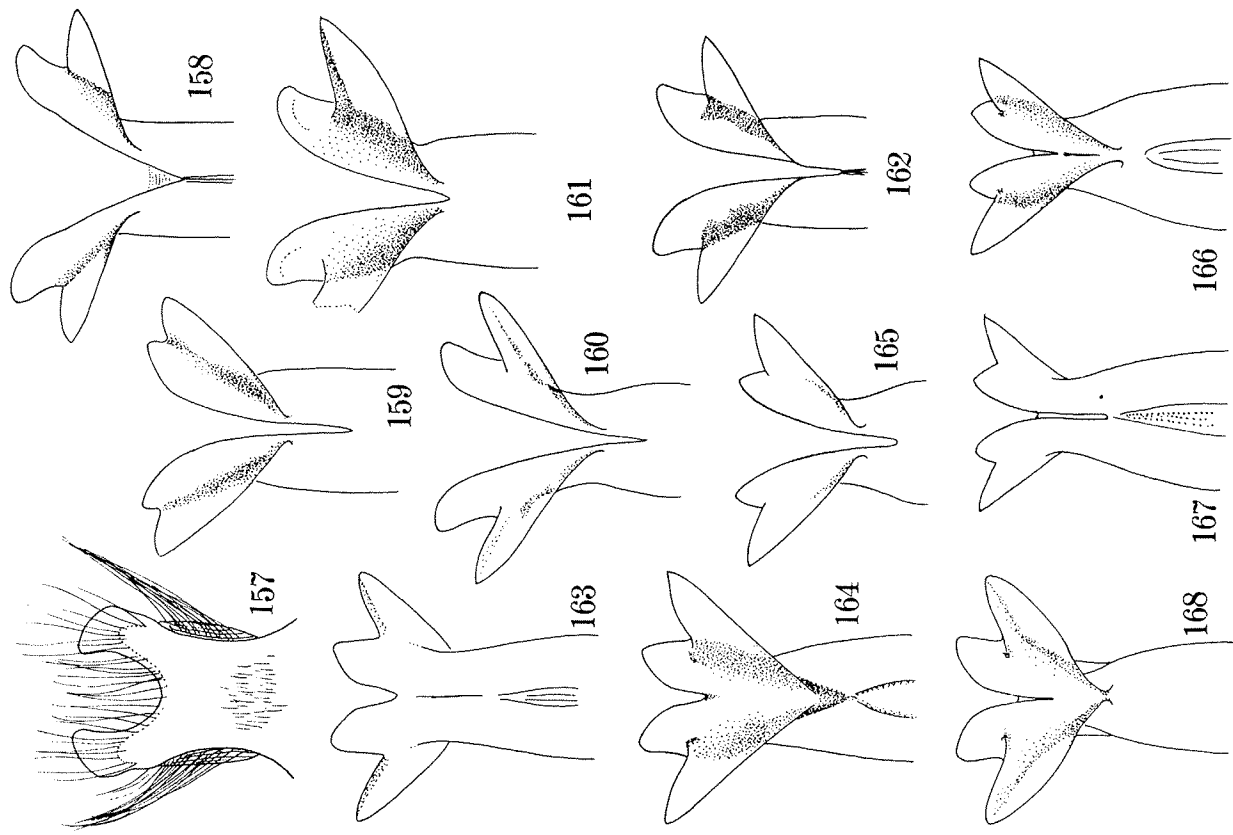
Table 7. *Trypoxylon schmiedeknechti* Kohl, ♀ ♂. Variation in characters of the surface condition of frontal shield and mesoscutum.

Locality	Frontal shield				Mesoscutum													
	Lower car.		Surface		Surface		Surface		MIScul.		Puncture		Size		Density			
	Str	M	We	No	D	M	Sha	Ma	Em	Shi	Pr	Ab	L	M	S	Cl	M	Spa
India ♀ ♂	-	2	3	-	2	2	1	-	4	1	1	4	-	4	1	-	2	3
Nepal	1	-	-	-	-	1	-	-	1	-	1	-	-	1	-	-	1	-
Sri Lanka	2	3	-	-	-	1	-	-	1	-	1	-	-	1	-	-	1	-
Thailand	5	11	-	-	6	5	3	6	9	1	1	15	-	6	10	-	3	2
Laos	-	1	-	-	-	1	-	-	1	-	1	-	-	1	-	-	5	10
Viet-Nam	-	1	-	-	-	1	-	-	1	-	1	-	-	1	-	-	1	-
Hainan	1	11	-	-	6	6	-	-	11	1	-	12	-	11	1	3	4	7
Hongkong	3	9	-	-	7	5	-	3	5	4	-	12	-	7	5	1	6	5
Borneo	5	8	-	-	9	4	-	4	7	2	2	11	1	6	6	2	4	7
Philippines	1	41	-	-	32	10	-	15	21	6	1	41	-	33	9	6	7	29
Formosa	-	1	-	-	1	-	-	-	1	-	1	-	-	1	-	-	1	-
Malaya	4	-	-	-	1	3	-	1	2	1	1	4	-	4	-	-	3	1
Sumat-Java	-	2	2	-	2	2	-	6	12	15	3	18	-	18	-	2	11	6
Australia	-	1	11	6	2	8	-	1	9	-	2	8	9	1	-	5	5	-
New Guinea	-	3	7	-	2	8	-	1	9	-	2	8	9	1	-	5	5	-
Laos	-	4	-	-	2	2	-	-	4	-	1	3	-	4	-	-	4	-
India	3	-	-	-	2	1	-	3	-	3	-	1	2	-	3	-	3	-
Cambodia	1	1	-	-	1	-	-	1	-	1	-	1	-	1	-	-	1	-
Laos	1	3	-	-	1	2	1	-	1	3	-	4	-	2	2	-	4	-
Viet-Nam	1	1	-	-	1	-	-	1	-	1	-	1	-	1	-	-	1	-
Macao	1	-	-	-	1	-	-	1	-	1	-	1	-	1	-	-	1	-
Hongkong	1	-	-	-	1	-	-	1	-	1	-	1	-	1	-	-	1	-
Borneo	2	-	-	-	1	1	-	1	-	2	-	2	-	1	1	-	1	-
Philippines	8	12	-	-	5	15	-	1	9	10	-	20	-	3	17	1	1	18
Formosa	1	19	-	-	10	10	-	3	14	3	-	20	4	10	6	3	5	12
Malaya	1	3	-	-	-	4	-	-	1	3	-	4	-	2	2	-	4	-
Singapore	1	-	-	-	-	1	-	-	1	-	1	-	-	1	-	-	1	-
Sumat-Java	12	-	-	-	2	4	6	3	7	2	2	10	-	7	5	-	3	9
Sumba	-	-	1	-	1	-	-	-	1	-	-	1	-	1	-	-	1	-
Australia	-	6	6	2	-	6	8	2	10	2	12	-	14	-	-	2	6	-

Abbreviation. car. = carina. Constrict. = Constriction. Distrib. = Distribution. Excavat. = Excavation. MIScul. = Microsculpture. Grade. We = Weak. D = Deep. Sha = Shallow. Ma = Mat. Hm = Half mat. Shi = Shining. Pr = Present. Ab = Absent. L = Large. S = Small. Cl = Close. Spa = Sparse.

Explanations to Figs. 157-168

Figs. 157-168. *Trypoxylon schmiedeknechti* Kohl (s. l.)
 157: Sternite 8 (Formosa, Ilan). 158-168: Apical part of penis valve (165 and 167 dorsal view, all others ventral view): 158: N. India, Kan-Gra Valley. 159: W. Java, Bogor. 160: Laos, Savannakhet. 161: Philippines, Luzon, Los Banos. 162: Do., Mindanao. 163: Formosa, Fuli. 164: Do., Ilan. 165-168: Australia (ssp. connexum Turner): 165: W. of Brisbane. 166: Bundaberg. 167: the same, dorsal view. 168: Darwin.



classes in Table 7. The shield is sparsely covered with short greyish pubescence, but on median area it is mixed with thick short glittering silvery hairs. The range covered by the silvery hairs sometimes narrowly restricted to the median shallow furrow, but sometimes fairly broad. Variation in the silvery haired area is considerably great among the specimens from the same district and seems to have no bearing with the geographical variation.

(5) Length of outward branch carinae of the frontal shield. Although there is a slight variation within each population they are comparatively stable throughout the populations except that of Australia in which the carinae are markedly short (Figs. 85-96, except 90 and 93); in the specimens from Sumba I., New Guinea and the Bismarck Archipelago they are rather intermediate between those of Australia and the Oriental region, but in a single male specimen among them from Sumba they are short as in the Australian population.

(6) Relative values between HW, 10Dv, A3, A12(♀) or A13(♂) and Pet. The width of head (HW) is taken as standard (100) and all others are measured under the same scale. When the specimens from the same regions are abundant some representative (locally or in body length) ones are selected, but as to those from problematical regions all are examined. The results are given separately by sexes in Tables 3 and 4. A considerable variation is observed either locally (10Dv) or individually (in all). Notice the underlined instances that are exceptional.

(7) 10Dv, L/W of A3 and A13, and Va M1 2nd 3rd. In Tables 3 and 4 these are given within parentheses, meaning that (1) ratio of interocular distance at base of clypeus when the same on vertex is 10, (2) relative maximum length to maximum width of antennal joint 3*, (3) that of A13** in ♂, (4) relative maximum and minimum width of gastral petiole and relative length of tergites 2 and 3*** when length of petiole is 100. These numerical values are comparatively stable, but those regarding the petiole are exception. It seems worthy of special notice that combined length of tergites 2 and 3 is usually shorter than petiole, but occasionally it is as long as or even longer than petiole, because the comparison between them is frequently used as one of the characters to separate the species.

(8) Mesoscutal lustre, microsculpture and punctation. Variations are given by 3 classes in Table 7, using all the specimens. As to the microsculpture the numbers of the presence alone are recorded. Comparatively large size of the punctures and constant presence of the microsculpture in the Australian specimens are distinctive. The states in the specimens from the Island of Sumba, New Guinea and the Bismarck Archipelagoes are worthy of comparison. Otherwise the values are sometimes comparatively constant to the population and sometimes variable within population.

(9) Sculpture on propodeum. Transverse striae of dorsal side vary partly in density. Usually the areas along lateral carinae coarsely, area dorsally more closely and the medial part of posterior inclination much more closely striate, but the density of each area is variable independently of others without connection with the locality. Furthermore, the striae are not always similar in strength within each area, frequently thick and strong striae are mixed with fine and weak ones and sometimes they are variously rugose or rugulose. Thus the sculpture is very complicatedly variable individually and quite valueless in classification. Sides usually obliquely finely closely striate except antero-ventral somewhat concave narrow area lying along metapleural suture where the surface is smooth and shining. Sometimes, how-

* A3, especially in ♂, is longest on dorsal side and widest in anterior view, when the antennae are stretched sideways, and the widest part is slightly before apex, because it is somewhat constricted at apex. In measurement care is taken to exclude the apparent width due to pubescence. The value of L/W is, therefore, somewhat longer than that under magnifying glass.

** A13 is measured under the condition when the antenna is stretched sideways without torsion and seen from above (in this condition it is longer above than beneath). Usually the segment is curved posteriorly and the basal line is placed obliquely, hence the anterior side is distinctly longer than posterior side. Measurement is made always from the mid point of basal line to the farthest point of curved apex.

*** As to segments 2 and 3 the length is always measured on that part of dorsal side only which is covered with pubescence, excluding the smooth and polished basal part even when it is well visible, which is inserted into the preceding segment under the normal state. Conversely, when the segments are strongly inserted into preceding segment the correct length is presumed from the condition of the lateral and ventral sides.

ever, the smooth area is broadly extended posteriorly and sometimes, on the contrary, even the area itself is also covered with striae. The striae themselves vary extensively in strength, density and rugosity and sometimes become transverse. But the variation appears quite individual, without bearing upon the locality, just as in the sculpture on the dorsal side.

(10) The form of petiole. Most usually as given in Figs. 143 and 145, roughly say, clavate or bat-shaped, but sometimes subflask-shaped as in Figs. 142 and 144.

(11) Sternite 8 in ♂. Under the natural state the sternite directed apically and apical arms gently curved up laterally, that is to say, somewhat directing inwards. In drawing the figures cares are taken to place the emargination between arms vertically, but the arms are drawn under the natural state, that is, seen somewhat obliquely. Variations are observed in the relative width between the arm and the emargination, relative depth to width of the emargination, in the form of the arm and sometimes in the colour and density of the bristles. Variations are in some characters geographical (relative width of the arm and emargination, colour of bristles etc), but in some others universal (the form of the arm) (cf. Figs. 148-157).

(12) Male genitalia. Slight variation can be seen in the form and relative length or width of apical lobes of penis valve (Figs. 158-168).

(13) Wing venation. In the relative length between the 2nd abscissa of cubital vein and transverse cubital vein, in the curvature of the two veins mentioned, in the angle formed by them and in its apical protuberance slight variations can be observed as given in Figs. 65-67.

Geographical variations

(1) Anterior margin of clypeus in ♂. Although a considerable variation is observed within each population it is remarkable that the range of variation in the specimens from Australia and the Sunda Islands is strikingly inclined towards the weaker side (Table 6 and Figs. 97-123), while, markedly contrasted to this is that the range is distinctly inclined towards the stronger side in the population of Formosa.

(2) Curvature of lower carinae of frontal shield. In the populations of the Island of Sumba, Australia, New Guinea and the Bismarck Archipelago the carinae in question are mostly very weakly sinuate, rather close to the straight line. This is very remarkable as against the distinctly sinuate state in other populations. In the males of the first group, however, the carinae are more or less, though never strongly, curved near lateral angles and some of them can not be separated by this character alone from some specimens of other populations. On the contrary, in the specimens from Java, especially in the male, the carinae are markedly upcurved at about a third from the lateral angles and sometimes appear rather bent (Figs. 185-190). This is partly due to that the carinae at the areas are considerably raised (Table 7).

(3) Excavation of the surface of frontal shield. A tendency to become deep or shallow of the excavation is locally observed. The populations of Laos, Hongkong, Borneo, Philippines and Formosa have generally the deeply hollowed frontal shield, while in the Australian population the excavation is markedly shallow as given in Table 7. The deep excavation in the specimens of the Sumba seems interesting, but the material is too scanty. It is also worthy of notice that in the populations of New Guinea and the Bismarck Archipelago the excavation is distinctly deeper than in the Australian representatives (Table 7).

(4) Surface condition of mesoscutum. The Australian specimens are, as given in Table 7, very characteristic in that the surface is distinctly microcoriaceous and mat, and superimposed with fairly close, markedly large punctures. In the specimens from other localities the mesoscutum varies from mat - half mat - to fairly shining; punctures are moderate in size or small and distributed with varied density, always sparser on the median area and microsculpture is usually lacking or indistinct under 50X magnification, only very rarely rather weakly defined. The specimens from New Guinea and the Bismarck Islands are rather close, in these respects, to those of other areas, having the surface half mat and not microcoriaceous (with few exception) and with the punctures moderate in size; while the specimens from the Island of Sumba are generally similar to those of Australia.

(5) Relative length of outward branch carinae of frontal shield. In the Australian specimens the carinae in question are remarkably short (Figs. 85-96, excepting 90 and 93), as a rule not extended into the range of eye incision and shorter than half the length of lower carina. In the closely allied specimens of New Guinea (♀, Fig. 90) and the Bismarck Islands (♀, Fig. 95) they are slightly longer, about half as long as the lower carina, while in those of the Sumba (Figs. 125 and 128, cf. Figs. 124-129) they are similar to those of New Guinea in ♀, but smaller to those of Australia in ♂, though the specimens examined are too scanty. On the other hand, in

the specimens from the Oriental Region in general, the outward branch carinae are much longer, slightly longer than half the length of the lower carina and distinctly extended into the eye emarginations.

(6) Relative length to width of frontal shield. In order to confirm whether or not there are geographic changes in the relative length of total area to its width at lateral angles and of upper area to lower area, measurements were made with all the specimens of each area. Inner distance between lateral angles (width) is taken as standard (= 10, in the actual measurement 20 was used to make it more accurate and later divided to make the result simpler) and the lengths at the median line of total area and upper area are measured (in the latter between inner margin of dorsal carina and the line connecting the lateral angles). The length percentages of total area to the width and of upper area to lower area are calculated and their frequencies are given by localities in Table 5 (♂ within parentheses). According to the results the length relations of frontal shield are all considerably variable within each population. But, generally speaking, it seems that the range of fluctuation is comparatively smaller in the Continental populations than in the Islands or Australian populations. This may, however, be due partly to the insufficient material of the former populations.

(7) Interocular distances (IODC in Tables 3 and 4). In the female the convexity of inner orbits towards clypeus is generally somewhat stronger in the Continental, Philippine and Formosan populations, and somewhat weaker in the Australian, while, in those of Papua, Bismarck Islands and Borneo it is rather intermediate. In the male, excluding some exceptional specimens, it is generally similar to the female. But, here, the specimens from Malaya and Java are rather intermediate in this respect. Generally say, IODs are comparatively stable throughout the populations and somewhat larger in the female than in the male.

(8) Male genitalia. The male genitalia were taken out from four Formosan, two Philippine, one Laotian, one Indian, one Javanese and three Australian specimens and comparatively studied in detail. They are same in the general structure and colouration, but in two Australian specimens from Queensland (west of Brisbane and Bundaberg) the apical lobes of penis valve are markedly short (Figs. 165-167), distinctly differing from those observed in the specimens from other areas (Figs. 158-164, excepting 159). However, in one specimen from Northern Territory (Darwin) the lobes in question are not so short (Fig. 168), rather close to those from other areas. Reversely, in one specimen from West Java the lobes are similar to those of the Australian specimens (Fig. 159). Apparently each population has its own distinction in the form of the apical lobes of penis valve, but the fact could not sufficiently be confirmed except for the Formosan representatives, since all the male specimens could not be dissected.

(9) Sternite 8 in ♂. In the Philippine specimens latero-apical arms are comparatively narrow and the emargination between them is comparatively broad (Figs. 154 and 155), while in the specimens of Formosa (Figs. 156, 157) the former is broader and the latter is narrower than in the Philippine. In the specimens from the Botal Tobago, lying off the southern promontory of Formosa, however, the structure of the sternite is rather close to that of the Philippine representatives. In the examples from India (Fig. 148 - from Anamalai Hills - and Fig. 149 - from Kangra Valley), irrespective of their original localities are southern or northern, the sternite is similar in structure generally to those of the Philippine specimens, while in those of the Sunda Islands (Figs. 150-152) it is similar to the Formosan instances, but as to the width of the emargination a considerable variation is observed. On the other hand, in two males from Australia (Queensland - west of Brisbane, Fig. 137 and Bundaberg, Fig. 135) it is generally similar in form to that of the specimens from other regions, but it has the lateral long bristles very sparse and whitish in colour as against the dense and castaneous ones in the specimens of other regions. In the specimen from Northern Territory (Darwin, Fig. 136), however, the apical emargination is much broader than in others and the bristles are dense and castaneous in colour. Judging from the differences in genitalia and sternite 8 (together with the microsculpture and punctures on mesoscutum), the southern and northern populations of Australia seem to show a tendency towards differentiation.

Some exceptional specimens

(1) A female specimen from Brisbane has the frontal shield (Fig. 126) very similar to those of the specimens of the Oriental Region; lower carinae distinctly curved upwards near lateral angles and the outward branch carinae longer than those of the other Australian specimens, entering distinctly the range of eye emargination.

(38)

There is no doubt, however, that it belongs to the same taxonomic category with the other specimens of Australia, because the shield is shallow and the mesoscutal microsculpture and punctation are similar to those of the sympatric members.

(2) The specimens from Northern Territory of Australia are weaker in the microsculpture of mesoscutum, especially in the male, and in 2 out of 5 of which the sculpture is especially feeble, only hardly visible under 60 times magnification. The state is rather close to that of the Papuan population, but the frontal shield is shallow, with the outward branch carinae shorter than in this, as in other Australian specimens.

(3) In the Indian female specimen from Beesa (to which still remained the taxonomic problem) tibiae and tarsi of legs pale brown in colour, particularly tibiae somewhat broadly at base and narrowly at apex rather whitish and both ends of tarsal joints also paler. The specimen is a long preserved one (IX. 1901, coll. C. G. Narce) and certainly considerably faded in colour, but the whitish bases of tibiae are exceptional. Moreover, in this specimen the surface of mesoscutum is rather strongly shining.

(4) In one female from Los Banos, Philippines (Fig. 77) and in one female from Malang, E. Java (Fig. 134), frontal shield is markedly narrow and upper lateral carinae are strikingly sinuate in middle area.

(5) In one male specimen from Formosa (Puli, 27. VII. 1971) the frontal shield is very similar in form to that of the Australian specimens. The situation of lower carinae is very weak, nearly straight and the excavation of its surface is very shallow. Furthermore, in this specimen the sculpture of the propodeum is quite abnormal: all the furrows on dorsal side very shallow and broad, striae on area dorsalis wholly oblique and very fine, at the outside of the area longitudinal, fine, close and more or less rugose; striae on the sides are confined to posterior portion only and very weak, with surface broadly smooth and polished.

(6) In three male specimens from the Lauhsu (Botal Tobago), off the southern-most promontory of Formosa, punctures on mesoscutum very fine and close, showing a marked contrast to those of the main island population, then known as *L. subilectum* Strand, and the specimens were once treated as *ssp. hainanense* m. In view of the variations observed on the specimens of this species distributed over a wide range, however, the character is not sufficient enough to create a subspecies, although it has certainly been differentiated from the main island population.

Taxonomic relationships

Viewed from the state of the lower carinae of the frontal shield and the sculpture on the mesoscutum it is easily realized that the present species consists of 2 groups, in one of which lower carinae are distinctly upcurved near the lateral angles and the mesoscutum is as a rule without microsculpture and finely to moderately largely punctured, while in the other the carinae are nearly straight and the mesoscutum is as a rule microcoriaceous and superimposed with comparatively larger punctures. The former comprises, so far known, the populations of the Continent (India, Nepal, Ceylon, Thailand, Viet-Nam, Cambodia, Malaya, Laos, Macao, Hongkong, Ningpo), Hainan, Sumatra, Bangka, Java, Borneo, the Philippines and Formosa and the latter those of Sumba, Australia, New Guinea and Lavongal (an island of the Bismarck Archipelago).

There may be a problem as to what rank these subdivisions should be referred to. Certainly the Australian population was treated once by Turner (1908) and the Bismarck population by myself (1977) separately as distinct and named *concerum* and *Lavongalium* respectively. The point is how the differences in the curvature of the lower carinae of the frontal shield and in the sculpture of mesothorax are evaluated. When the material examined is scanty and the knowledge on the distribution and variation is insufficient the above mentioned differences may naturally be considered specific. In the present study, however, thanks to the cooperation by many Museums and colleagues I could examine fairly long series of specimens and obtain considerable knowledge on the variation and distribution of the two groups above mentioned. According to this the distinctions of the two groups are considerably overlapped and they are distributed over different geographic areas, showing that they are not as yet qualitatively isolated. Based upon these knowledge it was determined that the two groups are dealt with as belonging to one and the same species.

The populations of the first group have each own series of distinctions (partly given in Tables 3-7) which are sometimes partly common to some of them and partly fairly distinctive to one population, but I can not find as yet any well integrated subdivisions among them, so that they are treated here as a whole as one subspecies. On the other hand, in the second group the population of Australia is separable from

(39)

the others by a series of distinctions (depth of frontal shield, length of outward branch carinae and surface condition of mesoscutum). But such a series is, as compared with the separating standard of the above mentioned two groups, too weak to allocate each to the subspecific rank. However, it is certain that there is a distinct differentiation among the second group, so that each of them is treated here as a different strain, namely, the Australian strain and the New Guinea strain.

(a) Trypoxylon schmiedeknechti Kohl, 1906

Trypoxylon schmiedeknechti Kohl, 1906, p. 34 (♂, Java); Tsuneki, 1974, p. 627 (♂, Thailand); 1977, p. 4 (♂, Singapore).
Trypoxylon subpileatum Strand, 1922, p. 165 (♀ ♂, Formosa); Tsuneki, 1967, p. 71, 72 and the Japanese authors (♂ ♂, Formosa).
Trypoxylon schmiedeknechti & subpileatum: Bohart & Menke, 1967, p. 347, 348.
Trypoxylon subpileatum hainouense Tsuneki, 1977, p. 7 (Botel Tobago).
Trypoxylon sinense Gussakovskij, 1936, p. 648 (♀, N. China).
Trypoxylon arabicum Gussakovskij, 1936, p. 649 (♀, SW Arabia).

Subspecific characters: Lower carinae of frontal shield distinctly curved upwards near lateral angles and gently rounded out on lower portion, thus unevenly sinuate as a whole, sinuation broadly fluctuate in strength, near lateral angles sometimes strongly bent, sometimes only gently curved; outward branch carinae at lateral angles are considerably long, slightly longer than half the length of lower carinae, distinctly entering the range of eye emarginations and curved downwards. Excavation of frontal shield moderate or deep, sometimes considerably shallow; anterior margin of clypeus in males recurved in middle with varying degrees; mesoscutum mat, halfmat, or fairly shining, surface without microsculpture as a rule, only rarely indistinctly microreticulate and covered with fine - medium-sized punctures.

Distribution: Widely spread over the Oriental Region.

Remarks. According to the original description T. sinense Gussakovskij, 1936 differs from the present subspecies only in that "capite sat nitido, sine puncta distincta" and "mesonoto et mesopleuris laevibus et nitidius, solummodo disperse et obsolete punctatis". Such differences, however, seem to fall within the variation range of the present subspecies, despite the comparative notes of the original author.

Similarly T. arabicum Gussakovskij, 1936 differs from schmiedeknechti s. str. in that "segmento mediano area dorsali glabra, setae crasse irregulariter rugosae, ... part dorsali juxta aream conferim rugosa, rugis fortioribus transversis nullis, pleuris omnino opacis, dense et non crasse irregulariter rugosis". The sculpture on the dorsal side of propodeum is sometimes considerably varied in the present subspecies, but the oblique striation of the sides is very constant, apart from the variation in density and partial disappearance of the striae. "Umbo opacis et irregulariter rugosis" is quite exception. Despite that to me it seems that arabicum may be an aberrant form of the present subspecies, because the form of the frontal shield well agrees with each other.

(b) Trypoxylon schmiedeknechti comexum Turner, 1908, Stat. n.

Trypoxylon comexum Turner, 1908, p. 522 (♂ ♂, Australia; Queensland, Mackey).
Trypoxylon comexum: Bohart & Menke, 1976, p. 346 (listed).
Trypoxylon lavongaisum Tsuneki, 1977, p. 1 (♀, Island of Lavongai, Bismarck Archipelago).

Subspecific characters: Frontal shield with lower carinae weakly sinuate, nearly straight (anterior margin of clypeus even in ♂ only weakly recurved, genitalia with apical lobes of penis valve very short).

(i) Australian strain: Frontal shield with outward branch carinae short, not or not deeply entering eye emargination, usually shorter than, at most equal to, half the length of lower carina, surface rather shallowly excavated, mesoscutum as a rule microreticulate and superimposed with comparatively large punctures.

Distribution: Australia.

(ii) New Guinea strain (= lavongaisum Tsuneki, 1977): Frontal shield with outward branch carinae long, entering eye emarginations, usually somewhat longer than, at least as long as, half the length of lower carinae, surface more deeply excavated, mesoscutum as a rule without microsculpture, with punctures fine or medium-sized.
Distribution: Sumba (Lesser Sunda Islands), New Guinea and Lavongai (Bismarck Archipelago).

Remarks. Among the specimens of Australia those from northern regions (Darwin,

Derby, King Leopold Range) have the characters somewhat close to those of the New Guinea strain, especially in the curvature of the lower carinae of frontal shield and in the microsculpture of mesoscutum.

In the male specimen from Sumba the outward branch carinae are short as in the Australian specimens. Whether or not this is the constant character in the male of the New Guinea strain, however, is uncertain, since the male specimen observed is but a single.

TRYPOXYLON MELANURUM CAMERON, 1901

Trypoxylon melanurum Cameron, Hym. in Feun. & Geogr. Maldive & Laccadive Archipel., I (1): 54, 1901 (♂, Maldives & Laccadives).
(Trypoxylon nigricans Cameron (nom. nud.), Mem. Proc. Manchester Lit. Phil. Soc., S. 4, 2: 267, 1889 (without description)).
Trypoxylon pilatum (: Cameron (nec pileatum Smith), Ibid., p. 270, 1889).
Trypoxylon melanurum: Bohart & Menke, World Sphecid., p. 347, 1976 (listed).

Original description:

Nigrum, tarsi, tegulisque fuscis, alis hyalinis, stigmatate fusco. Long: 10 mm. Hab. Mameduvari, Mahlos Atoll, Maldives; Minikoi, Laccadives.

Antenna black, fuscous towards the apex; the last joint is as long as the preceding three united; on the underside it is dilated at the base, narrowed towards the apex; the middle joints are slightly dilated beneath. Front and vertex closely punctured; on them is a large area; its upper part is rounded and encloses the lower ocellus; its lower is more narrowed towards the apex; the part occupied by it is raised and reaches near to the antennae, where it is prolonged as a short, stout keel; from the junction of the two parts a curved keel runs to the eye incision. The lower part of the eye incision, the face and clypeus are covered with silvery pubescence. Pro- and mesothorax smooth and shining. The base of the median segment bears stout, longitudinal keels, the two central of which are more widely separated; the rest of the segment is stoutly, irregularly, transversely striated; the basal half has two longitudinal keels which form a central area, rounded at apex; there are two longitudinal keels on the apical slope, which unite near apex of the segment, this second area being more sharply pointed at apex than the basal one. On the base of the mesopleurae is a wide, deep, crenulated furrow, bisected above by a smooth, curved one. Legs black, the tarsi testaceous, darker at the base. Wings hyaline, the nervures fuscous. Abdomen entirely black.

Observation of the type

The type preserved in the British Museum (Natural History) is a male. It is glued to a slit of card paper, 15 X 7 mm, complete specimen, but fore tarsi are folded under body and unobservable, antennae opened laterally, wings half erected (right hind wing obliquely stretched sideways), mid and hind legs well opened. The card paper is pinned near the posterior end with No. 4 pin of 35 mm long. Five labels are pinned under the specimen: (1) Type label, a round card paper 8 mm in diameter, encircled by a red band, carrying the printed letters, TYPE, (2) Data label, 10 X 7 mm, from top Madu (handwritten), Maldives, Gairainer, 27. VI. 1900 (printed) in 4 lines, (3) Possession label, 7 X 4 mm, carrying printed letter, Brit. Mus. 1931-156, on the back, (4) Name label, 15 X 10 mm, Trypoxylon melanurum, Cam. Type, Maldives (handwritten) in 4 lines, (5) Type label, 11 X 10 mm, B. M. TYPE, HYM. 21-456.

♂. Length 10.0 mm. Black, eyes changed to brown, antennae brownish, paler apically, tibiae also brownish, at base and apex paler, tibial spurs pale brownish whitish, tarsi light castaneous, base of each joint paler; pronotum posteriorly discoloured, pale brownish white, tegulae semitransparent pale brown; wings hyaline, veins and stigma brown, costa and subcosta darker. Hairs normal in distribution, silvery on head, sides of thorax and on dorsal aspect of propodeum except area dorsalis, long curved bristles on interantennal area and short erect curved ones on clypeus semitransparent white. Head from above with ratio of HW : 10Dv = 100 : 34, OOD : POD = 5 : 5, ocellar diameter relatively 3.5, interocellar ridge rather blunt, frontal shield seen vertically: Fig. 160, ratio of width at lateral angles, total length and length

of upper area 20 : 28 : 15, hence relative length of upper and lower areas 15 : 13. Situation of lower carinae moderately strong, but the very broad rounded apical angle formed by them is most remarkable; surface moderately deeply excavated, gently inclined towards median smooth bottom line, deeper around anterior ocellus and deepest at the minute pit at the apical and of the medial furrow; contour lines roughly given with dotted lines as in Fig. 169; medio-apical carina broader than usual, narrowed apically and longitudinally impressed medially at base; interantennal structure and long curved bristles as in *schmiedeknechti* (Figs. 52 and 132), IOBs = 10 : 7, clypeus with disc gently raised at base and moderately recurved at apex (apex covered with glue on right half), antennal joint 1 deeply hollowed on inner side below, joints 3 and 13 relatively 13 and 23.5 respectively as against HW 100, the former in broadest view 1.5-, in narrowest view 1.8-times as long as broad at apex, the latter 2.4 times as long as broad at base and appr. as long as 4 preceding joints united in left antenna (in the right somewhat shorter than 4, but distinctly longer than 5 preceding joints combined, the difference due to the curved condition of the area), it is gently curved and bent at apex as in *schmiedeknechti*, relative length of joints 3, 4, 5 appr. 10, 8 and 7.8. Pronotum with lamina on side obtuse triangular, only gently produced; propodeum similar in structure to that of *schmiedeknechti*, lateral carinae strong, area dorsalis with lateral and medial furrows broad and not deep. Gastral petiole similar in form to that of *schmiedeknechti*, relatively 128 as against HW 100, longer than tergites 2 and 3 united (100 : 86), with spiracles at about 1/4 from base; sternite 8, as far as observed outside, with latero-apical arms comparatively broad, at apex (in somewhat obliquely seen) only slightly less than the distance between them (Fig. 177). In fore wing abscissa 2 of cubital vein distinctly longer than transverse cubital vein (appr. 5 : 2), apical portion roundedly curved up, at the junction with the latter angulated and slightly produced on outer margin.

Frontal shield microcoriaceous, the sculpture stronger and finer on peripheral areas and weaker and larger towards median bottom line which is comparatively broad, without sculpture and shining, and sparsely superimposed with fine punctures that are also somewhat closer on lateral areas and sparser and weaker inwards, along median line short somewhat dilated silvery hairs over a comparatively broad area arising. Vertex more delicately than on shield microcoriaceous and more largely punctured along posterior margin of it and median obtuse ridge, punctures between upper lateral carina of frontal shield and inner margin of eye smaller, weaker and partly longitudinally confluent; mesoscutum half-mat, with plumbeous shine, but without well visible microsculpture under 50x magnification and rather sparsely punctured, punctures moderate in size, irregular in distribution, with interspaces 1-3 times larger than puncture diameter, only along weak extensions of notauli punctures somewhat close and much sparser and weaker on median area and finer posteriorly; scutellum finely sparsely punctured, on mesopleuron prepectus punctured as on scutum, epimeral area more finely and more sparsely punctured, but the punctures by degrees larger and closer downwards; propodeum rather coarsely sculptured, area dorsalis at base with a transverse row of 5 obliquely stretched foveae on each side, interval becoming a larger trapeziform fovea, disc with about 5-6 strong transverse carinae, each lateral furrow filled with a longitudinal series of 4 foveae, the area outside the furrow and along lateral carina transversely very coarsely striate, posterior inclination including median furrow transversely coarsely striate and covered with thick silvery hairs, upper rim of ligament socket of gaster strongly roundedly produced as usual; side of propodeum except smooth base-ventral area obliquely coarsely striate, mixing finer weaker striae between striae; intercoxal carina gently roundedly curved upwards.

Other specimens examined:

7 ♀, India (Barrackpore), Rotheny (of these 2 are labelled as pileatum and 5 as *nigricans*)/(UMO); 1 ♀, Bangla-Deah (Dhaul) (BNNH); 4 ♂, India (Deesa: 2 ♂, IV, 1898; 1 ♂, IV, 1901; 1 ♂, X, 1901) (BMNH); 11 ♂, 1 ♂, Chagos Archipel., Diego Garcia (11 ♀, Trois Picquet, Lagoon coast, of which 10 ♀, 6, IV, 1 ♀, 50, IV, 1971; 1 ♂, Roche Point, 2, V, 1971, A. M. Hutson) (BNNH); 1 ♀, India, Assam (Mismari, 26, VI, 1945, D. E. Hardy) (BNNH); 1 ♀, India (Agra via Barinqueh) 29, IV, 1944 (USNM); 1 ♀, S. India (Karakal Territory (Kumbagaram, III, 1947, P. S. Nathan) (USNM); 2 ♀, 2 ♂, India (Orissa: 1 ♀, 21, VIII, 1963; 1 ♀, 4, VII, 1965; 1 ♂, 20, 10, 1964; 1 ♂, 18, X, 1965, S. D. Jayakar & H. Spurway (USNM); 1 ♀, S. India, Coimbatore, XI, 1950, P. S. Nathan) (BNNH).

Observations on other male specimens:

Length 8.3-10.0 mm. In fresh specimens antenna black, apically somewhat brownish, mandible in *Oryssa* specimens rather dark brown, in Chagos light brown, in all on bas-

al third black; pronotum with posterior part always discoloured, not ferruginous, but rather whitish, tegula semitransparent light brown, legs black, base and apex of each tibia more or less brownish, tibial spurs pale brownish white, base and apex of each tarsal joint and joint 4 of all tarsi completely pale brownish white, especially marked on hind metatarsi; veins and stigma of wing light brown.

Measurements: Table 8. Frontal shield very similar in character to that of some form of *schmiedeknechti*, but the apical angle formed by the lower carinae distinctly wider and more broadly rounded, with lower carinae much less strongly sinuate and less strongly convergent below (Figs. 178-181, cf. 184-186, 188-190), medio-apical carina (till apex of anterior bifurcation seen from above) half as long as lower carina, apical part (= enclosed area of interantennal structure) seen in profile roundedly produced anteriorly over the lower perpendicular keeled area, the structure very similar to that of the compared species (Fig. 57); long curved bristles emitting from the enclosed area 4 in number, silky white, those from the lower keeled area also 4, apparently lower two forming a pair, shorter curved erect bristles on disc of clypeus also silky white, regularly scattered. Clypeus roundedly elevated with top of elevation located somewhat behind middle of disc, anterior margin markedly recurved (Figs. 175, 8-f), on an average stronger than in *schmiedeknechti*; antennal joints with length relation as in the type, joint 3 in broadest view 1.5-1.7 times as long as broad at apex (Table 8), ultimate joint most usually appears as long as 4 preceding joints taken together, but in some condition slightly shorter than this. Pronotum in middle with anterior part about half the length of posterior part, lamina on side slightly produced, obtuse triangle in form, with apex broadly rounded. Thorax, propodeum and gastral petiole (Fig. 176, Table 8) similar in structure to *schmiedeknechti*, petiole considerably varied in relative length and maximum and minimum width; also relative lengths of tergites 2 and 3 as against petiole, but relative situation of petiolar spiracles comparatively constant (Table 8). Sternite 8 (Fig. 195) with apical emargination (Figs. 191-197) distinctly narrower than in *schmiedeknechti* (Figs. 194 and 148-157). Genitalia (Fig. 196) very similar to those of *schmiedeknechti*, but the apical lobes of penis valve (Figs. 197-198) seem to be narrower than the scope of variation in this species (Figs. 199 and 158-168). Hind coxal process lacking, outer excavation of hind coxa with inner margin highly keeled and anteriorly triangularly produced, short-hair comb obliquely running along posterior margin of hind metatarsus reaches its apex, silvery white in colour.

Vertex delicately, frontal shield more distinctly microcoriaceous and the latter fairly closely superimposed with fine punctures, punctures on vertex confined in distribution as in the type; mesoscutum fairly shining, without microsculpture or very faintly microcoriaceous, punctures in front of parapsidal sutures usually rather sparse, with puncture-interspaces more or less larger than puncture-diameter, but sometimes as large as punctures, general tendency in change of distribution and size as in the type, medio-posterior area slightly impressed, with punctures very sparse and fine, surface shining, mesosternum medianly longitudinally carinate and on both sides of the carina shortly costate. Sculpture of propodeum similar in pattern to the type, but considerably varied in density, sometimes rough and coarse, but sometimes considerably close, sides wholly, obliquely closely striate, even antero-ventral smooth area also covered with weak striae.

Description of hitherto unknown female

By the form of frontal shield easily separable not only from its male, but also from *schmiedeknechti*. Frontal shield with lower carinae gently roundedly swollen out and the inside nearly smoothly, fairly deeply, roundedly excavated (Figs. 170, 172-174) with a deep pit near apical angle. Statistically relative total length to width at lateral angles is distinctly shorter than in *schmiedeknechti* (Table 8); this is due to that the lower area is shorter than in this (Table 5). Clypeus slightly longer than in ♂, with apical margin very weakly recurved, nearly simply rounded. Antennal joints slender and long, joint 3 in widest view 2.5-2.8 times as long as wide at apex, ultimate joint normal, appr. as long as joint 3 (Table 8), relative length of joints 3, 4, 5 appr. 10, 9, 8, measurements in Table 8, IOBs relatively distinctly narrower than in ♂, OOB also markedly narrower, IOBs on an average slightly larger, that is, convergence of inner orbits slightly weaker; gastral petiole with averaged length also somewhat longer than in ♂, end tergite laterally compressed as usual. Hind coxal organ shortly toothed, with a tuft of short pubescence on top. Tibiae and tarsal joints very weakly brownish at base, discolouration not so marked as in ♂, but pronotum posteriorly distinctly discoloured. Mesoscutum mostly microcoriaceous, varying in strength, otherwise general sculpture as in ♂.

Comparative notes

As repeatedly mentioned above the present species very closely resembles *T. schiedlekechti* Kohl and it is sometimes very difficult to separate it from this species, especially in the male. In the typical female the two species can easily be separated from each other by the difference in the form and surface excavation of frontal shield

Table 8. Measurements on *Trypoxylon melanurum* Cameron, ♀ ♂.

Loco.	IDV(IODc)	OOD Oa	POD	FSL UL	U/L	A3	(L/W)	Ant(L/W)	Pet	Ma	MI	Sp	2	3				
I. Coimb.	29	7.0	1	6.0	6.5	13	8	1.8*	16	2.7	15	2.6	134	18	7	30	42	44
Karik.	27	7.5	1	5.0	5.5	13	8	1.5*	15	2.5	15	2.5	130	17	7	28	44	46
Oryssa	28	7.0	1	5.0	6.0	13	8	1.7	16	2.4	15	2.5	138	19	8	29	38	40
Oryssa	29	7.0	1	4.5	5.0	13	8	1.5	15	2.8	15	2.5	116	24	8	28	48	48
Agra	28	7.5	1	4.5	5.5	12	8	1.7	15	2.4	-	-	132	22	7	30	-	-
Barrack.	28	7.5	1	5.0	6.0	13	8	1.6	-	-	-	-	134	19	7	29	42	44
Barrack.	30	7.0	1	5.0	6.5	14	9	1.5	16	2.7	16	2.7	136	18	7	30	44	46
Barrack.	29	7.0	1	6.0	7.0	13	8	1.6	16	2.7	16	2.6	136	19	7	30	44	46
Barrack.	29	7.2	1	5.5	6.3	14	8	1.6	16	2.7	16	2.7	136	17	7	30	48	48
Barrack.	29	7.5	1	6.0	7.0	13	8	1.6	16	2.9	15	2.6	140	18	7	30	42	42
Barrack.	27	8.0	1	5.0	5.0	13	8	1.6	16	2.7	16	2.7	134	20	8	29	42	42
Barrack.	29	7.0	1	6.5	6.5	13	8	1.5	16	2.7	15	2.6	136	19	7	29	44	44
Barrack.	28	7.3	1	4.5	5.5	13	8	1.5	16	2.7	15	2.6	136	18	7	32	42	44
Barrack.	29	7.0	1	5.0	6.0	13	8	1.4	16	2.5	15	2.6	138	18	7	30	42	40
Assam	29	7.5	1	5.5	6.5	14	8	1.5	16	2.9	16	2.7	132	18	8	28	42	40
Chagos	29	7.7	1	6.0	7.0	14	8	1.5	16	2.7	15	2.6	134	17	7	28	40	40
Chagos	28	7.6	1	6.0	7.0	14	8	1.5	16	2.7	16	2.6	134	18	7	28	40	40
Chagos	29	7.5	1	6.0	6.8	13	8	1.5	16	2.7	-	-	128	19	8	28	46	48
Chagos	28	7.5	1	6.0	6.5	14	8	1.5	16	2.7	15	2.6	132	18	7	28	42	44
Maldives	34	7.0	3	3.5	5.0	14	8	1.2	13	1.5	23	2.4	128	18	7	28	40	44
Chagos	34	7.0	3	4.5	5.5	13	8	1.4	14	1.7	25	2.5	126	16	7	28	44	44
Chagos	34	6.8	3	4.2	5.7	14	8	1.2	13	1.5	24	2.4	122	20	8	28	42	46
I. Oryssa	34	7.1	3	4.4	5.0	13	8	1.5	13	1.7	24	2.4	124	17	6	28	42	44
Oryssa	34	7.0	3	4.5	5.5	13	8	1.4	14	1.6	24	2.4	120	17	7	27	44	46
Deesa	34	7.1	3	4.0	6.0	14	9	1.7	14	1.6	25	2.5	104	22	9	26	50	50
Deesa	36	6.6	3	4.5	6.0	13	8	1.5	14	1.7	24	2.4	120	17	7	29	44	42
Deesa	35	6.5	4	4.0	6.0	13	8	1.4	14	1.6	24	2.4	120	18	8	28	48	46

Abbreviation: I. = India. Coimb. = Coimbatore (S. India). Karik. = Karikal Territory (S. India). Barrack. = Barrackpore.

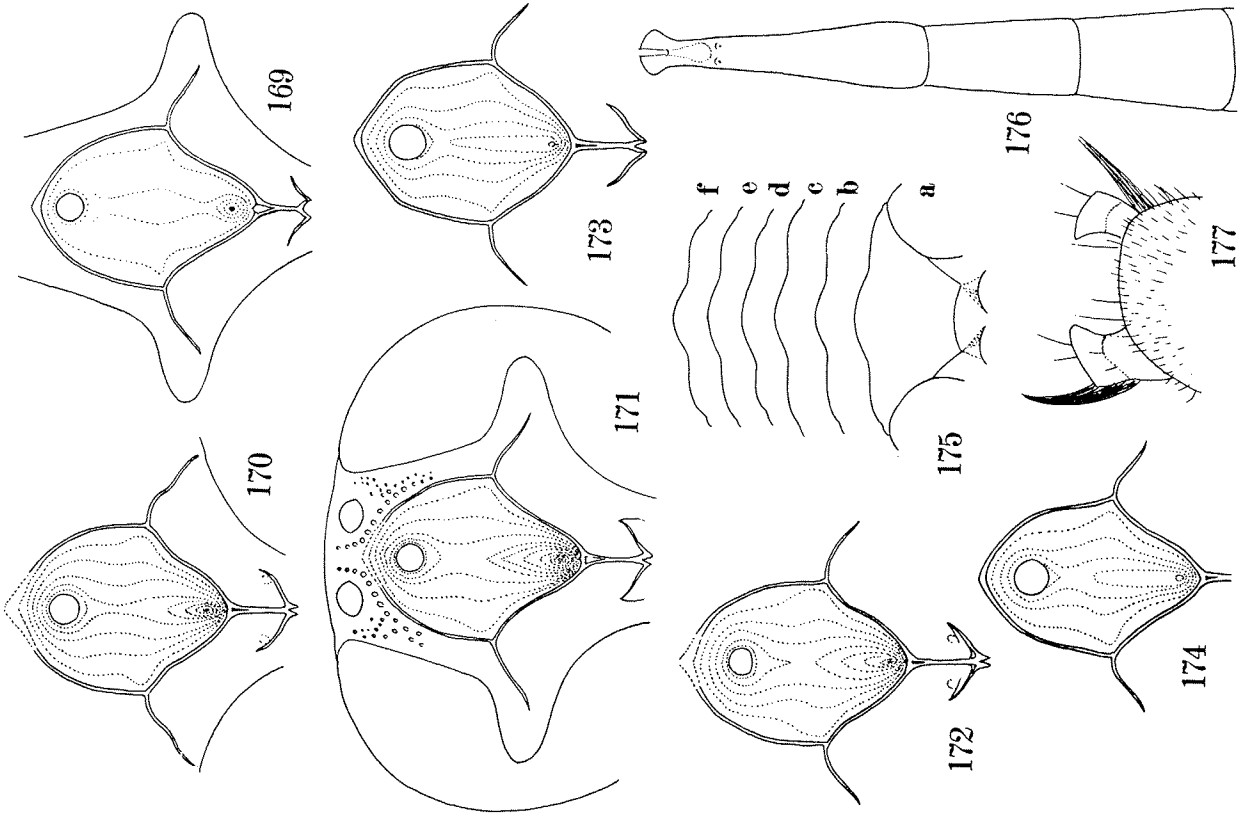
Remarks. From Maldives below ♂, others ♀.

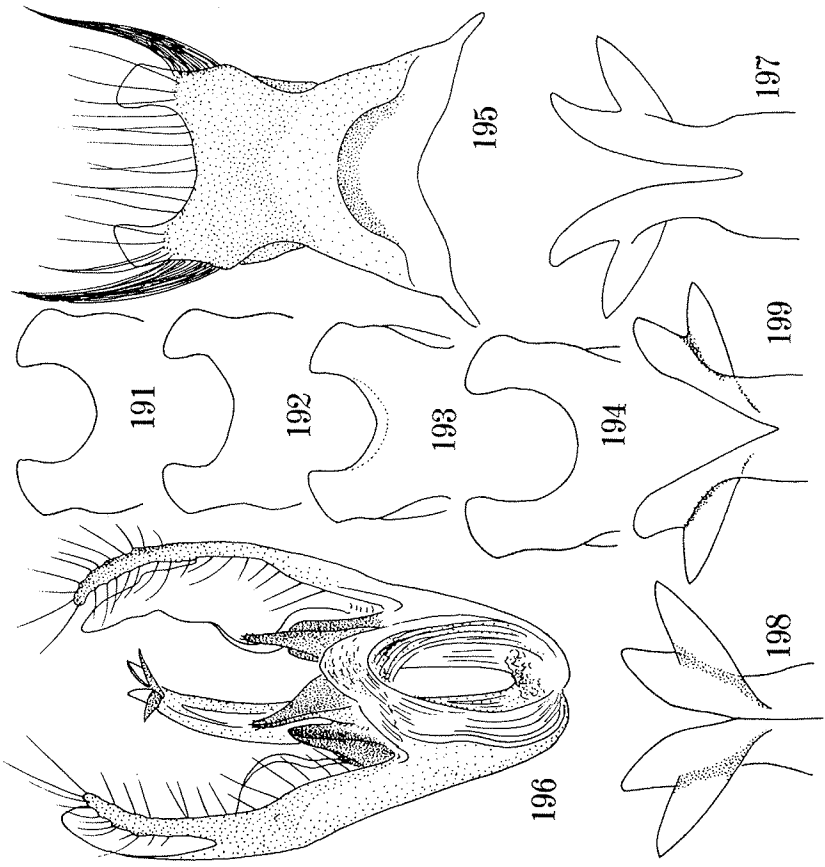
* As to the length relation of frontal shield frequent disagreements between values UAL/(FSL - UAL) and U(=UAL)/U(=UAL), or that figures of FSL:UAL are the same and those of U/L are different, is due to that the original values are obtained under the standard of the width at lateral angles 20, and it is divided to standard 10, while U/L is calculated on the original values before receiving "counting fractions of .5 and over as a whole and disregarding the rest".

Explanation to Figs. 170-177

Figs. 170-177. *Trypoxylon melanurum* Cameron, 170, 172, 173, 174... ♀; 169, 171, 175, 176, 177... ♂.

169-174: Frontal shield, vertically seen. 169: Maldives (type). 170-172: Chagos. 173: E. India, Oryssa. 174: Do., Assam. 175: Clypeus and its anterior margin: a and b; Oryssa. c: Chagos. d-f: Deesa. 176: Gastral segments 1-3 (Deesa). 177: Apical part of sternite 8 (type specimen).

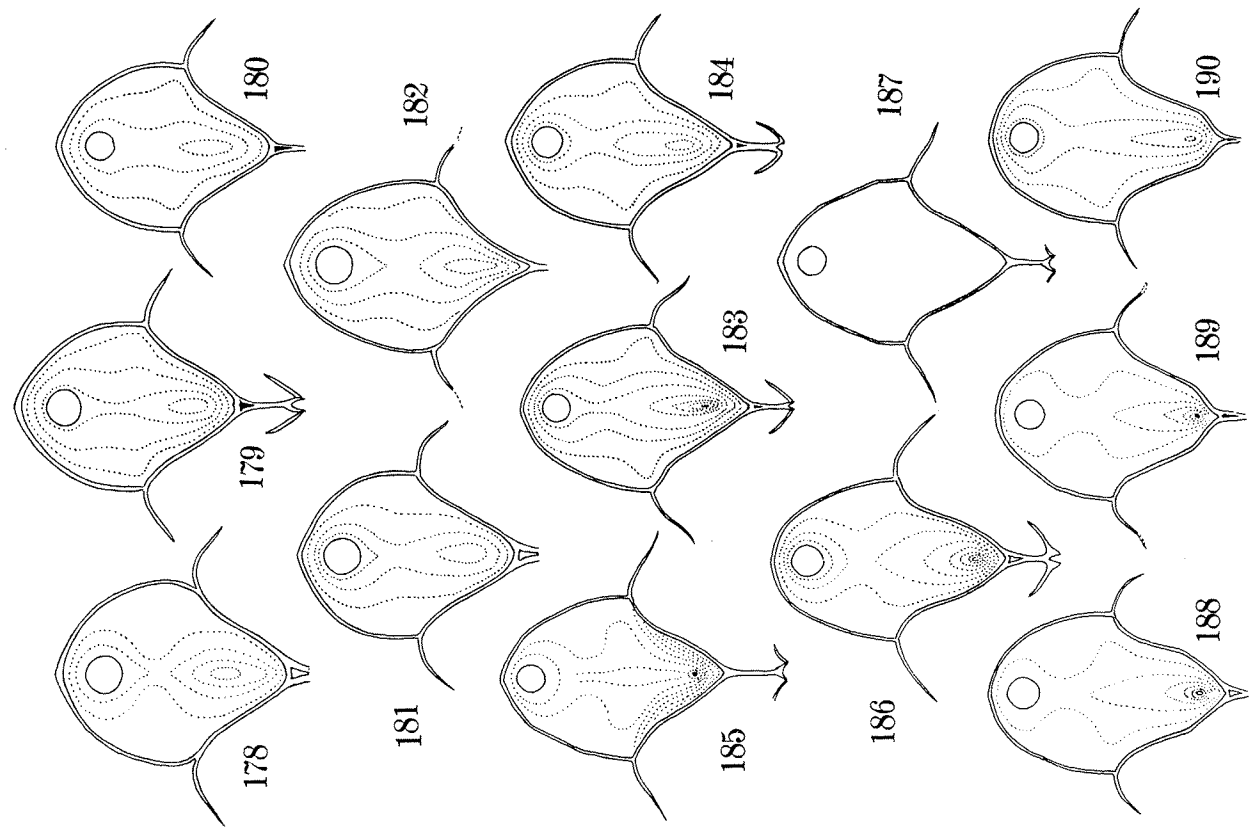




Figs. 191-199. *Trypoxylon melanurum* Cameron, ♂ and ♀, *schmiedeknechti* Kohl, ♂ (194 and 199 only).
 191-195: Sternite 8. 191-192, 195: *Oryssa*. 193: *Deesa*. 194: *Kangra v.*
 196: Genitalia, obliquely from beneath (*Oryssa*). 197-199: Apical part of penis valve. 197: *Oryssa*. 198: *Deesa*. 199: *Kangra Valley*.

Explanations to Figs. 178-190

Figs. 178-190. Comparison of frontal shields of *Trypoxylon melanurum* Cameron (178-181) and *Trypoxylon schmiedeknechti* Kohl (182-190), some problematic cases. 182, 183 and 187... ♀; all others ♂.
 178-182: W. India, *Deesa*. 183-184: N. India, *Kangra Valley*. 185-187: E. Java, *Malang*. 186, 188: W. Java, *Bogor*. 189-190: Java, *Kaliwoengoe*.



(Fig. 173, cf. Figs. 185 and 124); in the typical male also the separation is not always difficult (Fig. 171, cf. Figs. 184-185), but the form of the frontal shield is considerably variable in both species and in some cases it becomes to be very similar. The points of separation are that (1) in *melanurum* situation of lower carinae is always slight (in *schmiedeknechti*, especially in the male, marked, sometimes very strong - Fig. 186), (2) apical angle formed by lower carinae is in *melanurum* comparatively broad and rounded and very frequently medianly shortly incised from beneath (in *schmiedeknechti* usually narrow and angulated and when it appears broadly rounded lower carinae are strongly sinuate - Figs. 188-190). Statistically in *melanurum* frontal shield is comparatively shorter (as against the width at lateral angles); this is due to that the lower area is relatively shorter than in the compared species (Table 8, cf. Table 5). Anatomically in *melanurum* the 8th sternite in ♂ has the apical emargination shallower than in *schmiedeknechti* and the penis valve above the apical lobes slenderer and longer.

Remarks. The present species is sympatric with *T. schmiedeknechti* (Fig. 200) and, therefore, is not in the subspecific relationships with it. Five specimens (1 ♀, 4 ♂) are collected at Deesa, W. India. They were collected within a short period of time (1 ♀, IX, 1901; 2 ♂, IV, 1898; 1 ♂, IV, 1901; 1 ♂, X, 1901) and the female and the male are very similar in appearance, especially in the general form and depth of the frontal shield (Figs. 178-182). We are tempted to treat them as one and the same species. Detailed examination, however, reveals that the female and the male are different species respectively, namely, the former is *schmiedeknechti*, while the latter is *melanurum*, because the lower angle of their frontal shield is distinctly different from each other and each is provided with other characters of each species.

Similarly, 1 ♀, 1 ♂ from Punjab (Kangra Valley) and 1 ♀ from Assam are considerably similar in the general form of their frontal shields (Figs. 183-184 and 174), but in reality, the former is *schmiedeknechti* and the latter *melanurum*.

In some male specimens from West Java the frontal shield appears very broad in the lower angle (Figs. 186 and 188-190), but this is due to the strong sinuation of lower carinae and in them the lower area is relatively distinctly longer than in *melanurum* and sternite 8 and genitalia in one of them dissected shows the forms of *schmiedeknechti*.

As given above with some instances, the present species is sometimes very similar to some form of *T. schmiedeknechti schmiedeknechti*, especially in the male and, therefore, to separate from it detailed observation of the frontal shield is necessary.



Fig. 200. Distribution map of *T. melanurum* (white circles) and *T. schmiedeknechti* (black spots) in India and adjacent areas.

On *Trypoxylon nigricans* Cameron (n. sp., m. d.) and *T. pileatum*: Cameron

Trypoxylon nigricans Cameron, 1889, is nomen nudum, because Cameron did not make description of the species. It is interesting, however, to know what form he intended to place under this species name. In the Museum of Hope Department of Entom., University of Oxford, are preserved seven specimens that are labelled as "nigricans Cam." (handwritten on the Museum label). According to my investigation, of the specimens one (with a label, Barrackpore, Rothney) is in reality *T. intrudens* Smith, ♀, one (no data but with a small label written 8 with red ink) is *T. schmiedeknechti* Kohl, ♀, and the remaining five (1 ♀, with 2 labels, Barrackpore, Rothney, and "8" in red ink, and 4 ♀, all no data, but all with the red "8" label) are *T. melanurum* Cameron, ♀ ♀. The data lacking specimens are, judging from the same red "8" label and the Cameron's 1889 paper, possibly Barrackpore, Rothney Coll. It is strange that a specimen of *T. intrudens* Smith is included. But the confusion of *T. schmiedeknechti* with *T. melanurum* is accepted. In all the specimens of *melanurum* the frontal shield is nearly typical in form, with lower carinae only weakly sinuate and with the surface deeply rounded excavated. In the *Sphécid* Wasps of the World/Bohart and Menke treated *nigricans* Cameron (n. sp., m. d.) as a synonym of *T. pileatum* Smith (p. 347), but it is to be dealt with as a synonym of *T. melanurum* Cameron, though *nigricans* is a complex of three species. *T. pileatum* Cameron, 1889 (he spelled as *piliatum* erroneously) has been relied upon by the later investigators to understand the true characters of *piliatum* Smith, since the original description of this species is quite simple and incomplete. There are two female specimens labelled as *piliatum* Smith (handwritten) in the same Museum as above mentioned, of which one that carries the red "8" label together with two labels (one, "piliatum Cam." handwritten on the Museum label and the other "pileatum ? descr." on the surface and "Sp. nov. see Zool." on the back side, both handwritten) is no doubt above mentioned *melanurum* Cameron, and the other that bears similarly the red "8" label and two other labels (one, "piliatum Smith" handwritten in two lines and the other, "piliatum Cam." handwritten on the Museum label) is also *melanurum* Cameron. The two specimens are certainly the ones that were used by Cameron for the description of *piliatum* Smith, because they well agree in characters with the description of *piliatum* Cameron.

The relation above mentioned seems to me to tell the reason why Cameron did not try to describe *T. nigricans* and why Bohart and Menke synonymize *T. nigricans* with *T. pileatum*.

TRYPOXYLON THALANUM TSUNEKI, 1961

Trypoxylon thalantum Tsuneki, Nature and Life of S. E. Asia, I: 584, 1961 (♀, Thailand)
Trypoxylon dubiosum Tsuneki, Etizenia, 6: 4, 1964 (♀ ♂, Is. Amami-Oshima, Ryukyus)
 (sp) (syn. and stat. nov.); Ibid., 13: 6, 1966; --: Murota, Life Study, 17 (4): 101 (Is. Amami-Oshima).

Trypoxylon thalantum: Tsuneki, Poles. Pism. Ent., 44: 629, 1974 (♀, Thailand); Steenstrupia, 4: 76, 1976 (♀ ♂, Philippines: Palawan, Balabac and Tawitawi).

Specimens examined:

India 1 ♂, Anamalai Hills, Cinehono, 3500ft., V. 1964, P. Sasai Nathan (BMNH).
Sri Lanka (Ceylon) 1 ♀, Kan Dist. Kandy, Udawattakele, 1-3. X. 1973, K. V. Krombein, P. B. Kurunaratne and P. Fernando (USNM).

Thailand 3 ♀: 1 ♀, NW, Chiangmai Prov., Chiangdoo, 450 m., 5-11. IV. 1958, T. C. Mas; 1 ♀, Chiangmai, Fong, 500 m., 12. IV. 1958, T. C. Mas (RPBM); 1 ♀, Nakh. Ratcha Prov., Nakhon Ratchasima 60 km S., 2-4. III. 1971, P. & P. Spangler - Sakaeart Expt. Sta., 14° 30' N, 101° 55' E, 300-600 m., Malaise trap - (USNM).

Laos 15 ♀ 8 ♂: 9 ♀ 1 ♂, Vientiane Prov., Gi Sion Vill. de Tha Ngre, 7-21. II. 19-26. XII. 1965; 1 ♀, 9-26. I., 21-28. II., 24. X. 1966, Native collector, Light trap (RPBM); 4 ♀ 5 ♂, Sedone Prov., Pakse, 31. V. 1967, Native collector, Light trap (RPBM); 2 ♀, Wepiknamthong Prov., Wepi, 30. III. 15. IV. 1967, Native collector, Light trap (RPBM); 2 ♂, Sayaboury Prov., Sayaboury, 13, 15. IV. 1967 (RPBM).

Malaya 1 ♂, Selayang, 10 miles, 12. X. 1929, H. T. Pagden (BMNH).

Indonesia 14 ♀ 4 ♂: 1 ♀, Sinabang I., Simalur, Sum., II. 1913, E. Jacobson (RM)

NH); 1 ♀, Krakatau, VII. 1924, Demersman (RNH); 1 ♀, Palu, Pandjangan, Sim. Sum., V. 1913, E. Jacobson (RNH); 5 ♀, Sumba I.: 4 ♀, Central Region (3 ♀, Liniwetju, 10. X. 1949; 1 ♀, Lenggalliru, 10. X. 1949); 1 ♀, Western Region, Pogobina, 16. IX. 1949, all leg. Srs. Bahler & Saiter (RNH); 6 ♀, 4 ♂, Ambon I.: 3 ♀, 70 m, 3. XI. 1960, 13. XII. 1960, 25. II. 1961, A. M. R. Wagner (RNH); 3 ♀, 4 ♂, Wesi, A. I., 8, 19. III. 19. 66; 24. XI. 1965 (♂), A. M. R. Wagner (CAS).

Borneo 3 ♀, 2 ♂; 1 ♀, Saravak, first Div. Semangoh For. Res., 1° 25' N, 110° 17' E, 15-19. XI. 1976, P. S. Crenston (RNH); 2 ♀, 2 ♂, N. Borneo: 2 ♀, 1 ♂, Tawau, Qoain Hill, 3-6. VII; 1. IX. 1962 (1 ♀, 1 ♂), H. Holtmann (BPM); 1 ♂, Sandakan, Baker leg. (USNM).

Philippines 22 ♀, 15 ♂; 2 ♀, 1 ♂, Tawi Tawi (Tarawakan), 25. X. - 14. XI. 1961, Noona Dan Exp. (ZMUC); 1 ♀, Balabac (Dalawan Bay), 13. X. 1961, Noona Dan Exp. (ZMUC) 7 ♀, 2 ♂, Palawan: 1 ♀, Uring Uring, 15. VIII. 1961, Noona Dan Exp. (ZMUC); 1 ♀, Tumpitao Pt., 24. V. 1958, H. E. Milliron, Jungle clearing (BPM); 5 ♀, 1 ♂, 3 km NE Tubaog, 7. 8. 10, 11, 14, 24. V. 1962, H. Holtmann, Malaise trap (BPM); 1 ♂, Negros (Kalantakan), IX. 1920 (BPM); 1 ♀, 2 ♂, Busuanga (4 km N. San Nicolas), 21, 25, 26. V. 1962, H. Holtmann, Malaise trap (BPM); 1 ♀, Samar, Baker (USNM); 1 ♀, 1 ♂, Cullion (6 km W. of Cullion), 9. 12. VI. 1962, H. Holtmann, Malaise trap (BPM); 9 ♀, 8 ♂, Luzon: 6 ♀, 1 ♂, Los Banoa: 1 ♀, VIII. 1916, F. Muir; 3 ♀, 1 ♂, 1917, IV-VII. 1917-VIII. 1917, F. X. Williams (BPM); 2 ♀, Baker (USNM); 2 ♀, 3 ♂, Mt. Makiling, Baker (USNM); 1 ♂, Mt. Banahao (USNM); 1 ♀, 7; 1 ♂, Albany Prov., Labon, Cagucos, 200 m, 10. V. 1965, H. M. Torrewillas (BPM); 2 ♂, Mt. Montalban, Rizal, Wa-wa Dam, 150-200 m, 25. II., 3. III. 1965, H. M. Torrewillas (BPM).

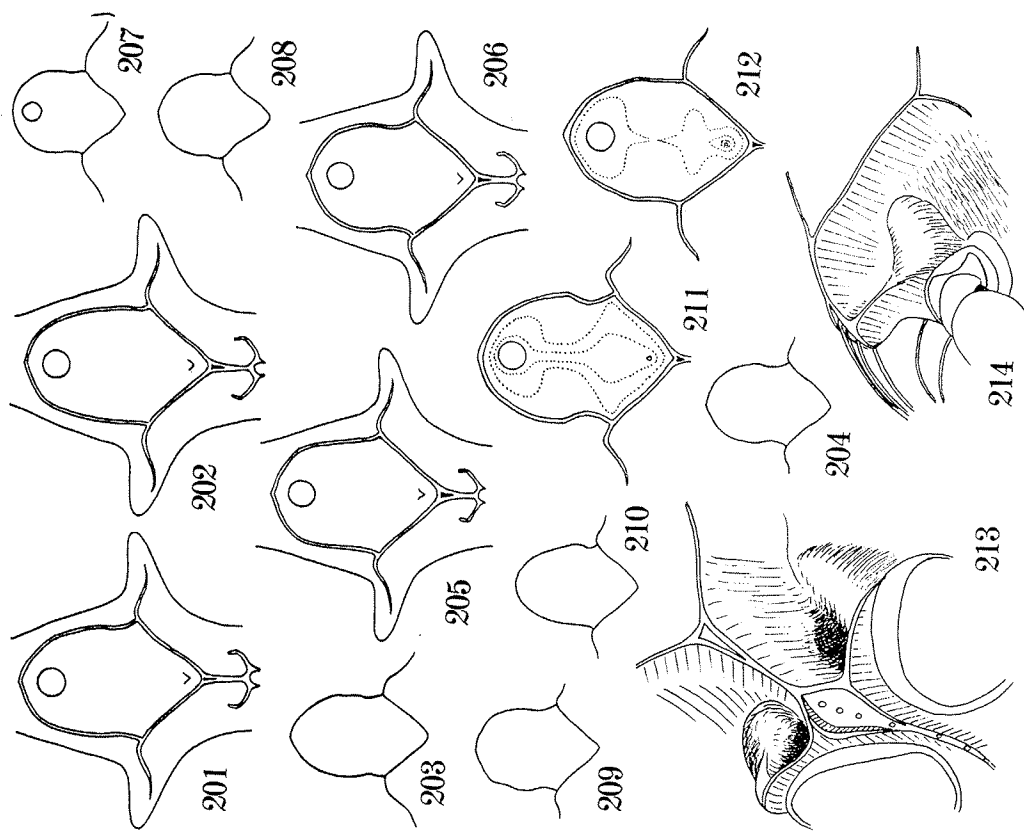
Myanmar 54 ♀, 3 ♂, Amani-Oshima, 28. VII. 1956; 24. VI. - 1. VII. 1961, K. Tsuneki (Coll. Tsuneki).

N. China 2 ♀, Peking, bred from *Celtis* gall (Recol. XI. 1905, issd. Fall 1906).

General characters

♀. Length 8-12 mm, mostly 10 mm or so. Black; mandible ferruginous, basally blackish, clypeus with a brownish spot on anterior marginal-area near each side, palpi pale ochreous, sometimes slightly brownish, basally black, tibial spurs white, with a slight yellowish or brownish tinge (in sep. abdomen dark brown); tegulae semitransparent brown, wings hyaline, veins and stigma brown to dark brown; tegulae semitransparent, lower inner orbits, supraclapeal area, clypeus and temples silvery, on sides of thorax and on propodeum except area dorsalis and sides silky white, on mesoscutum greyish, gaster covered with short greyish pubescence; long curved bristles on interantennal area and short curved erect bristles scattered over disc of clypeus white, in old specimens sometimes brownish; short silvery glittering hairs on median area of frontal shield considerably varied in density.

Head from above (Tsuneki, 1962, Fig. 2; 1964, Fig. 4; 1966, Fig. 3) with IOD approximately 1/4 the width of head, OOD very narrow, hence ratio of OOD : POD markedly varies according to its slight fluctuation, most usually 1 : 5-6, sometimes 1 : 7 or 1 : 4 (Table 9), in some population OOD constantly broader than in others, POD usually smaller than postocellar diameter (Table 9), interocellar longitudinal ridge-like elevation usually present, varying in length, but sometimes obscure or completely absent. Head seen in front (Tsuneki, 1961, Fig. 1; 1964, Fig. 13; 1966, Fig. 2) with IODs 10 : 8-9, most usually 10 : 8.5, eye incision with sinus broadly rounded, clypeus widely roundly elevated, top of elevation varies from half to one third from base, anterior marginal-area broad, flattened, reflected, epical margin simply roundly produced. Frontal shield considerably varied in form (Figs. 201-212), but always about 1.5 times as long in middle as broad at lateral angles, with upper area approx. twice as long as lower area (Table 9), surface gently roundly inclined towards median line, outward branch carina long, always deeply entering the range of eye incision, medio-apical carina usually distinctly less than half as long as lower carina, but sometimes subequal to the half, always with a triangular impression upwards, upper lateral carinae usually subparallel, but frequently more or less constricted, dorsal carina usually broadly rounded, sometimes angulate in middle; interantennal structure seen obliquely in front: Fig. 213, seen in profile: Fig. 214, characteristic is the fact that transverse carina branched out from the side of upper enclosed space of interantennal area increase apically and after touching the dorsal rim of antennal socket turns backwards and forms a short dike till the lateral wall of the lower carina of frontal shield, enclosing a deep hollow inside (Figs. 213, 214); long curved bristles from upper enclosed space of interantennal structure 4 (sometimes 3, but in



Figs. 201-214. *Tyropoxylon thaisium* Tsuneki. 201-212: Variation in form of frontal shield. 213-214: Interantennal structure.
201-204: Long form. 205-208: Short form. 203, 204, 206, 209, 211: Constricted form. 210: Asymmetric constriction. 212: The form in the specimen having abnormally thick petiole (Fig. 227), surface excavation also abnormal (compare with the normal form, e.g. Fig. 211 from Laos). 213: Laotian specimen (notice the hollow on each side of medio-apical carina of frontal shield). 214: Philippine specimen (Luzon); seen in profile.

rather close, with interspace nearly as large as puncture diameter, sometimes partly rugosely confluent, slightly sparse on medial area (but difference in density not so marked as in *schmiedeknechti*), scutellum more sparsely and somewhat more largely punctured, punctures on mesopleuron: on prepectus as on scutum but slightly sparser, on epimeral area finer and sparser than on scutum, but gradually larger and closer below, metapleuron smooth and polished, except finely closely punctured upper raised area just below metapleuron flange; sculpture on dorsal side of propodeum (Tsunekei, 1964, Fig. 16; 1966, Fig. 5) as in *schmiedeknechti* (cf. Fig. 60), on side obliquely finely striate, but very frequently the striae on antero-ventral area and on central area broadly vanished, with surface shining, usually without punctures mixed, but sometimes mixed with punctures, especially on dorso-anterior portion; gaster covered with very fine pile-bearing points.

♂. Besides the numbers of antennal and gastral segments, differs from ♀ in the following characters:

1. Antenna thicker and robust, with ultimate joint deformed; flagellum towards base much more strongly dilated than in ♀, for instance, joint 3 in broadest view approx. twice, in the narrowest view approx. 2.7 times as long as broad at apex (in eye measurement both appearing much wider, due to densely covering hairs) (relative length of joints 3, 4, 5 similar), ultimate joint slightly curved and bent at apex, as long as 2-3 preceding joints taken together (Figs. 215-221), the relative length varied geographically - the same figures and Table 10.
2. IOD at vertex as against HW. Much broader, one third as broad as head (in ♀ approx. one fourth).
3. IODs. Inner orbits more strongly convergent towards clypeus, IODs most usually 10 : 7.5 (= 4 : 3) (in ♀ mostly 10 : 8.5).
4. OOD : POD. Postocellus relatively more remotely separated from eye, therefore OOD : POD 1 : 2 - 2 : 3 (in ♀ mostly 1 : 5-6).
5. Clypeus relatively slightly shorter, with top of elevation somewhat more basally located, with anterior margin much less strongly produced, more markedly recurved.
6. Genitalia: Figs. 228, 229, similar in general structure to those of *schmiedeknechti*, but apical bifurcation of paramere slightly shallower, about one fifth of total length of the organs (in the compared species about one fourth).

Comparative notes

Amongst the species known from the Old World outside the scope of the present study *I. aegipticum* Kohl, 1906 is considered to be closest to the present species. According to my observation of a female specimen from Cyprus that well agrees in characters with the descriptions of this species by the original author and Oussakovskij (1956) it differs from *thalamum* in that interantennal transverse carina simply ended at the upper rim of antennal socket, not turned backwards to form the dike that encloses the deep hollow inside, that upper lateral carinae of frontal shield more strongly roundly convergent upwards and the dorsal carina distinctly angulated in middle and that sides of propodeum minutely shagreened between striae. Furthermore, in the specimen medio-spical carina of frontal shield longer than half the length of lower carina and gastral petiole for a considerable length parallel-sided behind spiracles.

Measurements in the same method and order as Tables 9-10 of the *aegipticum* specimen (♀): 29 (6.5) 8 (2.8) 7.3 (2.0) 63 (19.8) 28 (46.5%) (1.7) 6) (1.5) 9 (1.7).

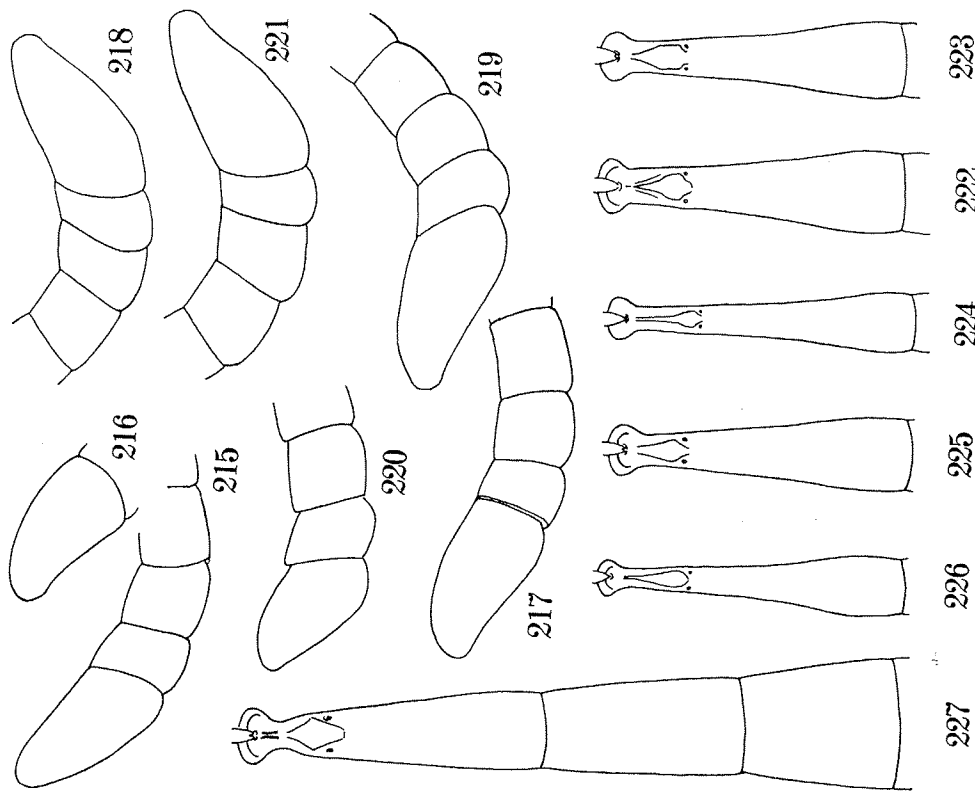
I. scutatum Chevriér, 1867 also somewhat resembles the present species in the form of frontal shield; in it, however, interantennal transverse carina is simple at the ends, medio-spical carina is much longer, more than half the length of lower carina which is strongly curved upwards and much more weakly inclined towards medio-apical carina.

Variation in characters

As regards the sexual variations accounts were already given in connection with the description of the male (wide also comparatively Tables 9 and 10).

1. The form of frontal shield. At a comparative glance it is easily perceived that the relative length to width of frontal shield is markedly varied among specimens (Figs. 201-212); the fac: is confirmed by measurements (Tables 9 and 10). Upper lateral carinae frequently constricted just above lateral angles, varying in degrees of depth and length (Figs. 201-212 except 202 and 205), constriction usually symmetric, but sometimes asymmetric (Fig. 210). Lower carinae usually almost completely straight, but rarely weakly sinuate (Figs. 205, 211), sinuation, however, not so marked as in *schmiedeknechti* and its occurrence is not geographic.
2. Excavation of frontal shield. It is deeper around ocellus and on lower area generally roundly inclined towards median line which forms shallow smooth bottom furrow,

(54)



Figs. 215-227. *Ityopylion thalamum* Tsunekei. 215-221: Local variations in antennal joint 13 (♀). 222-227: Variations in gastral petiole.
 215: Laos. 216: the same from different direction. 217: Malaya.
 218: Ambon. 219: N. Borneo. 220: Philippines. 221: Ryukyu (Amami I.).
 222-223: Amami, normal. 224: Amami, exceptional. 225: Borneo, abnormal.
 226: Palawan, normal. 227: Palawan, abnormal.

Table 11. *Typosylon thaianum* Tsunek, ♂. Variation in surface characters of frontal shield, mesoscutum and propodeum side.

Locality	Frontal shield			Mesoscutum										Propod. side			
	Up.lt.car. Construct.	Excavat.	Surface	Surface		Puncture		Size	Distrib.				Striae	Ws	NI	Bl	
				Ma	Fr	Ab	L		M	S	CI	M					Spa
Str M We No	D	M	Sha	Ma	Hm	Shi	Fr	Ab	L	M	S	CI	M	Spa	Ws	NI	Bl
Sri Lanka	1	-	-	-	1	-	1	-	-	-	-	1	-	-	-	-	-
Thailand	-	3	-	-	3	-	1	2	-	2	1	3	-	-	-	1	-
Laos	2	7	5	1	-	15	-	4	11	-	13	2	6	4	5	2	7
Sumat.-Java	-	2	-	-	1	2	-	1	2	1	1	1	3	-	-	-	1
Sumba I.	-	3	2	1	2	-	1	4	-	3	5	4	1	-	-	-	5
Borneo	1	2	4	-	6	-	2	4	-	6	6	-	3	1	2	-	6
Philippines	1	2	8	3	12	3	-	1	2	-	3	-	1	17	9	5	4
Amami I.	1	2	3	4	6	4	-	8	2	-	10	-	10	-	6	-	2
Peking	-	1	1	-	-	-	-	1	1	1	-	-	2	-	-	-	2
♂♂																	
South India	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Laos	1	5	1	1	-	-	8	-	7	1	2	6	-	5	3	5	2
Malaya	1	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-	1
Ambon I.	1	1	2	-	-	3	1	-	4	-	4	4	-	1	3	-	1
Borneo	-	2	-	-	-	1	1	-	2	-	2	-	2	2	-	1	1
Philippines	4	2	4	4	-	10	4	-	9	5	4	10	-	5	9	4	1
Amami I.	1	-	2	-	2	-	1	1	2	-	2	-	2	1	-	-	3

Abbreviation: See Table 7. To be added: Up.lt.car. = Upper lateral carinae. Ws = Whole the area (except anterior smooth area) striate. NI = (central part) narrowly lacking striae. Bl = (central part) broadly lacking striae.

the furrow is considerably hollowed at the lower end, but it is not so deep as in *schmidenechhi*; generally the excavation is deeper in ♀ than in ♂, but in the present species even the deepest instance is, when applied to the standard of *schmidenechhi*, only the medium class; similarly the shallow instance is not so shallow as in the extreme case of this species.

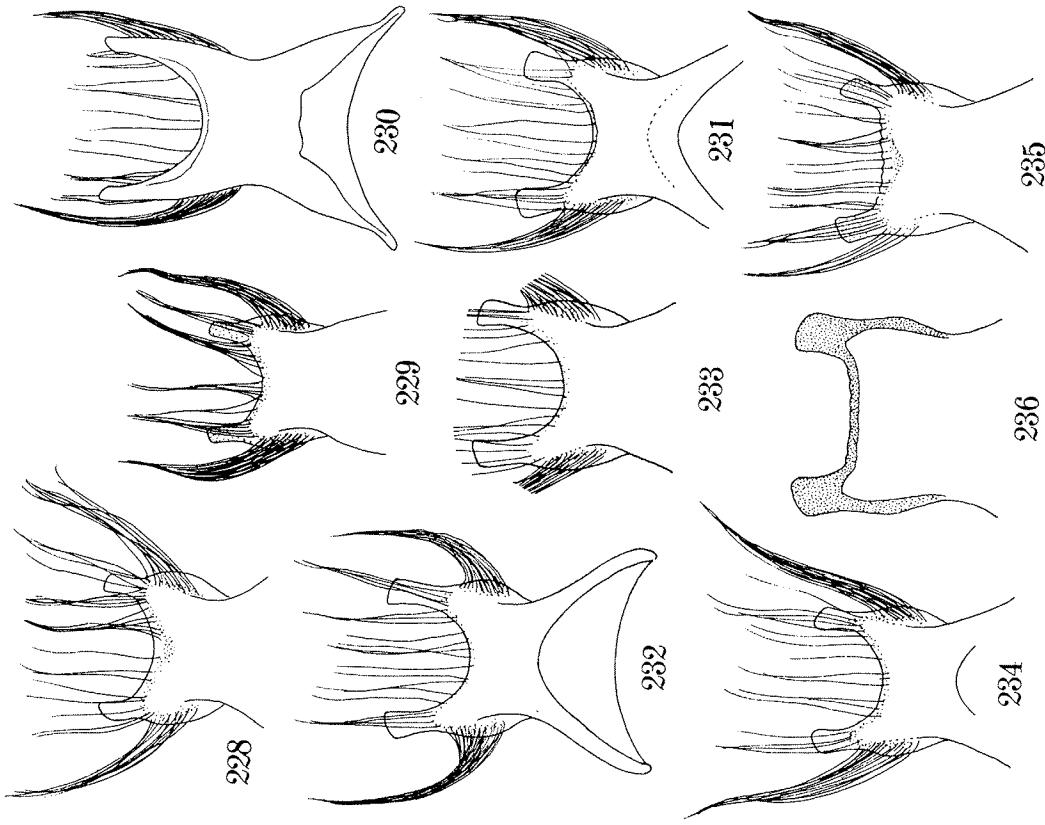
3. Ratio of interocular distance on vertex (10Dv) to head width (HW = 100). This is comparatively stable, centering around 26 in ♀ and 32 in ♂ (Tables 9 and 10), but a more or less variation is observed within the same population (e.g. Laos, ♂) or between different populations (e.g. Ambon and Amami).

4. Ratio of interocular distance at base of clypeus (10Dc) to that at vertex (10Dv = 10). It varies within the small range, in ♀ 8.5-9.5, mostly 8.5-9.0; while in ♂ 6.7-7.5, mostly 7.0-7.5.

5. OOD : Od : POD. Apart from the method of measurement considerably varies between sexes and within each population (Tables 9 and 10). Detailed figures are, therefore, of no value here for the comparison between the populations.

6. Antennal joint 3. Its relative length to head width (= 100) and length ratio to its width at apex seen from the broadest side (L/W) are given in Tables 9 and 10. The former in ♀ is mostly 16, rarely fluctuated within + 0.6, but -1.0 (Laos) and +2.0 (Laos) are exceptional, while in ♂ varies within much broader range, 14-18, without distinct local tendency, but 12.0 (N. Borneo) and 13.0 (Ambon) are rather exceptions. Length ratio to width at apex was measured by excluding the effect by covering pubescence: it is in ♀ mostly nearly equal to thrice the width at apex, but strictly it fluctuated within 2.5-3.2 times so; in ♂ mostly nearly twice the apical width, but strictly fluctuated between 1.6 and 2.2 times so.

7. Ultimate antennal joint. Ratio of its length to HW (= 100) shows usual fluctuating variation within a small range in ♀ (14-16, mostly centering around 15), but in ♂, besides the similar variation, a marked geographic variation is observed, namely, in the typical form from S. and SE. Asiatic Continent it is moderate in length and longer than 2, but shorter than 5 preceding joints united; in the populations of Ambon Island (Maluccas) and Amami-Oshima (Ryukyus) it is much longer



Figs. 228-236. *Typosylon thaianum* Tsunek, ♂. Local variation in sternite 8 (230 external view, all others internal).

228-229: Laos. 230: Ambon I. 231: N. Borneo. 232 (Luzon, Albany Prov). 233: Luzon, Mt. Makiling. 234: Luzon, Mt. Montalban. 235-236: Ryukyus, Amami I. (Notice relative length and form of latero-apical arms and form and depth of apical emargination. colour and number of hairs individually variable, in 228 and 235 scarce).

and as long as 3 preceding joints united; while in the Philippine population it is much shorter and as long as 2 preceding joints united; in the specimens from N. Borneo it can be considered similar to the Continental populations, or intermediate between those of the Moluccas and the Philippines, but the specimens are too scanty to know the variation range of the population. (cf. Tables 9-10, Figs. 219-221).

8. Gastral petiole. Excluding the three exceptional specimens (1 ♂ from N. Borneo, 1 ♂ from Palawan and 1 ♂ from Luzon, the measured values of which are underlined in Tables 9 and 10) and the specimens from Amami and Peking, the petiole is moderate in length and width (relative length to width of head (=100) 112-126, mostly 118-124 in ♂ and 112-122, mostly 114-118 in ♀; relative maximum and minimum width to length of petiole (=100) 18-20 and 6-8 respectively in ♀ and 17-21 and 7-8 respectively in ♂); while in the populations of Amami and Peking the petiole is much shorter and robust (relative length 104-114, mostly 110 in ♀ and 104-110 in ♂; relative maximum and minimum width 22-31 and 9-11 respectively in ♀ and 20-24 and 9-10 in ♂, cf. Tables 9-10 and Figs. 222-227).

9. Relative length of gastral segments 2 and 3. As against the length of petiole the relative length of segment 2 either singly or combined with segment 3 is often used as one of the characters of the species. To use it without confirming the range of variation is, however, not always safe. In the present species the combined length of both segments is usually fairly distinctly shorter than the petiole, but sometimes it is subequal to or even longer than the petiole (Tables 9 and 10). The latter fact is constant to the populations of Amami and Peking and no doubt the variation is geographic. This is due mainly to exceptional abbreviation of the petiole and not the elongation of the segments. In the Amhon population segments 2 and 3 taken together is always subequal in length to the petiole, but the petiole itself is not so thick as in the Amami population (Tables 9 and 10), showing distinctly the difference from the latter.

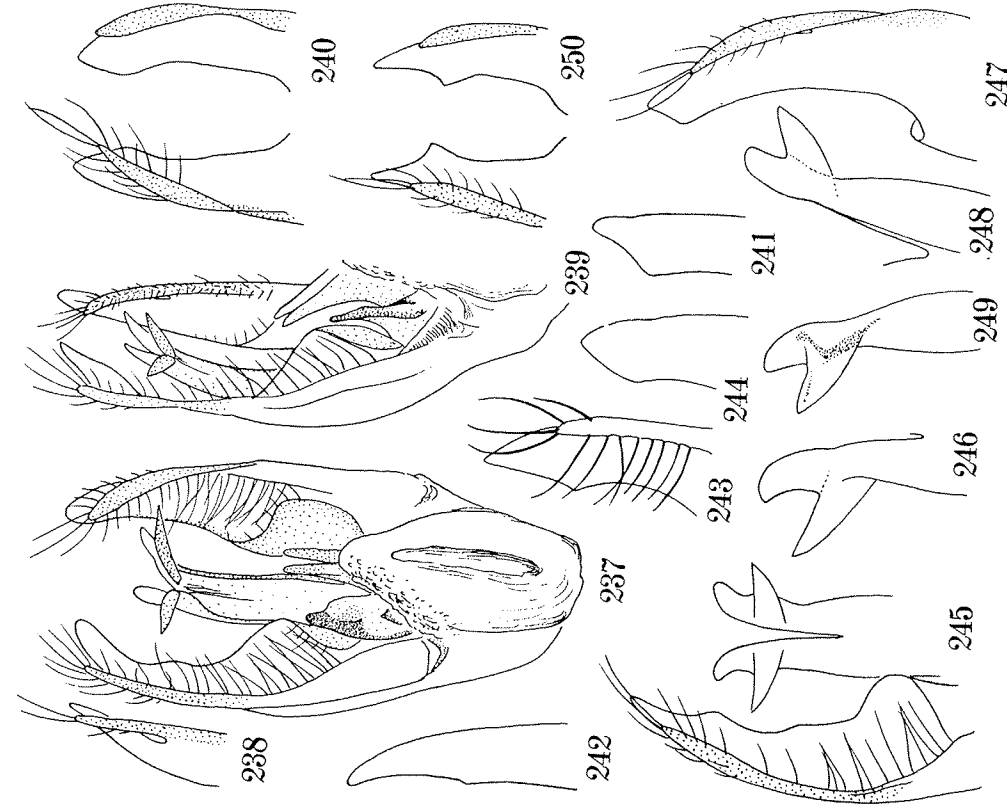
10. Sculpture on mesothorax (Table 11). Ground surface of mesoscutum smooth, usually with weak to moderate plumbeous shine, occasionally, however, rather weak micro-riceous sculpture can be seen. Punctures on scutum fine, sometimes medium-sized and locally somewhat larger and on mid-lateral area (the area in front of parapsidal suture is used as standard place) close (interspaces as large as or smaller than puncture), on median area slightly sparser, and larger posteriorly, but not so widely fluctuate individually or locally as in *schmidknechti*. Generally speaking, in the specimens from India, Thailand, Laos, Malaya, Sumatra, Java, Borneo and the Philippines punctures are medium-sized to fine, and close to very close; while in those from Sumba comparatively larger, closer, partly obliquely subrugose-ly confluent, with ground surface sometimes microsculptured; in those from Amhon also slightly larger and close, with surface less plumbeous and more shining; in the Amami and Peking specimens punctures distinctly larger, with puncture-inter-spaces = puncture diameter.

Mesopleuron on upper portion with punctures similar in size to those of scutum, but sparser and gradually slightly larger and closer towards mesosternum.

11. Sculpture on sides of propodeum (Table 11). Sculpture on dorsal side of propodeum is rather constant in pattern, only varies in density of the transverse striae, while that of the sides is markedly variable. Most usually antero-ventral part a long metapleural suture somewhat broadly smooth and polished and the remaining area obliquely finely closely striate. Very frequently, however, striae at central area broadly or narrowly obliterated and completely striated specimens are very rare, but in some of such rare instances the usual smooth anterior area is also covered with weak striae. Occasionally, moreover, punctures of moderate size are closely or sparsely mixed, especially on dorso-anterior part. But these variations are without connection with the locality.

12. Eight sternite in ♂. As compared with that of *schmidknechti* latero-apical arms shorter, narrower, with medial emargination broader and shallower. But the depth and width of emargination differs more or less with the localities, when they are remotely separated from each other. In the Amami specimens (3 examined) emargination shallow, with sinus nearly straight and minutely waved (Figs. 235, 236), in the Laotian specimens (2 examined) somewhat deeper (Figs. 228, 229), in the Philippine specimens much deeper (Figs. 233, 234), but even here emargination is far wider than the width of the arm while in the specimen from Amhon the arms are markedly slender and long (Fig. 230). As to the long hairs growing mainly on the sides considerable differences in density are observed among the specimens examined. There is certainly a more or less variation, but at least in part it is due to marring during the course of operation.

13. Male genital organs. Paramere bifurcates into two parts at apex, one a pale yellow



Figs. 237-250. *Exopoxylon thaianum* Tsuneki, ♀. Genital organs.

237: Whole the organs obliquely from beneath. 238: Apical part of paramere, showing bifurcating place. 239: Whole the organs obliquely from side (Laos). 240-247, 250: Apical form of transparent lobe of paramere in vertical view (sometimes accompanied by the bristled chitinized stick-like branch). 240: Laos. 241: Amhon. 242: N. Borneo. 243-247: Philippines, Luzon. (243: Albany Prov. 244: Do., different ex. 245: Mt. Makiling. 246: Do. 247: Mt. Montalban.) 250: Ryukyus, Amami I. 245-249: Apical form of penis valve. (245: Luzon, Mt. Makiling. 246: Do. 248 (dorsal), 249 (ventral): Luzon, Mt. Montalban.

low or pale brownish stick-like bristled projection and the other a nearly transparent colourless lamellate lobe. The latter obliquely truncate at the apex and the feature of truncation differs locally (240-245, 247 and 250). In the Amami population: Fig. 50, in the Philippine (Luzon) population: Figs. 243-244 (Albany Pr.) 245 (Mt. Makiling), 247 (Mt. Montalban), in the N. Bornean: Fig. 242, in the Amboinese: Fig. 241 and in the Laotian: Fig. 240. Between the four instances of Luzon a considerable difference is observed, possibly the variation within the population. Penis valve is similar in general structure to some form of *schmidtknechti*, but differing slightly from it in that the apical arms show a tendency to be cut obliquely; however, in the detailed form of truncation and in the relative length and width it differs somewhat from population to population as in sternite 8. In the Amami population the arms are broader and relatively shorter (Figs. 259-262), in the Amboinese population they are narrower and longer, with the oblique truncation indistinct (Figs. 253-255), while in those of the Philippine (Figs. 257-258), N. Bornean (Fig. 256) and Laotian (Figs. 251-252) the arms differ not only from either of them, but also from each other slightly. As there are restrictions to examine ample genitalia of the loaned Museum specimens it is impossible to deal with the variation range of each population.

Some exceptional specimens

1. In the Laotian female specimens from Sedone Province the constriction of frontal shield at above lateral angles is on the average stronger than in those of other localities. Fig. 211 (in No. 15) shows one of the utmost instances; the constriction of similar degree is also found in the female No. 6 from Viengiane Prov., No. 19 from Wapikhamthong Prov., No. 34 from Saravaku, Borneo and No. 35 from N. Borneo, and in the male Nos. 4 and 6, both from Sedone Prov., Laos, No. 19 from Negros, the Philippines, No. 20 from Buananga and Nos. 25 and 29, both from Luzon. Sometimes the constriction is asymmetry as in female No. 39 from Palawan (Fig. 210).
2. In male No. 18 from Palawan the surface of frontal shield is raised across middle, though gently inclined towards median line, fairly distinctly separating the inside into the excavation around ocellus and that of lower area (Fig. 210). Its dorsal carina much more strikingly angulated in middle and the gastral petiole of the specimen is quite abnormal as mentioned below. Quite similar elevation of the surface of frontal shield across middle is also observed on female No. 19 from Laos that has strong constriction of upper lateral carinae (see above).
3. In female No. 36 from N. Borneo (Fig. 225) and in male No. 30 from Mt. Bunahao, Luzon, the gastral petiole is markedly short and thick just as in the case of the specimens of the Amami population. The extreme case towards the same tendency occurs upon male No. 18 (see above) from Palawan (Fig. 227). In this specimen the location of the spiracles of the gastral petiole and relative length of segments 2 and 3 are also abnormal (Fig. 227 and Table 9).

Taxonomic relationships

(a) *Trypoxylon thaisanum* Tsuneki, 1961

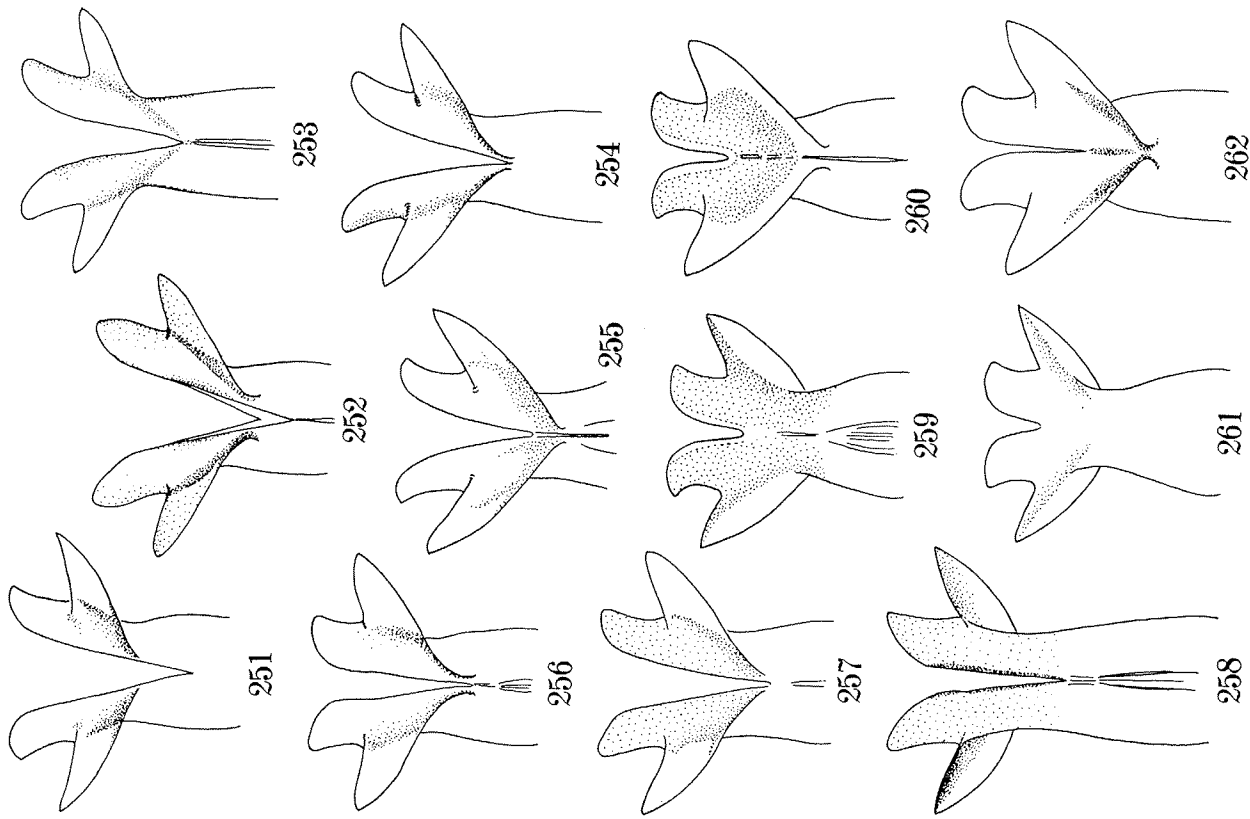
Ultimate antennal joint in the male longer than 2, but shorter than 3 preceding joints united (Figs. 215, 217), sternite 8 with apical emargination comparatively shallow and broadly rounded at the simus (Figs. 228, 229); mesoscutum with a more or less plumbeous shine, with punctures fine to medium-sized; gastral petiole normally slender, appr. 5 times longer than its maximum width (Tables 9, 10); paramere of male genitalia with apical lobiform branch bluntly obliquely truncate at apex (Fig. 240); apical lobes of penis valve moderate in length, with inner margin more or less angulated (Figs. 251, 252).

Distribution: India, Sri Lanka, Thailand, Laos, Malaya, Sumatra, Java and ad-

Explanations to Figs. 251-262.

Figs. 251-262. *Trypoxylon thaisanum* Tsuneki, ♂. Apical part of penis valve; local variation.

253, 259, 261: Dorsal view. All others ventral view.
251-252: Laos. 253-255: Ambon I. 256: N. Borneo. 257-258: Philippines, Luzon (257: Mt. Makiling. 258: Albany Prov.). 259-262: Ryukyu, Amami I.



(b) Trypoxylon thaianum ambonense sp. nov.

Ultimate antennal joint in the male empty as long as, or slightly longer than, 3 preceding joints united (Fig. 218); sternite 8 with latero-apical arms slender and long, with emargination between them broad and deep and rounded at the bottom (Fig. 238); mesoscutum almost without plumbeous shine, comparatively well shining, with punctures distinctly outlined and deep, as large as and as close as those of typical race; gastral petiole normally slender (Tables 9, 10); paramere of male genitalia with apical lobiform branch obliquely truncate at apex (Fig. 241); apical lobes of penis valve comparatively long, with inner margin rounded (Figs. 253-255).

Distribution: Moluccas (Ambon).

Holotype: ♂, Ambon Island, Waai, 24. XI. 1965, A. M. R. Wagner leg. (CAS).

Paratypes: 1 ♀ ♂, the same place, 4. I. 1966; 2 ♀, the same place, 8, 19. III. 1966, A. M. R. Wagner leg. (CAS); 3 ♀, Ambon, 70 m, 3. X. 1961; 15. II. 1961, A. M. R. Wagner (RMNH).

(c) Trypoxylon thaianum borneense sp. nov.

Ultimate antennal joint in the male as long as 3 preceding joints united (Fig. 219); sternite 8 similar to some of the Philippine specimens, shallower than in the typical race (Fig. 231); characters of mesoscutum and gastral petiole as in the typical race; paramere of male genitalia with apical lobiform branch acutely obliquely truncate (Fig. 242); apical lobes of penis valve comparatively short and broad, with inner margin bluntly angulated (Fig. 256).

Distribution: Borneo.

Holotype: ♂, North Borneo, Tawau, Quoin Hill, Cocoa Research Station, 1. IX. 1962, Y. Hiraehama leg. (BPM).

Paratypes: 1 ♂, Sandakan, Baker leg. (USNM); 1 ♀, collected with holotype, Y. Hiraehama (BPM); 1 ♀, Sarawak, First Div. Semongoh. For. Res., 1° 25' N, 110° 17' E, 15-19. XI. 1976, P. S. Cranston (BMNH).

Remarks. 1 ♀ (N. Borneo, Tawau, 3-7. VII. 1962, H. Holtmann leg.) is an abnormal specimen having markedly robust gastral petiole and is removed from the paratypes (cf. Fig. 225).

(d) Trypoxylon thaianum philippinicum sp. nov.

Ultimate antennal joint in the male as long as, or slightly shorter than, 2 preceding joints united (Fig. 220); sternite 8 with apical arms narrow, moderately long, with emargination between them deep and rounded (Figs. 231-234); mesoscutum and gastral petiole as in the typical race; paramere of male genitalia with apical lobiform branch obliquely truncate at apex (Figs. 243, 245, 247); apical lobes of penis valve moderately broad and long, with inner margin usually smoothly curved (Figs. 257-258).

Distribution: The Philippine Islands.

Holotype: ♂, Iuzon, Albany Prov., Libon Cagases, 200 m, 10. V. 1965, H. M. Torrevillas leg. (BPM).

Paratypes: 14 ♂ 22 ♀, Philippines (1 ♂ 2 ♀ Tawi Tawi, 1 ♀ Balabac, 2 ♂ 7 ♀ Palawan, 1 ♂, Negros, 2 ♂ 1 ♀ Buesuanga, 1 ♀ Samar, 1 ♂ 1 ♀, Cebu, 7 ♂ 9 ♀ Iuzon), detailed data: p. 50.

(e) Trypoxylon thaianum dubiosum Tsuneki, 1964

Ultimate antennal joint in the male empty as long as 3 preceding joints united (Fig. 221); sternite 8 with apical emargination shallow and broad, subtruncate and minutely waved at the bottom (Figs. 235, 236); punctures on mesoscutum slightly larger, otherwise as in the typical race; gastral petiole markedly robust, usually 4 times longer than its maximum width (Figs. 222, 223); paramere of male genitalia with apical lobiform branch obliquely truncate at apex (Fig. 250); apical lobes of penis valve broad and short, with inner margin somewhat angulated (Figs. 259-262).

Distribution: Amami-Oshima Is., Ryukyus and N. China (Peking).

Specimens examined: 54 ♀ 3 ♂, Amami-Oshima; 2 ♀, Peking (detailed data: p. 50).

Trypoxylon scutatum Chevriert, Mitt. Schweiz. ent. Ges., 2 (6): 231, 1876 (♀, Saith-erland); T. scutatum: Dalla Torre, 1897, p. 708; Kohli, 1884, p. 199; 1906, p. 202; Gasaokovskij, 1936, p. 639 and 647; André, 1886, p. 208; Berland, 1925, p. 151; Schmiedeknecht, 1930, p. 711; Zavadil et Snoflíak, 1949, p. 58; Bajari, 1957 p. 66; Noskiewicz et Pulawski, 1960, p. 107; Beaumont, 1964, p. 85; Baithasar, 1972, p. 227; Bohart and Menke, 1976, p. 347.

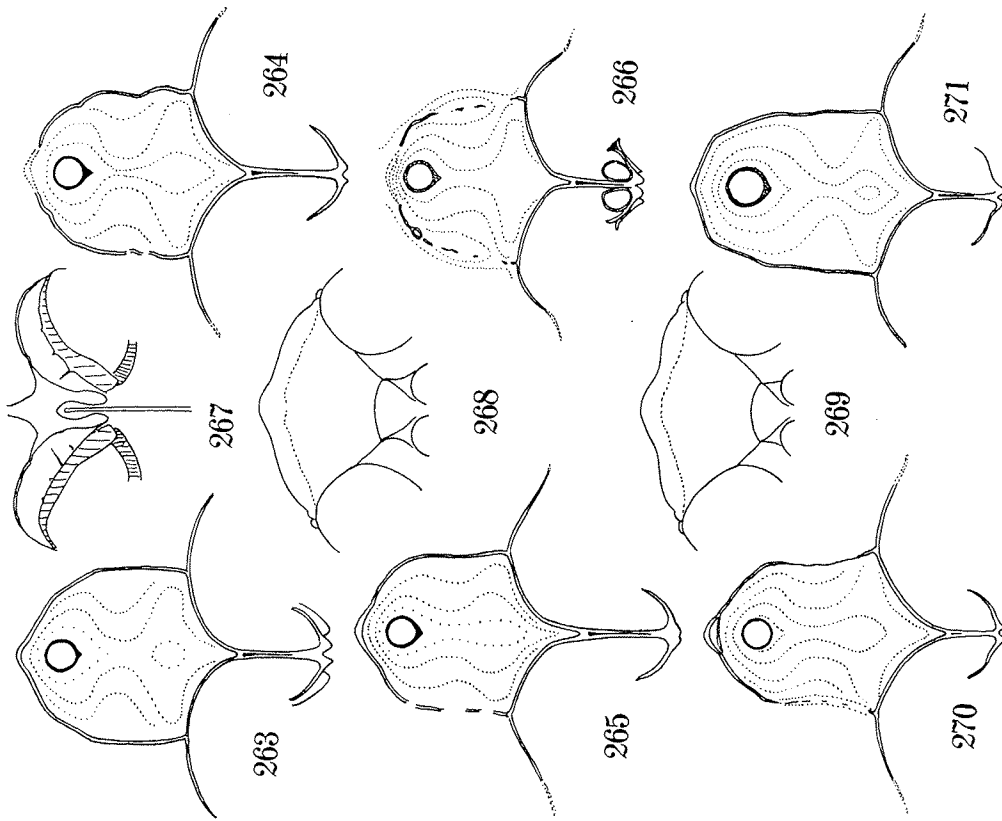
Despite that Trypoxylon scutatum is well known and has been repeatedly dealt with by many authors the detailed description of the species including variation of characters is almost none. Therefore, no local race of the species has ever been described. Even in the descriptions comparatively given with the allied species, such as those of Kohl (1906) and Gasaokovskij (1936), stress is placed mainly upon the form of the frontal shield which is certainly characteristic in the very gentle inclination of the lower carinae. However, the species is in some other respects also distinctive, namely, that the gastral petiole is very thick (Fig. 277), that the apical angle of the frontal shield is narrow and acute, with the medio-apical carina that follows very long, the outward branch carinae of the shield are markedly long and deeply penetrating into the eye emarginations (Figs. 270, 271), the hairs on the median area of the frontal shield are not thick and not silvery, but fine and greyish white, mesoscutum is without seneous shine, without macrosculpture and distinctly sparsely punctate, with puncture-interspaces smooth and shining, and in the male genitalia the apical split of the paramere is comparatively shallow and the apical lobes of penis valve are remarkably long.

On some European specimens. In order to make comparison I used some specimens from South Europe. Measurements are given in Table 12 and some instances of frontal shield vertically seen and of gastral petiole are given respectively in Figs. 270-273 and 277. According to these in the specimens from S. France and Portugal the frontal shield is comparatively longer than those given by most of the previous authors and considerably varied in form, sometimes with the upper lateral carinae partly becoming obscure (Fig. 270).

On the specimens from Pakistan. Measurements and figures for comparison are given in Table 12 and Figs. 265-269 and 272-282. In the Quetta specimens the frontal shield is comparatively broader and shorter, with the medio-apical carina much longer, ultimate antennal joint in the male is longer, usually as long as 4 preceding joints combined (in some condition appearing somewhat shorter than 4, but always longer than 3, preceding joints united; in the European specimens, according to the literature and in those observed it is as long as 3 preceding joints taken together; compare the relative length to width at base in Table 12) and the gastral petiole tends to be relatively somewhat longer.

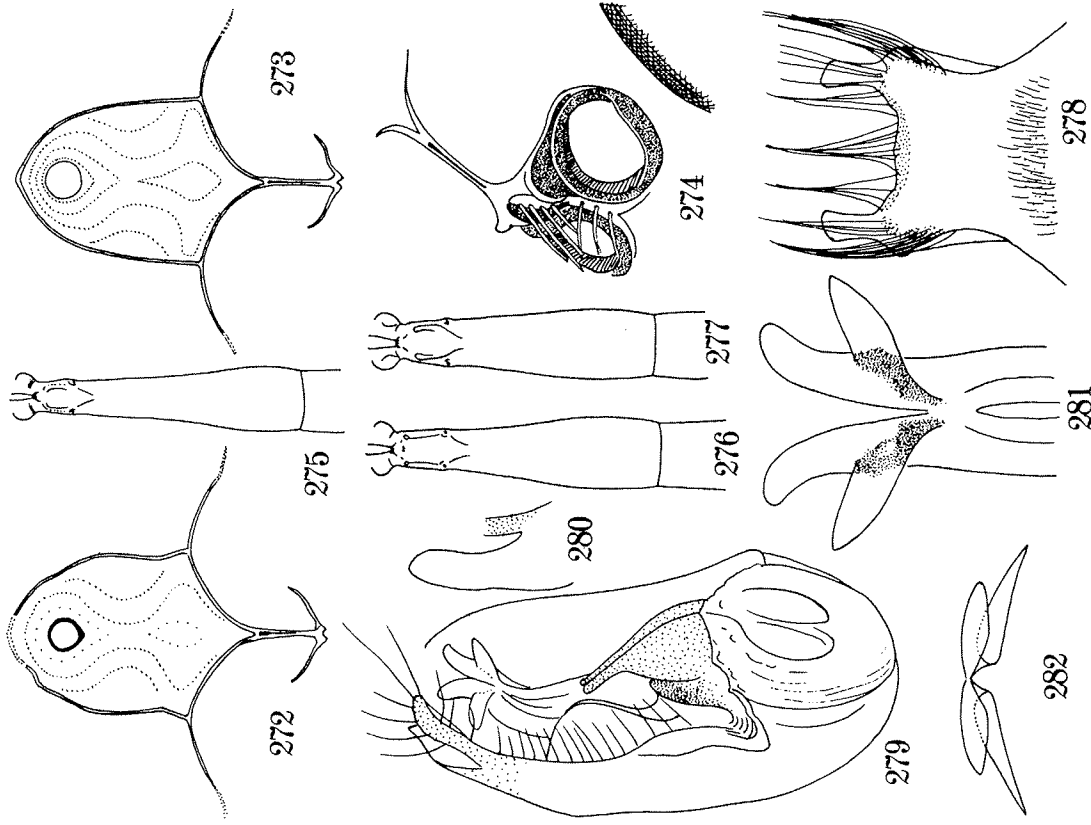
Table 12. Measurements on Trypoxylon scutatum and T. s. nursei ssp. nov.

Loco.	IODw	(IODc)	(OOD Od	POD)	(FSL UL U/L)	A3	(L/W)	Aul(L/W)	Pet (Ma Mi	Sp	2	3						
France ♀	28	8.0	2	4.5	7.0	15	12	3.8	17	2.9	14	2.2	92	28	11	26	58	58
Portugal ♀	27	7.5	2	5.5	5.5	15	11	3.0	16	2.5	15	2.2	96	27	11	24	58	56
"	3	37	5.6	3	4.5	5.0	14	10.2	5	1.8	25	2.5	92	27	11	24	58	56
"	3	38	5.5	3	5.5	16	11	2.2	15	1.8	24	2.6	92	26	11	24	60	58
"	3	34	6.0	3	4.5	6.5	14	10.2	1	1.6	1.8	2.2	92	28	12	22	64	60
"	3	36	6.0	3	4.0	6.0	14	11	3.0	1.5	1.7	2.4	92	28	12	22	64	60
Pakistan ♀	32	7.0	3	5.0	7.0	13	10	4.0	18	2.9	18	2.3	98	24	10	24	58	58
"	3	38	5.7	3	3.0	6.0	15	11	3.1	1.3	1.6	2.9	102	21	10	25	58	56
"	3	39	5.0	3	3.5	5.0	14	11	3.7	1.3	1.6	2.9	98	21	11	25	56	56
"	3	37	6.0	3	4.0	6.0	13	9	2.3	1.3	1.7	2.5	90	20	11	24	60	56
"	3	38	5.7	3	4.0	5.7	13	10	3.3	1.3	1.7	2.8	98	21	10	25	54	50
"	3	36	6.1	3	4.0	5.0	14	10	2.9	-	-	-	96	23	11	24	60	56
"	3	39	5.7	3	4.0	4.5	13	10	3.3	1.3	1.5	2.8	98	25	11	25	54	50
"	3	38	6.5	3	4.0	5.0	14	9	1.7*	1.4	1.5	2.8	88	25	11	23	58	56
"	3	38	6.5	3	4.0	5.0	14	9	1.7*	1.4	1.5	2.8	88	26	12	23	60	60



Figs. 263-271. *Tyrosylon scutatum* Chevrier (s. l.).
 263, 268 and 271 ♀, all others ♂. 263-269: *T. scutatum nursei* ssp. nov.
 from Pakistan (Quetta). 270-271: *T. s. scutatum* from Portugal and France.

267: Interantennal area from above (top is transverse carina that is thickened at median anteriorly produced part, medial parallel lines are bristles from upper enclosed space, hatched areas antennal socket rims). 268-269: Clypeus; all others Frontal shield in vertical view (notice relatively shorter frontal shield and long medio-apical carina in Quetta specimens).



Figs. 272-282. *Tyrosylon scutatum* Chevrier (s. l.). 273, 277... ♀, others... ♂.
 272, 273, 277: Portuguese specimens, all others from Quetta.

272-273: Frontal shield. 274: Interantennal structure. 275-277: Gastral petiole. 278: Sternite 8 seen from inside. 279: Genitalia. 280: Apical lamellate lobe of paramere in vertical view. 281: Apical part of Penis valve in vertical view. 282: Ditto seen from apex.

Upon the differences described in the preceding page of the specimens of the Indian Subcontinent a new subspecies, *nursei*, is erected.

Supplementary description:

Length ♀ 9.5, ♂ 6.5-9.0 mm. Lateral and dorsal carinae of frontal shield in ♂ frequently partly vanished (Figs. 264-266), in one specimen upper lateral carinae nearly completely disappeared and in this the shield itself is very broad and short (Fig. 266). Interantennal structure seen from above: Fig. 267, seen obliquely in front: Fig. 274. Clypeus gently rounded at base, with apical marginal glabrous area almost not reflected, with the margin weakly (♀) or distinctly (♂) recurved and strongly (♀) broadly triangular, slightly raised and produced, with apex bluntly pointed. Sculpture on dorsal aspect of propodeum markedly variable, with area dorsalis usually at base obliquely and on the remaining area transversely coarsely striate or rugoso-striate, with density of striation and degrees of rugosity variable, sometimes whole the area longitudinally and or obliquely rugoso-striate, lateral carinae usually distinct and strongly zigzagged, sometimes weak and indistinct, areas along them usually coarsely foveolate, but frequently transversely or irregularly rugoso-striate, posterior inclination also transversely or irregularly rugoso-striate with varying density; whole the surface except area dorsalis covered with greyish white, comparatively thick hairs, the hair on posterior inclination reversely directed forwards and the surface condition not well visible, Gastral petiole: Figs. 275 (♂), 276 (♀), sternite 8: Fig. 278, with apical arms narrow and broadly separated from each other, lateral triangular protuberances also remarkable, the hairs arising on sides fine, pale yellow and not brittle-like. Male genitalia: Fig. 279 (obliquely seen), paramere with apex bifurcated as usual, lobular part transparent, seen vertically: Fig. 280, the stick-like branch yellowish and sparsely bristled, volsella with digitus not well developed, not so highly raised as in most of the allied species; apical part of penis valve seen from beneath: Fig. 281, seen from apex: Fig. 282.

Vertex feebly microcoriaceous and strongly and closely punctured, punctures somewhat large, not uniform in distribution, usually lacking around ocellus, frontal shield more distinctly microcoriaceous and superimposed with punctures that are as large as those on vertex, generally close on lateral areas and sparser inwards and sometimes also upwards, density of punctures varied individually, in closer instances punctures on lateral areas partly subrugose confluent, sometimes upper part also similarly closely punctured. Mesoscutum smooth and polished and distinctly, on the average, sparsely punctured, puncture interspaces on mid-lateral area in front of parapsidal sutures 2-5 times larger than puncture width, but on medial area much sparser, only a long notauli close and finer; mesopleuron on epimeral area with punctures finer and sparser than on scutum, below and on prepectus strong and sparse, but sometimes closer downwards.

Holotype: ♂, Pakistan, Quetta, V. 1902, Coll. C. G. Nurse (labelled "under pileatum" (BMNH)).

Paratypes: 1 ♀ 6 ♂, the same place, V. 1902 (3♂); VI. 1903 (1♂ 2♂); IV. 1904 (1 ♂), all Coll. C. G. Nurse (labelled "under pileatum" by Mr. C. R. Vardy) (BMNH).

Other specimens: 1 ♂, VII. 1902 (Ditto) (BMNH) (head lacking and gaster dissected).

TRYPOXYLON BAKERI SP. NOV.

A large species, characteristic in the form of frontal shield and, so far known, endemic to the Philippines.

♀. Length 13-15 mm. Black, with rather weak aeneous shine on head posteriorly, pronotum and mesothorax; mandible brownish red, at base black, palpi on apical half ferruginous, basally brown, tegulae semitransparent ferruginous, pronotum with posterior half not discoloured, only slightly brownish apically, tibial spurs castaneous brown. Wings hyaline, stigma and veins brownish black; hairs on head normal and silvery, curved bristles on interantennal area silky white, but somewhat yellowish, hairs on thorax not dense, silky white, on dorsal side brownish.

Measurements: Table 13. Frontal shield very constant in form and excavation (Fig. 286 and 287), characteristic is the presence of inward branch carinae that are short, thick and curved, dorsal carina nearly straight running, with median area thickened

upwards, upper lateral carinae above inward branch thick, weakly microcoriaceous and frequently incompletely or completely interrupted by scattered comparatively gross punctures, converging lower carinae straight or very weakly sinuate, highly raised and acute, with top line blade-like; outward branch carinae not long, curved, almost not entering the range of eye emarginations (Fig. 287), excavation of the surface is roughly given by dotted contour lines in Fig. 286, medio-apical carina short, slightly less than one-third the length of lower carina, thick, always with median impressed line upwards, interantennal structure similar to that of Fig. 293, in lateral view: Fig. 288, transverse carina highly raised and from its posterior aspect along side of medio-apical carina deeply excavated into a round-bottomed or flat-bottomed hollow, outside of which is margined by a carina, a backward extension from the end of interantennal transverse carina (Fig. 288), but sometimes the backward extension of the transverse carina is incomplete and the hollow obliquely runs down as a deep V-shaped furrow. Long curved bristles from interantennal area markedly abundant, from upper enclosed space apparently 7-9 in number in two rows and from lower ridged area 7-10 in a line with varied intervals, the latter on lower portion curved alternately right and left; clypeus and supraclypeal area similar in structure to Fig. 296. Antennal joint 1 with a marked excavation on inner side, joints 3, 4, 5 with relative length appr. 10, 7, 6, joint 5 about 1.5 times as long as wide at apex (Table 13); on vertex postocelli sunk in each impression, interocellar ridge blunt, but distinct, post-ocellar ridge roundly inclined posteriorly, not carinated, OOD: POD mostly 1:2, ocellar diameter equal to, or slightly larger than POD, occipital carina complete. Pronotum normal, laminae thorax and propodeum normal in structure; basal condyle of gastral petiole provided with a rounded excavation on each lateral area (as in *T. interruptum* below described); in fore wing radial cell not reaching close to the wing apex, abscissae 1 and 2 of cubital vein appr. 3:1, the latter curved and as long as transverse cubital vein. Hind coxal organ simply roundly tuberculate.

Vertex, except narrow areas around each postocellus and posterior inclined area, microcoriaceous and superimposed with comparatively large punctures along posterior margin of frontal shield and along interocellar blunt ridge, frontal shield more strongly microcoriaceous and except the area around anterior ocellus and lower part of lower area covered with punctures, punctures on mid height zone comparatively large and close, subreticulate, but posteriorly finer and anteriorly sparser, fine ridges between punctures and inside of punctures also strongly microcoriaceous and punctures ridges partly strengthened and connected to form irregular rugae, thus the true feature of punctation becoming quite indistinct; frons outside the shield similarly punctured, but as microsculpture weaker towards inner margins of eyes punctures more distinct. Mesoscutum usually without microsculpture, only rarely sculptured in part, punctures not sharply outlined, but comparatively large and close, sometimes partly subrugose confluent, on mid-lateral area puncture-interspaces as large as, or rather smaller than punctures; on prepectus of mesopleuron punctures in size as on scutum, but much sparser, on other areas fine and sparse upwards and larger and somewhat closer downwards, mesosternum with median longitudinal carina and on both sides of it grossly punctured, metapleuron except some fine striae on upper area smooth and polished. Propodeum transversely strongly and coarsely striate, striae on area dorsalis somewhat oblique and on medial furrow somewhat arcuately transverse, but the striation

* As in Fig. 293.

Table 13. Measurements on *Trypoxylon bakeri* sp. nov., ♀.

Loco.	Long.	IODv	(IODv/100)	(OOD or POD)	(FSL UAL U/L)	A3	(L/W)	Aul	Pet	(Ma Mi Sp	2	3)						
Mindanao	15.0	27	6.0	3.0	6	5.7	16	9	1.2	18	3.3	14	128	20	7	26	44	46
"	16.0	26	7.0	3.0	6	6.0	15	9	1.3	18	3.0	13	120	22	8	24	50	52
"	13.2	26	6.9	2.5	6	5.0	16	9	1.4	17	3.3	14	106	25	9	26	48	50
"	15.0	26	6.7	2.8	6	5.5	16	9	1.4	18	3.3	14	124	18	7	27	44	48
"	13.5	25	7.0	2.7	6	5.5	15	9	1.4	18	3.3	14	-	-	-	-	-	-
"	12.7	26	6.7	2.5	6	5.0	16	10	1.6	18	3.3	14	120	20	7	26	46	44
Negros	16.2	27	6.6	3.0	6	6.0	15	8	1.2	18	3.3	13	124	22	7	28	50	56
Samar	14.5	28	7.0	3.0	6	6.3	15	8	1.2	18	3.3	13	116	21	8	26	52	52
Luzon	14.5	28	6.7	2.8	6	5.8	15	9	1.4	19	3.3	13	124	21	8	28	50	52

considerably varied in density among specimens; posterior-most area just above ligament socket of gaster broadly smooth and shining; sides sometimes mainly obliquely striate and mixed with punctures, sometimes mainly punctured and mixed with oblique striae and occasionally broadly smooth, in every case, however, narrow anterior area along metapleural suture smooth and shining and upper, posterior and lower areas always distinctly striate; in general the striae posteriorly stronger. Gaster covered with very fine hair-bearing punctures, but sternite 1 except shortly haired median line, and 2 and 3 both except posterior third, glabrous.

Holotype: ♀, Mindanao, Depitan, Baker leg. (USNM).
Paratypes: 3 ♀, Mindanao, Depitan, Baker: 1 ♀, Samar, Baker: 1 ♀, Luzon, Mt. Makiling, Baker (USNM).
Other specimen: 1 ♀, Mindanao, Depitan, Baker (gaster lacking) (USNM).

TRYPOXYLON INTERRUPTUM SP. NOV.

The present species closely resembles *T. funatai* Tsunekii, 1965, described from Thailand, but is different from this in that the body is much larger (in *funatai* 9.5-9.5 mm, in the present species mostly 14-15 mm), frontal shield with lower carinae nearly straight (in *funatai* markedly up-curved) and apical angle formed by them more acute (appr. 70°; in *funatai* apical angle formed by the imaginal straight lines 90° or more), antennal joint 3 in ♀ much longer, in broadest view 3.5-4 times as long as broad at apex (in *funatai* thrice so) and length ratio to joint 4 10:7 (in *funatai* only slightly longer than 4), OOD:POD = 1:2 (in *funatai* 1:3), pronotum with posterior area not discoloured (in *funatai* distinctly discoloured), striae on dorsal aspect of propodeum much closer, especially on posterior inclination and sides of propodeum largely punctured (in *funatai* largely striated).

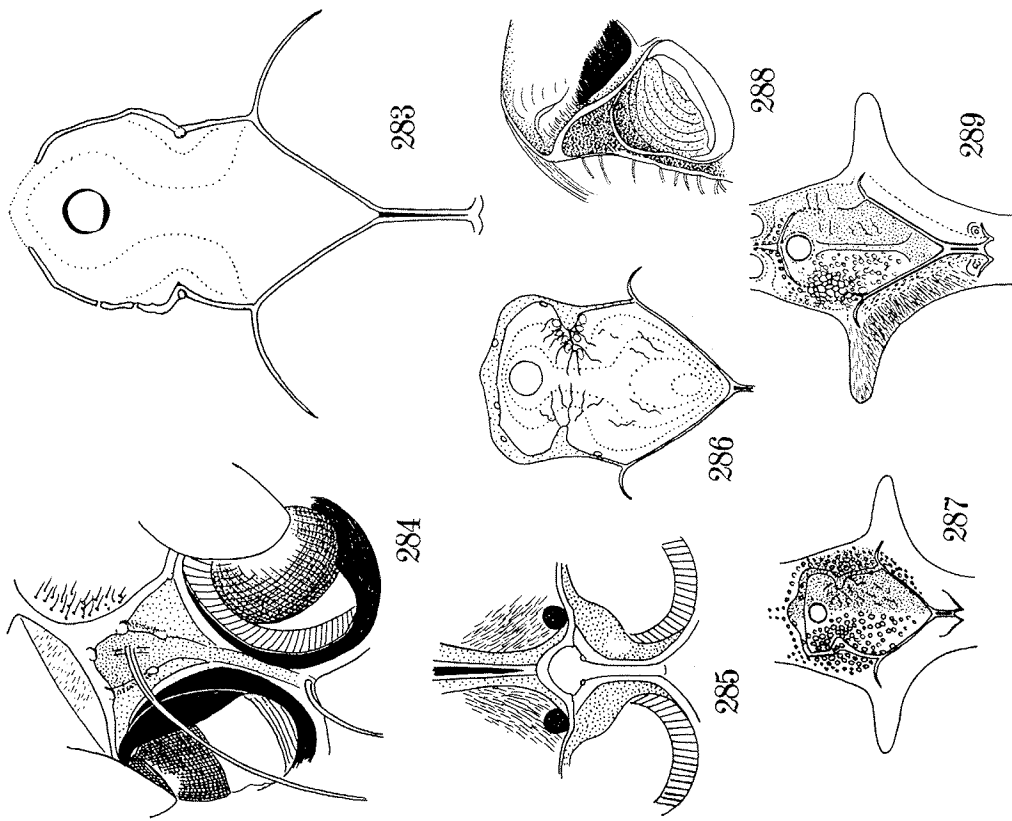
♀. Length 12-16 mm, mostly 14-15 mm. Black, with aeneous shine on mesothorax, especially on scutum (on pleuron weaker); mandible light castaneous, at base black, palpi with apical half yellowish white, tibial spurs light brown, tarsi slightly brownish; wings hyaline, costa, subcosta and stigma black, other veins dark brown. Hairs on inner orbits from eye incisions below, clypeus, supraclipeal area and temples silvery, on sides of thorax and on dorsal aspect of propodeum except area dorsally silky white, long and considerably abundant, on dorsum of thorax and on abdomen greyish white, short and fine; long curved bristles on interantennal area and scattered erect and curved thick hairs on the disc of clypeus silky white, slightly yellowish.

Head from above twice as wide as long at eye, seen in front roundly convergent below, eye incisions comparatively narrow (Fig. 289). Measurements: Table 14. Vertex around each of postocelli impressed and between the impressions raised to blunt ridge, sometimes finely carinated on top, frontal shield in vertical view: Fig. 290, upper lateral carinae broadly lacking, only rarely a fine, weakly raised and more or less wavy line incompletely connecting the dorsal and lower carinae; inside of the shield strongly excavated around ocellus and along median line and the excavation broadly enlarged and deepened at the lower area, thus the contour lines most usually

Table 14. Measurements on *Trypoxylon interruptum* sp. nov., ♀.

Loco.	Long.	IODw(Iobc)	OOD	Od	POD	(FSL	UAL	U/L)	A3	(L/W)	Aul	Pet	(Wa	Mi	Sp	2	3)	
Burma*	16.0	26	7.5	1	3.0	2.0	17	9	1.2	19	3.6	12	116	21	8	28	41	48
Laos	15.5	26	7.0	1	3.0	2.0	19	10	1.2	19	3.8	11	122	19	8	26	44	50
Laos	16.0	26	7.0	1	3.0	2.0	17	10	1.5	18	3.6	12	120	20	8	24	46	46
Laos	15.7	25	7.2	1	3.0	2.3	18	10	1.5	19	4.0	12	120	19	8	24	46	46
Laos	14.2	26	7.0	1	2.6	2.0	17	9	1.2	19	3.4	12	110	22	8	26	46	50
Thai	12.5	26	7.0	1	2.8	2.3	18	10	1.2	18	3.2	12	114	20	8	26	48	48
Malaya	16.0	26	7.2	1	3.5	3.0	17	10	1.2	19	3.7	13	122	17	6	26	44	46
W. Java	12.8	25	7.3	1	2.8	2.3	18	11	1.5	18	3.4	13	124	18	7	27	44	44
W. Java	15.0	25	7.0	1	2.8	2.5	17	10	1.4	18	3.4	13	124	17	7	24	44	46
W. Java	13.2	26	7.5	1	2.8	2.3	17	9	1.2	19	3.7	13	126	19	7	26	44	46
Sarawak	13.0	25	7.1	1	2.8	2.2	17	9	1.1	18	3.7	13	124	19	7	25	44	42

* = Tenasserim. Sarawak = Sarawaku.



Figs. 283-289. 283-285: *Trypoxylon cucurbitinum* Tsunekii, sp. nov., ♀. 286-288: *Trypoxylon bakeri* Tsunekii, sp. nov., ♀. 289: *Trypoxylon interruptum* Tsunekii, sp. nov., ♀.

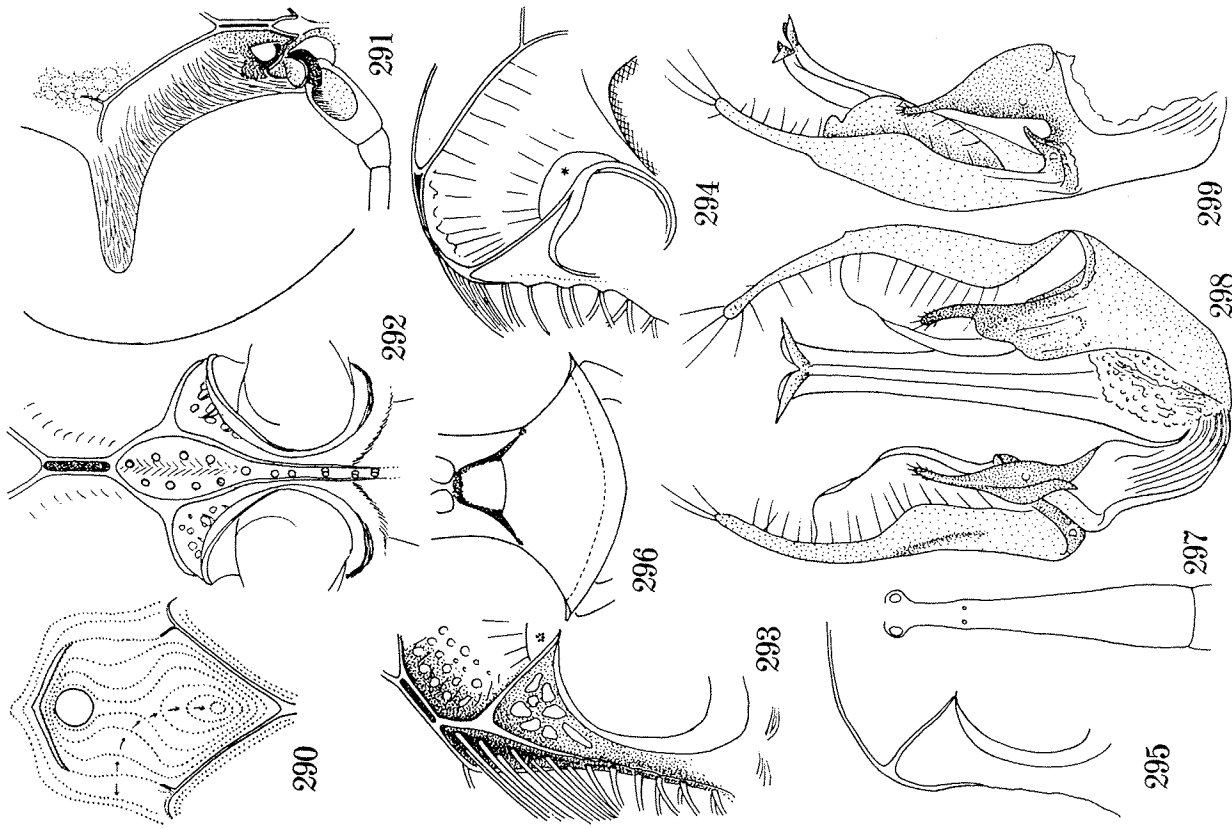
283-286 (Mindanao), 287 (Luzon), 289 (Laos): Frontal shield in vertical view. 284: Interantennal structure seen obliquely in front. 285: Do., dorsal view. 288: Do., in profile (notice the enclosed hollow at the side of medio-apical carina of frontal shield).

observed are as given by dotted lines in Fig. 290, convergent lower carinae nearly straight, sometimes very feebly sinuate or incurved, sometimes distinctly upcurved near lateral angles as in *T. schmiddeckerti*, the carinae highly raised, acute and shining, forming an angle of about 70° at medio-apical junction, medio-apical carina thick, parallel, always with an impressed line in middle, the carinae slightly longer than a third, but slightly shorter than half the length of lower carina, at the lower end it bifurcates into interantennal bristle-bearing structure which is in frontal view: Fig. 292, in lateral view: Fig. 294, seen slightly obliquely in front: Fig. 293, lower carinate portion not always waved as in Fig. 294, but sometimes smoothly inclined; transverse carina that runs from the side of upper enclosed space highly raised, at the end connected with upper-outer part of rim of antennal socket, but not turned posteriorly to form the dike (as in *thaiannu*); however, the place just behind antennal socket gently rounded swollen out, with the surface smooth and shining (shown by * in Figs. 293, 294 and by white patch in Fig. 291), this may be a budding of the dike; of the median longitudinal structure the lower narrowed portion is a ridge, distinctly raised high above level of inner rims of antennal sockets; from here and from upper enclosed area a series of long curved bristles growing out, the mode of bristling very characteristic, from the enclosed area 9 bristles in two rows and from the lower ridge 8 bristles in a line coming out, of the lower series upper 2 are thick single and lower 6 are closely attached paired ones that curved out to both sides. The distribution of the bristles is difficult to observed and seems to be somewhat different in numbers as well as in location individually, the typical case is shown by circlets in Fig. 292. Clypeus and supraclypeal area: Fig. 296, clypeus at base strongly raised and gradually lowering anteriorly, apical marginal area comparatively broad, glabrous, somewhat inebriate and slightly reflected; mandible simple, maxillary palpi with joints 1-5 subequal in length, 4-5 subequal to each other and longer than the preceding, 6 longest; in one specimen from Laos 4 and 5 subequal in length to 6. Antennal joint 1 on inner side broadly excavated except apex, basal condyle of it well developed like a separate segment (Fig. 291, in posterior view), joints 3, 4, 5 with relative length appr. 10, 7, 6, joint 5 mostly 5.7 times (in broadest view - Table 14 -, in narrowest view about 4 times) as long as broad at apex, joint 7 usually 1.5 times so, ultimate joint about 1.5 times as long as broad at base and less than 2 preceding joints united; occipital carina complete. Pronotum with posterior part not discoloured, with lamina on sides thin, broad triangular and obtuse at apex; mesonotum with notauli short and distinctly impressed, from apices continued as wide shallow impressed lines till apical margin; admedian line short, broad, smooth, jet black and margined by fine impressed lines; parapsidal sutures markedly contrasted to areneous surrounding as short piceous impressed lines. Propodeum with spiracles located close to base and from short distance behind them lateral carinae run strongly till apex of the segment; area dorsalis distinctly raised, margined on both sides by crenate narrow grooves and excavated medially by a broad furrow, on posterior margin it is steeply inclined to a deep excavation which is the beginning of the median wedge-shaped crenate furrow of posterior inclination, the furrow not reaching apex of the segment, but interrupted by an obtuse carina, between the carina and upper rim of ligament socket of gaster there is a large semicircular smooth and polished excavation which is margined on both sides by a carina; upper rim of ligament socket rounded produced posteriorly; intercoxal carina weakly curved upwards, the area just behind base of hind coxa broadly impressed. Gastral petiole usually as given in Fig. 297, characteristic is a deep rounded hollow on each side of basal condyle; length relation between petiole and tergites 2 and 3 as given in Table 14, spiracles of petiole located slightly before one third from base (ditto). In fore wing radial cell ending far before reaching apical margin, abscissa 2 of cubital vein very slightly longer than tr-

Explanations to Figs. 290-299

Figs. 290-299. 290-297: *Trypoxylon interruptum* Tsuneki, sp. nov., ♀.
298-299: *Trypoxylon taiwanense* Strand, ♂.

290: Frontal shield (vertical, Sarawak). 291: Right half of frontal structure (white patch is the swelling that is shown with * in Figs. 293 and 294). 292: Interantennal structure (circlets are bristle pores). 293: Ditto, seen obliquely in front. 294: Ditto, in profile (Sarawak). 295: Ditto (Laos). 296: Clypeus. 297: Gastral petiole. 298: Male genitalia (ventral). 299: Ditto (lateral).



anversae cubital vein and shorter than half, but longer than one third the length of abscissa 1, vestigial cubital cell 2 with upper and lower veins relatively about 3:8, with outer transverse vein strongly curved. Hind coxal tubercle beneath near apex produced into a small tooth, having a short seta at apex.

Frontal shield except smooth median furrow and impression around ocellus distinctly microcarinate and superimposed with comparatively large shallow irregular-shaped punctures, punctures on lower area of the shield always finer and sparser and on other areas finer and sparser towards median furrow, but punctures variable in density, sometimes very close, subreticulate, sometimes sparse, with considerable interspaces between, surface of dorsal carina and inside of each puncture also microcarinate, not shining, when punctures very close, the acute ridges between punctures connected and thickened to become rugae, this is especially marked on the lateral keel-less area of the shield. Vertex more weakly microcarinate and along dorsal carina of the shield and along interocellar elevation engraved with a row of coarse carinae, but the areas directly surrounding ocelli smooth and shining, post-ocellar area sparsely scattered with fine rounded punctures, posterior inclination and temples without microsculpture, shining and covered with minute hair-bearing points. Mesoscutum without microsculpture, covered with comparatively large punctures (about as large as diameter of penultimate joint of maxillary palpus), with averaged interspaces at mid-lateral area in front of parapsidal suture as large as puncture-diameter, punctures on all the impressed lines of the scutum much closer and on the central area much sparser, on medio-apical part finer, with interspaces relatively larger; scutellum finely and much more sparsely punctured; punctures on prepectus and lower part of episternum of mesopleuron as large as those on scutum, but sparser and on upper part finer and much sparser; metapleuron smooth and polished. Area dorsalis on propodeum at base oblique, on the remaining area transversely (on median furrow arcuately) striate, striae variable in strength and density, most usually fine and close, but sometimes strong and coarse and mixed with finer striae, rarely without finer striae mixed, but in every case the striae are far closer than in *T. funabai*; lateral areas outside area dorsalis till lateral longitudinal carinae anteriorly finely closely punctured and posteriorly gradually mixed with transverse striae (the striae begin to appear from about mid length of area dorsalis, but sometimes begin before this, always not so strong and coarse as usually observed in this group, with intervals not so widely smooth and polished), on posterior inclination except apical concave smooth area punctures completely replaced with transverse strong striae which are more or less varied in density; sides of propodeum except antero-ventral smooth area finely sparsely punctured and ventral area partly and posterior area largely covered with transverse or somewhat oblique, fine and close striae, punctures sometimes very weak and sparse on central area, with surface broadly shining, but sometimes slightly close and strong, except anterior smooth area, very rarely the surface broadly covered with subtransverse striae and mixed with fine punctures scattered. Gaster closely covered with pile-bearing punctures, but sternite 1 except medial line and sternites 2-4 except posterior triangular areas completely glabrous and shining.

Holotype: ♀, Laos, Vientiane Prov., Ban Van Ehe, 30. II. 1965, native collector (BPM).

Paratypes: 1 ♀, the same place and time; 1 ♀, the same place, 15. II. 1965, native collector; 1 ♀, the same place, 750 m, forest stream bed, 10-11. IV. 1965, J.L. Cressitt (Malaise trap); 1 ♀, Thailand NW, Chiangmai, Doi Suthep, 1278 m, 29. III. - 4. V. 1958, T. C. Maa (BPM). 1 ♀, Burma, Tenasserim, Ataran Valley, VIII. 1892, C. T. Bingham Coll. (BPMH); 1 ♀, Malaya, Bukit-Merai, Perak, 23. II. 1930, H. T. Pagden leg. (BPMH); 1 ♀, West Java, Gunung Halimene, 4-5000 ft, XI. 1937, K. N. Walsh leg. (BPMH); 1 ♀, West Java, Depok, 25. II. 1933, Lieftinck leg. (BPMH); 1 ♀, West Java, Winkopobasai, XII. 1936, Mrs. M. L. Walsh (BPMH); 1 ♀, Sarawaku, 1st Div., Lubok Jita, 112°N, 110°48' E, 6-10. XI. 1976, P. S. Cranston (BPMH).

Distribution: India, Burma, Thailand, Laos, Malaya, Java and Borneo.

* In this specimen anterior margin of clypeus, antennae, gaster wholly and all legs turn into light castaneous.

** In this specimen gastral segments 1-3 and all legs turn into light castaneous. It carries identification label "Trypoxylon nigricans Cam." handwritten (? by C. T. Bingham).

Remarks. I at first thought that *T. funabai* and the present species might represent different seasonal forms, because the specimens (1 ♀ 1 ♂) of *funabai* were caught in late July from Thailand and those of the present species except one were collected during November and April, and the differences between them were rather slight. But the presence of the exceptional one that was captured in August in Tenasserim and the largest specimen of all denies completely the concept of seasonal forms of one and the same species.

In the specimen from Sarawaku medio-apical angle of frontal shield is somewhat wider (Fig. 290, cf. Fig. 289), with the lower carinae slightly up-curved and ratio of OOD:POD is close to 1:3; that is to say, the specimen is close in the characters to *T. funabai*, but it is much larger in the body length and has the 3rd joint of antenna relatively much longer.

As to the variation of characters see Table 14.

TRYPXYLON TAINANENSE STRAND, 1923

Trypoxylon tainanense Strand, Internat. Ent. Z., 16 (23): 188, 1923 (3 ♀, Formosa: Aming and Tainan).

Trypoxylon nagamasae Tsuneki, Etizenia, 4: 12, 1965 (♂, Thailand) (syn. nov.).
Trypoxylon tainanense (?): Tsuneki, Etizenia, 13: 2, 6, 1966 (♀, keyed and listed).
Trypoxylon tainanense: Tsuneki, Ibid., 22: 2, 1967; Ibid., 54: 16, 1971 (keyed).
Trypoxylon tainanense: Tsuneki, Ibid., 60: 1, 1972 (1 ♀, Formosa, redescription, fig.).
Trypoxylon tainanense: Tsuneki, Ann. Hist.-Nat. Mus. Nat. Hung., 69: 270 (♂, Formosa, redescription).

Specimens examined:

2 ♀, Formosa (Ilan), 9. 10. VIII. 1971, Y. Haneda leg. (Coll. Haneda); 1 ♀ 2 ♂, Formosa (Takao, Tainan), 6. VII. 1907, H. Sauter leg. (NHMH); 2 ♂, Celebes (Singkang), 6, 12. IX. 1930, J. van der Vecht leg. (BPMH); 1 ♀, Sumba W. (Togobina, 7. IX. 1948, Drs. Bühler & Sutter (NHMH).

Distribution: Thailand, Sumba, Celebes and Formosa.

The original description of this species (?) is considerably detailed and I gave additionally a figure of the frontal shield and tried one little correction on the length relation of antennal joint 3 (1972), namely, joint 3 even in the narrowest view only 3.5 times (in the original description 4 times) as long as broad at apex. In his description Strand says "das erste (Hinterleibessegment) ist ... so lang wie das erste + zweite + dritte Segment". This must be an error of "das zweite + dritte + halbe fierte Segment".

Table 15. Measurements on *Trypoxylon tainanense* Strand.

Loco.	IODr(10Dc)	OOD Od	POD	FSL	UL	U/L	A3	(L/W)	Ant(L/W)	Pet	(Ma	MI	Sp	2	3)
Formosa ♀	30	9.5	2	4.0	3.5	12	7	1.6	20	2.8	20	2.8	140	16	6 26 36 40
Formosa ♀	30	9.7	2	5.0	4.5	12	7	1.6	19	3.0	18	2.8	142	17	6 26 36 38
Sumba ♀	31	9.3	2	2.7	2.7	12	7	1.6	15	3.2	19	2.8	150	17	5 26 34 38
Celebes ♂	37	8.0	4	3.3	5.0	11	7	1.8	15	1.7	3.0	3.4	138	14	5 24 36 36
Celebes ♂	36	8.0	4	4.0	4.0	12	8	1.9	16	1.9	3.0	3.2	158	16	6 26 36 36

♀. Length 10.5, 11.0 (Formosa) and 9.0 (Sumba) mm; black with very feeble plumbeous shine on mesothorax in certain light; mandible somewhat darkened brown, on basal third or half black, tegra dark brown, basally darker, palpi brownish black, tibial spurs in some light yellow, in some light greyish yellow, tarsi apically somewhat brownish, wings hyaline, apical margin narrowly darkened as if extension of R. of radial vein.

Characteristic is that IODr as against HW is remarkably great (Table 15), IODs = 1:1, frontal shield bearing inward branch carinae and the surface very shallow (Fig. 301), interantennal structure without median enclosed space on upper part (Fig. 302) and bristles arising from there only 2 in number, without bristle from lower carinate part (do.) and gastral petiole exceptionally long, with narrowest part located behind

spiracles (Fig. 306). Clypeus roundly, somewhat subtriangularly produced anteriorly, with a slight tendency towards recurving, disc at base suddenly raised and gently roundly inclined radiately, but the median area tends to be tectate; ocellar location considerably different between specimens observed (Table 15), especially in that from Sumba (geographic variation?), antennal joint 1 excavated on inner side as usual, relative length of joints 3, 4, 5 appr. 10, 8, 7; collar of pronotum with anterior part very short in middle, about 1/3 the length of posterior part which is posteriorly broadish, but not completely discoloured, mesopleural scrobe markedly large, but with outline indistinct; area dorsalis on propodeum at extreme base level with postscutellum, with 2 transverse narrow grooves, one at base and the other slightly behind it, then fairly acutely inclined posteriorly, this raised area seen from above wide triangular, with inclined marginal area well shining and crossed coarsely by oblique striae, the area once depressed into subtransverse furrow, raised again to connect with the main body of area dorsalis which is margined by fairly deep furrow and excavated medially by much broader furrow, the surface of area dorsalis as well as rest of dorsal aspect transversely coarsely striate; on posterior inclination at apex, just in front of roundly produced upper rim of ligament socket of gaster a well enclosed semicircular polished area present which is comparatively small and with surface somewhat wrinkled; sides of propodeum below with intercoxal carina uniformly gently curved upwards, hind coxal process normally shortly toothed, wing venation normal.

Vertex and frons microcoriaceous and closely superimposed with fine punctures, punctures on lower area of frontal shield somewhat large and irregular in form and distribution, partly subrugosely confluent, but general appearance of the shield is rather smooth; inner orbital areas outside the shield and vertex except narrow marginal area of each ocellus covered more broadly than usual with fine punctures; mesoscutum delicately microcoriaceous and sparsely rather finely punctured, puncture-in-terspaces 1-4 times, mostly twice larger than puncture-diameter, scutellum and post-scutellum more sparsely punctured, mesopleuron punctured as on scutum, but punctures except on propetctus much finer upwards; sides of propodeum wholly transversely, somewhat arcuately closely striate, the striae stronger posteriorly and finer and weaker anteriorly, especially on the area usually smoothed and polished, interspaces of striae mixed with irregular rugulae.

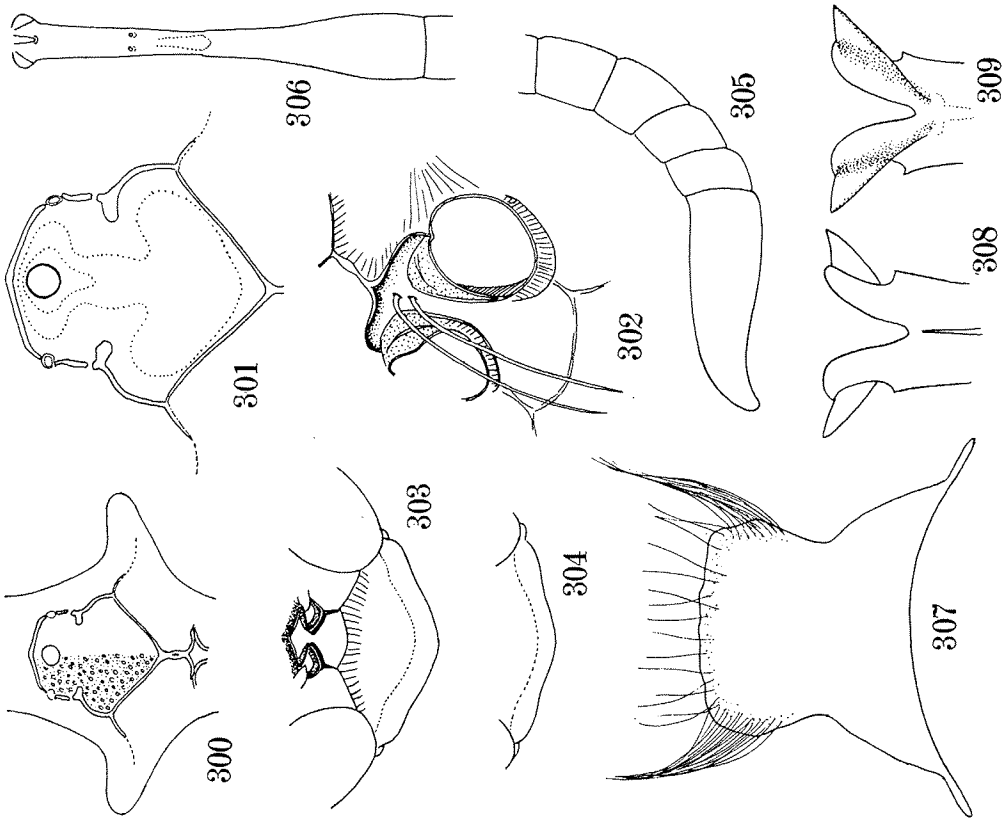
♂. Already given in detail with the Thailand (under the name *Nagamasae*, cf. Tsuneki, 1965) and Formosan specimens (cf. Tsuneki, 1977). In the following main characters of the specimens from Celebes will be given:

Length 8.5 and 9.5 mm (in the Formosan 8.0 and 9.0 mm); differs from ♀, besides the usual sexual characters, mainly in the following points: (1) relative length and form of antennal joints, (2) form of clypeus, (3) relative length of IOD on vertex and ratio of IODs (Table 15), (4) ocellar arrangement (Table 15), (5) punctuation and (6) genitalia.

Antennal joints relatively shorter and thicker, except ultimate joint (Table 15), relative length of joints 3, 4, 5 = 10, 8, 8, the following joints progressively shorter till penultimate joint, joint 5 in broadest view about 1.8 times, joint 4 about 1.4 times as long as broad at apex, ultimate joint: Fig. 305, in the normal state as long as 4 preceding joints combined and 3.3 times as long as broad at base. Clypeus as in Fig. 304 (cf. Fig. 303 in ♀), less strongly produced anteriorly and more distinctly recurved on anterior margin, with the apical glabrous area shorter; IOD at vertex as against head width much greater than in ♀ (Table 15) and inner orbits more strongly convergent towards clypeus (Table 15, IODc), OOD nearly equal to POD (do.). Sternite 8: Fig. 307, characteristic in that the apex is subtruncate, without arms and emargination, the long hairs on each side very thin and whitish in colour; genitalia in ventral view (basal ring removed): Fig. 298, in lateral view: Fig. 299, paramere not bifurcate at apex, provided with the bristled stick-like branch alone, lacking the transparent lamellate lobe, volsella with digitus not well developed, short; apical part of penis valve also somewhat peculiar, especially in bearing shoulder just before the stick-shaped lateral processes (Figs. 308 and 309).

Microsculpture on head and mesothorax much stronger than in ♀, with superimposed punctures on scutum somewhat closer and surface appears less smooth, on pleuron punctures longitudinally or obliquely confluent, appearing rugoso-punctate.

Remarks. In the male specimens observed (from Celebes) upper lateral carinae of frontal shield just above inward branch carinae always disappeared for a short distance and lower area somewhat more deeply depressed than in ♀, especially in one of the specimens. Sculpture on propodeum in both dorsal and lateral aspects considerably different in density between the two, in one of them sparse and coarse, while in the other fairly close and fine, but in both the carinae are stronger and thicker than in



Figs. 300-309. *Eryopylon kainamense* Strand. 300-302, 306... ♀; 303... ♀; 304-305, 307-309... ♂.

300-301: Frontal shield (vertical view). 302: Interantennal structure (obliquely in frontal view). 303-304: Clypeus. 305: Antenna. 306: Gasteral petiole. 307: Sternite 8. 308-309: Apical part of penis valve (308 dorsal view, 309 ventral view).

♀, especially in the sparsely sculptured one; peculiarity of interantennal structure and in the form of gastral petiole as in ♀.

TRYPOXYLON FUNATUI TSUNEKI, 1963

Trypoxylon funatui Tsuneki, Etizenia, 4: 13, 1963 (1 ♀ 1 ♂, Thailand, Muaglek).

♂. Closely resembles T. interruptum, but is much smaller, 9.3-9.5 mm. Black; mandible except extreme base, palpi, wing tegulae, knees, tibial spurs and tarsi (on basal rings paler) ferruginous; veins of wings dark brown, basally ferruginous. Pilosity normal.

OOD: POD = 1: 2 (♂) or 1: 3 (♀), ocelli uniform, slightly larger than OOD (♂) or twice as large as OOD (♀); head in frontal view with sides roundly convergent below, IOBs = 4: 5, frontal shield generally as in interruptum, with upper lateral carinae broadly vanished, but lower carinae more strongly upcurved, with apical angle formed by them more widely open (Fig. 310, cf. Fig. 289); clypeus with anterior margin recurved (♂) or simply rounded (♀), apical marginal area as in interruptum, but wider in ♀ than in ♂; antennal joints 3, 4, 5 and 6 subequal in length in ♂, 5 somewhat longer than 4, 4 ≠ 5, and 6 slightly shorter than 5 in ♀, joint 3 1.5 times (♂) or thrice (♀) as long as wide at apex, ultimate joint in ♂ slightly longer than 3 preceding joints united and gently bent. Pronotum with posterior area discoloured; propodeum as in interruptum structured, but the sculpture much coarser, gastral petiole relatively longer (7 times longer than its maximum width).

Punctuation as in the compared species.
 Specimens used for the original description: 1♂ (holotype), 1♂ (paratype), Thailand (Muaglek), 29. VII. 1961, H. Funata leg.

Remarks. As mentioned earlier in connection with T. interruptum this species is so closely similar to interruptum that they seem to be different seasonal forms of one and the same species. Occasionally, however, the two forms live simultaneously and the concept can not be supported.

The types of this species are said to have been sent back to Thailand, but it is unknown where they are preserved at present.

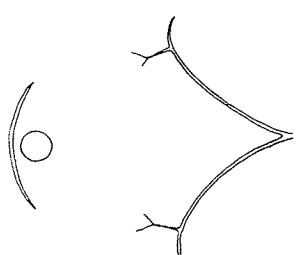


Fig. 310. Trypoxylon funatui Tsuneki, ♀. Frontal shield (after Tsuneki, 1963).

ON SOME SPECIES FROM MADAGASCAR AND ADJACENT ISLANDS

TRYPOXYLON SCUTIFRONS SAUSSURE, 1890

Trypoxylon scutifrons Saussure, Granddider: Hist. Phys. Nat. Polit. Madagascar, 20 (Hist. Nat. Ilym.): 523, 1892 (♀ ♂).

Trypoxylon scutifrons: Kohl, Denks. Math.-Naturh. Kl. k. Akad. Wiss., 71: 203, 1906 (♂).

Trypoxylon scutifrons: Arnold, Sphecid. Madagascar, p. 7 and 14, 1945.
Trypoxylon scutifrons: Bohart & Menke, World Sphecid., p. 347, 1976 (listed).

Specimens examined:

1 ♀ 1 ♂, Madagascar, Coll. Turner (RNH); 1 ♀ 1 ♂, Madagascar, Bekily, Reg. Sud de l'île, IV. 1937, A. Seyrig (with ident. label of T. scutifrons by G. Arnold); 2 ♀, Fort Dauphin, 500 m, 15. IV. 1968, K. M. Gaichard; 1 ♂, Isaïa, Km. P. 713, 1000 m, 19. III. 1968, K. M. Gaichard & P. D.

As mentioned by Arnold (1944) the original description is detailed and good, but without figure except general appearance of the body and wing venation. Arnold pointed out slight discrepancy between his specimens and Saussure's description regarding the length relation of the gastral petiole as against the 2 following segments (Saussure: P = II + 1/2 III; Arnold: P = II + 2/3 III). He gave figures of genitalia (dorsal view) and apical part of antenna in the male. According to my mode of measurement, that is to say, including the part of basal enlarged condyle to obtain the longest valve, petiole, as a rule, slightly shorter than the 2 following segments united (Table 16). This species is in the form of frontal shield very close to T. pileatum Smith (Fig. 311A, cf. Fig. 5) and apparently conspecific with this, but it can be distinguished from this by the following distinctions:

- (1) Body much larger (usually 13.0 mm - ♀, in pileatum 8-9 mm).
- (2) Frontal shield more deeply excavated and in lateral view upper lateral and lower carinae form a straight line (in Pileatum markedly waved - Fig. 6).
- (3) Mesoscutum with punctures larger, puncture-interspaces without microsculpture, shining and on medio-posterior area distinctly depressed (in Pileatum punctures very fine, interspaces microscarcous, without impression).
- (4) In ♀ OOD: POD = 1: 4-6 (in Pileatum 1: 2.5-3).
- (5) Upper enclosed area of interantennal structure with dorsal angle narrower, with sides distinctly enclosed by elevated lines, with bristles 3-4 in number, lower carinae area also with a row of bristles (in Pileatum dorsal angle much broader, with sides not distinctly margined by carinae, with bristles only 2 in number and lower area without bristles).
- (6) Sides of propodeum with antero-ventral area broadly smooth and polished (in Pileatum wholly obliquely finely closely striate, only anteriorly the striae weak).

Table 16. Measurements on Trypoxylon scutifrons Saussure (s. l.)

Loco.	L.	IODv(10Dc)	OOD	Od	POD	(FSL UAL U/L)	A3	(L/W)	Anal(L/W)	Pet	(Ma Mi Sp)	2	3							
Md.	12.5	♀	24	8.3	1	6.5	4.5	15	10	1.7*	16	2.3	16	2.3	120	21	7	26	54	56
"	13.0	♀	22	9.0	1	5.8	5.0	15	9	1.6	16	2.8	-	-	128	20	8	26	52	48
"	13.5	♀	22	8.5	1	5.8	6.0	15	10	1.7	19	3.0	16	2.5	124	21	8	27	50	54
"	11.5	♀	26	8.1	1	6.0	6.0	15	10	1.9	16	2.5	16	2.2	104	23	9	25	58	62
"	10.3	♂	32	6.6	3	6.0	6.0	15	10	1.7	11	1.6	30	3.0	116	19	8	25	56	56
"	6.7	♂	34	6.5	3	4.0	6.0	15	10	1.9	11	1.5	28	2.8	104	18	8	25	54	56
Al.	9.5	♀	28	7.5	1	4.7	4.0	16	11	1.9	16	2.4	17	2.1	116	20	8	27	52	52
"	6.3	♂	36	6.5	3	5.5	5.5	14	9	2.0	12	1.5	28	2.8	96	24	10	26	58	58
"	6.5	♂	35	6.5	3	5.5	5.5	15	10	2.2	12	1.6	29	2.8	96	24	10	26	60	56
"	7.2	♂	36	7.0	3	5.5	5.5	15	10	2.2	12	1.5	30	3.0	106	21	9	24	54	50
Mt.	10.0	♀	28	7.5	1	5.5	5.5	15	10	1.7	15	2.7	16	2.2	118	20	7	25	52	52
Sl.	11.5	♀	25	7.5	1	6.0	5.5	14	9	1.5	15	2.3	15	2.2	118	24	8	26	44	54
"	10.0	♀	25	8.0	1	6.0	4.0	14	9	1.8	15	2.4	16	2.2	122	21	8	26	52	56
"	11.0	♀	27	7.5	1	5.5	5.5	14	9	1.8	14	2.4	16	2.2	118	19	8	24	52	56
"	10.0	♂	30	6.6	3	5.0	5.0	14	9	1.8	11	1.6	31	3.0	116	21	8	25	44	42
Md.	9.5	♂*	33	7.0	3	4.5	6.0	14	9	1.8	11	1.5	-	-	106	23	10	24	56	58

Special abbreviation: L = Length of body (mm). Md. = Madagascar. Al. = Aldabra.
 Mt. = Mauritius. Sl. = Seychelles.
 Remarks. Md. ♂* is an aberration.

Observation of the Madagascan specimens. Length ♀ 11.5-13.5 mm, ♂ 6.7-10.3 mm. Mandible dark brown to ferruginous, at base black, in ♂ clypeus with a brownish spot on each side of apical margin, palpi with basal half dark brown, apically ochrous yellow, fore tibia in front, fore tarsus apically brownish, tibial spurs yellowish white, pronotum with posterior part discoloured, pale yellow, tegulae semitransparent brown. Pilosity on face and clypeus silvery, on median area of frontal shield also

silvery.

Measurements: Table 16. Beside antenna, IOD at vertex as against head width markedly different between sexes, similarly IOBs and ocellar location. Ultimate antennal joint in ♂ as long as 5 preceding joints united, in some condition appearing somewhat shorter, but always distinctly longer than 4 preceding joints combined, it is slightly curved, but not bent at apex (Arnold's figure shows that it is as long as 4 preceding joints united and Kohl says "etwas länger als die 5 vorhergehenden Glieder"). Frontal shield: Figs. 311 A and B (♀) and 312 and 313 (♂), sometimes upper area constricted just above lateral angles, in one male specimen from Bekil Valley upper lateral lines incomplete (Fig. 312), medio-apical carina short, at most half as long as lower carina and medianly impressed, excavation of the surface is shown by dotted lines in the figures, on median bottom line microsculpture weak, surface somewhat shining and sparsely punctured, with short silvery glittering hairs along both sides; interantennal structure seen obliquely in front: Fig. 314, upper enclosed space with lateral margins rather weakly marked off by fine elevated lines, long curved bristles as given in the above comparative notes, to be added is that the lowermost one is paired and curved right and left. Clypeus in ♀: Fig. 315, in ♂: Fig. 316, disc broadly rounded raised, with top behind middle; vertex between postocelli not strongly, but distinctly (♀) or rather indistinctly (♂) ridged, location of postocelli as in Table 16, OOD in ♀ very narrow. Pronotum with triangular lamina on side slightly produced, subrounded, but with margin acutely edged; mesoscutum medio-posteriorly distinctly depressed; gastral petiole: Fig. 317, detailed measurements in Table 16; sternite 7: Fig. 318, sternite 8: Fig. 323 (ventral view), male genital organs: Fig. 320 (ventral view), the form of the bifurcated lobes of paramere characteristic, the bristled branch much broader than in the Oriental species and the transparent lobe roundly incised on inner margin; apical part of genitalia in dorsal view: Fig. 321, long apical lobes of penis valve remarkable (do. and Fig. 322); digitus of volsella (closely dotted parts in Fig. 320) not highly raised.

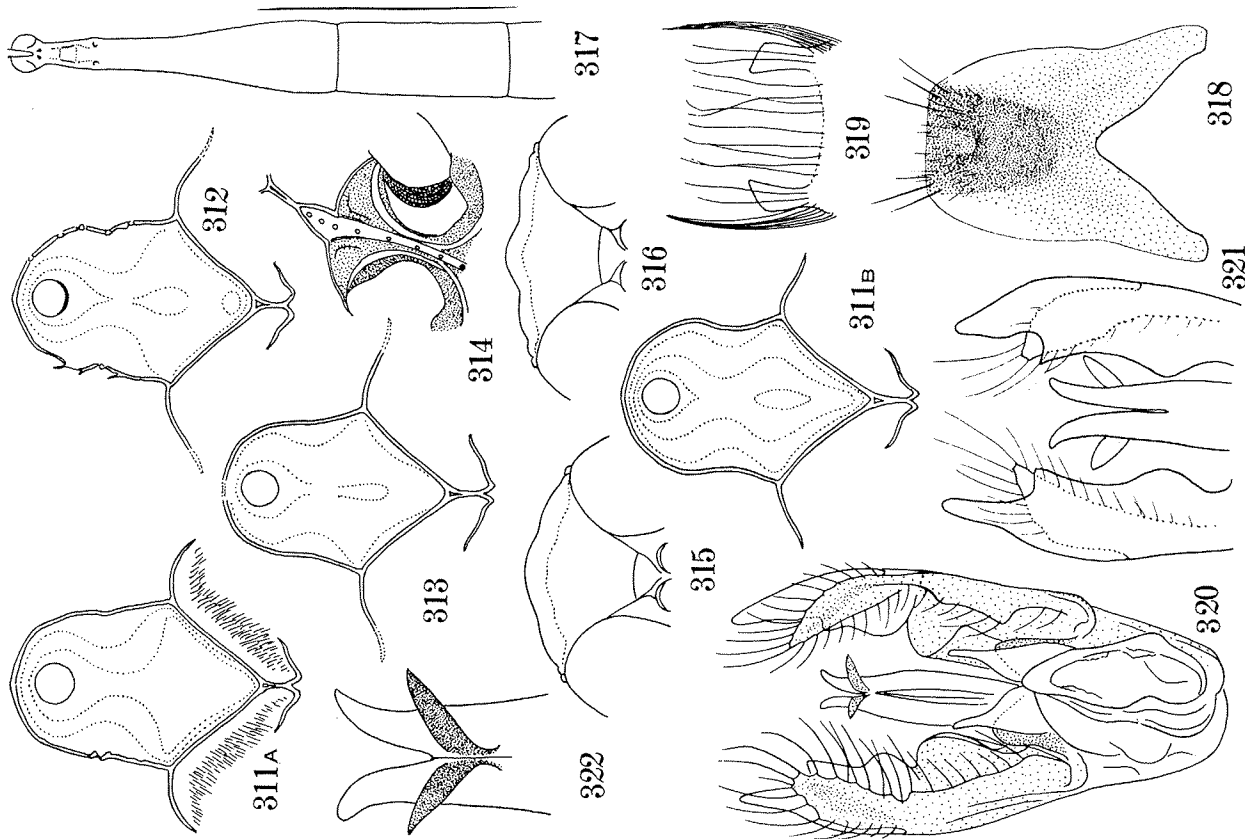
Vertex and upper inner orbits very weakly, frontal shield more distinctly microcoriaceous, the former strongly punctured along ridges and the latter superimposed with fine punctures, punctures on raised parts above lateral angles of frontal shield close, sometimes subrugose confluent; mesoscutum with weak plumbeous shine, but without microsculpture, covered with comparatively large deep punctures, punctures along notauli finer and closer, on mid-lateral area in front of parapsidal suture fairly close, puncture-diameter equal to or larger than puncture-interspaces, on medio-apical depressed area finer, sparser and very weak, on medial area also sparse; in ♂ punctures on mesoscutum similar in size and depth to ♀, but somewhat more uniform in distribution and density throughout the scutum; punctures on episternum of mesopleuron finer and weaker upwards. Propodeum transversely coarsely striate, on area dorsalis on basal part obliquely, on the rest transversely comparatively closely striate, on lateral areas along lateral carinae and on posterior inclination striae sparser, sides except broad antero-ventral area obliquely finely closely striate and on dorsal portion mixed with fine punctures.

Remarks. Arnold (1945) mentions that the transparency of one of the apical lobes of paramere of the male genitalia is very peculiar. In the Indo-Australian allied species, however, such is rather a rule. Characteristic are that the transparent lobe is deeply emarginated on apical inner margin (Fig. 321, the character is shown in his figure also) and that the other chitinized one is not stick-like, but flatly dilated into lobiform, with inner margin nearly straight. Further, very long apical lobes of penis valve is also distinctive. Chitinization of genitalia is not well developed, whole the organs pale yellowish, only middle part of paramere partly and the sickle-shaped lateral lobes near apex of penis valve are brown. Cuspis of volsella as in o-

Explanations to Figs. 311-322

Figs. 311-322. *Typoxylon scutiformis* Sauseure. 311A and B, 314-315, 317... ♀; others... ♂ (Madagascar).

311A & B, 312-313: Frontal shield in vertical view (Bekil Valley, Fort km, Bekil V. and Isalo respectively). 314: Interantennal structure (Fort km). 315-316: Clypeus (Vekil V.). 317: Gastral segments 1 and 2 (Bekil V.). 318: Sternite 7 (Isalo, external view). 319: Apex of sternite 8 (Seychelles Is.). 320: Genitalia (Isalo, ventral view). 321: Ditto, apical part (Isalo, dorsal view). 322: Apical part of penis valve (Isalo, ventral).



ther allied species, but digitus is only shortly expanded.

Aberration. In the male specimen that is labelled as "Coll. Turner, 1909-49" clypeus is much less strongly recurved on the anterior margin (Fig. 324, cf. Fig. 316). According to the examination of the genital organs, the apical transparent lobe of paramere in this specimen is not emarginate on inner margin (Fig. 325, ventral view; Fig. 326, dorsal view). Otherwise, however, no note-worthy difference can be found on the specimen. The 8th sternite is also similar (Fig. 323, ventral view, disc microcoriaceous, cf. Fig. 344, dorsal view in a male from Aldabra). The difference, though slight, in the genital organs is somewhat problematic in relation to its taxonomic position, but the facts that in the specimen from Aldabra the emargination of the transparent lobe is weak, showing an intermediate state, and that in *schmidelknechti* the character is considerably variable, seem to indicate the possibility of variation in this character in the present species also, and, moreover, the difference in the form of clypeus concerns the character which is usually very fluctuating. Upon these bases the specimen is treated here as aberration (cf. Table 16, bottom line with *).

Subspecific relationships

(a) *Trypoxylon scutifrons* Saussure, 1892

♀ ♂. Body much larger (Table 16, the specimen of 6.7 mm in length is the above mentioned aberration), mesoscutum without microsculpture and punctuation simple.

Distribution: Endemic to Madagascar.

(b) *Trypoxylon scutifrons aldabrenum* sp. nov.

♀. 9.5 mm, smaller than the averaged length of *scutifrons*; mesothorax nearly mat, with weak plumbeous shine, delicately microcoriaceous and more coarsely and shallowly punctured than in the typical race, except epimeral area of mesopleuron, punctures on scutum shallow and close, confluent or subconfluent and the surface appearing irregularly coarsely but shallowly rugose, on prepectus of mesopleuron punctures large but sparse, on lower part of episternum coarse and longitudinally or obliquely confluent, on subalar area microsculpture indistinct, surface mat, with indistinct medium-sized very shallow punctures scattered. Sides of propodeum wholly obliquely striate, on antero-ventral area the striae somewhat weaker. Frontal shield somewhat longer (Fig. 327), with silvery hairs along median furrow scarce, vertex between postocelli not raised into a ridge, otherwise as in the typical race. Measurements in Table 16.

♂. Also smaller than the typical race (Table 16), fore tibia and tarsus much less brownish. Mesoscutum without microsculpture, fairly shining, punctures comparatively large and shallow, more or less confluent, but less marked than in ♀, when isolated puncture-intervals as large as, or slightly larger than puncture-diameter, on lower portion of mesopleuron punctures always more or less confluent longitudinally; transverse striae on propodeum, especially on area dorsalis, very much finer and closer than in ♀. In all the specimens frontal shield with upper lateral carinae almost completely vanished, in one of them even the dorsal carina becomes obscure. Further, anterior margin of clypeus more weakly recurved than in typical race, gastral petiole in two of them very thick and robust (Table 16). Ultimate antennal joints appears in two of them as long as 5, in one of them as long as 4 preceding joints united; transparent one of the apical lobes of paramere of genitalia with inner emargination weak

Explanations to Figs. 323-334

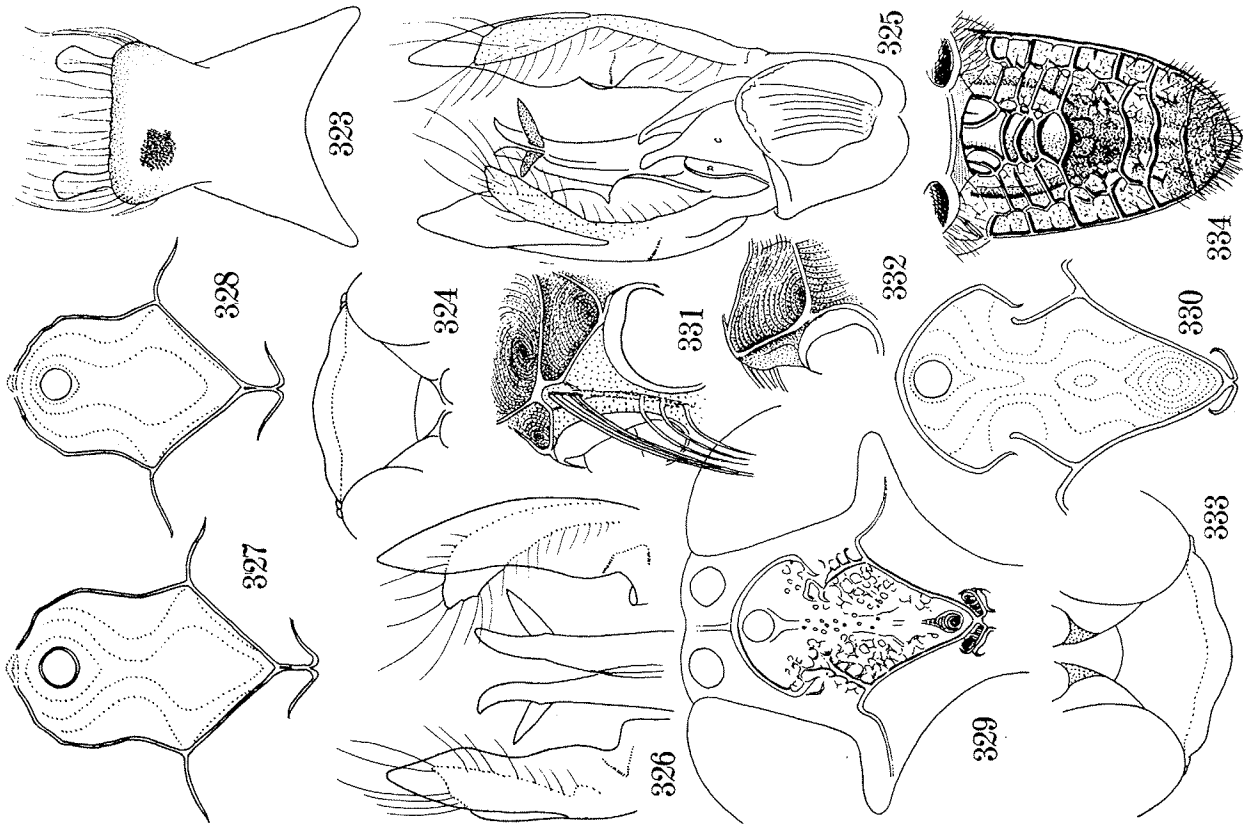
Figs. 323-334. 323-326: *Trypoxylon scutifrons* Saussure (s. str.), aberrant ♂.

327: *T. scutifrons aldabrenum* Tsuneki, sp. nov., ♀.

328: *T. scutifrons psychellense* Tsuneki, sp. nov., ♀.

329-334: *Trypoxylon longiscutis* Tsuneki, sp. nov., ♀.

323: Sternite 8 (external view). 324: Clypeus. 325: Genitalia, ventral view, somewhat from side. 326: Ditto, apical part, dorsal view. 327-328: Frontal shield, vertical view. 329: Frons with frontal shield seen vertically. 330: Frontal shield with dotted contour lines. 331: Interantennal structure. 332: Ditto in profile. 333: Clypeus. 334: Propodeum.



(Fig. 345, T), otherwise genitalia as in the typical race; sternite 8: Fig. 344 (dorsal view).

Holotype: ♀, Aldabra Is., P. E. Dygent leg. (No. 1907-72) (BMNH).
 Paratypes: 3 ♂, Aldabra, South Island (1 ♂, Cam. Cases, 3-16. I. 1968; 1 ♀, Takamaka Pool, 1-17. II. 1968; 1 ♂, Dune Jean-Louis, 13-20. III. 1968), B. Cogan & A. Imtson leg. Aldabra Atoll Royal Society Expedition 1967-68 (BMNH).

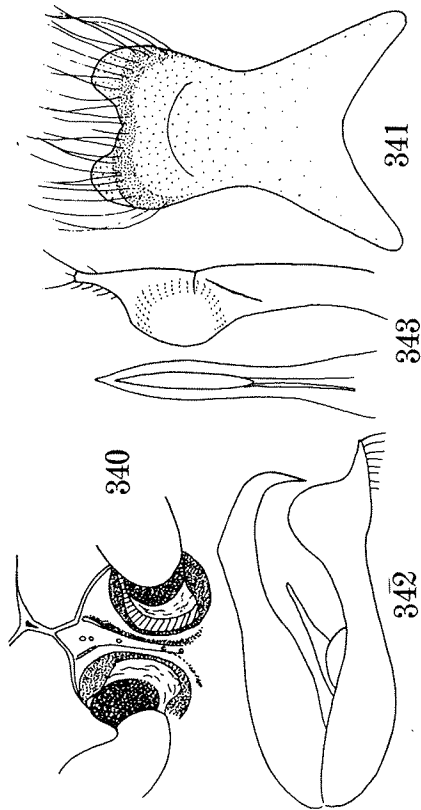
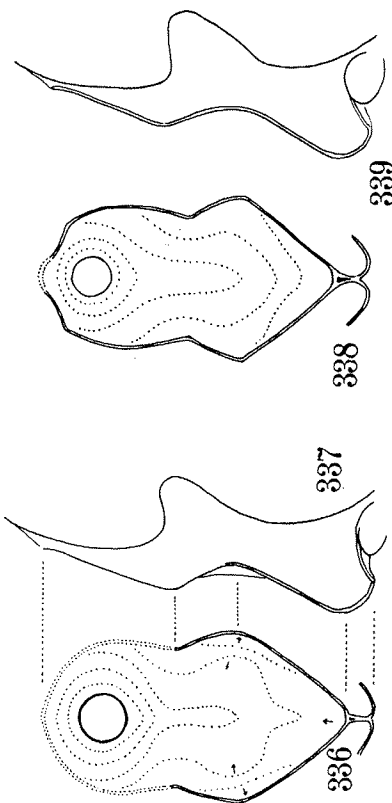
(c) *Trypoxylon scutifrons mauritium* sp. nov.

♀. Closely resembles preceding subspecies, but is different from it as follows: Mesoscutum more strongly and distinctly microcoriaceous, with punctures very much stronger and deeper, only partly subrugosely confluent and surface somewhat shining. Differs from the typical female in that mesothorax, especially scutum, distinctly microcoriaceous, with punctures on the average larger, closer and partly confluent, intercellular area not ridged and body somewhat smaller (Table 16).

On mesoscutum punctures along notauli, median scutal line (both reaching near apex) and parapsidal sutures finer and closer, subreticulate, on the mid-lateral area fairly large and close, partly transversely or obliquely subconfluent, on central area sparser, with puncture-interspaces 1-2 times larger than puncture-diameter. Measurements: Table 16.

♂, unknown.

Holotype: ♀, Mauritius, J. E. M. Brown, 99-265 (7 1899, No. 265). (BMNH)

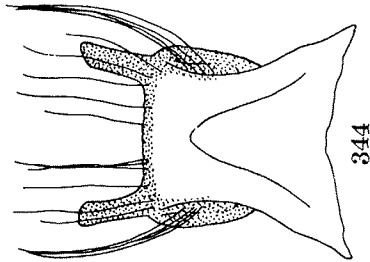
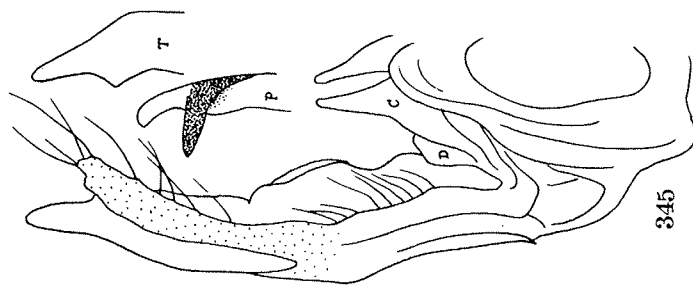


Figs. 336-343. *Trypoxylon simoscutis* Arnold. 338-340... ♀, others... ♂.
 336, 338: Frontal shield, vertical view. 337, 339: Ditto, lateral view.
 340: Internantennal structure. 341: Sternite 8, internal view. 342: Genitalia, lateral view. 343: Paramere and penis valve, apical part, dorsal view.

Table 17. Measurements on *Trypoxylon simoscutis* Arnold

Sex	BL	IODv(10Dc)	(OOD OR POD)	(FSL VAL)	A3	(L/W)	Aul	(L/W)	Pet	(Ma Mi Sp)	2	3)						
♀	10.5	26.0	8.0	0.5	5.0	4.5	17.5	12.5	16	2.7	15.0	2.5	120	22	7	25	46	48
♀	13.0	26.0	9.0	1.0	5.0	5.5	17.5	12.0	18	2.8	15.4	2.3	120	21	7	26	48	50
♂	10.0	30.0	7.0	3.0	5.0	6.0	18.0	12.0	12	1.6	26.8	2.8	112	20	7	26	50	50

Abbreviation: BL = Body length



Figs. 344-345. *Trypoxylon scutifrons* alabramum sp. nov., ♀.

344: Sternite 8 (dorsal or inner view).
 345: Genitalia. C: Cuspid. D: Digitus.
 P: Right half of apical part of penis valve. T: Apex of trans-parent lobe of paramere (vertical view).

(d) Trypoxylon scutifrons seychellense ssp. nov.

♀ ♂. Strange to say, more closely allied to typical race than the two sub-species above described, though the locality is more remotely separated from Madagascar than those of the two. It differs from both in that mesothorax is not microsculptured, with punctures well separated, without mutual confluence. Therefore, the punctation in both sexes of the present subspecies is as in ♀ of the typical race (in ♂ not as in ♂ of the Madagascar population). It differs from this in that averaged body size is smaller, fore tibia in front and fore tarsus more broadly distinctly ferruginous and punctures on mesoscutum comparatively larger and closer. Sides of propodeum in both sexes obliquely, finely and closely striated all over the area and on upper portion mixed sparsely with fine punctules.

Holotype: ♂, Seychelles, Mahe Is., VIII. 1938, D. V. Fitz Gerald (BMNH).
Paratypes: 3 ♀, Seychelles (2 ♀, Mahe Is., 1-2. IX. 1936, D. V. Fitz Gerald; 1 ♀, Praslin Is., D. V. Fitz Gerald) (BMNH).

Remarks. The specimens from Mahe Island possess the interocellar ridge on the vertex, though weak and in the male rather indistinct, while in the female from Praslin Island it is completely lacking. The ultimate antennal joint in the male is as long as 5 preceding joints combined.

TRYPOXYLON SINUOSISCUTIS ARNOLD, 1944

Trypoxylon sinuosiscutis Arnold, Sphacid. Madagascar, p. 7, 8 (keyed) and 13, 1945 (♀ ♂)

Trypoxylon sinuosiscutis: Bohart & Menke, World Sphacid., p. 348, 1976 (listed).

Specimens examined: 1 ♀ 1 ♂, Madagascar, Bekily, I. 1942 (with det. label by Arnold); 1 ♀, Madagascar, date and collector unknown (BMNH).

The present species is very peculiar in that the frontal shield lacks the outward branch carinae and tibiae and tarsi of fore and mid legs are broadly ferruginous. Measurements: Table 17.

Main characters: Vertex without interocellar ridge, frontal shield: Figs. 336 (♂) and 338 (♀), its lateral view: Figs. 337 (♂) and 339 (♀), enclosing carinae low and weak, in ♂ very obtuse and indistinct on all the parts above constriction, in ♀ obsolete on median top area of dorsal carina; surface excavation shallow (shown by dotted contour lines in the figure) and covered sparsely with comparatively long pale yellowish pubescence which is mixed with a small number of short silvery white hairs on median shallow furrow; medio-apical carina short, less than half the length of lower carina; interantennal structure: Fig. 340, with upper enclosed area distinctly margined by lateral carinae, arising points of long curved bristles are shown with circlets. Clypeus in ♀ as in scutifrons, in ♂ with apical margin much less strongly recurved than in the species compared. Microsculpture on head as in scutifrons, but superimposed punctures on frontal shield much sparser; antennal joints 3, 4, 5 with relative length appr. 10, 8.5, 8 (♀) or 7, 6.5, 6 (♂), ultimate joint in ♂ slightly longer than 4 preceding joints united, in some condition appears as long as 4 united, slightly curved and gently bent at apex; lamina on sides of pronotum slightly produced, broadly rounded, acutely edged at the apical margin; mesothorax with weak plumbeous shine, without microsculpture, in punctation similar to scutifrons; propodeum with structure and sculpture as in the species compared, but the striae on area dorsalis wholly transverse and much closer; gastral petiole also similar. Male genitalia with paramere not bifurcated at apex, but markedly enlarged and rounded inflated before the slender apex (Fig. 242, lateral view, Fig. 243, dorsal view), penis valve without lateral sickle-shaped lobes at apex (Figs. 342, 345), volsella generally similar to that of scutifrons, but cuspis with apical slender part much longer; sternite 8: Fig. 341, apical form is characteristic, hairs fine, weak, scarce in number.

Distribution: Endemic to Madagascar.

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TRYPOXYLON LONGISCUTIS SP. NOV.

In the key by Arnold on the South African (1924) and Madagascan (1945) Trypoxylon the present species runs to T. punctatissimum Arnold, 1924, but it differs from this in that pronotum is distinctly discoloured on its posterior part, frontal shield is very much longer, mesoscutum with punctures finer and closer and without depressed and striated area in front of posterior margin, scutellum more sparsely punctured than antecutium, sides of propodeum without microsculpture, 10D on vertex much shorter than antennal joints 2 + 3 + 4 (20 : 27), 00D much smaller than diameter of postocellus and gastral petiole much less than 7 times as long as its maximum width.

♀, 10 mm. Black; without aeneous shine on mesoscutum, but mesopleuron shows a little in certain light. Mandible ferruginous, at extreme base black, tegula semitransparent pale brown, palpi obscureous, tibial spurs light brown, articulations and under-side apically of tarsi somewhat brownish, wings hyaline, stigma and veins dark brown; hairs on inner orbits, supraepical area and clypeus silvery, on temples, sides of the-gastrax and dorsal side of propodeum except area dorsalis silky white; pubescence on gaster abort, sparse, greyish white, on posterior margin of each tergite somewhat close, petiole with median line beneath glabrous, other sternites wholly pubescent; long curved bristles on interantennal area slightly yellowish white.

Head from above with length at eye slightly more than half its width (56 : 100), interocellar and post-ocellar blunt carinae distinct, the former meeting with the latter at its posterior end and the latter extending further to upper temple near the top of each eye, forming the posterior margins of the impressions around ocelli, vertex behind the carina till occipital margin flatly inclined posteriorly. 10Ds = 4 : 5, 00D : POD = 1 : 4, POD slightly longer than postocellar diameter; head in frontal view with sides gently roundly convergent below, with eye emarginations comparatively narrow frontal shield in vertical view: Fig. 329 (cf. Fig. 346, a reproduction of Fig. 12 of Arnold's 1924 paper), ratio of length to width at lateral angles 2 : 1, lower area deeply hollowed before apex, approximate contour lines are given by dotted lines in Fig. 330, outward branch carina bent near base and deeply penetrating into eye incision, medio-apical carina almost lacking, almost directly open to the upper enclosed area of interantennal structure which is seen obliquely in front: Fig. 331, upper enclosed area margined laterally by weak elevated lines, the structure seen in profile: Fig. 332, long curved bristles (groove: Fig. 332, from lower carinate part at least 3, transverse carina at its end turned posteriorly, embracing a deep hollow inside (Figs. 329 and 331-332); clypeus: Fig. 333, anterior margin slightly recurved, with broad flattened marginal area, disc gently roundly raised from base. Antennal joint 1 deeply hollowed on inner side, 2 slightly longer than wide, subglobe, 3, 4, 5 with relative length 12, 9, 8, joint 3 in widest view 2.7 times as long as broad at apex. Pronotum with transverse furrow comparatively broad and shallow, letting anterior part appear as long as posterior part in middle, lamina at side obtuse triangular, very slightly produced, mesoscutum with all the impressed lines very indistinct, scutellum and postscutellum with surface flattened, mesopleural scrobe very large, mesosternal median carina distinct; on propodeum area dorsalis distinctly margined by furrows, lateral carinae of the segment distinct, the enclosed semicircular smooth area in front of ligament socket of gaster comparatively small, with the surface shining, but somewhat scabrous, upper rim of the socket roundly produced posteriorly, gastral petiole clavate as usual, 4.5 times longer than maximum width, hind coxal organ in a ed comparatively posteriorly, at about one third from base; hind coxal organ in a short tooth. In fore wing 2nd abscissa of cubital vein slightly less than a half the

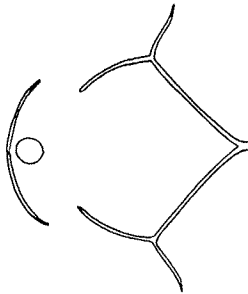


Fig. 346. Trypoxylon punctatissimum Arnold. Frontal shield in frontal view (after Arnold, 1945)

ing from upper enclosed space apparently 4 in number and from lower carinate part at least 3, transverse carina at its end turned posteriorly, embracing a deep hollow inside (Figs. 329 and 331-332); clypeus: Fig. 333, anterior margin slightly recurved, with broad flattened marginal area, disc gently roundly raised from base. Antennal joint 1 deeply hollowed on inner side, 2 slightly longer than wide, subglobe, 3, 4, 5 with relative length 12, 9, 8, joint 3 in widest view 2.7 times as long as broad at apex. Pronotum with transverse furrow comparatively broad and shallow, letting anterior part appear as long as posterior part in middle, lamina at side obtuse triangular, very slightly produced, mesoscutum with all the impressed lines very indistinct, scutellum and postscutellum with surface flattened, mesopleural scrobe very large, mesosternal median carina distinct; on propodeum area dorsalis distinctly margined by furrows, lateral carinae of the segment distinct, the enclosed semicircular smooth area in front of ligament socket of gaster comparatively small, with the surface shining, but somewhat scabrous, upper rim of the socket roundly produced posteriorly, gastral petiole clavate as usual, 4.5 times longer than maximum width, hind coxal organ in a ed comparatively posteriorly, at about one third from base; hind coxal organ in a short tooth. In fore wing 2nd abscissa of cubital vein slightly less than a half the

(85)

This species should be transferred to p. 76 (below "On Some...")

length of the 1st and very slightly longer than transverse cubital vein. Measurements:

HW	10Dv	10Dc	00D	0d	POD	(FSL UAL)	A3	(L/W)	AL2	(L/W)	Pet	Ma	MI	Sp	2nd	3rd
100	27.0	7.7	1.5	5.5	6.0	20	11	16	2.7	15.4	2.0	126	22	7	32	36* 42

* Strongly inserted.

Vertex including interocellar and post-ocellar elevations delicately microcoriaceous, with large rounded punctures in a line along interocellar elevation and dorsal carina of frontal shield, posterior inclination covered with fine indistinct punctures; frontal shield more strongly microcoriaceous except median furrow, narrow area around ocellus and anterior hollow and closely superimposed with irregular-shaped and -sized punctures, punctures with bottoms and marginal ridges also microcoriaceous or microgranulate, not shining, inner orbits outside the shield more finely and more closely punctured; mesoscutum without microsculpture, closely subreticulately covered with well outlined comparatively large punctures, punctures on narrow median area nearly rounded, but on broad lateral areas transversely elongated, as a result the surface appears transversely rugoso-reticulate; scutellum and postscutellum more finely but sparsely punctured, with puncture-intervals far larger than the width of punctures, mesopleuron upwards finely, downwards gradually largely punctured, with interspaces as large as puncture, punctures on prepectus large and everywhere uniform. Sculpture of propodeum: Fig. 334, surface of area dorsalis and its enclosing furrows smooth and polished, on other areas finely scabrous, sides except antero-ventral smooth area obliquely somewhat arcuately strongly and closely striate and mixed with sparse fine punctures; gaster covered with micropoints bearing pubescence, sternite 1 smooth and shining, only on posterior portion with a few short hairs, 2 and 3 also at base glabrous.

♂, unknown.

♀: *MaKa55er*

Holotype: ♀, only Mdk (=Medevesee), with two other labels, one "wt. eximum Smith" handwritten in two lines and the other "Smith coll. pres. by Miss Farren White 99-303" pressed in four lines (BMNH).

Remarks. Judging from the measure of difference of the present species from *T. punctatissimum* Arnold which is first known from Algoa Bay, Cape Province and later known from Madagascar, it seems to me that both are in a subspecific relationships. However, Arnold in his 1944 paper clearly says "the ♀ does not differ in any way from the type form, although a little smaller, 10.5 mm long". Because of the rule that different subspecies can not exist in sympatric the present species is separated from it at the species rank.

ON THE AFFINITIES AMONG SPECIES

Judging from the characters of the genital organs and the 8th sternite in the male *T. sinuositus* is most deviated from other species the males of which are dealt with in the present paper and *T. tainanense* is the next. Among the remainder *T. scutifrons* is opposed to all the others in the characters of the apical bristled lobe of the paramere and *T. papuanum* in that of sternite 8. But the genital character is considered more important. The four species remained, *schmidtknechti*, *melanurum*, *thianum* and *scutatum*, are closely allied to each other, but *scutatum* may be slightly apart from other three. As to the species known from the female only future studies are desired.

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