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

VI. SPECIES FROM BORNEO, CELEBES AND MOLUCCAS

By K. TSUNEKI

MISHIMA

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

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Synopsis

Seventy-four species are recorded from the areas covered by the present Part, including thirty-three new species and eight new subspecies. In connection with the alteration in the sex-combination or the taxonomic status of the hitherto described species two new species of other areas are also recorded. Corrections of the errors in the previous Parts that are made clear during the course of the present study are collectively given in the following page. The names of the species dealt with in the present Part are listed in the index on the final page.

The material investigated in the present Part is derived mainly from the collections of British Museum (Natural History) and Bernice P. Bishop Museum, and partly from United States National Museum, Natural History Museum of Leiden and California Academy of Sciences.

The specimens are considerably abundant, but they are restricted in distribution chiefly to Sarawak and North Borneo and those from South Borneo, Celebes and the Moluccas are very scarce and the future investigation of these areas is desired.

Of the 74 species treated those which are common with the Philippines (according to my preliminary study) and the areas already studied are 15, namely, appendiculatum, bicolor, errans, flavipes, fulvocollare, laeviceps*, mindanaonis*, ornatigaster, petiolatum, rufiventre*, schmiedeknechti, singaporense, striolatum, thaianum and varipilosum, those that are common with the already studied areas are 14: antennatum, concinnum, javanense, kalimantan, kepongianum, lumpurense, maculiventre, membranaceum, naviforme, prominens, rufigaster, shakha, sumatraense and tainanense, and those common with the Philippines alone are only 2: auropilosum and balabacense (but this number will increase when the detailed investigation on the Philippine species are made), while the species confined to the areas dealt with here are, besides the 33 new species, 8 in number, coloratum, elegantulum, eximium, ferox, gracilescens, longiscutis, placidum and providum, but some of these 41 are presumed to occur also in New Guinea and eastern Archipelagoes.

As to the local variations of the characters of the known species it is endeavoured to give a more or less comment including the measurements of certain body parts in order to contribute towards the knowledge on the geographical speciation.

* See the following alteration.

ALTERATIONS AND CORRECTIONS

For the new method of classification of the present genus, placing a stress on the supraantennal structure, the previous description, however detailed it may be, is of little use and unable to give the final determination. On this account the species described by me with the material collected by the Noona Dan Expedition in the Philippines must be reexamined in order to know the relationships between the species of the Philippines and other areas. Through the courtesy of Dr. Ole Lomholdt, Zoological Museum of Copenhagen, a chance was given and the results obtained are included amongst the following:

(1) T. ferox Smith, ♂ (Tsuneki, SPJHA, 8: 16, 1978) is a species different from T. ferox Smith ♀ and named as T. wallacei sp. nov.

(2) The female specimen that is one of the syntypes of T. gracillimum Smith and that is identified by me at the moment of the first reexamination of the syntypes (SPJHA, 8: 26, 1978) with T. bituberculatum m. (var.) is newly named T. bituberculatum mysolense ssp. nov.

(3) The lectotype of T. gracillimum Smith is identified with T. eximium Smith as its male.

(4) T. basiflavum Tsuneki, ♂ ♀ (SPJHA, 10: 11, 1979, Ceylon) is a synonym of T. testaceicorne Cameron, 1907 (♀, India) (SYN. NOV.)

(5) T. maculiventre: Tsuneki (SPJHA, 11: 29, 1979, specimens from Sumatra and Java) is different from true T. maculiventre (specimens from Singapore, Malaya and Laos) and named T. cavum sp. nov.

(6) T. khasiae: Tsuneki (SPJHA, 9: 84, partim: Malayan specimens) and T. khasiae: Tsuneki (SPJHA, 11: 36, 1979, specimens from Sumatra and Java) are not khasiae, but strictly they should be identified with T. varipilosum Cameron.

But, T. khasiae, yumi and varipilosum are very closely related species and there remains possibility that they are in subspecific or variational relationships. At the present state of my knowledge, however, it is difficult to give final confident determination and they are treated rather provisionally as distinct respectively.

(7) T. penangense Tsuneki (♀ ♂ from Laos) is a different species from T. penangense Tsuneki (♀ from Penang - holotype -, Malaya, Singapore and Java) and is named anew T. rutilans sp. nov.

(8) T. penangense Tsuneki (specimens from Pennng, Malaya, Singapore and Java) is a synonym of T. rufiventre Tsuneki, 1976 (Steenstrupia, 4: 81) (SYN. NOV.)

(9) T. vicinum Tsuneki (SPJHA, 11: 15, 1979) is in a subspecific relationship with T. laeviceps Tsuneki, 1976 (Steenstrupia, 4: 83) and should be called T. laeviceps vicinum Tsuneki, 1979.

(10) T. bakerianum Tsuneki is in a subspecific relationship with T. mindanaonis Tsuneki, 1976, as a result the following changes occur:

T. bakerianum Tsuneki ⟶ T. mindanaonis bakerianum Tsuneki, 1979

T. bakerianum fortius Tsuneki ⟶ T. mindanaonis fortius Tsuneki, 1979

T. urbanii Tsuneki, 1979, known from Sumba, may be included within the range of mindanaonis, but the lack of the knowledge of its male makes me hesitate to do so, taking into account the case of nigripes and nishidai. Until the discovery of its male the determination is postponed.

(11) T. tawitawiense Tsuneki, 1976 ♂, nec ♀ which is the holotype, is the male of T. striolatum Tsuneki, 1979.

(12) T. dorsale Tsuneki, 1977 (SPJHA, 6: 5 - ♀, Bismarck Archipelago and New Guinea, erroneously identified with T. bicolor dorsale and redescribed) is in reality differrent from true T. bicolor dorsale Tsuneki, 1977 (= T. bicolor marginale Tsuneki, 1976 nec T. marginale Cameron, 1912) and is a synonym of T. eximium Smith, 1957.

(13) T. bicolor dorsale Tsuneki, 1977 (Akitu, N.S. 9: 4, nom. nov. for T. bicolor marginale Tsuneki, 1976, nec T. marginale Cameron, 1912) is nothing else than T. bicolor Smith s. str. showing a slight variation.

(14) T. aureohirtum Tsuneki, 1976 (Steenstrupia, 4: 77) is a synonym of T. varipilosum Cameron, 1901 (with a slight variation in the colour of hind leg).

H O M O N Y M S

(1) T. venustum Tsuneki, 1979 (SPJHA, 9:63), nec T. venustum Tsuneki, 1977 (Ibid. 2: 8, Formosa) is renamed: T. scitulum nom. nov.

(2) T. nasutum Tsuneki, 1979 (SPJHA, 9: 37), nec T. varipes nasutum Tsuneki, 1974 (Ann. Hist.-Nat. Mus. Nat. Hung., 66:365, Korea) is renamed: T. nasale nom. nov.

(3) T. brevicarinatum Tsuneki, 1979 (SPJHA, 9: 65), nec T. brevicarinatum Cameron 1912 (= T. fabricator Smith, 1973) is renamed: T. darjeeling nom. nov.

ABBREVIATIONS

A1, A2 and so on ... Antennal joint 1, Antennal joint 2 ...
A10–12 ... A10+A11+A12 united.
ASR ... Antennal socket rim (raised upper part of antennal socket)
AW ... Apical width or Width at apex (always maximum width, in case of A3 very frequently in lateral view.
BW ...Basal width or Width at base (always maximum width near base).
CV1, CV2 ... Abscissa 1 of cubital vein, Abscissa 2 of cubital vein ...
G1, G2 ... Gastral segment 1, Gastral segment 2 ...
GSR ... Gastral socket rim, really the dorsal rim of socket of lifting muscle of gaster (sometimes simple and not raised, but frequenly highly, roundly or subtriangularly raised).
HL ... Head length at inner orbit in dorsal view (not in middle where particularly longer due to SAT).
HW ... Head width in dorsal view (always maximum width).
IAA ... Interantennal area.
IAF ... Interantennal furrow.
IOD ... Interocular distance or distance between eye.
IODc ... Minimum IOD at about base of clypeus (frontal view).
IODv ... Minimum IOD at vertex (dorsal view).
IODs ... Ratio of IODv to IODc, usually shown by IODv as 10.
L/W ... Ratio of length to width.
Ma ... Maximum width (in case of gastral petiole dorsal view).
Mi ... Minimum width (ditto, usually just behind basal condyle, but sometimes in front of apical swelling).
2(Ma), 3(Ma) ... Length of G2 (Maximum width of G2), ditto of G3.
OOD (or OD) ... Ocellocular distance, namely the distaene between inner margin of compound eye and outer margin of hind ocellus.
Od ... Ocellar diameter (transversely measured).
P ... Petiole = G1
PAF ... Post antennal furrow, transverse or oblique furrow between ASR and SAT.
PD ... Puncture diameter.
PIS ... Puncture interspace.
POD ... Postocellar distance, distance beteeen inner margins of hind ocelli.
RC ... Radial cell of fore wing.
R1 ... Apical produced part of R1 beyond the meeting point with Rs, often very long.
SAT ... Supraantennal tubercle, nasiform or tuberiform, characteristic to species.
TCV ... Transverse cubital vein.
T1, T2 ... Tarsal joint 1, tarsal joint 2 ...
W:L ... Ratio of width to Length.

FORMULAE

Formulae always show the relative length.

HW,HL,IODv,A3,A13,P= ... measured under the standard of HW as 100.
P,Ma,Mi,2(Ma),3(Ma)= ... measured under the standard of P as 100.
A3,4,5=...measured under the standard of A3 as 10.

On the KEY TO THE SPECIES

1. When a character is variable or intermediate and fits for both of the couplet the species is put under both of the couplet.
2. AW of A3 and BW of A13 are always measured from the widest side.
3. Length of gastral petiole (P or G1) is the total length, measured from the extreme base of basal condyle to the apex.

KEY TO THE SPECIES

1 Frons with shield-shaped enclosure, sometimes the lateral carinae of the enclosure incomplete ..... scutatum-Group, see Part I
– Frons without shield-shaped enclosure 2
2 Gastral petiole clavate, gradually widening apically, usually short, sometimes considerably long, but always appr. as long as, or shorter than, 2 following segments united 3
– Gastral petiole flask-shaped, bearing parallel-sided stalk part in front, apical widening rather sudden, usually distinctly longer than 2 following segments united 19
3 Frons at supraantennal area with ship-shaped enclosure, widely open upwards (carinae reaching about mid point of the distance to fore ocellus, IODs≒3:1, propodeum with lateral carinae, area dorsalis with lateral furrows, transversely finely striate, P,Ma,Mi≒4,2,1, mesoscutum microcoriaceous, antenna basally, fore and mid legs nearly wholly, hind legs partly yellow), 5.5 mm, Sarawak (Java) naviforme lucidipes ssp. nov.
– Frons without such structure 4
4 At least G2 and 3 each with a minute fovea at apex in middle (head thick, subcubic) 5
– Gastral segments without foveae 6
5 G1 without fovea, SAT anteriorly expanded into subquadrate flat plate and produced between bases of both A1, propodeum only slightly extended posteriorly beyond base of hind coxa (antenna basally, fore and mid legs nearly wholly, hind leg partly yellow, gaster at intersegmental areas of G1-2-3-4 reddish or yellowish, IODs≒10:1 (♀), 10:2 (♂), in ♂ A10 excavated at base beneath and produced at apex, A13≒A9-12, anterior part of collar transverse, not trituberculate, mesoscutum without microsculpture, simply finely closely punctured, propodeum with lateral carinae, area dorsalis enclosed with furrow, RC B-type, R1 long, attaining close to wing apex, in ♂ head, prothorax and fore leg till femur covered beneath with long frizzled pubescence), 6–7 mm, Sarawak and North Borneo (Singapore) singaporense Tsuneki, 1979
– G1 with a fovea at apex in middle, SAT low flattened tuberiform, medio-apical area without carina, obliquely smoothly inclined to IAA, propodeum markedly extended posteriorly beyond base of hind coxa, with distinct propodeal sternite (colouration similar, G2,3,4 reddish at each base, IODs=10:2.5 (♀), 10:3.5 (♂), in ♂ A7 and base of A8 excavated beneath and A8 produced at apex, A13≒A10-12, anterior part of collar thick, distinctly trituberculate, mesoscutum distinctly microcoriaceous, propodeum with strong lateral carinae, area dorsalis without lateral furrows, venation similar, in ♂ head, prothorax and fore leg without particular pubescence beneath), about 7 mm, Sarawak and North Borneo (Ceylon and Laos) flavipes Tsuneki, 1979
6 Propodeum with distinct lateral carinae 7
– Propodeum without lateral carinae or with vestigial, very indistinct lateral carinae 18
7 Hair golden or brassy 8
– Hair silvery 9
8 Mesoscutum distinctly microcoriaceous, half mat, subalar area without pent-roof structure, collar black (IODs=10:7, clypeus weakly rounded out and broadly gently recurved in middle, area dorsalis distinctly enclosed with fine furrow, surface glabrous, SAT triangular in vertical view, ASR much below top level of SAT, PAF broad and shallow, down-curved in cross section, frons almost without microsculpture, comparatively coarsely rugoso-punctate or -reticulate, – sculpture very characteristic –, A3≒AW×3, RC=C, A1-3 beneath, clypeus apically, fore and mid legs nearly wholly, hind leg partly yellow, sides of G1, bases of G2,3,4 yellow or reddish yellow), 11–12 mm, Sarawak and North Borneo borneanum sp. nov., ♀
– Mesoscutum without microsculpture, PIS shining, subalar area with fairly well developed pent-roof structure, collar and prosternum orange yellow (IODs= 10 : 9-10, clypeus weakly rounded out, in ♀ medianly feebly emarginate, area dorsalis without lateral furrows, with hair at baso-lateral areas curled, SAT low nasiform, ASR below top level of SAT, bicarinate, PAF wide V-shaped in cross section, A3≒AW×3.5 (♀), ×1.5 (♂), A13 ≒ A3-12, RC=C, antenna basally, clypeus apically, fore and mid legs nearly wholly (mid T2-5 brown), hind leg partly yellow, gaster black and broadly maculated and banded with yellow), 10–12 mm, North Borneo (Laos, Malaya and Java) antennatum longulum ssp. nov.

9 ASR subsylindric, in lateral view erecting much higher than top of SAT, with a hollow on top and in front (black except mandible and palpi, legs more or less brownish, head thick, IODs≒5:3, Al3=All+12, anterior part of collar strongly trituberculate, mesoscutum without microsculpture, but very closely punctured, fairly shining, subalar area thick, with half developed pent-roof structure, propodeum extended posteriorly beyond base of hind coxa, area dorsalis enclosed with furrow, transversely coarsely striate, P,Ma,Mi≒10,2,1, RC=C, CV1=CV2×2.5), 5.5–6.5 mm, Borneo (Malaya and Philippines) appendiculatum Tsuneki, 1974, ♂

– ASR not so highly erected 10

10 ASR short subcylindric, distinctly separated from SAT by deep PAF, as high as top level of SAT, with a large hollow in front (other characters generally similar to those of appendiculatum except sexual characters) laeviceps Tsuneki, 1976, ♀

— ASR different 11

11 Subalar area of mesopleuron with well developed pent-roof structure (IODs= 3:1 (♀ ♂), A3≒AW×4(♀), ×3(♂), in ♂ flagellum without excavation beneath, Al3= All+12, clypeus: Fig. 50 in ♀, Fig. 38 in ♂, SAT low tuberiform, nearly flat, medianly carinate, PAF shallow and broad, gently downcurved in cross section, mesoscutum finely closely punctured, PIS without microsculpture, area dorsalis enclosed with distinct furrow, G2≒AW×3, RC=B–C, but close to C, Rl fairly long reaching fairly close to wing apex, antenna basally, fore and mid legs nearly wholly, hind legs partly yellowish, gaster with G2, 3, 4 ferruginous and yellow, often slightly different in maculation), ♀ 10, ♂ 8 mm, Sarawak kuchingense sp. nov.

— Subalar area without pent-roof structure 12

12 Gaster with 3 bright yellow bands (fore and mid legs nearly wholly, hind leg except femur and median part of tibia largely yellow , IODs≒5:4, frons nearly flat, SAT low nasiform, long carinated in middle, apical margin triangular in vertical view and carinated, almost covering ASR, accompanied just behind with false PAF, clypeus: Fig. 59, Al ≒ A2+3, A3=AW×1.7, mesoscutum microcoriaceous, area dorsalis with distinct lateral furrows, at base irregularly subreticulate, rest transversely coarsely striate, Al wholly, 2–3 beneath yellow), about 5.5 mm, Sarawak flavofasciatum sp. nov., ♀

— Gaster without yellow bands 13

13 Head from above subquadrate, W:L≒5:4 (IODs=5:1 – 4:1, A3≒AW×4, frons flat, SAT high long acute nasiform, apical margin triangularly raised and carinated, carina connected with ASR, thus forming false PAF, clypeus: Fig. 64, anterior part of collar narrowly transverse, not tuberculate in middle, mesoscutum weakly microcoriaceous and punctured, area dorsalis distinctly enclosed with furrow, RC=B, Rl moderately long, legs variegated with yellow and gaster medianly partly red), 6–7 mm, Sarawak and North Borneo (see also couplet 18) kalabakan sp. nov., ♀

— Head from above transverse, W:L below 3:2 (anterior part of collar transverse, narrow, without tubercle in middle) 14

14 Gaster ferruginous, often with a dusky patch on G1 (G2=AW× 1–1.3) 15

— Gaster black, sometimes with ferruginous bands (SAT low small tuberiform, nearly flat, PAF shallow, broad, down-curved in cross section) 17

15 SAT-ASR: Fig. 65, G1 without dusky patch (frons gently concave, IODs=5:4, A3 AW×5, clypeus: Fig. 66, mesoscutum without microsculpture, but not shining, area dorsalis with distinct lateral furrows, G1 short, but basal part parallel, RC=C, legs except black coxae and arolia yellow, hind femur above and tarsus pale brown), 9.5 mm, Sarawak rufigaster cavatum ssp. nov., ♀

— SAT-ASR different, G1 with brownish patch (mesoscutum microcoriaceous and superimposed with fine punctures) 16

16 A3≒AW×3.5, IODs=2:1, clypeus: Fig. 69, lateral furrows of area dorsalis distinct, Rl not reaching close to wing apex (SAT-ASR: Fig. 68, false PAF present, Al–2 and 3 beneath yellow, fore and mid legs nearly wholly, hind trochanter, tibia at base and apex and Tl also yellow), 8 mm, Sarawak (Java) javanense Tsuneki, 1979, ♀

— A3≒AW×2.8, IODs=5:3, clypeus: Fig. 73, lateral furrows of area dorsalis weak and indistinct, Rl reaching close to wing apex (SAT-ASR: Figs. 70, 71, true PAF present, lateral carinae of propodeum sometimes very feeble, colouration generally similar), about 7 mm, Sarawak and North Borneo mulusanum sp. nov., ♀

17 Mesoscutum distinctly microcoriaceous, area dorsalis without lateral furrow (IODs=5:4, A3=AW×4, SAT-ASR: Fig. 265, clypeus: Fig. 266, RC=C–B, antenna basally, fore and mid legs partly brown or whitish – see also couplet 56), 11 mm, N.

Borneo kinabalum sp. nov., ♀

— Mesoscutum without microsculpture, area dorsalis enclosed with furrow (IODs 10:7, A3=AW×2.3, Al3=All+12, frons flat, with shallow medial furrow, clypeus: Fig. 80, apical margin brown, antenna basally, all trochanters, fore tibia and tarsus, mid tibia and base of hind tibia ferruginous), 5 mm, Sarawak paulum sp. nov., ♂

18 Head transverse, gaster ferruginous, with a dusky patch on G1 (lateral carinae of propodeum sometimes distinct, sometimes indistinct - see also couplet 16), 7 mm, Sarawak and North Borneo mulsanum sp. nov., ♀

— Head subquadrate, gaster black and G2, 3, 4 at each base ferruginous (IODs= 4:1, frons flat, median furrow lacking, SAT-ASR: Figs. 61-63, clypeus: Fig. 64, collar transverse, subalar area normal, area dorsalis with distinct lateral furrows, lateral carinae of propodeum sometimes defined, sometimes very faint, mesoscutum microcoriaceous and closely superimposed with fine punctures, antenna basally, clypeus apically, fore and mid legs nearly wholly and hind leg partly ferruginous - see also couplet 13), North Borneo and Sarawak kalabakan sp. nov., ♀

19 Hair golden or brassy at least on head or thorax 20

— Hair silvery 46

20 Propodeum with lateral carinae 21

— Propodeum without lateral carinae 37

21 Mesoscutum microcoriaceous (subalar area with well developed pent-roof structure, Al-2 at least, clypeus anteriorly, fore and mid legs nearly wholly (except mid T2-5) and hind leg partly lemon- or orange-yellow, at least G2-3 partly reddish or yellowish, length 10-13 mm) 22

— Mesoscutum without microsculpture, simply punctured 28

22 Prothorax completely orange yellow (clypeus: Fig. 89, SAT-ASR: Figs. 85-88, A3≒AW×6, pronotal lamina: Fig. 90, RC=C-M), about 12 mm, North Borneo sandakanum sp. nov., ♀

— Prothorax not completely yellow 23

23 Prothorax except dark brown band across middle of nape region extending to sides of notum orange yellow (vertex depressed, frontal elevations weak, SAT-ASR: Fig. 95, apical margin of clypeus: Figs. 93, 94 (♀), 96 (♂), IODs=10:9 (♀), 10:8 (♂), A3≒AW×5(♀), ×3.7(♂), Al3=A9-12 — Fig. 97—, pent-roof structure with broad transparent membrane at outer margin till end of mesopleural flange, area dorsalis without lateral furrows, RC=C, A3 partly yellow (♀), hind tibia broadly yellow, G1 in ♀ broadly ferruginous basally, in ♂ brown till spiracles) ♀ 12, ♂ 9 mm, North Borneo silvicola sp. nov.

— Prothorax on posterior part of collar and tubercles yellow (often anterolateral areas somewhat brownish) 24

24 ♂ (Median carina of SAT at apical end not enlarged into a hollow-carrying flat shining area, SAT anteriorly obliquely, smoothly inclined to IAA, clypeus: Fig. 128, IODs=10:8.3, antenna wholly, gaster except apical portion and legs nearly wholly orange yellow), 9.5 mm, Celebes wallacei sp. nov., ♂ (= ferox Smith, ♂, nec ♀)

— ♀ (SAT low rounded nasiform, nearly tuberiform, carinated in middle, PAF deep, flat-bottomed, without hollow on both ends, clypeus rounded out, with a shallow round excavation on each side of median area, pronotal lamina toothed, area dorsalis without lateral furrows, RC=M, Al-2 at least, apical margin of clypeus broadly, fore leg nearly wholly, mid leg except brown T2-5, hind leg at least partly yellow, gaster at least on bases of G2 and 3 reddish or yellowish, sometimes coloured area more broadly extended) 25

25 A3=AW×6.5 (apical margin of clypeus: Fig. 125, PAF: Fig. 123, G1 on apical swelling black, turning to dark brown - pale brown towards base, A3 yellow, A4 brown, rest black, fore coxa at extreme base brown, mid and hind coxae except apical area black, hind trochanter wholly and tibia at base broadly yellow), 13 mm, North Borneo flagellatum sp. nov., ♀

— A3=AW × 4-5 26

26 PAF: Fig. 128, SAT medio-anteriorly with an obliquely inclined flat shining and hollowed area (A3-12 distinctly black, coxae, hind trochanter and femur black, hind tibia except yellow base and tarsus nearly wholly dark brown, gaster black, G2 and 3 at each base yellowish), 11 mm, North Borneo kuncheriai sp. nov., ♀

— PAF not oval in cross section, SAT medio-anteriorly smoothly inclined to IAA 27

27 PAF: Figs. 137-139 (A3-12 distinctly black, coxae black, hind trochanters yellow, hind T1 at base whitish yellow, varied in extent, G2, 3 at base yellowish or reddish, rarely G1 at base beneath ambur yellow), 11-13 mm, Sarawak and

North Borneo tirimen sp. nov., ♀

— PAF: Figs. 130–133 (rarely A3 yellow or yellow beneath, fore and mid coxae nearly wholly yellow, hind coxa largely black or largely yellow, hind T1–2 varied in the extent of whitish maculation), 11–13 mm, Sarawak (Malaya, Laos, Sumatra, Java) maculiventre Tsuneki, 1979, ♀

28 Prothorax completely orange yellow (antenna largely yellow, only median part partly brown, gaster broadly yellow, IODs≒1:1 (♂ ♀), SAT low nasiform, median carina at apical end obliquely inclined and enlarged, flattened into a round shining and hollowed area, clypeus: Fig. 142 (♀), 143 (♂), A3≒AW×6 (♀), ×3 (♂), Al3≒A9–12, pronotal lamina broad triangular, apex rounded, mesopleural flange somewhat laterally expanded, subalar area not expanded, RC=M), ♀ about 14 mm, ♂ 11 mm, Sarawak and North Borneo (Malaya) concinnum Tsuneki, 1979

— Prothorax not completely yellow 29

29 Prothorx, besides posterior part of collar and tubercle, partly yellow (often yellow broadly extended to sternum, but in such a case at least a transverse band across nape region and sides of notum black, sometimes yellow narrowly restricted to ridge of collar and not conspicuous) 30

— Prothorax except posterior part of collar and tubercles black 32

30 Legs except coxae and arolia and gaster except a patch on apical swelling of G1 wholly ferruginous yellow (yellow on collar fine and weak, rather vestigial, hair on clypeus pale brassy, in some light appears silvery, apical margin of clypeus rounded, SAT low broad nasiform, apical margin transversely roundly carinated, carina connected with ASRs, thus false PAF arisen (Fig. 154), mesoscutum nearly mat, punctures fine and close, but quite inconspicuous, subalar area with postero-outer margin edged, but not expanded, area dorsalis enclosed with shallow crenate furrow, Al–2 and greater part of 3 yellow), 11 mm, Sarawak (the Philippines – Tawi Tawi) rufiventre Tsuneki, 1976, ♀

— Legs and gaster more broadly black 31

31 PAF deep, flat-bottomed, in ♀ U-shaped, in ♂ oval in cross section (cf. Figs. 169, ♀; 171, ♂), medial carina of SAT at apical end obliquely inclined and enlarged into flat shining area carrying a large fovea on it (area dorsalis enclosed with shallow furrow, apical margin of clypeus: Fig. 170, ♀, 172, ♂, A3≒AW×5 (♀), ×2.7 (♂), Al3 >Al0–12, but <A9–12, subalar area with postero-outer margin acutely carinated, Al–4 or –5 yellow, apically brown or dark brown, fore and mid legs nearly wholly, hind trochanter, tibia broadly yellow, RC=C, lateral carinae of propodeum weak, not conspicuous), 11–14 (♀), 11–12 (♂) mm, shakha Tsuneki, 1979

— PAF shallow, upcurved, wide V-shaped in cross section, medio-apical area of SAT without smooth shining area (clypeus simply rounded out (♀ ♂), area dorsalis without lateral furrows, A3≒AW×4 (♀), ×2.7 (♂), Al3≒A9–12, RC=C, Al–2, sometimes 3 also, fore and mid legs nearly wholly, hind leg broadly ferruginous or yellow, G1 yellow, black above, rest of gaster yellow and variably maculated with black), ♀ 15, ♂ 12–13 mm, Sarawak and North Borneo (Assam, Laos, Malaya and Sumatra) fulvocollare Cameron, 1904

32 Al–2 at least yellow, apical margin of clypeus simply rounded, or nearly (gaster at least medianly broadly yellow or ferruginous) 33

— Antenna black, apical margin of clypeus not simply rounded (gaster black and medianly narrowly reddish or brownish) 35

33 SAT (Fig. 154) low tuberiform, apical margin transversely carinated, carina connected with ASRs, thus false PAF arisen (gaster completely ferruginous, with a blackish mark on apical swelling of G1, fore and mid legs nearly wholly, hind leg partly yellow, IODs=10:8, mesoscutum nearly mat, Al3≒A8–12 (Fig. 156), 10–11 mm, Borneo (Is. Tawi Tawi), see also couplet 30 rufiventre Tsuneki, 1976, ♂

— SAT without transverse carina at medio-apical margin which is connected with ASRs 34

34 IODs≒2:1, PAF deep, flat-bottomed, U-shaped in cross section, ASR with dorsum broad and rounded, minutely granulate (antenna, G1–4, fore and mid legs nearly wholly, hind leg on trochanter and broad base of tibia yellowish, A3≒AW×6), 12 mm, Celebes ferox Smith, 1860, ♀

— IODs≒10:9, PAF shallow, upcurved, wide V-shaped in cross section, ASR bi- or tricarinate (yellow: Al–2, black maculated above, base and apex of G2 and 3, and base of 4, fore and mid legs (except coxae, dorsal marks of trochanters, femora and mid T3–4) and base and apex of hind tibia; A3=AW×4), 13–15 mm, Sarawak and North Borneo (Malaya and Sumatra) ornatigaster Tsuneki, 1979, ♀

35 P≒Ma×10, bases of tibiae slightly pale brownish (fore tibia in front and tar-

sus pale brown, rest of legs dark brown, often mid tarsus somewhat light brown, SAT tuberiform, carrying a small nasiform elevation in middle, IODs=10:8(♀), 10:9(♂), A3=AW×4.5(♀) ×3.3(♂), in ♂ antenna strongly incrassate apically (Fig. 195), Al3≒A9–12, clypeus: Figs. 192(♀), 194(♂)), 10–11 mm, North Borneo (Philippines: Is. Tawi Tawi) auropilosum Tsuneki, 1976

— P≒Max6, bases of all tibiae broadly distinctly yellow (fore tibia largely ferruginous, mid tarsus except articulations dark brown or black, G2–3 ferruginous and dorsally dark brown to black, SAT moderately high nasiform, sides smoothly inclined 36

36 IODs≒10:8, A3≒AW×4.5, lateral carinae of propodeum feeble, area dorsalis without lateral furrows, GSR nearly simple (frontal furrow shallow, surface delicately microcoriaceous and weakly, somewhat sparsely punctured, fore tarsus pale yellow), 13–15 mm, Borneo (Java) kalimantan Menke, 1976, ♀

— IODs=10:10, A3≒AW×6, lateral carinae of propodeum strong and distinct, area dorsalis with broad but distinct lateral furrow, GSR roundly highly raised, discoloured (frontal furrow deep, surface distinctly microcoriaceous and strongly closely punctured, fore T2–5 dark brown), about 14 mm, Sarawak cameroni sp. nov., ♀

37 Mesoscutum delicately microcoriaceous and somewhat closely superimposed with fine punctures, gaster yellow, each segment black maculated above (collar black, G1 wholly black above, A1–2 yellow, 3–12 black, IODs≒10:7(♀), 10:8.5(♂), A3≒AW×5(♀), ×3(♂), Al3≒A9–12, vertex depressed, apical margin of clypeus: Fig. 203(♂), more strongly produced and waved (♀), SAT medio-anteriorly with a flat shining round area, usually carrying a large fovea on it, PAF in ♀ moderately deep, nearly U-shaped in cross section, but distinctly upcurved, ASR bluntly bicarinate, in ♂ PAF deep, flat-bottomed, oval in cross section, ASR acutely highly bicarinate, hind carina strongly reflected; legs yellow, hind femur beneath and -tarsus except articulations black, RC=C, area dorsalis without lateral furrows) 12–17 mm, Sarawak and North Borneo coloratum Smith, 1857

— Mesoscutum without microsculpture, gaster not maculated as above 38

38 Collar more or less yellow (vertex not depressed, SAT with a round flat shining and foveate area medio-anteriorly, ASR bicarinate on top, area dorsalis enclosed with shallow furrow, A1–4 or –5 yellow, from 5 apically brown – dark brown brown, legs ferruginous, coxae largely, hind femur and tarsus largely, tibia partly black or brown, gaster black, G2–3, often 6–7 also, reddish yellow, propodeum with lateral carinae weak 39

— Collar black 40

39 ♂. Hind carina of ASR triangularly raised and reflected, PAF oval in cross section (Fig. 171), clypeus: Fig. 172, A3=AW×3.3, Al3≒A10–12, 11–12 mm, North Borneo (Malaya) shakha Tsuneki, 1979, ♂

— ♀. Hind carina of ASR not markedly reflected, PAF U-shaped in cross section (Fig. 169), clypeus: Fig. 170, A3≒AW×5, 11–14 mm, North Borneo (Malaya) — (see also couplet 31) shakha Tsuneki, 1979, ♀

40 Gaster, antennae and legs except bases of coxae and arolia wholly orange yellow (SAT low broad nasiform, with a small round flat shining and foveate area in front, ASR bicarinate, PAF oval in cross section, clypeus roundly produced anteriorly and trisinuate in middle, IODs≒4:3, A3=AW×4.5), 15 mm, Celebes elegantulum Smith, 1860, ♀

— At least G1 above black 41

41 PAF shallow, roundly down-curved in cross section (SAT–ASR: Fig. 175, ASR widely expanded anteriorly, smooth, SAT low tuberiform, strongly carinated in middle, clypeus: Fig. 177, IODs≒10:8, A3=AW×3.7, area dorsalis with feeble lateral furrows, RC=B, A1–2 and 3 beneath yellow, coxae trochanters, hind femur, -tibia except base and -T1–3 black (-T4–5 brown), gaster black, G2,3 reddish, both broadly black above), about 12 mm, Sarawak rajang sp. nov., ♀

— PAF deep, flat-bottomed 42

42 Antenna wholly, fore leg till knee and mid leg except base of tibia black (see also couplet 35), 12–15 mm, Borneo (Java) kalimantan Menke, 1976 (= annulipes Smith, nec Taschenberg)

— A1–2 at least, fore and mid legs at least largely yellow or ferruginous 43

43 Gaster on apical sides of G1 and G2–3 reddish, rest black, SAT medio-apically without a round flat shining area (apical margin of clypeus: Fig. 223, R1 moderately long, but reaching almost wing apex, mid femur largely brown, hind femur and apical 3/5 of tibia black, but T1 whitish, IODs≒10:9, A3≒AW×4.5), 13 mm, North Borneo cinnamolum sp. nov., ♀

— Gaster from apical area of G1 to end ferruginous red, sometimes with a dusky patch above, SAT medio-anteriorly with a round flat shining area 44

44 ♀. Apical margin of clypeus simply rounded, hind leg nearly completely ferruginous, PAF oval in cross section (IODs÷IO:8, A3÷AWx6, area dorsalis enclosed with feeble furrow, propodeum except disc of area dorsalis transversely finely closely striate), 13–14 mm, Celebes *gracilescens* Smith, 1860

— ♀. Apical margin of clypeus strongly (♂ weakly) waved, hind leg partly brown or blackish, PAF not oval in cross section 45

45 ♀. IODs÷IO:9, PAF U-shaped in cross section, ASR except apical margin roundly thickly raised in lateral view (Figs. 207, 208), G5 without a black mark above (hind femur usually with two dusky streaks above, mesoscutum mat or half mat, lamina of pronotum rounded), 12–15 mm, Borneo (Singapore, Sumatra, Java) *varipilosum* Cameron, 1901

— ♀. IODs÷IO:6, PAF V-shaped in cross section, ASR thinly bicarinate on top (Figs. 210 –212), G5 with a black mark above (hind femur on apical half darkened, mesoscutum mat or half mat, pronotal lamina shortly toothed – Fig. 214, clypeus: Fig. 213), 12–15 mm

♂. IODs÷IO:8, clypeus: Fig. 215 (A3=AWx2.8, A13 slightly longer than A10–12, PAF, G5 and hind femur similar), 9–10 mm, Sarawak and North Borneo *varipiloides* sp. nov.

46 Mesoscutum microcoriaceous and superimposed with fine punctures 47

— Mesoscutum without microsculpture, simply punctured 57

47 Propodeum without lateral carinae 48

— Propodeum with lateral carinae 51

48 ♀ about 16 mm (antenna black, G2, 3 reddish beneath, fore tibia largely, -tarsus wholly, bases of mid and hind tibiae, mid T1–4 pale ferruginous, SAT moderately high nasiform, ASR much below top level of SAT, PAF shallow, downcurved in cross section, clypeus: Fig. 368, with apical margin broadly pale brown, with hair at base strongly convergent towards medial line, IODs÷IO:9, A3÷AWx5.5, area dorsalis enclosed with shallow striated furrow, mesoscutum distinctly, fairly closely punctured, with PIS feebly, in part fairly distinctly microcoriaceous (usually without microsculpture), RC=B, CV1÷CV2 x 7–8), Sarawak *eximium* Smith, 1860, a form

— 6–10 mm 49

49 ♀ about 10 mm, antenna, gaster and mid and hind legs black, SAT at apical margin transversely edged, hanging over PAF (apical margin of clypeus: Fig. 225, with hair parallel, A3÷AWx2.5, IODs÷IO:6, lateral furrows of area dorsalis very faint, RC=C–M, CV1÷CV2x6, fore tibia except folded side and -tarsus ferruginous), Sarawak *sumatraense borneonis* ssp. nov.

— A1–2, fore and mid legs broadly, hind leg partly yellow, G2–4 except dorsal marks red (lateral furrows of area dorsalis almost lacking, clypeus with apical margin broadly yellowish, with hair parallel) 50

50 ♀ 10 mm, trochanters black, SAT nearly flat, medianly carinate, PAF shallow, gently downcurved in cross section, ASR broadly expanded, apical area smooth and polished, IODs÷IO:6 (clypeus: Fig. 229, coxae, hind femur and tibia, both at apical half and -tarsus black), Sarawak *venaticum* sp. nov.

— ♀ ♂, 6–7 mm, trochanters yellow, SAT nasiform, moderately high, PAF moderately deep, with bottom line upcurved, V-shaped in cross section, ASR broadly expanded, surface finely closely striate, IODs÷IO:4(♀), IO:5(♂) (clypeus: Fig. 232(♀), 234(♂), A3÷AWx3.5(♀), x2(♂), A13÷A9–12, hind leg largely brown or black), Sarawak (Malaya) *lumpurense* Tsuneki, 1979

51 Gaster from apical sides of G1 to base of G4 red (11 mm, IODs÷IO:8, A3÷AWx 4, clypeus: Fig. 247, apical margin black, hair strongly convergent towards medial line, SAT-ASR: Fig. 248, area dorsalis wholly transversely distinctly striate, RC=C, fore tibia except folded side, bases of mid and hind tibiae, mid T1–2 and tibial spurs ferruginous, microsculpture on mesoscutum feeble), North Borneo (Laos, Singapore, Sumatra, Java and Philippines) *striolatum* Tsuneki, 1979, ♀

— Gaster black (at most G2 somewhat brownish beneath) 52

52 ASR highly raised, having a hollow in front (P considerably long, but apical swelling rather gradual, head subquadrate, collar well developed, trituberculate, subalar area with half developed pent-roof structure, propodeum with posterior part constricted and extended beyond base of hind coxa, 10 mm or so) ... 53

— ASR not so highly raised 54

53 ASR long, subcylindric, standing like a column, much higher than top level of SAT (see couplet 9) *appendiculatum* Tsuneki, 1974

— ASR short subcylindric, standing as high as SAT (see couplet 10) *laeviceps* Tsuneki, 1976

54 Legs wholly black except whitish spurs (♀, 7–8 mm, SAT nearly flat, apical

margin triangular, verge to PAF acutely edged and produced over PAF, PAF deep, flat-bottomed, with outer end open to inner orbital area, ASR with a fovea on posterior aspect, clypeus medianly weakly produced, with apex gently emarginate), Sarawak (Philippines and Java) mindanaonis mulu ssp. nov.

— At least tarsi partly brown, ferruginous or whitish 55

55 Subalar area with pent-roof structure, apical margin of clypeus: Fig. 245 (♀ 14 mm, IODs≒10:10, SAT moderately high tuberiform, median carina broad and weak, PAF V-shaped in cross section: Fig. 243, A3≒AWx6, area dorsalis enclosed with distinct furrow, fore tarsus brown, other tarsus apically somewhat brownish), South Moluccas (Ambon) moluccanum sp. nov., ♀

— Subalar area without pent-roof structure, clypeus with apical margin different 56

56 Apical margin of clypeus: Fig. 266, PAF shallow, downcurved: Fig. 265 (IODs 10:8, A3≒AWx4, area dorsalis practically without lateral furrows, RC=C-B, A1-2 brown beneath, fore tarsus, mid T3-5 brown, mid T1-2 whitish - see also couplet 17), 11 mm, North Borneo kinabalum sp. nov., ♀

— Apical margin of clypeus: Fig. 247, PAF: Fig. 248 (IODs≒10:7, A3=AWx4, fore tibia at base in front, fore tarsus, mid T1-4 yellowish white, bases of mid and hind tibiae brown, lateral furrows of area dorsalis weak but well defined, area transversely closely striate - see also couplet 51), 10-11 mm, Borneo striolatum Tsuneki, 1979, black form, ♀

57 Propodeum with lateral carinae 58

— Propodeum without lateral carinae 83

58 Gaster at least medianly reddish or pale brown 59

— Gaster wholly black 72

59 Frontal rounded elevations on both sides of medial furrow markedly high (G1-3 ferruginous, 3 dusky above, IODs≒2:1, clypeus rounded out and broadly subtruncate in middle, antenna black, all tibiae and fore and mid tarsi ferruginous to pale brown, SAT nasiform, shining, RC=C, OOD:POD≒2:5), 8 mm, Is. Myssol placidum Smith, 1864 ♀

— Frontal elevations on both sides of medial furrow not remarkably high 60

60 PAF deep, flat-bottomed or nearly, oval or U- or acute V-shaped in cross section 61

— PAF shallow, bottom line strongly upcurved, wide V-shaped or downcurved in cross section 69

61 A1-2 distinctly yellow (all trochanters at least largely yellow) 62

— A1-2 black, sometimes partly brownish 65

62 Gaster nearly wholly and legs largely ferruginous or yellow 63

— Gaster and legs broadly black (IODs less than 10:4, SAT high, fairly acute nasiform, narrowed towards apex, apex perpendicularly inclined, median carina anteriorly widened, flattened, sometimes roundly impressed, ASR as high as SAT, bicarinate, PAF oval in cross section, area dorsalis distinctly enclosed with fine furrow, surface smooth, fore tibia largely, tarsus wholly, mid tibia and tarsus both partly yellow) 64

63 Apical margin of clypeus: Fig. 66, P≒Max3 (see couplet 15), about 10 mm, Sarawak rufigaster cavatum ssp. nov., ♀

— Apical margin of clypeus: Fig. 270, P≒Max4 (IODs≒4:3, A3≒AWx5, and largely yellow, clypeus apically broadly ferruginous, subalar area with half developed pent-roof structure, area dorsalis enclosed with furrow, SAT moderately high tuberiform, medio-apical area obliquely inclined and shining, but not roundly margined and irregularly punctured, RC=C), 9 mm, Sarawak collinsi sp. nov., ♀

64 11-13 mm, ♀ apical margin of clypeus: Fig. 276, IODs≒10:4, A3≒AWx6, CV1≒CV2x 6, North Borneo balabacense ovatum ssp. nov. ♀

— 7-8 mm, ♀ apical margin of clypeus: Fig. 289, IODs≒10:3, A3≒AWx5, CV1≒CV2x 4.5, Sarawak and North Borneo miniovatum sp. nov. ♀

65 Apical margin of clypeus: Fig. 298 (♀ 12 mm, IODs≒10:8, A3=AWx4.5, SAT moderately high nasiform, roundly inclined to PAFs and IAA, PAF deep, but gently upcurved, area dorsalis enclosed with shallow crenate furrow, GSR highly elevated, RC=B, fore tarsus wholly, fore and mid tibiae and mid tarsi largely ochre yellow, gaster from apex of G1 to end ferruginous red, but each broadly black above), 12 mm, Sarawak sectum sp. nov., ♀

— Apical margin of clypeus different in form 66

66 IODs=2:1 - 3:1, trochanters pale yellow, apical margin of clypeus recurved, often incised or depressed in middle 67

— IODs larger than 2:1, trochanters black, apical margin of clypeus different in form 68

67 IODs=2:1, mesoscutum somewhat strongly and closely punctured, surface not polished, G3 largely reddish (SAT moderately high nasiform, PAF deep, acute V-shaped in cross section, with bottom line nearly flat, but above level of scapal sinus, area dorsalis distinctly enclosed with furrow, RC=C, bases of tibiae yellowish, fore and mid T1-2 pale yellow, T3-5 brown, G2-3 and base beneath of 4 reddish, each with an obscurely outlined brown mark above), 10-11 mm, Celebes (widely in Oriental Region) errans Saussure, 1867, ♀

— IODs=3:1, mesoscutum smooth and polished, finely and very sparsely punctured, G3 largely black (SAT-ASR: Figs. 320-322, PAF very deep, nearly level with scapal sinus, clypeus: Fig. 323, A3÷AW×5), 10 mm, North Borneo yanoi sp. nov., ♀

68 A3=AW×5, apical margin of clypeus: Figs. 303-304, ASR bicarinate, not widely expanded anteriorly, PAF deep, flat-bottomed, SAT with apical margin triangular (Figs. 300-302) (IODs÷10:7, apical margin of clypeus black or dark brown, fore tibia in front, bases of other tibiae, fore tarsus and mid T1 pale yellow, G2 and 3 at base and beneath yellow), 10-11 mm, Sarawak and North Borneo djun sp. nov., ♀

— A3=AW×4, apical margin of clypeus: Fig. 309, ASR unicarinate at apical margin, broadly expanded anteriorly, PAF deep, bottom line gently upcurved, SAT with apical margin transverse (Figs. 306-308) (IODs÷10:6, apical margin of clypeus light brown, gaster and legs similar in colour), 10 mm, Sarawak and North Borneo cindjun sp. nov., ♀

69 Area dorsalis completely, transversely finely closely striate (IODs=10:7 - 10:8, apical margin of clypeus: Fig. 247, hair at base strongly convergent towards medial line, A3=AW×4.5, SAT-ASR: Fig. 248, fore tibia largely, bases of other tibiae, fore tarsus wholly, mid tarsus partly or wholly pale yellow, apical margin of clypeus black), Sarawak, North Borneo (Laos, Singapore, Sumatra, Java, Philippines) striolatum Tsuneki, 1979, ♀

— Area dorsalis without so close transverse striae, at least on disc 70

70 ♂ about 8 mm, apical margin of clypeus: Fig. 314 or 315, gaster medianly brown beneath (IODs=10:7.5, SAT-ASR: Figs. 311-313, apical part of antenna: Fig. 316, A3=AW×3.5, area dorsalis enclosed with fine furrow, tibiae at base pale, fore tarsus yellowish white, mid tarsus apically brownish), North Borneo amatorium sp. nov., ♂

— ♀ (lateral carinae of propodeum very feeble, in some light lacking) 71

71 About 11 mm, apical margin of clypeus: Fig. 395, from apex of G1 to base of G4 yellowish red, G2 alone with a small obscure black mark above, (IODs=10:7, SAT-ASR as in normal petiolatum Smith, pronotal lamina as in Fig. 391, all tibiae at base (in fore leg not broadly extended), fore and mid T1, fore and mid tibial spurs yellowish white, fore T2-5 brown), Sarawak petiolatum Smith, aberratio ♀

— ♀ 10.5 mm, apical margin of clypeus: Figs. 380, 381, G2-3 on sides and beneath largely red (IODs=10:6, SAT-ASR: Figs. 377-379, pronotal lamina: Fig. 382, fore tibia and tarsus, bases of other tibiae, fore and mid tibial spurs, mid T1-2 yellowish, rest of mid tarsus brown), North Borneo outang sp. nov., ♀

72 PAF deep, flat-bottomed or nearly, oval or U- or acute V-shaped in cross section 73

— PAF shallow, bottom line up-curved, wide V-shaped or simply down-curved in cross section (A1-2 black, at most partly brown) 78

73 ♂, A1-2 yellow, often more or less brownish above (SAT high short nasiform, anteriorly narrowed, dorsal line strongly up-curved seen in profile, ASR as high as SAT, highly bicarinate, hind carina extended and reflected, PAF oval in cross section, apical margin of clypeus: Fig. 278, IODs=10:6, A13÷A10-12, pronotal lamina: Fig. 280, RC=C, fore tibia broadly, tarsus wholly, bases of other tibiae, all spurs, mid T1-2 or 1-4 whitish, gaster sometimes medianly beneath brownish) 74

— A1-2 dark brown, at most partly pale brown 75

74 Apical margin of clypeus broadly yellow or ferruginous, A3=AW×3.0-3.2, CV1÷CV2×5.5-5.7), 7-9 mm, Sarawak balabacense ovatum ssp. nov., ♂

— Apical margin of clypeus black, A3=AW×2.3-2.5, CV1=CV2×4-4.5), 6-7 mm, North Borneo and Sarawak miniovatum sp. nov., ♂

75 ♀ 9 mm. IODs=10:5 or less, all trochanters yellowish white, area dorsalis enclosed with distinct furrow 76

— ♂ 8-9 mm. IODs=10:7, all trochanters black, area dorsalis enclosed with weak broad shallow furrow 77

76 SAT moderately high cornform, PAF deep V-shaped in cross section: Figs. 320-322, apical margin of clypeus: Fig. 323, IODs=10:3, A3÷AW×5, mesoscutum sparse-

ly punctured, fore tibia except folded side and tarsus, mid tibia at base and apex, mid Tl-2, hind tibia at base and tibial spurs yellowish white, gaster medianly somewhat brownish beneath - see also couplet 67), North Borneo
yanoi sp. nov., ♀

— SAT broad tuberiform, raised towards apex, apical margin transversely rounded, acutely edged and produced over PAF, PAF deep, broad U-shaped and somewhat inclined inwards,(Figs. 325-327), clypeus: Fig. 329, colouration generally similar to the above, RC=C, CV1÷CV2×4.5), Celebes makassarense sp. nov., ♀

77 PAF oval in cross section, Al3÷All+12 (SAT high rounded tuberiform, latero-apical inclinations roundly excavated, ASR as high as SAT, top flattened, posteriorly extended, forming an oval shining area, apical margin of clypeus medianly minutely recurved, A3÷AW×2.7, lamina triangular, pointed at apex, area dorsalis enclosed with weak furrow, median furrow transversely striate, disc sparsely scattered with large shallow punctures, RC=C-B, bases of all tibiae, fore tibia in front and tarus, mid Tl and tibial spurs whitish), North Borneo
kepongianum miserum ssp. nov., ♂

— PAF V-shaped in cross section, rather small U-shaped near bottom, bottom line gently up-curved, Al3÷Al0-12 (SAT moderately high nasiform, medio-apical area in front of apex of medial carina forming an obliquely inclined round step, thence acutely inclined to IAA, ASR seen obliquely from side to see through PAF: Fig. 251, dorsum with about 5 striae, apical margin of clypeus: Fig. 250, A3=AW×2.5, lamina triangular, distinctly produced, area dorsalis enclosed with feeble furrow, surface of the area transversely finely closely striate, legs till apices of tibiae black, except dark brown tibial bases, fore Tl-4, mid Tl-2 except apices yellowish white, apical margin of clypeus(Fig. 250) till apex black, RC=B, CV1÷CV2×4), Sarawak and North Borneo (see couplet 69)
striolatum Tsuneki, 1979, ♂

78 ♀ 79
— ♂ 81

79 Frons flat, SAT nearly flat, median carinate area only gently raised, PAF simply down-curved in cross sectoon (cf. Pt. III, p. 122, figs. 471-473), ASR broadly expanded anteriorly (apical margin of clypeus: Fig. 331, brown in colour, area dorsalis enclosed with furrow, surface smooth, IODs÷10:9, A3=AW×3.3, subalar area with half developed pent-roof structure, RC=C, fore tibia in front and tarsus, bases of mid and hind tibiae, fore and mid tibial spurs and bases of mid Tl and 2 pale brown), 8 mm, Sarawak (Laos, South India, Singapore, Java and Sumatra)
membranaceum Tsuneki, 1979 ♀

— Frontal median furrow moderately deep, SAT nasiform, PAF V-shaped in cross section, strongly up-curved 80

80 IODs÷4:3, apical margin of clypeus: Fig. 247, A3÷AW×4 (area dorsalis enclosed with shallow but distinct furrow, surface transversely finely closely striate, RC=C, all tibiae at base, in fore leg wider, fore Tl-4 and mid Tl-2 or -3 whitish), 9-11 mm, Sarawak and North Borneo
striolatum Tsuneki, 1979, black-gastered form ♀

— IODs÷2:1, apical margin of clypeus: Fig. 337, A3÷AW×6 (area dorsalis without lateral furrows, but transversely finely closely striate, fore tibia except folded side and tarsus, bases of mid and hind tibiae, mid Tl-4 ferruginous, RC=C, punctures on mesoscutum comparatively large and close, PIS=PD× 1-2), 11 mm, Moluccas (Is. Obi)
obiense sp. nov., ♀

81 PAF simply down-curved in cross section, with slope of ASR distinctly longer than that of SAT (SAT nearly flat, median carinate area alone somewhat raised, apical margin of clypeus: Figs. 332-333, frons nearly flat, A3÷AW×1.5, Al3÷Al0-12, area dorsalis enclosed with furrow, surface shallowly punctured, RC=C, legs black, fore tibia in front and tarsus brownish), 8 mm, Sarawak and North Borneo (cf. couplet 79)
membranaceum Tsuneki, 1979 ♂

— PAF V-shaped in cross section, with slope of ASR nearly as long as that of SAT or even shorter (SAT more highly raised, short nasiform, frons with median furrow, area dorsalis enclosed with furrow) 82

82 Apical margin of clypeus medianly gently recurved: Figs. 314-315, A3=AW×3.5, PAF in cross section with slope of ASR distinctly shorter than that of SAT (SAT low nasiform, with lateral inclinations flat, Al3 slightly >Al0-12, mesoscutum very sparsely finely punctured, area dorsalis faintly striate on posterior portion, legs black, bases of tibiae and fore tibia in front and tarsus brownish), 8-9 mm, North Borneo (cf. couplet 70)
amatorium sp. nov., ♂

— Apical margin of clypeus medianly produced: Fig. 343, A3=AW×2.3, ASR longer, slope of ASR slightly longer than that of SAT (SAT moderately high tuberiform, rather conical, Al3÷Al0-12, mesoscutum smooth and polished, with sparse fine

punctures, area dorsalis transversely strongly striate, on disc striae weak and mixed with punctures, legs black, tarsi apically brownish, spurs and claws pale), 11 mm, Sarawak hollisi sp. nov., ♂

83 Gaster with a more or less reddish area 84
— Gaster completely black 93
84 PAF shallow and broad, wide V-shaped or gently down-curved in cross section. 85
— PAF deep or moderately deep, oval or U- or V-shaped in cross section (when moderate in depth bottom line up-curved) 88
85 Length about 10 mm, hair on clypeus parallel 86
— Length 16–20 mm, hair on clypeus at base strongly sinuately convergent towards medial line (SAT nasiform, long carinated in middle) 87
86 Apical margin of clypeus: Fig. 351, broadly yellowish, IODs≒4:3, SAT moderately high nasiform, long carinated in middle (ASR opaque, transversely finely closely striate, tibiae and tarsi of fore and mid legs and hind tibia on basal half yellowish, from apical sides of G1 to base of G4 red and broadly black maculated above, A3≒AW×4, RC=B–C, CV1≒CV2×5.5, mesoscutum finely sparsely punctured, under high magnification PIS with delicate microsculpture), Sarawak semongoh sp. nov., ♀
— Apical margin of clypeus: Fig. 356, narrowly castaneous, IODs≒10:9, SAT very low conical, medianly shortly carinate (ASR semitransparent brown, smooth and polished, legs black or dark brown, fore tibia and tarsus and bases of mid and hind tibiae pale brown, G2 and 3 reddish at base and beneath, A3≒AW×3.8, RC=C–M, CV1≒CV2×6, mesoscutum with strong plumbeous tone, nearly mat), North Borneo bettotan sp. nov., ♀
87 ASR with 3–4 strong coarse transverse carinae, PAF almost indistinct, apical margin of clypeus strongly produced and broadly truncate, often slightly emarginate (frontal furrow deep, elevations on both sides considerably high, – as high as in the case of petiolatum ♀ – , IODs=10:7–8, A3≒AW×5.5, lateral furrows of area dorsalis feeble, RC=B, CV1≒CV2×7, tibiae at base yellow, fore and mid tibiae broadly ferruginous in front, fore tarsus, mid T1–2 or –3 whitish yellow, G2–3 brownish red, darker above), 18–20 mm, Celebes providum Smith, 1860, var. ♀
— ASR not so strongly and coarsely carinate: Figs. 365, 366, apical margin of clypeus different in form (frontal furrow shallower, with elevations on both sides only gentle, IODs≒10:9 (♀ ♂), apical margin of clypeus ♀: Fig. 368, ♂: Fig. 369, Al3≒A9–12, fore tibia largely, mid and hind tibiae partly, tarsi largely ferruginous, G2–3 or –4 reddish and broadly blackish above, mesoscutum comparatively strongly, fairly closely punctured, sometimes PIS with feeble microsculpture), 16–18 mm, Celebes and Sarawak eximium Smith, 1859
88 IODs≒3:1, Al–2 yellow 89
— IODs larger than 3:1, Al–2 not yellow 90
89 ASR broadly expanded anteriorly, sometimes laterally compressed, apical margin only carinate, PAF V-shaped in cross section (mesoscutum under high magnification microcoriaceous – cf. couplet 50), 6–7 mm, Sarawak and North Borneo (Malaya) lumpurense Tsuneki, 1979
— ASR bicarinate, hind carina strongly reflected, PAF deep, oval in cross section (♀ about 10 mm, SAT moderately high nasiform, shining, anteriorly narrowed, clypeus: Fig. 289, apical half strongly reflected, hair parallel, A3≒AW×5.3, area dorsalis distinctly enclosed with fine furrow, surface smooth and polished, mesoscutum polished, somewhat sparsely punctured, RC=C, A3 largely, apical margin of clypeus broadly, all trochanters, fore and mid tibiae except inner side, base of hind tibia, fore tarsus and mid T1–2 pale yellowish, gaster from apex of G1 to G3 reddish beneath), about 8 mm, North Borneo – cf. couplet 64 miniovatum sp. nov., ♀
90 SAT broad round tuberiform, raised towards apical margin, the margin transversely rounded and acutely edged, produced over deeply depressed PAFs, ASR as high as apical margin of SAT, strongly bicarinate, hind carinae of both ASRs fused together at upper part of IAA, forming a deep transverse furrow (=PAFs) (clypeus ♀:Fig.375, ♂:Fig.376, IODs≒10:7(♀), 10:8(♂), A3≒AW×5.7(♀), ×3.3(♂), Al3 >Al0–12, <A9–12, distinctly bent at apical area, area dorsalis with weak lateral furrows, RC=C, punctures on mesoscutum comparatively large, fairly close, but not strong, apical margin of clypeus broadly ferruginous, fore and mid tibiae except inner side, base of hind tibia, fore T1–5, mid T1–4, all spurs and claws yellow, gaster from apical sides of G1 to base of G4 red, with large blackish marks above), ♀ 11–12 mm, ♂ 10 mm, Sarawak and North Borneo (Laos, Malaya, S. India, Java) prominens Tsuneki, 1979
— SAT–ASR different in structure 91

91 IODs=10:6 or less, ASR long expanded anteriorly, very finely closely striate, ♀ 10 mm (apical margin of clypeus: Fig. 380, marginal area pale brown, A3≒AW×4.5, SAT-ASR: Figs. 377-379, PAF moderately deep V-shaped in cross section, with bottom line up-curved, frontal furrow distinct, lamina: Fig. 382, area dorsalis enclosed with shallow furrow, RC=C, CV1≒CV2×5, punctures on mesoscutum comparatively large and very sparse, gaster on G2 and 3 at each base and beneath reddish, fore tibia and tarsus, mid tibia at base and apex, mid T1-2 or 1-4 and base of hind tibia pale yellow - cf. couplet 71), North Borneo outang sp. nov., ♀

— IODs=10:7.5 or 8, ASR short, bi- or tricarinate on dorsum (SAT generally similar to that of outang, but usually with a somewhat inclined, nearly round flat and narrow step around apex of median carina, it gently inclined and at verge to PAFs and IAA bluntly edged and then acutely inclined, PAF somewhat deeper and nearly flat-bottomed in ♂, but with bottom line up-curved in ♀, apical margin of clypeus strongly produced, with apex broadly truncate or subtruncate in ♀, but weakly rounded out in ♂, disc gently tectate, with hair at base strongly convergent medially in ♀, very weakly roundly raised, with hair parallel in ♂, lateral furrows of area dorsalis very obscure in ♀, weakly defined in ♂) 92

92 Gaster from apex of G1 to G4 red, pronotal lamina toothed: Figs. 384(♀), 385(♂) (A3≒AW×5 in ♀, ×3 in ♂, A13≒A9-12, fore tibia nearly wholly, mid tibia largely, hind tibia at base, fore tarsus, mid T1-3 or 1-4 pale yellow), ♀ 16-18 mm, ♂ 12-16 mm, Celebes, E., M., and N. Borneo (Malaya, Thailand, Sumatra, Singapore and Java) bicolor Smith, 1856 s. str.

— Gaster from apex of G1 to apex of G3, at most to base beneath of G4 red, pronotal lamina triangular, not toothed: Figs. 390 (♀♂ Ambon), 391 (♀♂ Sandakan) (A3≒AW × 4.7-5 (♀), ×2.3-2.5 (♂), A13≒A9-12, in ♀ fore tibia at base broadly, fore T1-2, 1-4, mid and hind tibiae at base, mid T1-2 pale yellow, in ♂ fore tibia at base in front and fore tarsus brown, rarely fore tibia and tarsus partly paler, but rest of legs black or dark brown, RC=B, CV1≒CV2×5-6), Ambon, Celebes, E. and N. Borneo, Sarawak and Is. Besi (widely in Oriental and partly in Palaearctic Regions) petiolatum Smith, 1857

93 About 7 mm, ♂, IODs≒2:1, A1-2 yellow (A13≒A10-12, A3≒AW×3, clypeus: Fig. 291, marginal area broadly yellow, area dorsalis distinctly margined with fine furrow, surface smooth, mesoscutum polished, sparsely weakly punctured, SAT moderately high nasiform, ASR as high as SAT, highly bicarinate, hind carina strongly reflected, PAF very deep, flat-bottomed, oval in cross section, fore tibia and tarsus, mid tibia largely and T1-4, hind tibia at base pale yellow, trochanters pale brown, rest of legs dark brown, G2-3 somewhat reddish, RC=B, R1 moderately long), Sarawak (cf. Couplet 74) miniovatum sp. nov., ♂

— 15-20 mm, IODs≒10:8 or 9, antenna black 94

94 SAT high and large tuberiform, gently inclined antero-laterally to connect with ASRs, forming a stumpy Y-shaped elevation, ASR very strongly tri- or quadricarinate, in ♀ PAF indistinct, in ♂ distinct, shallow U-shaped in cross section and upper part of IAA very deeply excavated (apical margin of clypeus in ♀ strongly produced and broadly truncate at apex, sometimes minutely incised in middle, in ♂ less strongly produced and indistinctly recurved, A3≒AW×5.5-6 (♀), ×3(♂), A13≒A10-12 or slightly shorter, area dorsalis enclosed with shallow groove, RC=C, CV1≒CV2×6-7, bases of tibiae, in fore tibia somewhat extended in front, fore tarsus largely, mid T1-2 pale yellow (♀), wholly dark brown, in fore tibia in front and tarsus somewhat pale (♂)), ♀ 18-23, ♂ 18-19 mm, Bachian, Gilolo, Celebes, Obi, Ternate providum Smith, 1860

— SAT moderately high nasiform, long carinated in middle and smoothly inclined to every direction, ASR broadly expanded anteriorly, with surface transversely delicately striate, or smooth and shining, PAF wide V-shaped or simply down-curved in cross section 95

95 Apical margin of clypeus medianly broadly truncate and toothed in middle (Fig. 368), ASR finely closely striate, A3=AW×5, PAF wide V-shaped in cross section (fore tibia and tarsus, base of mid tibia ferruginous), 16-18 mm, Is. Obi eximium obicola ssp. nov. ♀

— Apical margin of clypeus simply roundly produced (Fig. 372), without median tooth, ASR smooth and shining, A3=AW×6, PAF shallower, down-curved in cross section (fore tibia and tarsus, mid and hind tibiae at base and mit tarsus partly yellowish white), 17 mm. Is. Ambon wegneri sp. nov. ♀

DESCRIPTIONS AND RECORDS OF THE SPECIES

After Part I of the present paper had appeared I received a considerable number of the Bornean specimens of the species belonging to scutatum-group from British Museum (Natural History). These specimens are also recorded additionally in the present Part.

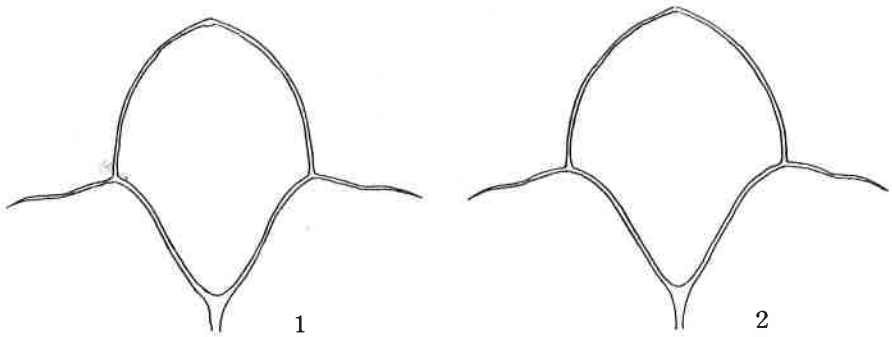
1. TRYPOXYLON SCHMIEDEKNECHTI KOHL, 1906

Trypoxylon schmiedeknechti: Tsuneki, SPJHA, 7: 21, 1978 (references, synonyms, redescription, distribution records, geographical races, figures).
Trypoxylon schmiedeknechti: Tsuneki, SPJHA, 10: 5, 1979 (Ceylon).

The Bornean specimens of this species recorded in Pt. I of the present paper are 12 ♀ 2 ♂ from Sarawak and North Borneo.

The specimens newly examined: 4 ♀ 10 ♂, Sarawak, 4th Div. Gn. Mulu, RGS Exp., 17.IX. - 23.X. 1977, D. Hollis (BMNH).

Remarks. As to the shield-shaped enclosure on the frons a considerable variation is observed between sexes in the relative width of the enclosure at the lateral angles to the length in middle: Fig. 1, ♀; Fig. 2, ♂. When the length is taken as 10 relative width in ♀♀ (measured at the inner margins of the carinae): 6.5, 7.0, 7.0, 6.7; while in ♂♂ 7.3, 7.0, 7.8, 7.7, 7.5, 7.5, 7.4, 7.7, 7.8 and 7.3.



Figs. 1-2. Trypoxylon schmiedeknechti Kohl, frontal shield. 1: ♀, 2: ♂.

Under the eye measurements the difference appears far larger than the above value. This is mainly due to that the lower carinae of the enclosure in ♂ are much more strongly up-curved near lateral angles than in ♀ and as a result the lower area becomes far narrower than in ♀. This is the general rule in this species. But, of course, there are some exceptions in which the form in ♂ is close to that of the female. The surface of the shield is distinctly more shallowly excavated in the male than in the female.

The ultimate joint of antenna in ♂ is more frequently as long as 4 preceding joints united than the case wherein it is longer than 3, but shorter than 4 preceding joints united.

In fore wing RC=B, CV1=CV2 2-2.3, TCV slightly shorter than CV2, angle less than 90°.

2. TRYPOXYLON THAIANUM TSUNEKI, 1961

Trypoxylon thaianum Tsuneki, Nature & Life in S. E. Asia, I: 384, 1961 (♀, Thailand).
Trypoxylon thaianum: Tsuneki, SPJHA, 7: 49, 1978 (ref. syn. distr. redescr. spp. figs.)

A. Trypoxylon thaianum ambonense Tsuneki, 1979

Trypoxylon thaianum ambonense Tsuneki, SPJHA, 7: 62, 1978 (3 ♀ 4 ♂ from Ambon).

Specimens newly examined: 3 ♀, Ambon, 70 m, 3. XI. 1961; 15. II. 1961, A. M. R. Wegner (RMNH).

B. Trypoxylon thaianum borneoense Tsuneki, 1978

Trypoxylon thaianum borneoense Tsuneki, SPJHA, 7: 62, 1978 (2 ♀ 2 ♂, Sarawak and N. Borneo).

Specimens newly examined: 9 ♀ 5 ♂, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX. - 23.X. 1977, D. Hollis (RMNH).

Remarks. Sexual difference in the form and surface excavation of the frontal shield is also observed in this species. It is similar to the case of schmiedeknechti. In the female the enclosure is relatively longer and deeper than in the male. Under the standard of the width at lateral angles as 10 the relative length in the middle in ♀: 17, 17, 16.5, 16.5, 16.5, 17.5, 16.5, 16, 16.5 (average 16.7), while in ♂: 15.5, 14.5, 15, 14.5, 16 (average 15.1). Upper lateral carinae are frequently constricted above the lateral angles, more frequently so in ♀.

In fore wing RC=B, CV1≒CV2×2, TCV:CV2=1:1.3, TCV nearly straight, CV2 downcurved beyond middle, angle roughly about 90°.

3. TRYPOXYLON INTERRUPTUM TSUNEKI, 1978

Trypoxylon interruptum Tsuneki, SPJHA, 7: 68, 1978 (♀, India, Burma, Thai, Laos, Malaya, Java, Borneo).
Trypoxylon interruptum: Tsuneki, Ibid., 10: 6, 1979 (♀, Ceylon).
Trypoxylon interruptum: Tsuneki, Ibid., 11: 11, 1979 (♀, Java).

Specimens newly examined: 12 ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X. 1977, D. Hollis (RMNH).

Remarks. In fore wing RC=B, CV1≒CV2×3, CV2≒TCV, TCV straight, CV2 downcurved, angle about 90°.

4. TRYPOXYLON LONGISCUTIS TSUNEKI, 1978

Trypoxylon longiscutis Tsuneki, SPJHA, 7: 85, 1978 (♀, Celebes).

Remarks. The locality of the holotype specimen in the original description: Mdk (=Madagascar) is an error, rearly it is Mak (=Makassar - Celebes).

No new specimen could be examined.

5. TRYPOXYLON TAINANENSE STRAND, 1923

Trypoxylon tainanense Strand, Internat. Ent. Z., 16 (23): 188, 1923 (♀, Formosa).
Trypoxylon tainanense: Tsuneki, SPJHA, 7: 73, 1978 (ref. syn. redescr. distr., ♀ ♂, Thailand, Is. Sumba, Celebes and Formosa, tabs. figs.).

Specimens newly examined: 2 ♂, Celebes (Singkang), 6, 12. IX. 1930, J. van der Vecht (RMNH).

Remarks. In this species RC in fore wing is B-type, Rl is short, CV1≒CV2×2.5, TCV straight and shorter than CV2 which is downcurved, angle about 90°.

6. TRYPOXYLON NAVIFORME TSUNEKI, 1979

Trypoxylon naviforme Tsuneki, SPJHA, 11: 14, 1979 (♀, Java, Figs. 13-18 of Pt. V.).

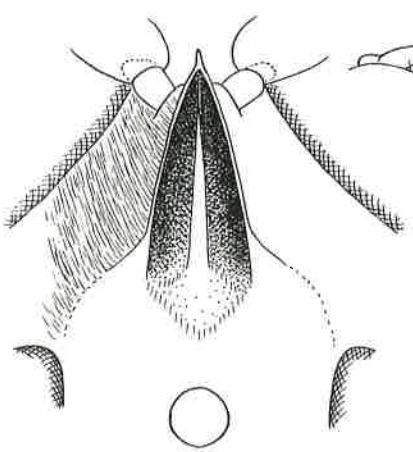
The Bornean specimen below described differs considerably from the nominate species from Java in the form of supraantennal half-enclosure and in the colour of the legs and certainly it represents a geographical race:

Trypoxylon naviforme lucidipes ssp. nov.

Holotype: ♀, Sarawak, 1st Div., Semongoh Forest Research Station, 1°25'N, 110° 17'E, 15-19. 1976, P. S. Cranston (Malaise trap in secondary growth) (BMNH).

Observation. The ship-shaped structure on supraantennal area is more narrowed anteriorly than in the Javanese specimens and the lateral margins are divergent posteriorly straight (Fig. 3, vertical view), not parallel-sided as in the latter. Legs much more broadly yellow: Fore and mid legs except coxal bases and areolia completely, hind trochanter, base broadly of tibia, spurs and articulations of tarsus comparatively broadly ambur yellow, rest of hind tarsus brown or pale brown.

Al-3 (4 brown, from 5 apically black), palpi and tegula ambur yellow, prenotal tubercle and basal plate of wing yellow, the latter marked with brown, posterior part of collar almost without discolouration, G2 and 4 at each base ferruginous red, G3 broadly brownish red. Head seen obliquely from side: Fig. 4, clypeus: Fig. 5 (less produced than in the typical race), pronotal lamina triangular apex narrowly rounded.



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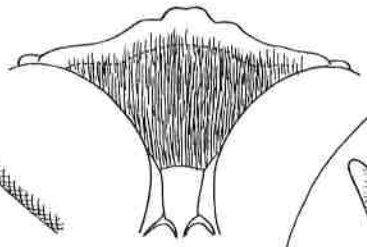

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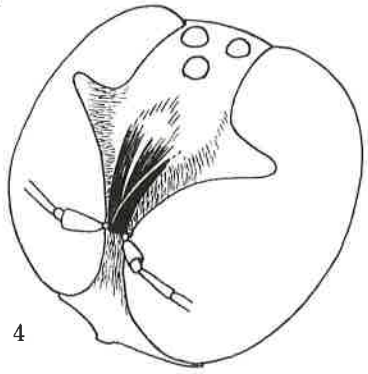

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Measurements: HW, HL, IODv, A3, P = 100, 64, 28, 17, 76; IODs=10:3.3 (3:1), A3=AWx3, OOD,Od,POD=1,6,3; P, Ma, Mi, 2(Ma), 3(Ma) = 100, 48, 28, 74(64), 54(72). RC= B, R1 considerably long, 2/3 the length of TCV, but not reaching wing apex, TCV=CV2, TCV nearly straight, angle about 110°.

Mesoscutum microcoriaceous and closely superimposed with fine punctures, area dorsalis enclosed with shallow indistinct furrow, at base obliquely coarsely striate, on the rest surface transversely finely closely striate, lateral series of strioles and sculpture on sides of propodeum as in the nominate race.

7. TRYPOXYLON FLAVIPES TSUNEKI, 1979

Trypoxylon flavipes Tsuneki, SPJHA, 9:24, 1979 (2 ♀, Laos).
Trypoxylon flavipes: Tsuneki, Ibid., 10: 8, 1979 (1 ♀, Ceylon)

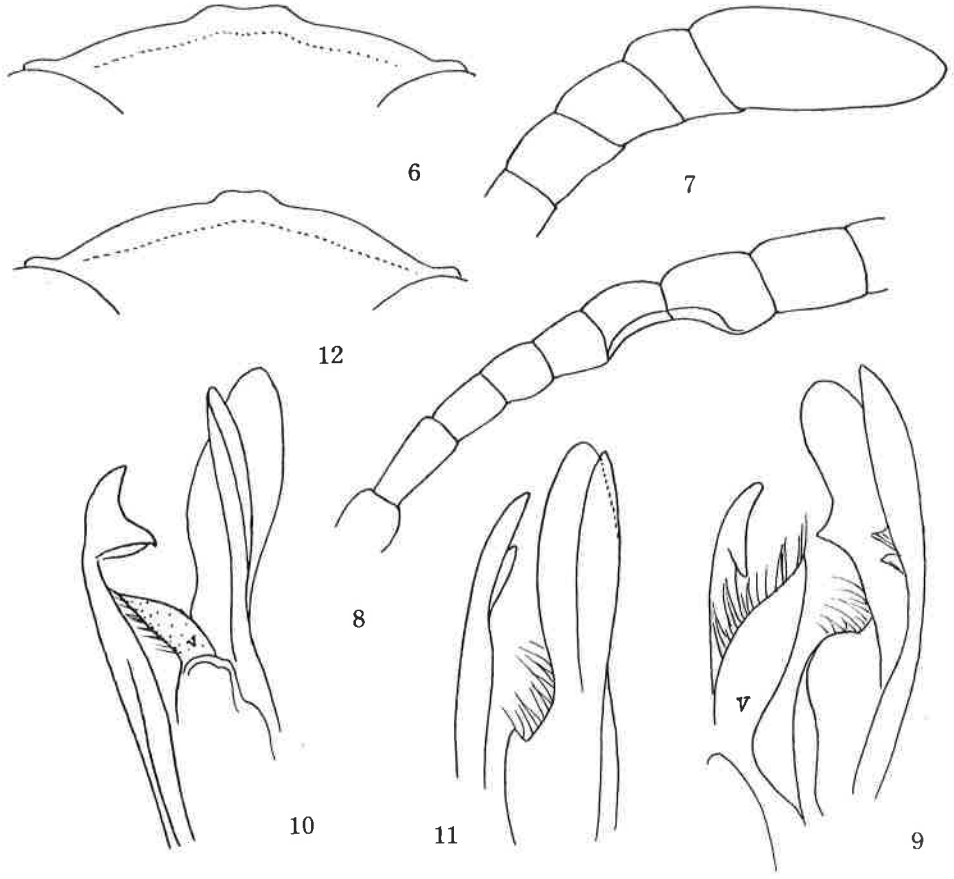
Specimens examined: 1 ♀, Sarawak, VI-IX. 1958, T. C. Maa (HPBM); 1 ♂, North Borneo, Forest Camp, 19 km North of Kalabakan, 60 m, 14. XI. 1962, K. J. Kuncheria (HPBM).

Observation. The female specimen above listed differs from the type from Laos in that IODc is relatively much narrower, namely IODs=4:1 (in the type 3:1), frontal furrow distinctly shallower, fore femur somewhat brownish posteriorly and mid femur

broadly black on posterior surface. Otherwise well agrees with the type. Measurements: HW,HL,IODv,A3,P=100,68,30,19,140; IODs=10:2.5; A3≒AW×3; A3,4,5≒10,9,8; P,Ma,Mi,2(Ma), 3(Ma)=100,20,11,56(22),45(26); RC=C, R1 long, reaching almost wing apex, CV1≒CV2×3; TCV:CV2≒8:10, angle about 105°. The male of this species has been unknown.

♂. 6.2 mm. In general colouration, structure and sculpture as in the Bornean female. Differences: A1-2 lemon yellow (in ♀ ferruginous yellow), fore and mid femora, except apical half and dorsal line that are lemon yellow, pale semitransparent glossy castaneous, G2 without basal ferruginous mark and G3 at base and beneath dusky red (4 broadly orange at base).

Head seen in front more rounded, frontal furrow deeper, median line of SAT carinated and shining, IODs=10:3.5, clypeus similar in pattern, but the teeth somewhat larger and more remotely separated (Fig. 6, cf. Fig. 12 in ♀), antenna thicker, joints shorter, A7-8 and 13 deformed. A3≒AW×2, A1,2,3,4,5,13=14,7,10,6,5,17, A13≒BW×2, not bent and ≒A10-12 (Fig. 7). A7 and base of A8 excavated beneath and A8 produced at apex beneath (Fig. 8). Measurements: HW,HL,IODv,A3,A13,P=100,65,30,13,27,176; IODs= 10:3.5, OOD,Od,POD≒1,8,6, P,Ma,Mi,2(Ma),3(Ma)=100,22,11,50(24),44(28), RC=C, R1 long, longer than TCV and reaching wing apex.



Genitalia with paramere deeply split at apex into two broad lobiform layers (Fig. 9, right half seen from beneath, V...volsella; Fig. 10, ditto seen from inside; Fig. 11, left half seen from back side). Volsella also lobiform and fringed with hair on inner margin (ditto, V). Penis valve with a triangular process before apex (Figs. 9, 10), this may correspond the sickle-shaped appendages in other species, but it is not produced sideways, but ventrally.

Remarks. In view of the narrower IODc the Bornean representatives may be dealt with as a local race.

8. TRYPOXYLON SINGAPORENSE TSUNEKI, 1979

Trypoxylon singaporense Tsuneki, SPJHA, 9: 29, 1979 (♂, Singapore, 5 figs.)

Specimens examined: 1 ♂, North Borneo, W. Coast Residency, Ranau, 8 miles N. of Paring Hot Springs, 500 m high, 9-18. X. 1958, T. C. Maa (BPBM); 1 ♂, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 60 m, 21. XI. 1962, K. J. Kuncheria (BPBM); 1 ♂, Sarawak, 4th Div. Gn. Mulu, RGS Exp. 17.IX. - 23.X. 1977, D. Hollis (BMNH); 1 ♀, Sarawak, 1st Div. Semongoh Forest Res., 1° 25′ N, 110° 17′ E, 15-19. XI. 1976, P. S. Cranston (Malaise Trap in secondary growth) (BMNH - B.M.1977-19).

Observation. The males observed well agree in characters with the holotype from Singapore. Characteristic in that A10 is excavated at base beneath and produced at apex; head, prothorax and fore legs till femora densely covered with yellowish long frizzled hair; SAT flatly produced between both A1; IODs markedly narrow - IODs=6:1 and G1 without fovea at apex, while G2 and G3 each with a fovea.

Supplement. To be added to the above is that gastral sternite 6 is provided with a pair of obliquely (divergently) running short carinae at base in middle which are fringed with long curved hairs.

♀ (hitherto unknown). Similar in general colouration, structure and punctuation to the male, but antenna is normal, clypeus somewhat more strongly produced anteriorly, IODs much narrower, head, prothorax, fore legs at base not covered with tuft of long frizzled hair and sternite 6 without divergent haired carinae.

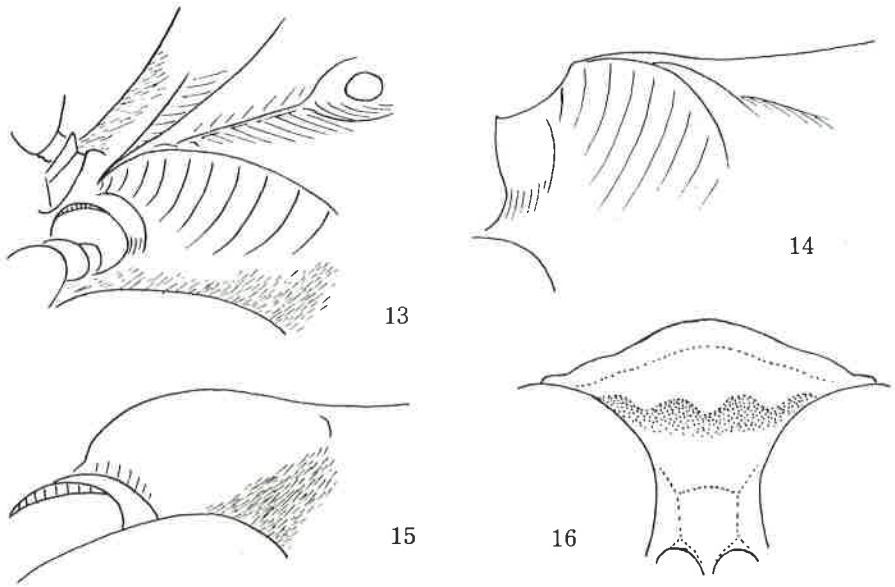
Head in frontal view subquadrate, W:L=100:94. HW,HL,IODv,A3,P=100,70,26,18,118; IODs=10:1; A3÷AW×3; A3,4,5÷10,6,5.5; OOD,Od,POD÷1,6,3; P,Ma,Mi,2(Ma),3(Ma)=100,28, 14,60(33),52(41). RC=B-C, R1 long, longer than TCV, reaching wing apex, TCV÷CV2, CV1÷CV2×4. Pronotal lamina obtused triangular, with apex broadly rounded. Metapleural flange produced sideways as a small round flat plate. Length 7.5 mm.

9. TRYPOXYLON BORNEANUM sp. nov.

♀. In colouration considerably similar to the preceding species, but the present species is characteristic in the structure and punctuation of the frons and SAT-ASR and in the thin lamellate texture of apical part of clypeus.

Length 10-12 mm. Black, orange or lemon yellow are A1-3 beneath, apical half of clypeus, mandible (apex reddish brown), mouth parts, discoloured posterior part of pronotal collar, tubercle, tegula (semitransparent) and basal plate of wing, sides of G1, whole of G2 and 3, except each dorsally enlarged band before apex, base of G4, fore leg except extreme base of coxa and arolium, mid leg except basal half of coxa and arolium (often T3-4 brownish) and hind leg on apex of coxa, greater part of trochanter, knee, base broadly and apex narrowly of tibia, shorter one of spurs, base and apex of T1 and T2-5 except arolium (sometimes hind tarsus except articulations wholly dark brown, sometimes T1 largely black and T3-4 brownish above, longer one of spurs brown). Hair deep brassy, on posterior half of mesoscutum directing from median line laterally.

Head in frontal view with sides rounded, very slightly narrowed below, HW:HL= 100:90, vertex almost not depressed, frons moderately raised, narrowed triangularly towards SAT, posteriorly depressed around fore ocellus and deeply furrowed in middle till SAT (Fig. 13, latero-vertical), the furrow broad triangular in cross section, SAT begins from the apical triangular area of frontal elevation, in lateral view (Fig. 15) dorsal line almost level with frons and anteriorly roundly inclined to IAA, the ridge of SAT acute, but short, ASR short, without carina except apical margin, much below level of SAT, PAF shallow and broad, only gently downcurved in cross section (Fig. 14, dorso-lateral to see through PAF). Clypeus: Fig. 16, medio-apical glabrous and shining area weakly bevelled. HW,HL,IODv,A3,P=100,56,24,20,110; IODs=10:7; A3÷ AW×3.6; A3,4,5÷10,8,7.5; OOD,Od,POD÷1,4,3; P,Ma,Mi,2(Ma),3(Ma)=100,29,11,60(41), 56(52). Collar transverse, feebly enlarged laterally, in frontal view dorsal line gently rounded, not tuberculate in middle, lamina on side obtused triangular, apex angulated and slightly produced, subalar area of mesopleuron normal, propodeum with distinct lateral carinae, area dorsalis enclosed with fine furrow, medial furrow wide, GSR not raised. G1 clavate, but with basal half subparallel-sided, hence as a whole subflask-shaped, but distinctly shorter than G2+3, in fore wing RC=C, R1 short, CV1= CV2×4, TCV slightly longer than CV2, sinuate, CV2 nearly straight (very curious and exceptional), angle markedly broad, about 130°, vestigial cubital cell 2 observed,



Figs. 13-16. T. borneanum sp. nov., ♀

with upper and lower abscissae relatively 1:4, upper one nearly half the length of TCV.

Frons strongly closely punctured-reticulate, punctures mostly subrugosely confluent, without microsculpture on PIS, SAT with lateral flat inclinations closely covered with hair-bearing points. Mesoscutum closely punctured with fine punctures bearing greyish hair, surface half mat, propodeum without series of strioles along lateral carinae, area dorsalis transversely striate at base, disc smooth but not shining, sides polished, only on posterior part covered with hair-bearing pounctures.

♂, unknown.

Holotype: ♀, Sarawak, 4th Div. Mt. Mulu, RGS Exp. X-XI. 1977, M. Collins (BMNH).
Paratypes: 1 ♀, same loco., 17.IX. - 23.X. 1977, D. Hollis (BMNH - B.M.1977-543); 2 ♀, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 60 m high, 21. XI. 1962 K. J. Kuncheria (BPBM); 1 ♀, same loco., 13. XI. 1962, K. J. Kuncheria (BPBM).

10. TRYPOXYLON ANTENNATUM TSUNEKI, 1979

Trypoxylon antennatum Tsuneki, SPJHA, 9: 68, 1979 (♂ ♀, Laos, Malaya, 6 figs.).
Trypoxylon antennatum: Tsuneki, Ibid., 11: 28, 1979 (2 ♀, Java, fig.).

Specimens examined: 1 ♀, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 18. X. 1962, Y. Hirashima (BPBM); 1 ♂, the same loco., Primary Forest, Y. Hirashima (BPBM).

Observation. Closely resembles the typical race from Malaya except the structure and somewhat colour of the male antenna.

In the Bornean male above listed (1) ultimate antennal joint relatively longer: Al3=BWx6 and =A2-12, (2) antenna as a whole almost not compressed dorso-ventrally except Al3 which is flattened beneath, (3) A3-13 contrastively black. In the typical male (1) Al3=BWx4.8 and =A5-12, (2) antenna as a whole considerably compressed dorso-ventrally and (3) Al-5 orange yellow, 4-5 brownish above, thence apically black. As the antenna is not lengthened as a whole and Al3 is relatively longer the rest of the flagellar joints are shortened accordingly. In this case in A3-5 abbreviation is comparatively small as compared with the typical male, while in 6-12 markedly large, and the joints are progressively shorter towards Al2 (Fig. 17).

The difference is very conspicuous and the Bornean population is treated as a

geographical race:

Trypoxylon antennatum longulum ssp. nov.

Holotype: ♂, paratype: ♀, above listed.

♂. HW,HL,IODv,A3,Al3,P=100,50,25,12,64,92. IODs≒10:8. A3≒AW×2. A3,4,5≒10,5,6. Al3≒BW×6, OOD,Od,POD≒3,8,4. P,Ma,Mi,2(Ma),3(Ma)=100,31,11,52(40),60(65). RC=M-C, Rl short, CV1≒CV2×5.5, TCV:CV2≒3:2, angle about 90°. Pronotal lamina obtused triangular, apex minutely rounded and slightly produced.

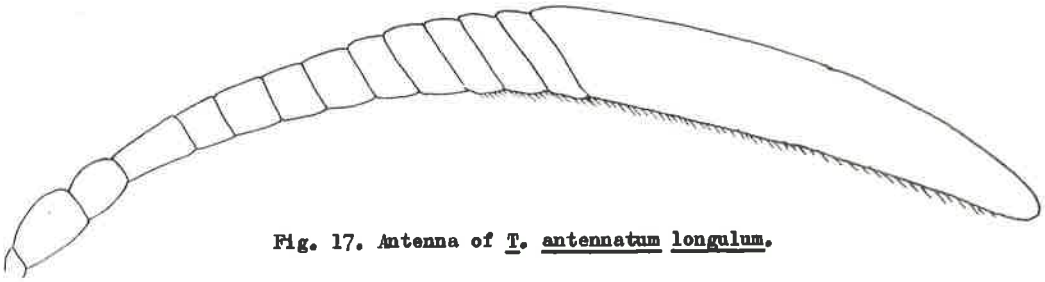


Fig. 17. Antenna of T. antennatum longulum.

♀. HW,HL,IODv,A3,P=100,46,24,22,110. IODs≒10:10. A3=AW×3.7. A3,4,5≒10,6,6. OOD,Od,POD≒2,6,3. P,Ma,Mi,2(Ma),3(Ma)=100,32,9,42(42),60(54). RC, Rl similar to ♂, CV1≒CV2×4.5, TCV:CV2≒4:3, angle about 100°. Lamina similar.

Remarks. In the holotype male-specimen Al3 is enlarged till about 2/3 from base and thence attenuate towards apex (Fig. 230 of Pt. III). This form is, however, not constant. In other Laotian male Al3 nearly parallel-sided till about 2/3 from base and thence attenuate, with apex rounded. SAT is always low long nasiform, Fig. 228 of Pt. III is incorrect. It is drawn too high and it is corrected with Fig. 76 of Pt. V.

11. TRYPOXYLON APPENDICULATUM TSUNEKI, 1974

Trypoxylon appendiculatum Tsuneki, Pol. Pis. Ent., 44: 631, 1974 (♂, Borneo, figs.).
Trypoxylon appendiculatum: Bohart & Menke, World Spheo., p. 630, 1967 (listed).
Trypoxylon appendiculatum: Tsuneki, SPJHA, 9: 162, 1979 (♂, Malaya, redescr. figs.)

Specimens examined: 3 ♂ (Nos. 1, 2, 3 in Table below given), North Borneo, Sandakan, dates undescribed, C. F. Baker (USNM); 1 ♂ (No. 4), West Borneo,Mowong, IX. 1907, E. Muir (BPBM); 1 ♂ (No. 5), North Borneo, Sandakan Bay (NW), Sepilok Forest Res. 1-10 m, 29. X. 1957, J. L. Gressitt (BPBM).

Table 1. Measurements on the above listed specimens (No. 6 from Malaya)

No.	HL	IODv	A3	Al3	P	IODs	A3*	A3-4-5	Ocelli	Ma	Mi	2(Ma)	3(Ma)	RC	CV1	T:C	Angle
1	64	27	12	21	121	5.0	2.0	10 8 8	1 6 3	20	9	44(25)	40(31)	C	2.7	4:5	120°
2	66	28	11	19	120	5.0	2.0	10 8 8	1 5 3	18	9	46(22)	52(26)	C	2.6	4:5	110°
3	62	26	11	20	120	5.0	1.8	10 8 8	1 5 4*	19	11	50(23)	50(28)	C	2.5	2:3	110°
4	62	28	12	19	121	5.2	1.7	10 9 9	1 5 3	19	10	56(23)	50(29)	C-B	2.7	4:5	110°
5	64	26	11	20	122	5.2	1.7	10 8 8	1 5 3	21	10	46(26)	42(32)	C-B	2.8	4:5	110°
6	66	26	12	18	130	4.5	2.0	10 8 8	1 6 4	18	7	42(22)	44(25)	B	2.7	4:5	120°

Remarks. In HL——P HW=100 is omitted. In Ma——3(Ma) P=100 is omitted. In IODs 10: is omitted. CV1... CV1=CV2× is omitted. T:C=TCV:CV2. A3*... AW× is omitted. Ocelli = OOD,Od,POD. Ocelli... 1 5 4* is really 1,5,3.5.

The values are not always strict, because of the thickness of the scale line, improper position of the area and indistinct border line (e.g.OOD,OD,POD).

On the structure of subalar area of mesopleuron.

The area is swollen up dorsally, acutely edged at outer margin and somewhat produced over subalar pit, namely in a half developed condition.

12. TRYPOXYLON LAEVICEPS TSUNEKI, 1976

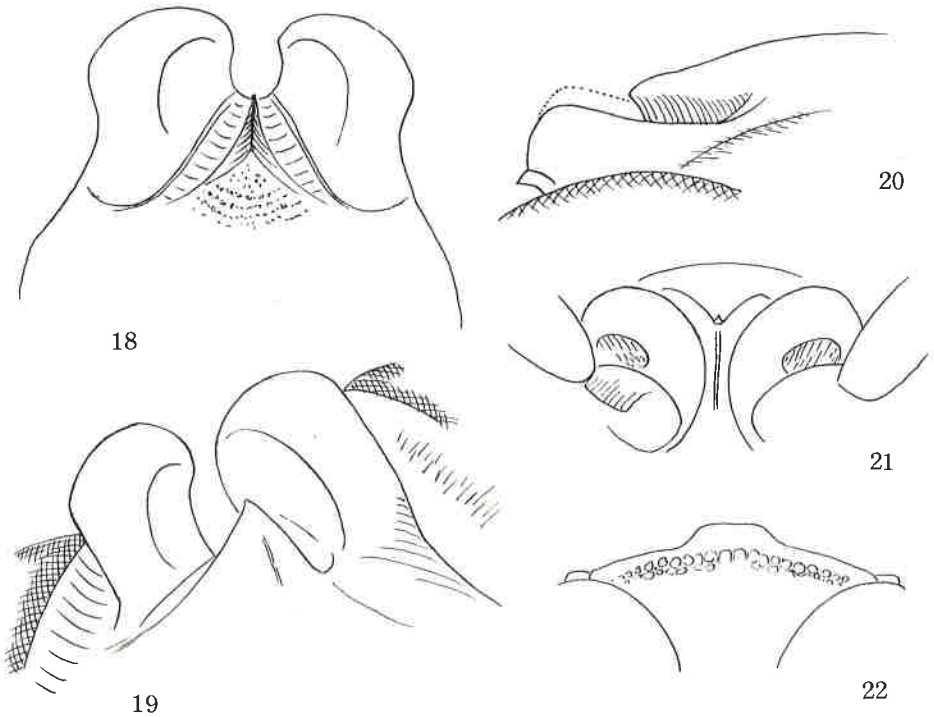
Trypoxylon laeviceps Tsuneki, Steenstrupia, 4 (6): 83, 1976 (♂, Philippines: Is. Tawi-tawi, figs.)
Trypoxylon vicinum Tsuneki, SPJHA, 11: 15, 1979 (♀ ♂, Java, figs.) (SYN. NOV. ssp.)

Specimens examined: 2 ♀, North Borneo, Sandakan, dates unknown, C. F. Baker (USNM).

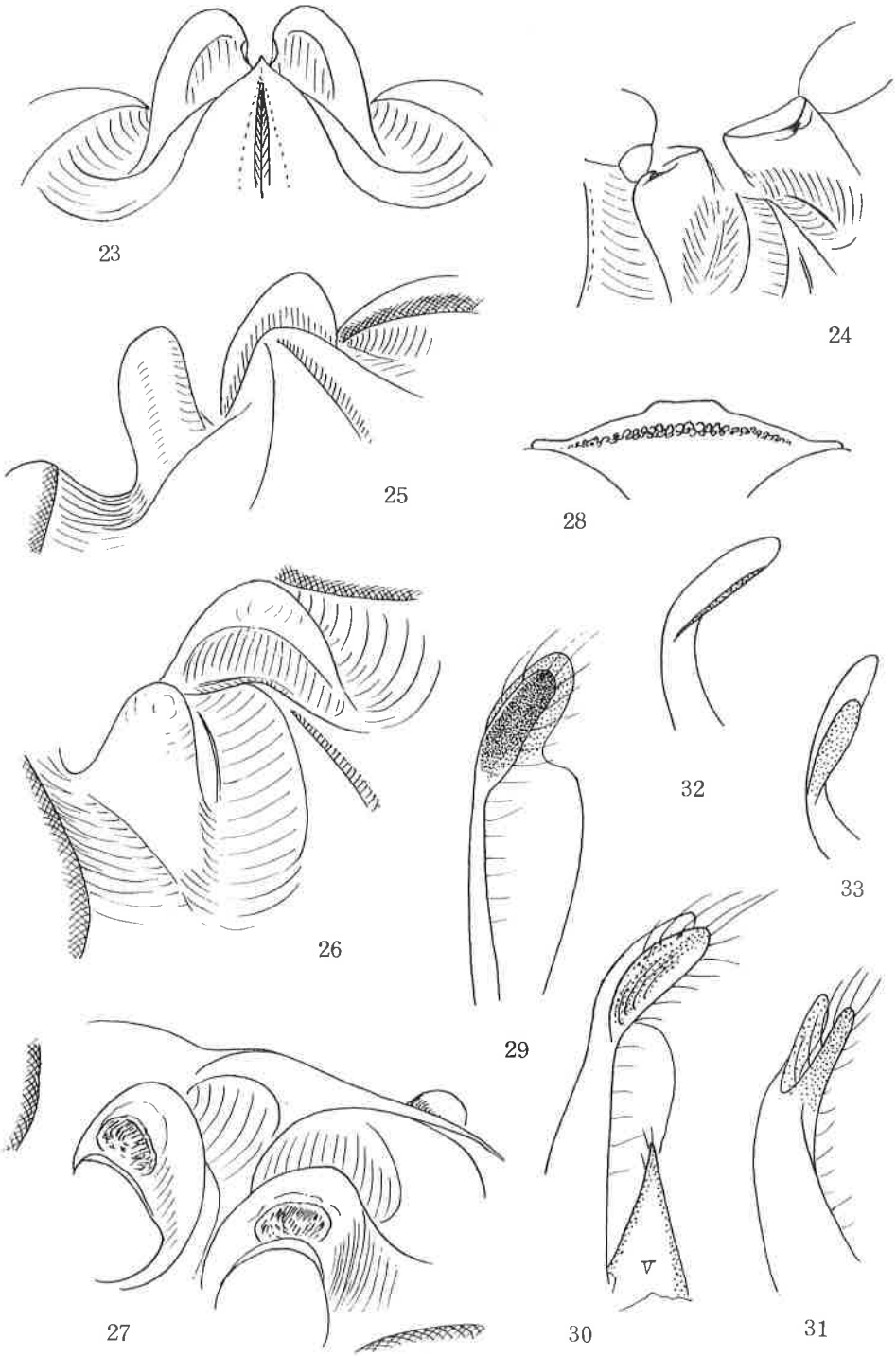
The reexamination of the holotype specimen (♂) of T. laeviceps m. has led to the conclusion that the two specimens above listed should be combined with the male of this species, because they well agree in non-sexual characters with each other and the localities of them are also close to each other.

♀ (hitherto undescribed), 6-7 mm. Black, mandible glossy ferruginous, mouth parts pale brown, legs more or less brownish. Hair silvery.

Head in frontal view subquadrate, with angles rounded. Measurements in Table 2. Supraantennal structure seen vertically from dorsal side: Fig. 18, somewhat from left side: Fig. 19, in profile: Fig. 20, seen from beneath: Fig. 21, thus ASR highly raised, but not so high as in appendiculatum, SAT produced anteriorly in triangle, PAF deep, flat-bottomed, inclining towards IAF, in cross section V-shaped, but V has both arms rounded out. SAT dorso-posteriorly covered with hair-bearing punctures, but anterior triangular area smooth and polished, ASR with a hollow in front (Fig. 21). Frons with surface gently rounded, nearly flat and without median furrow. Clypeus: Fig. 22, disc from base gently roundly elevated, apical marginal area broadly reflected, base of reflected area very coarsely irregularly punctured, in middle area puncture-interspaces turn to short longitudinal carinulae. Occipital carina complete and triangularly depressed behind buccal cavity. Collar of pronotum well developed, laterally strongly roundly incrassate and markedly tuberculate in middle, lamina on side triangular (angle appr. 120), apex minutely rounded and slightly produced. Subalar area with half developed pent-roof structure, dorsal side roundly swollen, outer mar-



Figs. 18-22. Trypoxylon laeviceps Tsuneki, ♀



Figs. 23-33. <u>Trypoxylon laeviceps</u> **Tsuneki, ♂**

gin acutely edged and slightly produced over subalar pit, but not widely expanded, propodeum with distinct lateral carinae, area dorsalis with feeble lateral furrows, rather indistinct, posterior inclination at the end of medial furrow transversely bordered with a carina, the carina laterally extended, running across sides of the segment, thence propodeum is constricted and extended posteriorly beyond base of hind coxa, the area on dorsal side longitudinally tricarinate, lateral ones of the 3 carinae are independent of the lateral carinae of propodeum (but the condition of the propodeal sternite is unobserved, due to glue). G1 long, as a whole flask-shaped, but the mode of apical swelling is rather gradual. As to length relation of G1:G2+3 and venation of fore wing see Table 2.

Frons on upper area finely sparsely weakly punctured, surface shining, but anteriorly punctures slightly larger, closer and stronger and on antero-lateral inclinations finely rugoso-subreticulate, mesoscutum finely very closely punctured, under high magnification punctures connected with each other with very fine impressed lines, area dorsalis at base obliquely, on broad median furrow transversely strongly coarsely striate, lateral series of striae strong and sparse, posterior inclination transversely coarsely striate, posterior extended area minutely irregularly uneven and closely covered with fine hair-bearing points, sides smooth and polished, with a few transverse striae in front of the transverse carina and behind this irregularly minutely rugulose.

♂ (the specimen from Is. Tawitawi) 5.5 mm. Supraantennal structure is given in Figs. 23 (vertical from dorsal side), 24 (latero-vertical), 25 (dorso-lateral), 26 (obquely lateral) and 27 (obliquely from beneath, fore ocellus is seen) and clypeus: Fig. 28. Structure of pronotum, subalar area of mesopleuron and propodeum as in ♀, measured values are also similar except sexual difference in A3, the only differences are that frons has a distinct median furrow and that the hollow at anterior aspect of ASR is larger, deeper and more distinct.

Genitalia at the apical two lobes of paramere alone characteristically darkened. Left paramere seen from beneath: Fig. 29, somewhat more lateral: Fig. 30 (V .. volsella), lateral: Fig. 31, right penis valve seen from inside: Fig. 32, from somewhat more backside: Fig. 33, dotted part is the primitive sickle-shaped appendage.

Talbe 2. Measurements on Trypoxylon laeviceps.

No.	HL	IODv	A3	A13	P	IODs	A3*	A3-4-5	Ocelli	Ma	Mi	2(Ma)	3(Ma)	RC	CV1	T:C	Angle
♂ t	66	25	12	-	130	6.0	1.7	10 8 10	1 5 3	19	10	48(22)	48(30)	C	2.7	5:6	110°
♂ v	68	28	12	17	136	6.0	2.3	10 8 10	1 8 6	18	9	50(22)	52(30)	B	2.5	5:6	120°
♀ 1	66	24	14	-	150	6.0	2.7	10 9 10	1 6 4	20	8	46(22)	42(30)	C	3.5	1:1	110°
♀ 2	68	24	16	-	140	6.2	3.0	10 9 10	1 9 5	20	8	40(26)	40(34)	C	4.0	1:1	100°
♀ v	72	25	15	-	154	7.0	3.0	10	10 1 8 6	18	8	50(24)	44(32)	C-B	3.0	1:1	120°

Remarks. ♂ t ... ♂ type. ♂ v ... ♂ vicinum. ♀ 1 and ♀ 2 ... ♀ ♀ from Borneo. ♀ v ... ♀ vicinum. Omission as in Table 1.

Remarks. Trypoxylon vicinum m. described from Java is in the subspecific relationships with the present species. It differs from this only in that the highly raised ASR has the anterior aspect very coarsely punctured and not gl ssy, excavation on its anterior aspect is larger and deeper, its obliquely locating top area is much thinner, rather keel-like, clypeus is somewhat more strongly produced anteriorly and fro s in ♂ also with the median impressed line. Measurements of both forms are very similar (Table 2). Genitalial structure of vicinum ♂ is, according to the reexamination, completely consistent with that of laeviceps ♂. Thus vicinum is sunk to a subspecies of the present species:

Trypoxylon laeviceps vicinum Tsuneki, 1979

13. TRYPOXYLON KUCHINGENSE sp. nov.

Diagnosis. 8-10 mm. Head transverse, IODs=3:1 (♀♂), A13 slightly longer than A11 +12, clypeus weakly rounded out, apical margin medianly gently sinuate, mesoscutum closely punctured, without microsculpture, subalar area with pent-roof structure, propodeum with lateral carinae, area dorsalis enclosed with furrow, RC=B, G2,3,4 reddish

yellow, each with a broad black band across middle, fore and mid legs nearly wholly, hind leg partly yellow, hair silvery. ♀♂, Sarawak.

♂. 8 mm. Black, ferruginous or yellow are A1-2 wholly and 3 beneath (rest brown -dark brown, paler beneath), clypeus on about apical half, mandible, palpi, tubercle, tegula and basal plate of wing, G2,3,4, except a bro d brown band before apex, fore leg except black arolium and brown spots on tarsus (may be psstmortem change), mid leg except brown tarsus and parts of hind leg: apical half of coxa, trochanter wholly and base of tibia; rest of legs brown to dark brown, but hind tarsus on articulation pale. Hair silvery.

Head in frontal view wider than high, H:L=100:82, vertex slightly depressed, in dorsal view transverse, HW,HL,IODv,A3,A13,P=100,54,28,20,14,94. IODs=10:3.3, A3=AW× 3.7, A3,4,5÷10,8,8, A13=BW×1.6 and slightly shorter than A11+12 (Fig. 39), OOD,Od, POD÷2,6,3. P,Ma,Mi,2(Ma),3(Ma)=100,22,12,84(26),70(28). G2 and 3 markedly long.

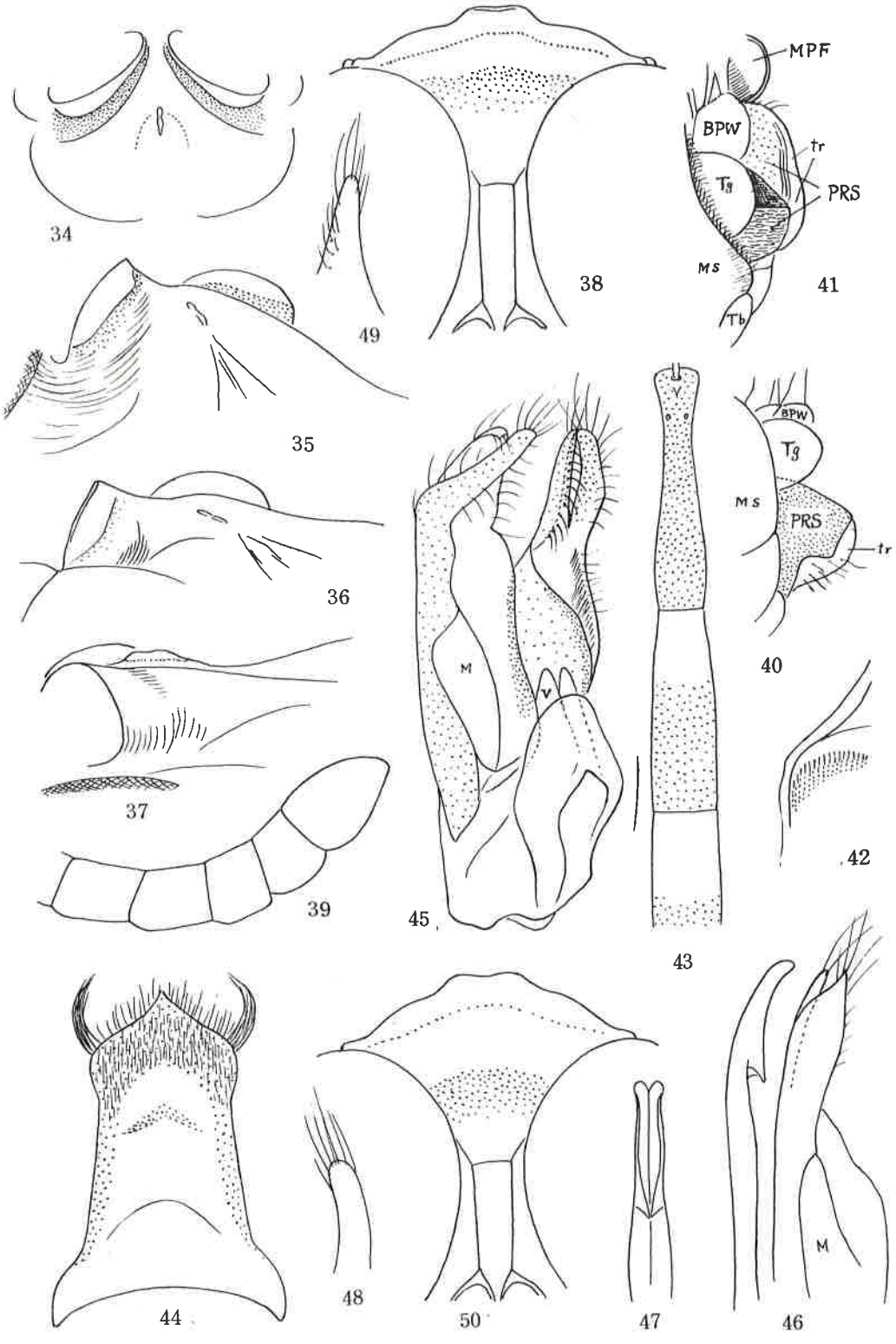
Frons moderately raised, median furrow broad and deep. SAT short broad, gently raised, with a short median carina on rather posterior portion (in the specimen carina constricted in middle of its length), in vertical view: Fig. 34, nearly flatly connected with ASR, ASR broadly transparent on apical area, PAF only gently downcurved in dorso-lateral view (Fig. 35), similar but in lower view to see through PAF: Fig. 36 in profile: Fig. 37, only median carina raised. Clypeus: Fig. 38, apical yellow area very broad, hair parallel, without apical reflection; A3,4,5 curiously long (see measurements), while A13 markedly short (Fig. 39). Occipital carina complete. Collar of pronotum transverse, only slightly widened laterally, in frontal view gently upcurved, without median tubercle, lamina on side obtused triangular, apex minutely rounded; subalar area of mesopleuron with well developed pent-roof structure, left one seen in front: Fig. 40, seen from above: Fig. 41, main body of pent-roof structure (PRS) black and transversely finely closely rugulose, posterior part (dotted area in Fig. 41) pale yellowish with distinct yellow striae, outer marginal area broadly transparent, membraneous, bearing sparse long curved hairs beneath, in the figures MS=Mesoscutum, Tg= Gegula, HPW=Basal-plate-of-wing, MPF=Metapleural-flange (markedly roundly stretching out, also mainly semitransparent), Tb=Tubercle, tr=transparent. Propodeum with distinct lateral carinae, area dorsalis ligulate in form and enclosed with fine furrow, area apicalis indistinct, GSR roundly raised. G1,2,3: Fig. 43, G2 and 3 markedly long (see measurements). In fore wing RC=B, R1 considerably long, slightly longer than TCV and reaching close to wing apex, CV1=CV2×3.3, CV2=TCV, angle about 90°. Sternite 8: Fig. 44 (seen from inside), the form is characteristic.

Genitalia: Fig. 45 (seen obliquely from beneath and left side, penis omitted, M ... membraneous, V ... volsella), paramere deeply bifid at apex into two elongate lobes both sparsely fringed with stiff hair, inner margin of basiparamere expanded and half rolled, outer margin partly membraneous (M), volsella short (Fig. 45, V), in ventral view: Fig. 48, in lateral view (from right side): Fig. 49, left paramere and penis valve in lateral view: Fig. 46, penis valve in ventral view: Fig. 47, ventral process may be the primitive sickle-appendage.

Frons delicately microcoriaceous and feebly superimposed with fine punctures, on anterior area and on SAT punctures slightly large and strong, ASR smooth and shining; mesoscutum very finely closely punctured, each puncture bearing short pubescence and surface half mat, but PIS without microsculpture; propodeum with series of sparse and short strioles along lateral carinae, area dorsalis transversely coarsely striate on median furrow, on disc only a few weak striae can be seen, lateral and posterior areas of dorsal aspect covered with hair-bearing punctures, sides smooth and polished, only posteriormost area irregularly and closely punctured, and mixed with transverse striae.

♀, about 9 mm. Similar to ♂ in general, but in the specimens coloured areas of antenna, clypeus and legs bright lemon yellow and apex of propodeum narrowly yellow; gastral colouration considerably different between the two specimens, in one of them (from Semongoh) base of G2 broadly reddish yellow, base of G4 narrowly dusky red, but G3 black and G6 apically pale brownish. As to the second specimen see Remarks.

Antenna normal, clypeus slightly more produced anteriorly, with medio-apical emarginate area slightly broader (Fig. 50). Head in frontal view with lateral margins rounded, very slightly convergent towards clypeus, W:L=100:84, vertex somewhat depressed, but tops of hind ocelli higher than level of tops of eyes. Measurements (within parentheses are with 2nd ♀): HW,HL,IODv,A3,P=100,50,28,24,106 (100,48,28,23,108), IODs=10:3.2 (10:3.0), OOD,Od,POD÷2,6,3 (2,5,3), A3=AW×4 (×4.5), A3,4,5=10,6.5,6 (10,7,7), P,Ma,Mi,2(Ma),3(Ma)=100,21,10,80(22),76(22) (100,20,9,80(24),70(30)). The structure of supraantennal area, pronotum with lamina, subalar area, propodeum and gaster similar, but in fore wing RC is rather close to C-type, R1 shorter than TCV and relatively shorter than in ♂, but reaching close to wing apex, CV1=CV2×5 (5.3), TCV:


34
49
38
MPF
BPW
tr
Tg
PRS
ms
Tb
41
35
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50
47
46
M

CV2÷3:2 (3:2), angle about 100° (110°). Except that mesoscutum is more shining the surface sculpture and punctuation similar to those of ♂.

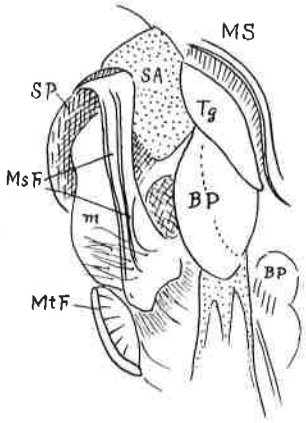
Holotype: ♂, Sarawak, Kuching, Santubong, 797-1500 m, 18-30. VI. 1958, T. C. Maa (HPBM).

Paratypes: 1 ♀, Sarawak, 1st Div. Semongoh Forest Res. 1 25 N, 110 17 E, 15-19. XI. 1976 (Malaise trap in secondary growth), P. S. Cranston (BMNH - B.M.1977-19); 1 ♀, Sarawak, Mt. Matang, 2000 ft, 6.XII. 1913, G. E. Bryant (BMNH - B.M.1914-382).

Remarks. The second female specimen from Mt. Matang was first treated as a separate species, because of the considerably different colouration:

Al yellow, A2 brown above, 3 pale brown, th nce apically gradually dark brown; gaster with G2-5 at each base ferruginous: fore and mid legs from base of coxa to apex of femora ferruginous, thence apically lemon yellow except black arolia, but mit T2-5 brown above, hind leg dark brown and apex of coxa, trochanter wholly, knee, both ends of tibia (base broader) with spurs yellow, articulations of tarsus somewhat pale.

But the structural comparison made it identify with the present species. The following figures were made to explain the specimen and are of use to realize the female characters of the present species. Figs. 51: SAT-ASR (vertical), Fig. 52: do. (dorsolateral), Fig. 53: do. (lateral, from right side), Fig. 54: pent-roof structure at subalar area of mesopleuron (left side seen vertically from side, with head forwards), Fig. 55: do. (dorsal view). MS=Mesoscutum, Tg=Tegula, Bp=Basal plate of wing, Tb=Tubercle of pronotum, SA=Subalar area, SP=Subalar pit, MsF=Mesopleural flange, MtF=Metapleural flange, m=membraneous (transparent like cellophane).



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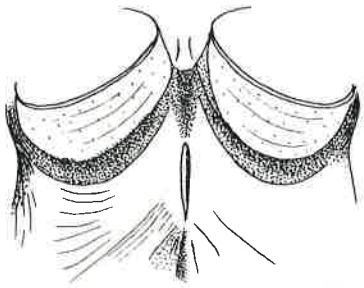

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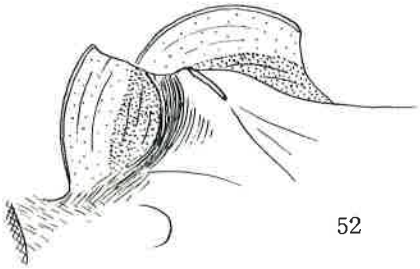

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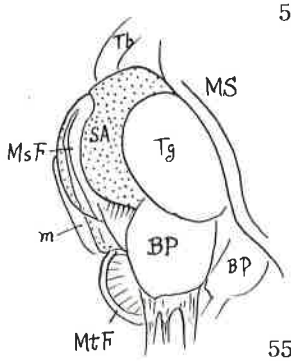

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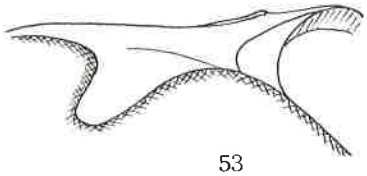

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Figs. 51-55. Trypoxylon kuchingense sp. nov., ♀.

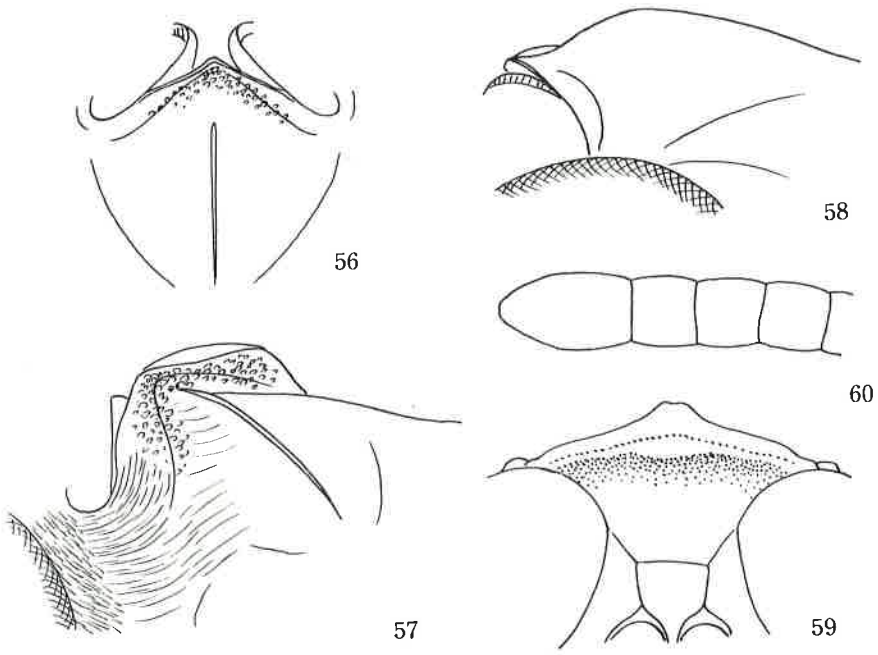
14. TRYPOXYLON FLAVOFASCIATUM sp. nov.

Closely allied to T. testaceicorne Cameron, 1907, differing from it, however, in the details of the structure of SAT, the form of clypeus and gastral petiole and the colour of antenna, gaster and legs and can easily be separated from this species.

Diagnosis. About 6 mm. G1 clavate, mesoscutum microcoriaceous, propodeum with lateral carinae, head transverse, IODs=5:4, SAT low broad nasiform, medio-apical margin transversely carinate, carina connecting with ASR, thus false PAF arising, antenna basally yellow, legs black and maculated with yellow, gaster yellow banded, hair silvery, ♀, Sarawak.

♀. 5.5 mm. Black with the following portions lemon yellow: Al wholly, 2 except a brown mark above, 3 beneath, 4 at base beneath, basal third of mandible, main part of mouth parts and palpi, pronotal tubercle, tegula (transparent), bases and apices of G2 and 3, base of 4 (yellow on underside broader, especially on G3), fore leg except greater part of coxa and arolium, mid leg except base of coxa, median area of femur (brownish) and arolium, hind leg on apex of coxa, trochanter, base broadly and apex narrowly of tibia, spurs, T1, 4 and both ends of 2 and 3. Clypeus apically broadly and rest of mandible pale brown, the latter black at apex, posterior part of collar transparent yellow, appearing dusky yellow, mid T5 above, middle part of hind T2 and 3 and T5 above pale brown. Hair silvery.

Head in frontal view somewhat subquadrate, but roundly, slightly convergent below W:L=100:90, vertex not depressed, frons flat, very gently concave on anterior area, SAT low broad nasiform, rather gently tectate, median carina distinct, but not reaching apex of SAT which is triangular in vertical view, with the margin edged and produced over IAA (Fig. 56, vertical), a shallow broad furrow accompanied along apical edge just behind, the edge connected with apical margin of ASR at its top (Fig. 56, vertical and Fig. 57, dorso-lateral), just as in trochanteratum Cameron or javanense m. (but in both SAT different in structure, in the present species the lateral inclination is very gentle), the structure seen in profile: Fig. 58.



Figs. 56-60. Trypoxylon flavofasciatum sp. nov., ♀.

HW,HL,IODv,A3,A12,P= 100,62,28,12,16,78. IODs÷10:8. OOD,Od,POD÷1,4,3. A3=AWx2. A3, 4,5÷10,9,8. P,Ma,Mi,2(Ma),3(Ma)=100,46,22,76(64),68(80). A3 comparatively short and A12 comparatively long and in form somewhat male-like (Fig. 60). Clypeus: Fig. 59, disc at base flat, with hair parallel, apically gently roundly tectate, almost without reflection at apical marginal area, occipital carina complete, but low and weak beneath head. Collar of pronotum transverse, very short, anterior part rather carina-like, posterior part broader, discoloured, lamina on side rounded, almost not produced, mesopleuron normal, metapleural flange somewhat roundly stretching out; propodeum with distinct lateral carinae, area dorsalis distinctly enclosed with deep furrow, median furrow broad and deep, with bottom transversely down-curved, area apicalis not margined with carinae, but medianly longitudinally strongly carinate, GSR with posterior margin gently roundly elevated. Petiole clavate, short and thick, G2 and 3 also thick (see measurements). RC=B-C, Rl fairly long, reaching fairly close to wing apex, TCV nearly straight, ÷Rl, TCV:CV2=5:4, CVl=CV2x3.5, angle about 120°.

Frons distinctly microcoriaceous and closely covered with comparatively large punctures, punctures partly subrugosely confluent; mesoscutum also distinctly microcoriaceous and closely superimposed with distinct punctures, punctures slightly smaller than those on frons; propodeum with lateral series of striae, the striae sparse and short, but interspaces of them again finely striate, area dorsalis at base obliquely finely and sparsely striate, area between the striae weakly irregularly reticulate, rest of the area transversely strongly and coarsely striate, sides smooth and polished but dorsally with fine close striae obliquely running, and posteriorly closely covered with hair-bearing punctures.

♂, unknown.

Holotype: ♀, Sarawak, 4th Div. Gn. Mulu, RGS Exp., X-XI. 1977, M. Collins (BMNH).

15. TRYPOXYLON KALABAKAN sp. nov.

Closely allied to T. vechti m., but is much smaller in body size, with inner orbits much more strongly convergent towards clypeus and IODc is markedly narrower and can easily be distinguished from the Javanese species.

Diagnosis. ♀, 6-7 mm. Head subcubic IODs=4:1 - 5:1, SAT long high nasiform, medio-apical point nearly in contact with top of ASR, A3=AWx4, mesoscutum microcoriaceous, propodeum with weak lateral carinae, area dorsalis enclosed with furrow, gastral petiole clavate, short, RC=C, CVl÷CV2x3, fore and mid legs at least largely, hind leg partly yellow, G2,3,4 partly reddish. Hair silvery.

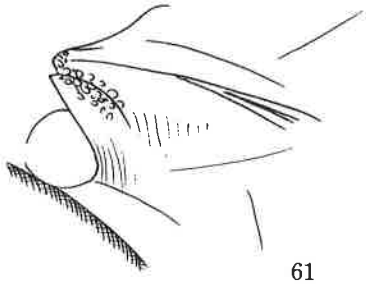
Black, yellow are Al,2, greater part of 3, palpi, tubercle posteriorly, tegula (transparent), fore leg except base of coxa and arolium, mid leg except base of coxa and T2-5 (brown) and hind leg on apex of coxa, trochanter and base of tibia and of Tl; apical margin of clypeus, mandible and basal plate of wing ferruginous, base and apex of G2 and of 3 and base of 4 reddish yellow, yellow tint extending much broader beneath, but in some specimens the colour turns into dusky red and inconspicuous; antenna from apical half of A3 apically pale brown - dark brown, mid Tl apically, hind femur and rest of hind tibia and tarsus deep brown. Hair silvery.

Head seen in front quadrate, W:L=100:98, markedly large ommatidia at lower parts of eyes very conspicuous, IODc remarkably narrow, IODs=10:2 or 10:2.5, frons gently raised, surface flat, without medial furrow, but narrow ridge of acutely raised nasiform SAT posteriorly slightly enlarged and medianly longitudinally impressed, SAT narrow, long, seen in profile with dorsal line curved like an acquiline nose and apically pointed (Fig. 63), ASR short, highly raised, with top locating close to medio-apical pointed apex of SAT, sometimes narrow space between them (=PAF) interrupted a ridge of coarse punctures covering there, but usually not, thus highly raised PAF connected directly with also highly raised IAF. The structure in somewhat oblique vertical view: Fig. 61, in dorso-lateral view: Fig. 62, in lateral view: Fig. 63. Clypeus: Fig. 64, at base flat, apically gently roundly tectate, apical margin reflected.

HW,HL,IODv,A3,P=100,70,32,22,100. OOD,Od,POD÷1,5,3. A3÷AWx4, A3,4,5÷10,7,6.5. P,Ma,Mi,2(Ma),3(Ma)=100,34,18,64(48),52(58). RC=C, Rl slightly shorter than TCV but reaching close to wing apex, CVl=CV2 x 3-4, TCV:CV2÷5:4.

Occipital carina disappeared behind buccal cavity. Collar of pronotum with anterior part very narrow, in broad middle area nearly keel-like and slightly incrassate laterally, posterior part discoloured, lamellate and semitransparent, dusky yellow.

lamina on side slightly produced, rounded, not conspicuous, mesopleuron with markedly large scrobe, subalar area normal. Propodeum with weak lateral carinae, in some light defined and in some light almost unobservable, area dorsalis enclosed with distinct fu furrow, median furrow broad and fairly deep, area apicalis subtriangularly raised, not completely enclosed with carinae, GSR band-shaped, not elevated.



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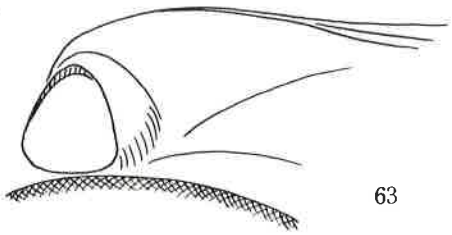

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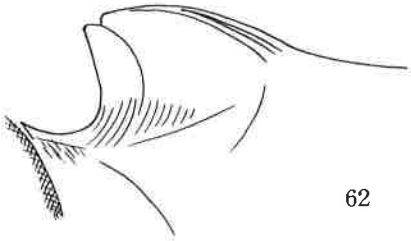

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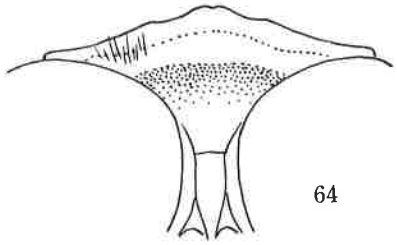

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Figs. 61-64. Trypoxylon kalabakan sp. nov., ♀.

Frons distinctly microcoriaceous and closely superimposed with comparatively large strong punctures, mesoscutum similarly closely punctured, punctures are connected with each other by several fine impressed lines under high magnification. Propodeum with series of striae along lateral carinae, striae anteriorly weaker and posteriorly sparser and stronger, sometimes anterior part simply closely punctured, area dorsalis at base obliquely shortly, rest of the area transversely distinctly and rather coars ly striate, sides smooth and polished, only on dorsal area covered sparsely with punctures.

♂ unknown.

Holotype: ♀, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 60 m high, 25. X. 1962, K. J. Kuncheria (HPBM).

Paratypes: 2 ♀, same loco, 22, 24. X. 1962, K. J. Kuncheria (HPBM); 1 ♀, Sarawak Nanga Pelagus, 7-14. VIII. 1958, T. C. Maa (BPBM).

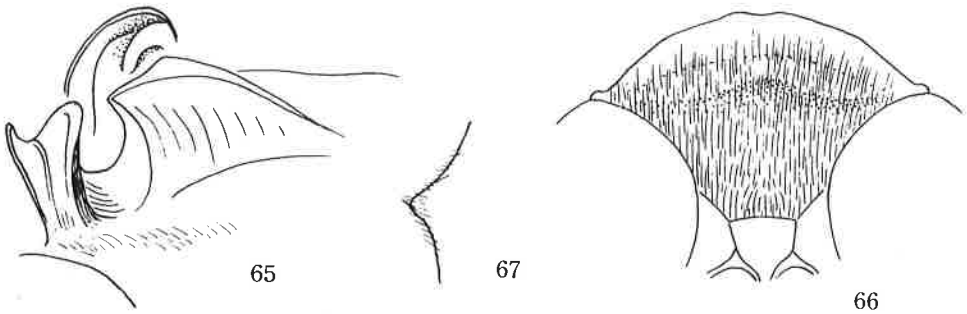
16. TRYPOXYLON RUFIGASTER CAVATUM ssp. nov.

(Trypoxylon rufigaster Tsuneki, SPJHA, 9: 78, 1979 (♀ ♂, Laos, Singapore, figs.)

The new subspecies (♀) differs from the nominate race in that Gl is relatively much longer, mesoscutum with strong plumbeous shine, half mat and more closely finely punctured, femora of legs wholly yellow, only hind one medianly pale brownish and mid T3 and 5 above and hind tarsus except articulations brownish (coxae and arolia black). (In rufigaster rufigaster mesoscutum smooth and shining, almost without plumbeous shine and finely very sparsely punctured and all femora black, but mid and hind tarsi without dusky patches.)

Main characters: SAT-ASR: Fig. 65 (dorso-lateral), median carina of SAT anteri-

orly enlarged, acutely inclined to IAA where it carries a round fovea. Clypeus: Fig. 66, pronotal lamina: Fig. 67, posterior part of collar incompletely discoloured, propodeum with lateral carinae, area dorsalis enclosed with distinct crenate furrow, median furrow deep, with bottom line crenate, gastral petiole subflask-shaped.



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Figs. 65–67. T. rufigaster cavatum ssp. nov., ♀

Measurements (within parentheses: paratype): HW,HL,IODv,A3,P=100,48,24,26,82 (100,50,24,26,92). IODs=10:8 (do.). A3=AW×5.3 (×5.5). A3,4,5÷10,6,5.5 (10,6,5). OOD,Od,POD=1,4,2 (do.). P,Ma,Mi,2(Ma),3(Ma)=100,36,12,56(46),60(66) 100,26,10,50(26)* 56(34)*. (* laterally pressed). RC=C, CV1=CV2×6, TCV:CV2÷5:3, Rl moderately long =CV2 reaching close to wing apex.

Al, 2 and basal half of 3 yellow, mandible yellow, apically brown, mouth parts and pronotal tubercle posteriorly yellow, tegula semitransparent yellow, basal plate of wing opaque yellow. Gaster completely ferruginous, in paratype G1 on basal part beneath black, legs yellow, base of fore and mid coxae, hind coxa nearly wholly, hind femur above and hind T2–3 black (T4–5 brown).

♂, unknown.

Holotype: ♀, Sarawak, 4th Div. Gn. Mulu, RGS Exp. 17.IX.–23.X. 1977, D. Hollis (BMNH – B.M.77-543).

Paratype: 1 ♀, the same data (BMNH – B.M.77-543).

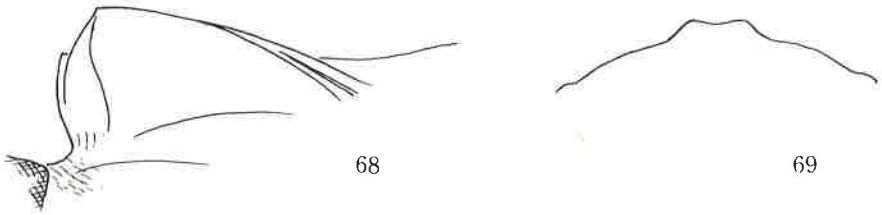
17. TRYPOXYLON JAVANENSE TSUNEKI, 1979

Trypoxylon javanense Tsuneki, SPJHA, 11: 24, 1979 (♀ ♂, Java, figs.)

Specimens examined: 1 ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.–23.X. 1977, D. Hollis (BMNH – BM77-543); 1 ♀, same loco, XI.–XII. 1977, M. Collins (BMNH).

Observation. The Bornean form of this species is much brighter in colour than the bright-coloured one of the Javanese representatives. Lemon yellow (not ferruginous) are Al–2 and 3 on basal half and beneath, apical margin of clypeus (extreme apex brownish), mandible, mouth parts, pronotal tubercle on posterior half, tegula and basal plate of fore wing, fore leg except coxa and arolium, mid leg from apex of coxa to T5 (T2–4 faintly brownish) and hind leg on trochanter, knee, base broadly of tibia and T1 (T2–5 pale brown). In one specimen fore and mid femora stained respectively with a brown streak above, mid T2–5 partly brownish and hind tarsus from apex of T1 to 5 more darkened. Gaster ferruginous, in both a black patch is present on anterior part of apical swelling.

Structural and sculptural characters generally as in the typical form. Measurements on the brighter one (within parathesis: second one): HW,HL,IODv,A3,P=100,56, 29,21,92 (100,58,29,20,96) (in the Javanese P is relatively 115). IODs=10:5, OOD,Od, POD÷1,5,3 (1,6,4). A3=AW×4. A3,4,5÷10,7,6. P,Ma,Mi,2(Ma),3(Ma)=100,36,17,56(50), 50(54). Head in frontal view W:L=100:88. In fore wing RC=C, Rl moderately long, =TCV × 0.5, TCV÷CV2, CV1=CV2 ×3.5. Apical margin of clypeus: Fig. 69, SAT–ASR in dorso-lateral view to see through false PAF: Fig. 68. Length 8.0 and 9.0 mm.



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Figs. 68-69. T. javanense Tsuneki (Bornean form, ♀).

18. TRYPOXYLON MULUSANUM sp. nov.

Closely resembling T. ferrugineum m. described from Thailand and Laos, but in the present species propodeum with very indistinct lateral carinae, area dorsalis without lateral furrows, SAT somewhat higher and without medio-apical transverse carina connecting it with ASR (Figs. 70 and 71, cf. Figs. 75 and 76 in ferrugineum) and antennal joints somewhat shorter, appearing thicker (A8-11 in the present species distinctly shorter than wide, in ferrugineum almost as long as wide). Colouration and general structure very similar.

Diagnosis. About 8 mm. Gaster ferruginous, antenna basally and legs broadly yellow, Gl clavate, mesoscutum microcoriaceous, propodeum with very feeble lateral carinae, area dorsalis without lateral furrows, IODs=5:3, clypeus bluntly bidentate at apex in middle, SAT-ASR: Figs. 70-72.

♀. 7.5-8.5 mm. Black, yellow are A1 and 2 (often with blackish mark above) and 3 beneath, apical margin of clypeus (extreme apex brown), mandible at base, palpi, posterior margin of pronotal tubercle, tegula (transparent, with an opaque yellow spot), basal plate of wing, fore and mid legs except greater part of coxa and arolia and hind leg on the following parts: apex of coxa, trochanter, base and apex of femur, tibia except outer apical brown mark, spurs and T1. Gaster ferruginous, usually with one or two small blackish patches on apical swelling of petiole, often posterior part beneath also obscurely blackish, rest of hind femur, tibia and tarsus brown.

Head in frontal view with lateral margins fairly rounded and very slightly convergent towards clypeus, W:L=100:86. HW,HL,IODv,A3,P=100,56,26,18,84. IODs=10:6. OOD, Od,POD=1,5,2. A3÷AW×3.7. A3,4,5÷10,7,6. P,Ma,Mi,2(Ma),3(Ma)=100,46,20,56(70),50(70). SAT-ASR: Figs.70(dorso-lateral to see through PAF), 71(obliquely ventro-lateral) and 72(lateral). Clypeus: Fig. 73, disc gently roundly tectate, with hair parallel; occipital carina broadly lacking beneath head. Pronotal collar transverse, anterior part very narrow ridge-like, posterior part discoloured, but appears dark brownish, lamina on side: Fig. 74. Subalar area roundly raised, with outer margin edged, but not expanded. Propodeum with very indistinct lateral carinae, in some condition almost absent, area dorsalis without lateral furrows, median furrow elongate oval, fairly deep, area apicalis with distinct lateral carinae, but the carinae not extended inwards, but the area raised, medianly bluntly ridged and enclosed with feeble furrow. GSR transversely roundly up-curved, but posterior margin not specially elevated. Gl stoutly clavate (see measurements), in fore wing RC=C-B, R1 fairly long, 2/3 the length of TCV, but not reaching close to wing apex, CV1÷CV2×4, TCV:CV2÷5:4.

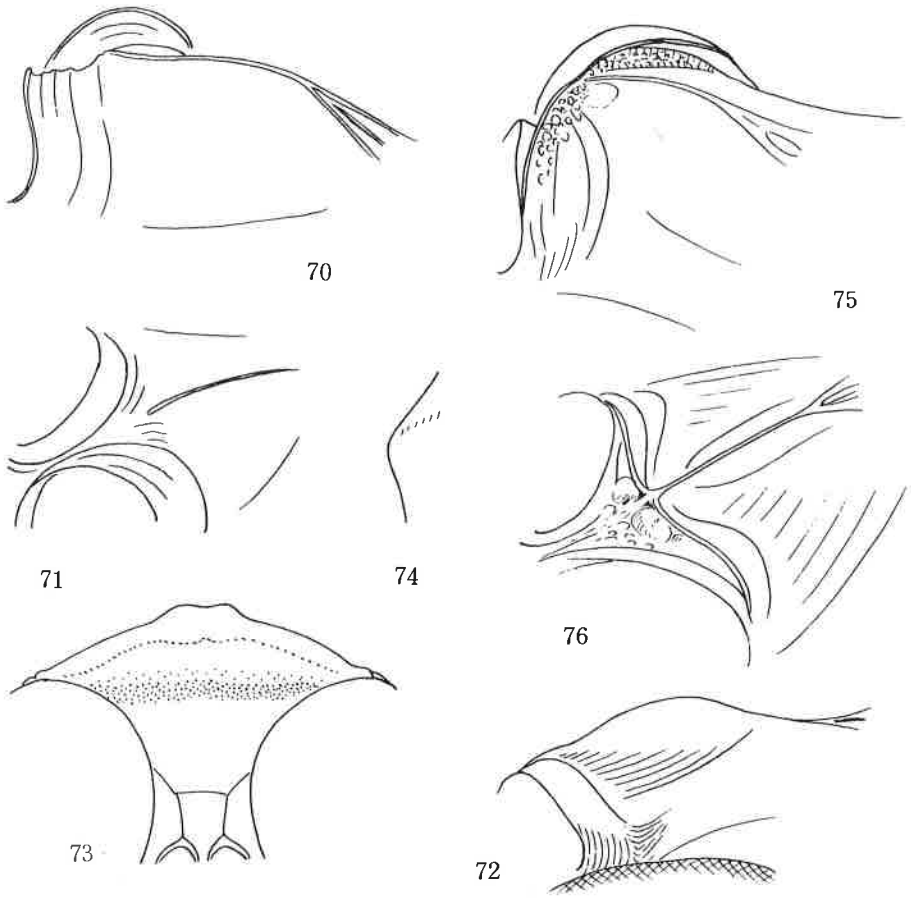
Frons distinctly microcoriaceous and finely closely rugoso-punctate, mesoscutum similarly sculptured, but punctures less rugosely confluent; propodeum with distinct lateral series of striae, striae fine and close, area dorsalis at base crenate,crenae longer at median furrowed area, the furrow itself transversely finely closely striate, disc smooth and shining, sides polished, only on posterior area finely closely punctured.

♂ unknown.

Holotype: ♀, Sarawak, 4th Div. Mt. Mulu, RGS Exp. 17.IX. - 23.X. 1977, D. Hollis (BMNH - B.M.77-543).

Paratypes: 1 ♀, the same data as holotype (BMNH); 3 ♀, North Borneo, Forest Camp, 19 km North of Kalabakan, 60 m high, 9-13, XI. 1962, K, J. Kuncheria and 18. X. 1962, Y. Hirashima (BPBM).

Remarks. The present species is also closely allied to T. pagdeni m., but can be



Figs. 70–76. 70–74. T. mulusanum sp. nov. ♀. 75–76. T. ferrugineum Ts., ♀.

separated therefrom by that the legs are much brighter (in pagdeni all femora, mid and hind tibiae largely and greater part of mid and hind tarsi black), propodeum almost without lateral carinae and area dorsalis completely without lateral furrows (but SAT-ASR similar).

Medio-apical area of SAT in the present species sometimes appears to be transversely carinated in some light condition, but this is due to a blunt edge, in frontal view (as in Fig. 71) there is always no carina that connects SAT and ASR.

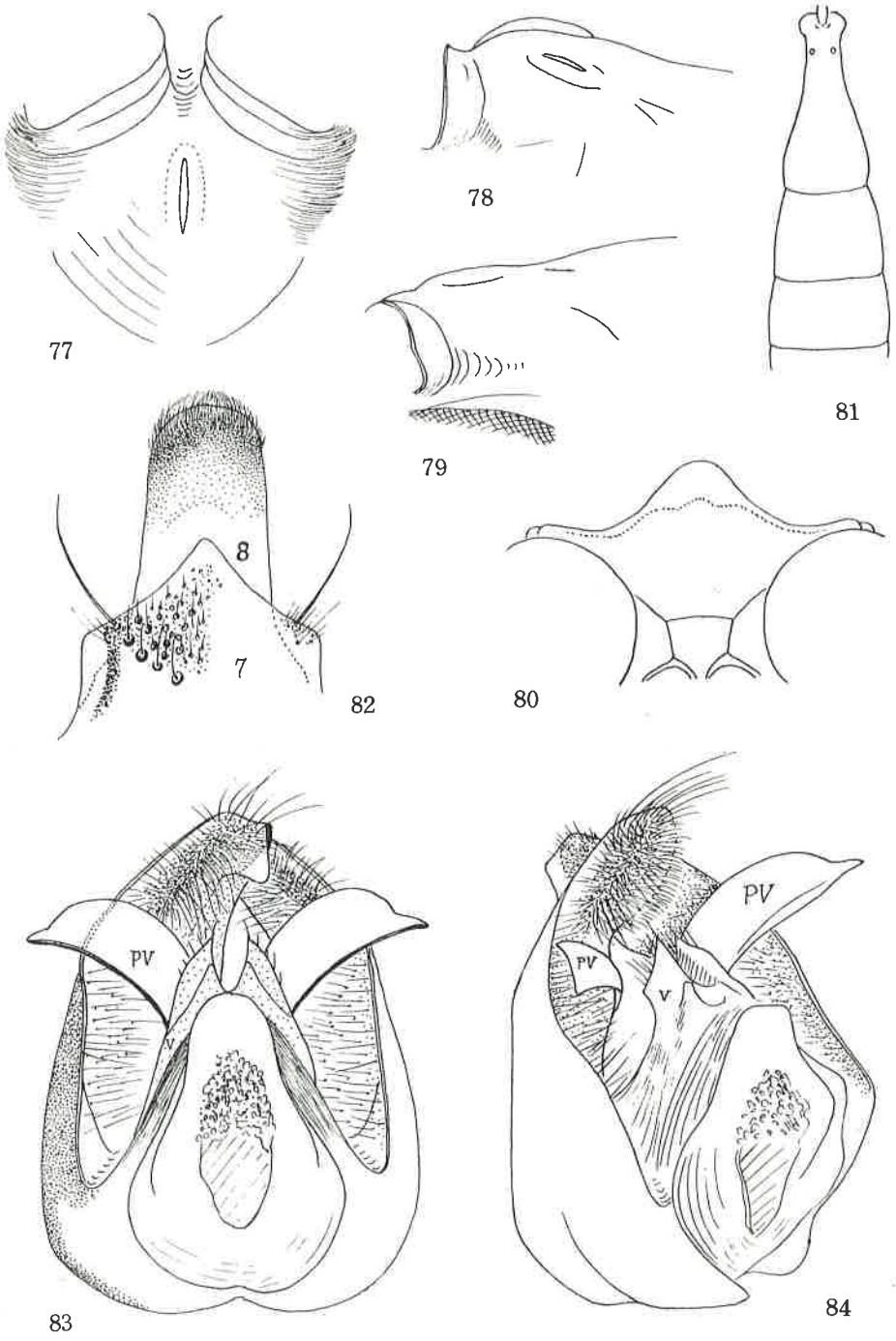
In one specimen from North Borneo (13.XI.1962) gaster is markedly stained and appears broadly blackish, scattered with semitransparent reddish patches. Possibly this must be a postmortem change.

18. TRYPOXYLON PAULUM sp. nov.

Diagnosis. ♂ 5 mm. Gastral petiole clavate, mesoscutum under high magnification only faint microstriae can be seen, propodeum with lateral carinae, area dorsalis enclosed with furrow, IODs=10:7, SAT low tuberiform, PAF down-curved in cross section, clypeus medianly strongly produced, A13=A11+12, A1-4, all trochanters, fore tibia and tarsus, mid tibia and T1 and base of hind tibia ferruginous, hair silvery.

Black, A5 and 6 more or less brownish, apical glabrous area of clypeus slightly brownish, mandible at base dark brown, medianly ferruginous and apically reddish brown

(natural?), palpi ochre yellow, apices of coxae, base and apex of fore and mid femora, fore tibial spur ferruginous, rest of femora, tibiae, tarsi and mid and hind tibial spurs dark brown, tubercle brown and posteriorly yellowish, veins dark brown. Hair silvery.



Figs. 77-84. Trypoxylon panlum sp. nov., ♂

Head in frontal view with sides gently rounded, somewhat subquadrate, W:L=100:90. HW,HL,IODv,A3,A13,P=100,66,33,14,14,86, IODs=10:7, OOD,Od,POD≒1,4,2, A3=AW×2.3 (in narrowest view ×3), A3,4,5≒10,7,6, A13=BW×1.5 and ≒A11+12, P,Ma,Mi,2(Ma),3(Ma)=100, 44,18,48(60),40(66). Frons moderately raised, surface nearly flat, median furrow very weak, broad and shallow, eye incisions fairly narrowed towards bottom, SAT low tuberiform, with short median carina, carinate area longitudinally slightly elevated, medio-apical area smoothly inclined to IAA and separated from ASR by a very broad and shallow PAF, ASR short, PAF gently downcurved in cross section (Fig. 78, dorso-lateral view to see through PAF), SAT-ASR in vertical view: Fig. 77, in lateral view: Fig. 79. Clypeus: Fig. 80, disc medianly roundly tectate, with hair parallel, medio-apical area broadly glabrous, smooth and shining. Antenna comparatively short, strongly incras- towards apex, A12 appr. 2.5 times as wide as A3 at apex (A13 transformed due to disc- cation), flagellum basally compressed, hence in A3 ratio of L:W is varied according to the direction observed. (occipital carina unobservable beneath head). Anterior part of collar narrow, especially in middle area, dorsal line gently upcurved in frontal view, posterior part parallel, broader, discoloured, lamina on side blunt triangular, apex broadly rounded; subalar area normal. Lateral carinae of propodeum distinct, lateral furrows of area dorsalis also distinct, GSR comparatively broad and broadly, gently up-curved, not discoloured; G1-3: Fig. 81, sternites 2,3,4 each with a weak tubercle on each side of the medial gentle elevation before apical margin, but 5 and 6 without particular structure. In fore wing RC=B, R1 moderately long, nearly as long as TCV, TCV≒CV2, CV1≒CV2×3, angle about 100°.

Genitalia thick and stampy, seen from beneath: Fig. 83, obliquely from left side and beneath: Fig. 84. PV ... widely separated penis valve and V ... volsella. Paramere simple at apex (when seen from beneath apparently bifurcate, as if two layers closely overlapped, but in lateral or dorsal view no bifurcation can be confirmed) and apical area curved and glabrous, smooth and polished, rest of the ventral side of paramere closely covered with somewhat stiff hair, volsella pointed at apex, posterior margin angled above middle, dorsal area also with a weak tubercle. Penis valve very strange in structure, without shoulder and sickle appendages (the state shown in Figs. 83 and 84 is considered unnatural, here the pair are separated and widely open laterally, in the natural condition they must be contiguous with each other in middle like one layer). Sternites 7 and 8 seen from beneath: Fig. 82, the form of sternite 8 very curious and the short pubescence also very strange.

Frons microcoriaceous and distinctly superimposed with medium-sized punctures, PIS=PD x 1-2, mesoscutum closely covered with punctures, similar to those of frons, PIS=PD or less, under high magnification very faint striae can be seen on PIS, area dorsalis at base obliquely strongly coarsely striate, striae gradually longer and longitudinal towards middle area where they cover about basal third of the area, medial furrow transversely coarsely striate, disc smooth, partly covered with the extended striae from base and from middle, lateral furrows strongly crenate, series of stioles along lateral carinae of propodeum strong and distinct, sides smooth and polished, with a patch of strioles below spiracle and strongly closely punctured at posterior most area.

♀, unknown.

Holotype: ♂, Sarawak, 1st Div., Semongoh For. Res., 1°25'N, 110°17'E, 15-19. XI. k976, P. S. Cranston (BMNH - B.M.1977-19).

Remarks. This species considerably resembles T. jacobsoni known from Sumatra, but is different from this in that IODc is much broader, clypeal apical margin is different in form (rather similar to ♀ of jacobsoni in this character) and gastral petiole and especially the genitalia distinctly dissimilar.

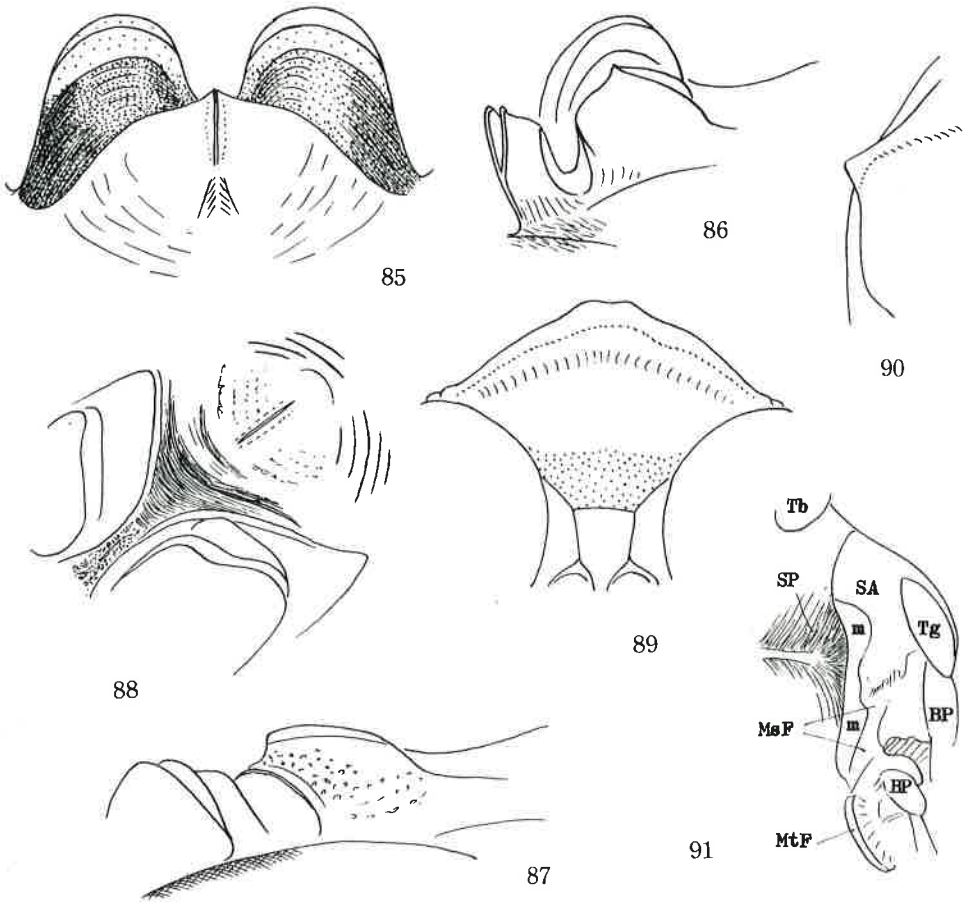
20. TRYPOXYLON SANDAKANUM sp. nov.

Similar in appearance to T. concinnum m. known from Malaya, but is slenderer, IODc is relatively narrower, SAT anteriorly without fovea, PAF U-shaped in cross section, subalar area with well-developed pent-roof structure, gastral petiole relatively longer and apical swelling much weaker.

Diagnosis. ♀ about 12 mm. Hair golden, prothorax completely orange yellow, subalar area with well developed pent-roof structure, P long, flask-shaped, mesoscutum distinctly microcoriaceous, propodeum with lateral carinae, IODs=10:8, clypeus strong-

ly rounded out and medianly minutely and weakly emarginate, antenna basally, clypeus nearly wholly, fore and mid legs nearly wholly, hind leg broadly orange yellow, G1 at base and on sides, G2-3 largely ferruginous.

Black, A1-2 and basal half of 3 yellow, apical half pale brown, thence apically brown to dark brown, clypeus ferruginous yellow, on basal third somewhat brownish; orange or ferruginous yellow are mandible, mouth parts, prothorax completely (but tubercle lemon yellow), tegula (semitransparent, with a lemon yellow patch in middle), basal plates of wings, outer margin broadly of subalar pent-roof structure, meso- and metaflanges, apex of propodeum, basal half and sides of G1 (at base till spiracles paler), G2-3 (G2 slightly dark) except blackish underside, fore leg completely, mid leg except brown T2-5 and hind leg except base of coxa, broad median area of femur and whole of tarsus (the parts brown). Hair golden, on clypeus parallel, on baso-lateral areas of propodeum curled.



Figs. 85-91. Trypoxylon sandakanum sp. nov., ♀

Head in frontal view with outer margins of eyes roundly convergent towards clypeus, W:L=100:88, vertex fairly depressed, with tops of hind ocelli in same level with upper margins of eyes, eye incision narrow and deep, subparallel-sided. HW,HL,IODv,A3,P= 100,50,21, 28, 156. OOD,Od,POD÷1,6,2. IODs=10:8. A3÷AW×6. A3,4,5÷10,7,6, A12 relatively 6.5. P,Ma,Mi,2(Ma),3(Ma)=100,14,5,34(17),33(22). Notice the underlined values. They show the very narrow vertex, long antennal joint 3 and very long and slender gastral petiole. RC=C-M, R1 short, but reaching close to wing apex, CV1=CV2 6, TCV:CV2= 3:2, both gently curved, angle about 100°.

Frons gently raised, median furrow broad and shallow, SAT moderately high tuberi form, but medianly shortly highly carinated (Fig. 87, lateral view), at verge to PAF edged and medio-anteriorly obliquely flattened into triangular area, the area not polished nor foveate, ASR highly elevated and highly bicarinate on top, the carinae ambur yellow in colour, rest black, PAF deep, flat-bottomed, U-shaped in cross section, SAT-ASR seen from dorsal side: Fig. 85, in dorso-lateral view to see through PAF: Fig. 86, in profile: Fig. 87 and obliquely from beneath: Fig. 88. Clypeus: Fig. 89, A3 markedly long (ref. measurements). Pronotal collar transverse, anterior part narrow and slightly widened laterally, seen in front dorsal line gently up-curved and medianly recurved, lamina on side: Fig. 90. Subalar area of mesopleuron in lateral view: Fig. 91, Tb=Tubercle, Tg=Tegula, SA=Subalar-area, BP = Basal plate of wing, MSF=Mesopleural-flange, MtF=Metapleural-flange, SP=Subalar-pit or -excavation. Subalar area expanded into pent-roof structure, apex triangularly membraneous (m) and transparent like a cellophane paper and extended posteriorly along the margin, metapleural flange roundly expanded laterally. Lateral carinae of propodeum distinct, area dorsalis not enclosed by furrow, but the area slightly raised above surrounding area and well defined as such, medial furrow fairly deep, enlarged towards apex, Gl=AW×7, very slender and long.

Frons very minutely microcoriaceous, with superimposed punctures indistinct except on medial furrow, SAT distinctly closely punctured; mesoscutum microcoriaceous and somewhat sparsely superimposed with punctures, punctures anteriorly weaker, closer and not distinct, posteriorly larger, stronger and distinct, propodeum with series of striae along lateral carinae, the striae anteriorly shorter, weaker, sparser, but posteriorly larger closer and stronger, area dorsalis transversely strongly closely striate, at base crenate, sides of propodeum transversely delicately striate and punctulate except anterior smooth area, posteriormost area covered with strong hair-bearing punctures.

♂, unknown.

Holotype: ♀, North Borneo, Sandakan, date unknown, C. F. Baker (USNM).

Remarks. From the specimen the head is dropped off and mounted on the card point, the right antenna from joint 8 apically lost, left antenna is detached and joints 1-3 are missing, the rest is mounted on the card together with the head, G2 laterally compressed and G3 is pushed out (in measurements basal smooth - usually hidden - area is excluded).

21. TRYPOXYLON SILVICOLA sp. nov.

♀. 12 mm, very close to the preceding species, but can be separated therefrom mainly by the following differences:

Prothorax has a black band crossing nape region to sides of the notum, flagellar joints of antenna relatively shorter, A3=AW×5, A4=AW×2.7, A6=AW×2 (in sandakanum ×6, × 4, ×3 respectively), IODc slightly wider, supraclypeal area distinctly broader (cf. Fig. 93 and Fig. 89), SAT with verge to PAF not edged (Fig. 92, dorso-lateral), area dorsalis only on posterior portion transversely striate and disc sparsely punctured. Clypeus with apical margin sometimes different and sometimes similar in form, according to the condition (Figs. 93 and 94). Hair on head and thorax-complex rather brassy.

Colour of antenna, clypeus (till base ferruginous), mandible, palpi and legs similar, gastral petiole and G2 and 3 also generally similar, but G3 sometimes with a pair of yellow marks above (This can vary, because in one specimen only one of them present - certainly they appear by the partial exfoliation of inner epidermis).

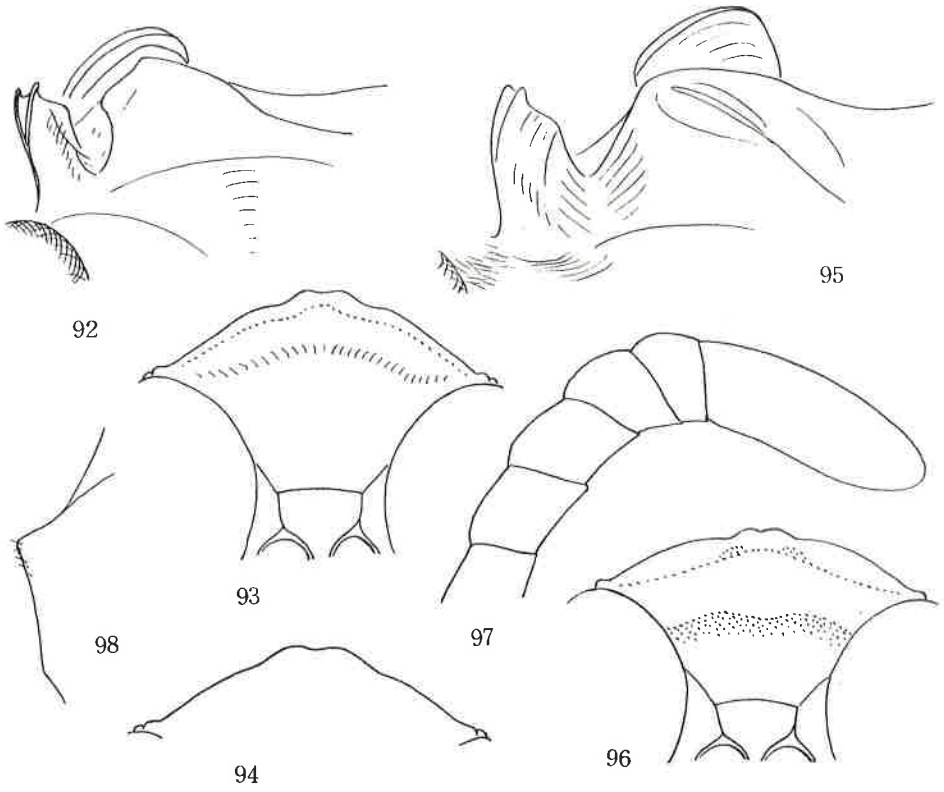
Head in frontal view with sides roundly, slightly convergent towards clypeus, vertex depressed as in sandakanum, W:L=100:84, eye incision somewhat narrower than in this and narrowed towards bottom. Measurements (within parentheses the other paratype): HW,HL,IODv,A3,P=100,46,23,24,164 (100,48,23,26,164). IODs=10:9 (do.). OOD, Od,POD=1,4,2 (1,3.5,2). A3,4,5÷10,6,6 (10,6,5.5). P,Ma,Mi,2(Ma),3(Ma)=100,16,5,30 (17),32(26) (100,14,5,29(15),34(33)). Slight differences from sandakanum are present in relation to HL, IODv and length of P.

Structure of pronotum including lamina, mesopleuron including pent-roof structure at subalar area, propodeum, gastral petiole and fore wing venation also closely similar.

♂. 9 mm. In colouration slightly different from ♀. Al-2 orange yellow, rest

brown, clypeus on apical 3rd only ferruginous and medio-apical area narrowly castaneous, mandible on basal 2/3 lemon yellow, apical 3rd ferruginous and reddish brown at apex, mouth parts ferruginous, palpi ochre yellow, G1 dark brown, somewhat paler on peduncular area and sides throughly honey yellow, G2 on sides and G3 at base semi-transparent yellow, rest of gaster brown (on G2) or dark brown. Prothorax including tubercle, tegula and basal plate of wing, pentroof structure of mesopleuron and legs similar to ♀ in colouration.

Head in frontal view with sides strongly rounded, not convergent towards clypeus, markedly wider than long, W:L=100:76, vertex depressed, tops of eyes and hind ocelli in a line, eye incisions narrowed towards bottom as in ♀. Head seen from above markedly transverse, with vertex broader than in ♀. HW,HL,IODv,A3,Al3,P=100,44,25,18,22, 132. IODs=10:8. OOD,Od,POD≒1,4,2. A3=AW×3.7. A3,4,5≒10,7,6, Al3 relatively 12. Al3=BW×2.4 and ≒A9-12. P,Ma,Mi,2(Ma),3(Ma)=100,20,6,34(32),34(40). RC=C-M, Rl short, not reaching close to wing apex, CV1≒CV2×5, TCV:CV2≒3:2, TCV bent inwards at a 3rd from angle, CV2 gently downcurved, angle about 100°.



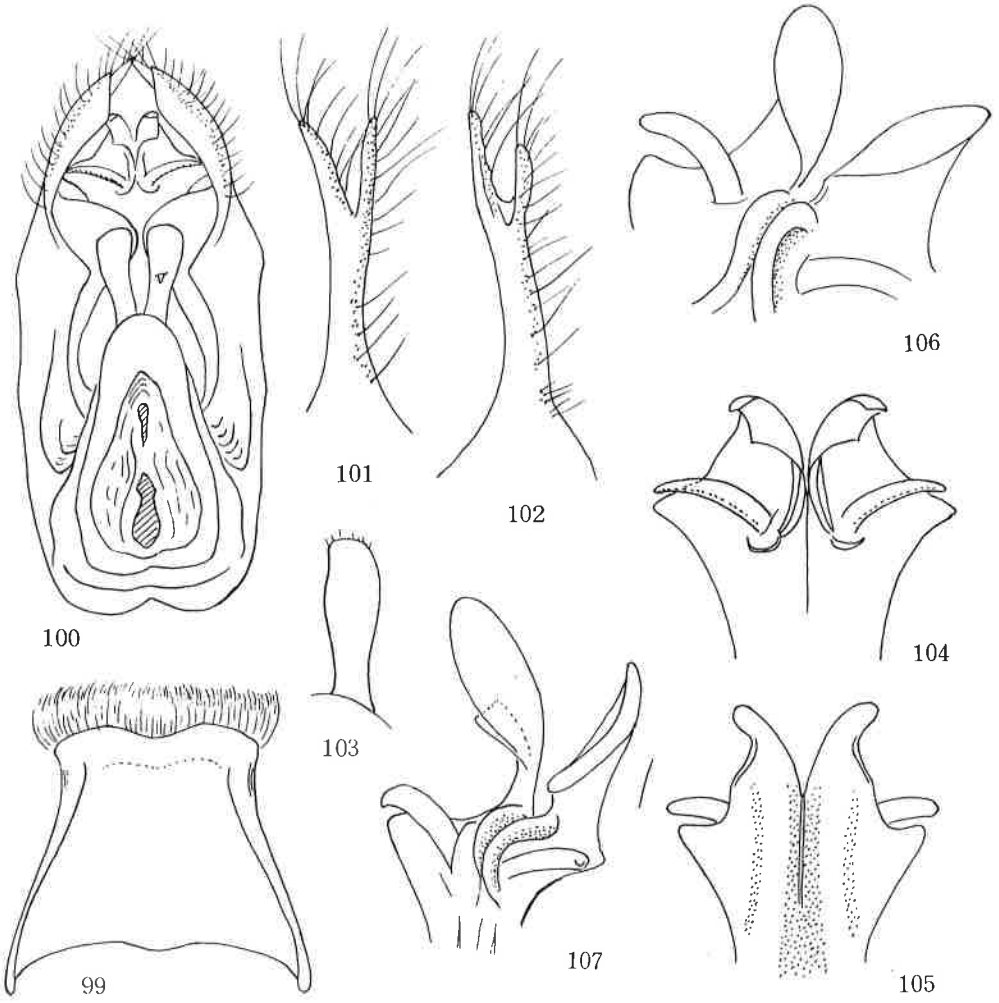
Figs. 92-98. Trypoxylon silvicola sp. nov. 92-94, ♀; 95-98, ♂.

Frons gently raised, medial furrow broad and shallow, SAT low tuberiform, medianly weakly carinate, carinate area somewhat flattened and smoothly inclined to IAA, surface punctured and without fovea, verge to PAF not acutely edged, ASR anteriorly bicarinate, obliquely inclined posteriorly to PAF, surface transversely striate, PAF deep, flat-bottomed, V-shaped in cross section (Fig. 95), clypeus: Fig. 96, less produced anteriorly than in ♀, disc gently roundly tectate, not reflected at apex, apical part of antenna: Fig. 97; occipital carina complete. Collar of pronotum with anterior part narrow, slightly incrassate laterally, in frontal view dorsum gently subtriangular, median top broadly rounded, lamina on side: Fig. 98, similar to ♀, parapsidal sutures of mesoscutum in a raised line as in ♀; subalar area of mesopleuron with well developed pent-roof structure, similar in structure and colouration to ♀, propodeum with well defined lateral carinae, but it ends at about a 3rd from apex and fairly broadly separated from the lateral carina of area apicalis, area dorsalis with-

out enclosing furrow, but median furrow distinct, enlarged posteriorly, area apicalis only on sides margined with carina, GSR roundly raised, Gl distinctly flask-shaped.

Frons distinctly microcoriaceous, superimposed punctures on upper portion sparse and indistinct, on lower portion somewhat stronger and close; mesoscutum similarly microcoriaceous, punctures distinct, PIS=PD× 2-3, area dorsalis from baso-medial area 3 long striae extended to about mid point of medial furrow, the middle longer (constant?), disc irregularly coarsely punctured, on apical third including medial furrow transversely finely closely striate, lateral series of striae indistinct, lateral and posterior parts of dorsal side of propodeum closely covered with hair-bearing punctures, sides irregularly, rather sparsely covered with comparatively large, but shallow punctures except anterior smooth area and posterior striate area.

Sternite 8 seen from inside: Fig. 99, without long hair-bundle on each side at apex. Genitalia seen from beneath: Fig. 100, considerably resembling those of maculiventre m. Paramere similarly bifid at apex (Figs. 101, 102, left-hand one, lateral and dorso-lateral view), but the fissure is shallower than in this, sparsely but strongly fringed with somewhat stiff hair, main body lamellately expanded on inner margin and half rolled ventrally, volsella spatulate, apically reflected, with sparse pubescence at apex (Figs. 100, V and 103, right half); penis valve thick and robust, with well developed shoulder and sickle appendages (Figs. 104, ventral; 105, dorsal) and characteristic in the structure of ventral side. It has a thick and roundly raised swelling on inner margin (Figs. 106, obliquely ventral; 107, more lateral).



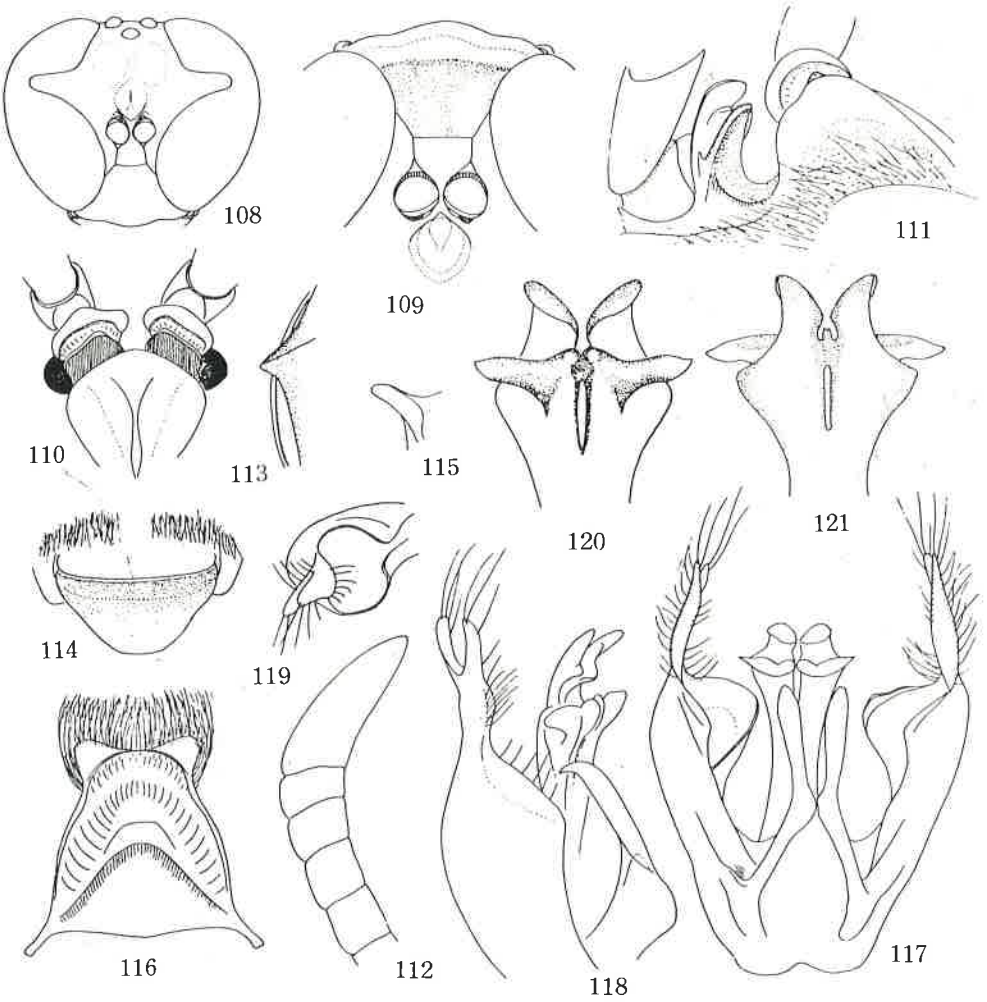
Figs. 99-107. Trypoxylon silvicola sp. nov., ♂

Holotype: ♂, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 12. XI. 1962, Malaise trap, Y. Hirashima (BPBM).
Paratype: 2 ♀, same loco, 30. X., 18. XI. 1962, K. J. Kuncheria (BPBM).

22. TRYPOXYLON WALLACEI sp. nov.

Trypoxylon ferox: Tsuneki, SPKJA, 8: 16, 1978 (♂ nec ♀, Celebes, Makassar, A.R.Wallace - UMO).

Along with the named female of T. ferox Smith, 1860, is preserved a male specimen from the same locality bearing the same locality label by the hand of A. R. Wallace or his assistant in the Hope Entomological Collection at Oxford. When I tried the redescription of the type specimen (♀) I described also the male as the other sex of T. ferox. Judging by our present knowledge, however, there is no doubt that the male belongs to a species distinctly different from the female, because the male differs from the female in that it has a well developed pent-roof structure at subalar area of mesopleuron, its ASR is strongly bicarinate, with the posterior carina markedly reflected posteriorly, embracing oviform PAF (not flat and minutely granulate having U-shaped PAF posteriorly) and its mesoscutum distinctly microcoriaceous, not smooth and punctured.



As to the characters of this species detailed description was already made. Here the main points are summarized with the reproduction of the figures (except subalar pent-roof structure).

♂, 9.5 mm. Black, ferruginous are clypeus on apical 2/3, antenna wholly, mandible largely, posterior part of collar, tubercle, tegula and basal plate of wing, G1-5, fore and mid leg from apex of coxa to T5 excluding arolium, hind leg except brownish outer side of tibia and tarsus. Extreme apical margin of neck region and apex of pronotal lamina castaneous brown.

Head in frontal view: Fig. 108, HW,HL,IODv,A3,A13,P=100,50,25,9,14,156; OOD,Od, POD≒2,5,3; A3≒AW×3; A3,4,5≒10,6,6; A13=BW×3 and ≒A9-12. Clypeus and antennal area: Fig. 109; SAT-ASR in dorsal view: Fig. 110; ditto in dorso-lateral view: Fig. 111; A9-13: Fig. 112; pronotal lamina: Fig. 113; GSR from above: Fig. 114, from right side: Fig. 115; sternite 8: Fig. 116. P,Ma,Mi,2(Ma),3(Ma)=100,18,6,32(26),34(30). P is broken into 2 pieces and the value above given was calculated from the combined length of them. Genitalia from beneath: Fig. 117, in ventro-lateral view: Fig. 118, paramere from apex: Fig. 119, apical part of penis valve from beneath: Fig. 120, from above: Fig. 121.

The genitalial structure is very similar to those of T. silvicola (cf. Figs. 100-107), especially in that of penis valve.

23. TRYPOXYLON FLAGELLATUM sp. nov.

Diagnosis. ♀, 14 mm. Hair golden, petiole flask-shaped, mesoscutum microcoriaceous, propodeum with lateral carinae, subalar area with pent-roof structure, IODs≒10: 9, PAF deep U-shaped in cross section, clypeus medianly bluntly bidentate, A1-3, fore and mid legs nearly wholly or largely, hind leg partly yellow. North Borneo.

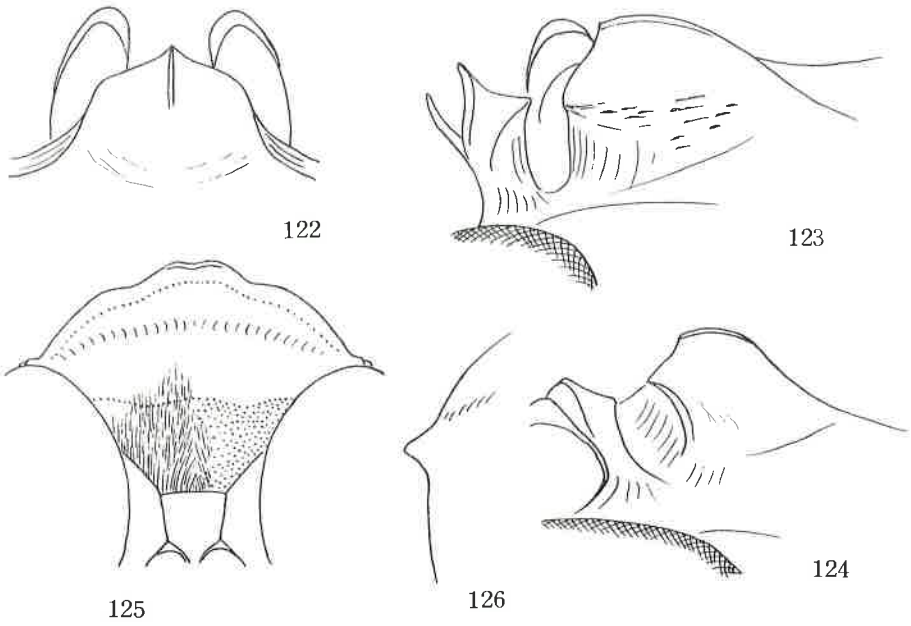
Closely allied to maculiventre m., especially the Malayan form, but is different from it in that the flagellar joints of antenna are much longer, PAF is deeper and flat-bottomed and pent-roof structure at subalar area with the apical transparent part reflected and produced nearly horizontally.

Black; ferruginous to orange yellow are A1-3, apical 2/3 of clypeus (basal 3rd brown), mandible (basally lemon yellow, apically reddish brown), mouth parts, discoloured posterior part of collar, tubercle, tegula and basal plate of wing, apical part of pent-roof structure, meso- and metapleural flanges, basal half of G1 (sometimes brownish above posteriorly, on sides and beneath more broadly extended posteriorly), G2-3 (both apically above brownish), fore leg except arolium, mid leg except base of coxa, T2-5 (brown) and arolium and hind leg on apex of coxa, whole of trochanter, both ends of femur, base and inner side of tibia and fore and mid tibial spurs. Hair golden, at baso-lateral areas of propodeum slightly curled.

Head in frontal view wider than long, W:L=100:82, with sides rounded, slightly convergent towards clypeus, vertex narrow and depressed, upper margins of hind ocelli somewhat below level of tops of eyes, eye incision narrow and deep, subparallel-sided and broadly rounded at bottom. Head seen from above markedly transverse, with occipital margin gently emarginate. HW,HL,IODv,A3,P=100,42,20,33,194; IODs=10:9; OOD,Od, POD=1,8,4 (OOD linear); A3≒AW×6.5, A3,4,5≒10,7,6.5; A4≒AW×4; A7≒AW×3; A12≒BW×4.6. P,Ma,Mi,2(Ma),3(Ma)=100,12,4,30(14),36(17).

Frons weakly raised and gently inclined towards medial line, SAT-ASR in dorsal view: Fig. 122, ASR narrow, SAT moderately high tuberiform, shortly carinated in middle, medio-apical area flatly and rather acutely inclined to IAA, surface finely punctured, not shining, without fovea on it, verge to PAF distictly edged, ASR tricarinate (Fig. 123, dorso-lateral view), PAF deep, flat-bottomed, narrow and deep, U-shaped in cross section (Fig. 123), SAT-ASR seen in profile: Fig.124. Clypeus: Fig. 125, at base gently roundly raised and broadly reflected at apex, hair at base somewhat convergent towards medial line; antenna flagelliform, each joint long (see measurements). Occipital carina complete. Collar transverse, anterior part narrow and only weakly enlarged towards sides, in frontal view dorsal line in a obtused triangle, with top minutely rounded, lamina on side: Fig. 126. Pentroof structure at subalar area well developed, apical margin transparent and reflected to horizontal plane, mesopleural flange orange yellow, margined also with transparent membrane that comes from pentroof and further extending posteriorly to outer margin of metapleural flange which is roundly expanded laterally. Lateral carina of propodeum roundly curved in lateral view, ending far before apex of the segment and at its end not directed towards apex, but to-

wards hind coxa, area dorsalis not enclosed with furrow, median furrow broad and fairly deep, enlarged posteriorly; area apicalis indistinct, its short lateral carinae covered with dense hair under natural condition. GSR vertically (not obliquely) roundly elevated and discoloured to honey yellow. Gl,2,3 slender and long (see measurements). In fore wing RC nearly M-type, Rl short, yet reaching close to wing apex, CV2 very short, CV1≒CV2×7, TCV:CV2≒7:4, TCV sinuate, angle about 100°.



Figs. 122-126. Trypoxylon flagellatum sp. nov., ♀

Frons very minutely microcoriaceous and fairly closely superimposed with fine shallow punctures, punctures somewhat larger anteriorly, SAT without microsculpture, closely covered with slightly large punctures, mesoscutum distinctly microcoriaceous and closely punctured, area dorsalis transversely closely striate, striae anteriorly weak, mixed with punctures, outside the area surface also transversely striate, lateral series of strioles present, not strong, sides transversely finely closely rugoso-striate and mixed sparsely with fine punctures, on posterior portion punctures closer.

♂, unknown.

Holotype: ♀, North Borneo, Sandakan, date undescribed, C. F. Baker (USNM).

24. TRYPOXYLON KUNCHERIAI sp. nov.

Diagnosis. ♀, 11 mm. Hair golden, Gl flask-shaped, mesoscutum microcoriaceous, propodeum with lateral carinae, subalar area with pent-roof structure, IODs≒10:9, clypeus medianly bluntly bidentate, SAT narrow high nasiform, PAF oval in cross section, antenna basally, legs broadly yellow, gaster medianly partly ferruginous. N. Borneo.

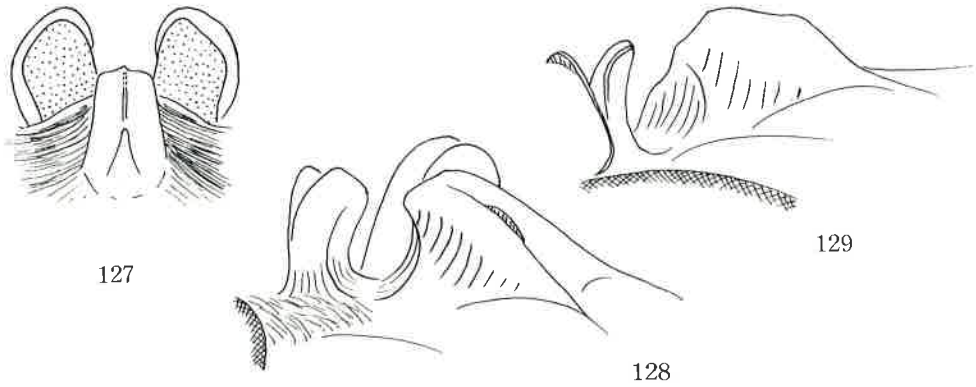
Nearest to T. selangor m. known from Malaya, but in the present species antenna from A3 apically completely black, with flagellar joints (e.g. A3) distinctly longer, SAT narrower nasiform, bearing a foveate round flat area in front and ASR only bicarinate. It is also similar in appearance to T. maculiventre, but can be distinguished from this by the difference in the structure of SAT, especially in the anterior fove-

ate round area of SAT and in the form of PAF seen through it. The present species also somewhat resembles T. coloratum Smith, but is separable therefrom by the difference in the microsculpture of mesoscutum and in the colouration of gaster and hind leg.

Black; Al and 2 orange yellow, rest black, without brownish intermediate area, ferruginous to yellow are clypeus on about apical half, mandible, mouth parts, pronotal tubercle, discoloured posterior part of collar, tegula and basal plate of wing, apical sides of G1, bases of G2 and 3 (somewhat dusky, rest of G2-3 dark brown), fore leg except base of coxa and arolium, mid leg except greater part of coxa and T2-5 (mid femur somewhat brownish above) and following parts of hind leg: bases of tibia and of T1 and spurs (articulations of tarsus slightly pale). Hair golden, on clypeus parallel and on baso-lateral areas of propodeum not curled (on area dorsalis fine and sparse, directing forwards, hence apparently greyish - really golden).

Head in frontal view with sides somewhat roundly convergent towards clypeus, W:L 100:84, vertex depressed (depression not strong, but tops of hind ocelli below level of upper eye margins, this is due to that the round elevation of ocelli is weak), eye incision rather narrow, weakly narrowed towards bottom. HW,HL,IODv,A3,P=100,45,22,28, 154; IODs=10:9; OOD,Od,POD=1,4,2; A3=AW×5; A3,4,5÷10,7,6; P,Ma,Mi,2(Ma),3(Ma)= 100,15,5,38(16),42(22).

Frons gently raised, medial furrow broad and moderately deep, SAT-ASR seen from dorsal side: Fig. 127, SAT moderately high narrow nasiform, medio-apical area obliquely, rather acutely inclined to IAA and enlarged to round flat shining area bearing a large fovea on it. SAT-ASR in dorso-lateral view to see through PAF: Fig. 128, in lateral view: Fig. 129; clypeus very similar to that of flagellatum (cf. Fig. 125), basal main part gently roundly elevated and apical area broadly, not strongly reflected, form of supraclypeal area also similar to flagellatum, occipital carina complete. Pronotum similar in structure to the preceding species, including lamina on side (cf. Fig. 126). Pent-roof structure of subalar area roundly curved down, apical margin transparent, cellophane-like and extended posteriorly through outer margin of mesopleural flange till metapleural flange which is roundly expanded horizontally sideways.



Figs. 127-129. Trypoxylon kuncheriai sp. nov., ♀

Propodeum with lateral carinae, located rather on upper part of the side of the segment, not acutely raised, curved in lateral view, with end not directed towards apico-lateral carina of propodeum and considerably apart from it, area dorsalis only on posterior area enclosed with weak furrow, median furrow moderately deep, enlarged posteriorly, GSR only gently roundly elevated, not discoloured. In fore wing RC=C, R1 moderately long, reaching close to wing apex, CV1÷CV2×5.5, TCV:CV2÷3:2, angle about 100°.

Frons distinctly microcoriaceous, punctures superimposed shallow, very sparse, quite indistinct, mesoscutum also distinctly microcoriaceous and closely superimposed with comparatively large punctures, area dorsalis without basal oblique striae, transversely finely closely striate on medial furrow and closely punctured with large but shallow punctures on disc, lateral series of striae only on posterior portion defined, sides polished, but with indistinctly punctured zone along dorsal carina.

♂, unknown.

Holotype; ♀, North Borneo, Forest Camp, 19 km North of Kalabakan, 6. XI. 1962, K.

J. Kuncheria (BPBM).

25. TRYPOXYLON MACULIVENTRE TSUNEKI, 1979

Trypoxylon maculiventre Tsuneki, SPJHA, 9: 73, 1979 (♀ ♂, Malaya, Penang and Singapore) (nec maculiventre: Tsuneki, SPJHA, 11: 29, 1979 - Sumatra and Java).

Specimens examined: 1 ♀, Sarawak, Semongoh Forest Res., 15 miles South of Kuching, 12. IX. 1966, J. F. G. & T. M. Clarke (USNM); 2 ♀, Sarawak, 4th Div. Mt. Mulu, RGS Exp. 17.IX. - 23.X. 1977, D. Hollis (BMNH, B.M.77-543); 2 ♀*, Sarawak, 1st Div. Semongoh Forest Res., 1 25 N, 110 17. E, 15-19. XI. 1976, P. S. Cranston (BMNH, B.M.1977-19).

Remarks. Measurements on one of the Bornean specimens (first listed one): HW:HL in frontal view 100:88. HW,HL,IODv,A3,P=100,50,19,30,194. IODs=10:9. OOD, Od,POD÷1,9,3 (OOD very narrow, almost linear). A3=AW×5.3. A3,4,5÷10,6.5,6. P,Ma, Mi,2(Ma),3(Ma)=100,13,5,38(16),36(19). RC=M. Rl short, but reaching wing apex, CV1 ÷CV2×6.5, TCV:CV2÷3:2, angle about 100°.

Variation in colour:

(1) Antennal colour. Al-2 orange yellow, rest black (3* individuals), Al-2 yellow, A3 brown, rest black (1 ex.), Al-2 yellow, A3 nearly wholly yellow (apically above brownish), rest black (1 ex.).

(2) Colour of G1. Basal half yellow (2*ex.), basal third yellow (1 ex.), till spiracles yellow (2 ex.).

(3) G2-6. G2-3, base of 4 and whole of 6 slightly darkened reddish yellow, with a black mark on G2 and 3 above (apical margins of all segments transparent ambur yellow (2* ex.). Bases of G2 and 3 dull yellow (do.) (3 ex.).

(4) Middle leg. T3-4 pale brown (rest ferruginous or yellow except extreme base of coxa and arolium) (2* ex.). From middle of T2 apically blackish, often T5 partly ferruginous (do.) (3 ex.).

(5) Hind leg. Ferruginous with following black: Extreme base of coxa, femur and tibia, both except base and apex, apex of T1, whole of T2-3 (2* ex.). Ditto, but T2-5 black (1 ex.). Coxa, trochanter, femur all largely, tibia except broad base and narrow apex and T2-5 black (2 ex.).

* shows the specimens asterisked in the list of the specimens examined. They seem to be the local variation, judging from the colouration above given.

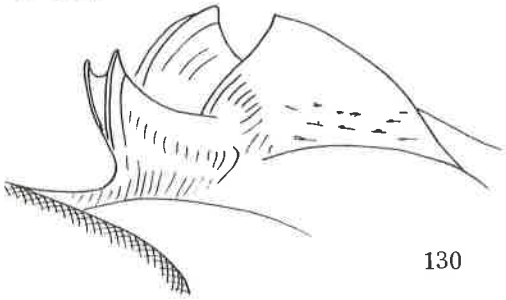
On the other hand, IODs, structure of SAT-ASR, form of clypeus, pronotum with the lamina, pentroof structure at subalar area and characters of propodeum, gaster and wing venation are almost constant among the specimens.

On TRYPOXYLON CAVUM sp. nov.

In Pt. V of the present paper (SPJHA, 11: 29, 1979, September) I tried the detailed description of the state of PAF in T. maculiventre with the Sumatran and Javanese specimens that were believed to belong to this species at that time. In order to know the relationships of the Bornean specimens of maculiventre treated in the preceding section I reexamined comparatively the Malayan and the Javanese specimens. As a result it was brought to light that the Bornean specimens differ considerably from the Javanese one, although they well agree with the Malayan specimen (holotype). The difference lies mainly in the structure of PAF, namely, the character of PAF described in detail in Pt. V with figures is the character of the Javanese and the Sumatran specimens and not of maculiventre. The difference is so marked that they should be separated at the species rank.

In maculiventre (♀) PAF seen to see through it: Fig. 130, while in the Javanese and Sumatran (abbreviated below as J-S) specimens: Fig. 133. The difference of the relative height at its outer end of PAF is very clear. This is due to the difference in the structure of ASR. In maculiventre, further, outside of the outer end of PAF at oculo-antennal area is not particularly excavated and inside of the inner end of PAF at IAA is also not excavated, but in J-S specimens the two places are very deeply excavated into hollows, especially striking at oculo-antennal space (in Fig. 133 this is shown with darkened area). At interantennal area median line turns to be a high

ridge by the deep excavations at inner ends of PAF of both sides (cf. Figs. 77, 78 and 81 of Pt. V, on p. 30 of SPJHA, No. 11). Thus it is supposed that the bottom line of PAF in frontal view is in maculiventre as Fig. 131, while in J-S specimens as Fig. 134. Besides the PAF a considerable difference is observed on SAT. Seen from dorsal side it is broader and lower in J-S specimens (Fig. 135) than in maculiventre (Fig. 132).



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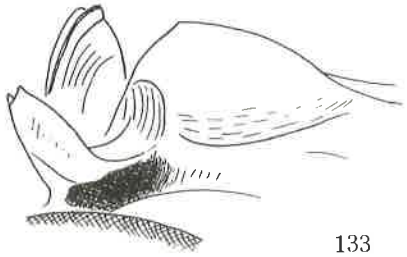

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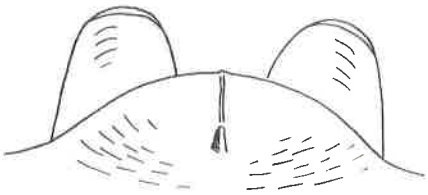

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Figs. 130-132. T. maculiventre.

Figs. 133-135. T. cavum nov.

Other slight differences between the two:
IODs=10:9 in maculiventre, =10:10 in J-S specimens.
Mid leg. In maculiventre ground colour ferruginous and extreme base of coxa black and T3 and 4 slightly dusky. In J-S coxa except apex black, trochanter brownish, femur black except base and apex, T3,4 brown and the rest ferruginous.
Hind leg. In maculiventre base of coxa and femur with median area broadly or in stripes dark brown and T2-4 largely brown. In J-S coxa and femur nearly wholly and tibia except base black, tursus wholly dark brown (articulations somewhat pale).

Based upon the differences above given the J-S specimens are named:

Trypoxylon cavum sp. nov.

Trypoxylon maculiventre: Tsuneki, SPJHA, 11:29, 1979 (♀ ♂, Sumatra and Java)(nec T. maculiventre Tsuneki, SPJHA, 9: 73, 1979 - ♀ ♂ from Penang, Singapore and Laos, Laotian specimen is a subspecies)

Holotype: ♀, West Java, Middle Djampang, Mt. Tijsoeroe, 6-800 m, E. M. Walsh (RMNH).
Other specimens: 3 ♀ 1 ♂, Sumatra (RMNH), 9 ♀, Java (RMNH), 7 ♀, Java (EMNH). (Details of the data of the specimens are already given on p. 29 of Pt. V of the present paper).

Measurements of holotype: Head in frontal view W:L=100:87. HW,HL,IODv,A3,P=100, 48,21,29,190. IODs=10:10. A3=AW 5. A3,4,5=10,6,6. OOD,Od,POD=1,8,4 (OOD very narrow). P,Ma,Mi,2(Ma),3(Ma)=100,13, 4,30(13),28(16). RC=M, R1 short, but almost reaching wing apex. CV1=CV2 7. TCV;CV2=7:4, TCV gently sinuate, angle at base about 90 , at apex about 100 .

Remarks. Other specimens above listed were already returned to the respective

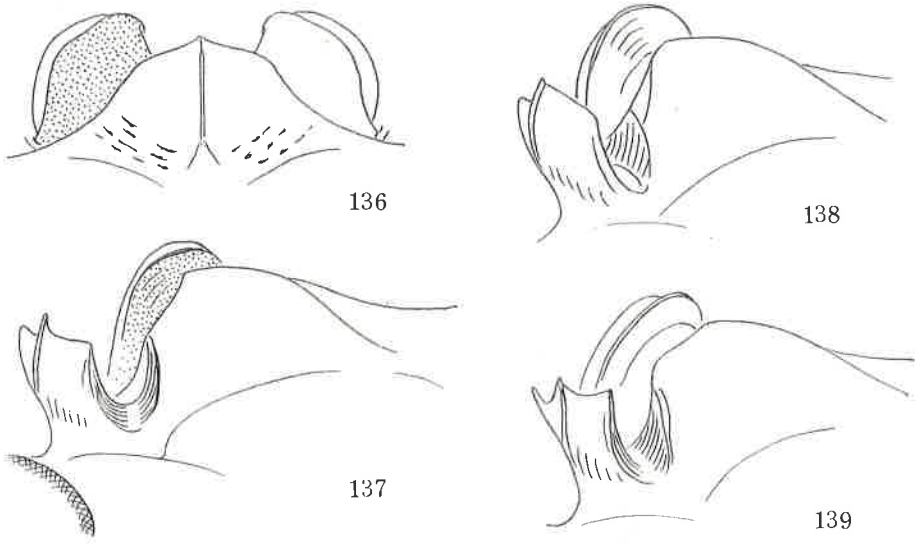
Museum to which they belong and at present I can not reexamine the specimens. Especially it is regret that the male genital organs can not be examined, because to give final determination to the taxonomic status of cavum whether it is surely a distinct species or a local race of maculiventre the comparison of the organs is necessary. On the other hand, the reexamination of the specimens is also necessary, because, judging from the description on the variation of the Javanese and the Sumatran specimens, some of them have the bright coloured hind leg and these may be true maculiventre. If the two forms occur really in synpatric the fact affords an evidence that both belong to a distinct species respectively, according to the ecological rule of the subspecies. Future confirmation about the characters is desired.

26. TRYPOXYLON TIRIMEN sp. nov.

Very closely resembles T. maculiventre m. and unless the structure of ASR and PAF is examined the present species will be identified with this species as a variation, since apparently it differs from maculiventre only in the colour of the hind metatarsus.

SAT-ASR in dorsal view (Fig. 136) is very similar to that of maculiventre (cf. Fig. 132), but in dorso-lateral view to see through PAF (Fig. 137) distinctly different (cf. Fig. 130). PAF narrow and deep, flat-bottomed, U-shaped in cross section and not so markedly inclined towards IAA, with its outer end not so highly located as compared with the inner orbital (or oculo-antennal) area. SAT at medio-anterior inclination more broadly flattened (surface closely punctured, not shining) and more gently inclined than in maculiventre.

♀. 11-13 mm. Black, A1-2 orange yellow, rest black, but in one specimen A3 brown and paler basally. Apical marginal area of clypeus broadly (about 2/5), mandible, palpi, pronotal tubercle, posterior part of collar, basal plate of wing, G1 on side and beneath broadly (dark brown above and anteriorly gradually paler), G2, 3 at each base, fore and mid legs except greater part of coxae, arolia and mid T2-5 (rarely mid femur broadly dusky or with a dusky streak above) and hind trochanter, base of tibia and of T1 and tibial spurs yellow or ferruginous. Hair golden, on clypeus parallel and on baso-lateral areas of propodeum curled.



Figs. 136-139. Trypoxylon tirimen sp. nov., ♀

Head in frontal view with sides rounded, almost not convergent towards clypeus, W:L=100:90, eye incisions narrow and subparallel-sided, vertex moderately depressed, top level of hind ocelli slightly below level of tops of eyes, head from above with

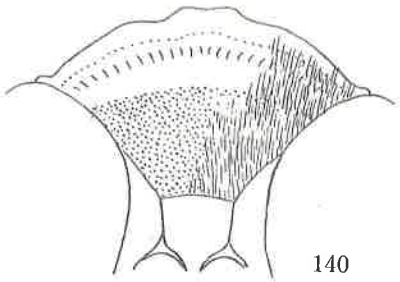
vertex narrow, OOD very narrow, almost linear.

Table 3. Measurements on Trypoxylon tirimen sp. nov., ♀

No.	HW	HL	IODv	A3	P	IODs	OD	Od	PD	A3	A3-4-5	P	Ma	Mi	2(Ma)	3(Ma)
1	100	48	21	26	170	9.0	1	8	3	4.6	10 7.0 6	100	14	5	36(14)	38(22)
2	100	48	20	27	190	9.5	1	8	3	4.5	10 6.5 6	100	13	4	32(15)	30(20)
3	100	50	23	26	162	9.3	1	8	3	4.7	10 6.0 6	100	15	5	34(14)	38(18)

No. 1 = holotype from North Borneo. Nos. 2 and 3 = paratype from Sarawak.

Frons gently raised, medial furrow broad and moderately deep, on lower portion enlarged to a large round shallow concave hollow, SAT moderately high rounded tuberiform, medianly distinctly carinate, sometimes appears subnasiform, apical margin sometimes transversely roundly and bluntly edged, sometimes without edge and smoothly obliquely inclined (when bluntly edged inclined on both sides of the edge) and forms flat triangular area (not polished) at medio-anterior part of SAT, always without a fovea on it. SAT-ASR in dorsal view: Fig. 136, in dorso-lateral view to see through PAF: Fig. 137 (type, with medio-apical area subcarinate), 138 (one of the Sarawak specimens, medio-apical area smooth and PAF comparatively narrow) and 139 (Sarawak, medio-apical area smooth and somewhat broader than in others). Clypeus: Fig. 140, disc gently roundly tectate, apical margin broadly reflected. Occipital carina complete. Anterior part of pronotal collar narrow and slightly widened laterally, seen in front dorsal line raised in wide triangle, with mid point rounded, lamina on side shortly toothed (Fig. 141); pent-roof structure at subalar area of mesopleuron well developed, marginal area transparent membraneous and extended posteriorly till metapleural flange which is obliquely roundly expanded. Propodeum with lateral



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Figs. 140-141. Trypoxylon tirimen sp. nov., ♀

carinae, carina in lateral view up-curved, area dorsalis only on posterior portion enclosed with shallow groove, median furrow moderately deep, gradually enlarged towards apex, GSR slightly raised, not discoloured. Gaster slender, flask-shaped. In fore wing RC=C-M, Rl short, less than TCV×0.5, yet reaching close to wing apex.

Frons very minutely microcoriaceous and sparsely indistinctly punctured, mesoscutum distinctly microcoriaceous and closely superimposed with fine distinct punctures, propodeum with lateral striae, anteriorly weak and indistinct, area dorsalis at base weakly crenate, medial furrow transversely finely closely striate, disc irregularly punctured, sides polished, but dorsal half obliquely finely closely striate and further scattered with indistinctly outlined comparatively large punctures.

♂, unknown.

Holotype: ♀, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 10. XI. 1962, K. J. Kuncheria (BPBM).

Paratypes: 2 ♀, North Borneo, Sandakan, dates unknown, C. F. Baker (USNM); 1 ♀, Sarawak, Kampong Pueh, Lundu District, 690-1500 m, 25-31. V. 1958, T. C. Maa (BPBM); 1 ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X. 1977, D. Hollis (BMNH, BM77-543).

Remarks. The two specimens from Sarawak have the mid femur either largely or

in a stripe above and beneath brown, in the last listed one hind T1 at base broadly yellow, in this specimen yellow areas, including bases of G2 and 3, are distinctly lemon yellow.

27. TRYPOXYLON CONCINNUM TSUNEKI, 1979

Tryporylon concinnum Tsuneki, SPJHA, 9: 102, 1979 (♀, Malaya).

Specimens examined: 1 ♀, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 19. XI. 1962, K. J. Kuncheria (BPBM); 1 ♂, same loco, 27. X. 1962, Y. Hirashima (BPBM); 1 ♀, Sarawak, 4th Div., Gn. Mulu, RGS Exp., 17.IX. - 23.X. 1977, D. Hollis (BMNH, BM77-543).

♀. Well agrees in characters with the Malayan specimens, especially the consistence in the antennal colouration is impressive (from apical half of A3 to A9 black, rest yellow). The Sarawak specimen has the bright coloured gaster: Ground colour yellow and black are G1 from spiracle to apex (extreme apical margin yellow), G3 above except base, G4 at base and beneath, G5 at base except above. G1 at apical swelling brown beneath. In the North Bornean specimen coloration similar, but gaster posteriorly stained and yellow colour turned to dirty brown. In both mid T2-5 pale brown above, hind femur in some light brown streaked, tibia on outer side except base brown and T1-5 black and turning to brown apically.

Subalar area not expanded laterally, but mesopleural flange with lateral margin somewhat stretched sideways in a semitransparent membrane, covering posterior part of subalar pit; metapleural flange not stretched laterally into horizontal round plate. Measurements on the Sarawak specimen: Head in frontal view with W:L=100:92. HW,HL, IODv,A3,P=100,44,20,27,138. IODs=10:10. OOD,Od,POD≒2,6,3. A3≒AW×5. A3,4,5≒10,7,7. P,Ma,Mi,2(Ma),3(Ma)=100,24,8,32(30),44(42). RC=C-M. R1 short, CV1≒CV2×6, TCV:CV2≒3:2, angle about 110°.

♂ (hitherto unknown). 12.5 mm. Similar in colour to ♀ in general, but antenna with median dusky part above narrow and paler (from apical half of A3 to 7 brownish, not black), clypeus on sides of basal part blackish (in ♀ wholly ferruginous, but the ground colour is unobservable unless the hair is directed against the light, since golden hair is very dense), G1 from spiracles to apex above brown, only anterior half of apical swelling blackish, blackish parts of G3 and 4 broader, G5 and 6 on sides and beneath blackish, ground colour of G2-7 ferruginous, not yellow (as in the dark form in ♀), G2 without dusky mark. Mid leg without apical brown tinge, hind leg with medial part of femur and apical part of tibia on outer side in some light appears brownish, T1-3 deep brown, T4-5 paler brown. Hair brassy, on clypeus parallel, on baso-lateral areas of propodeum sparsely curled.

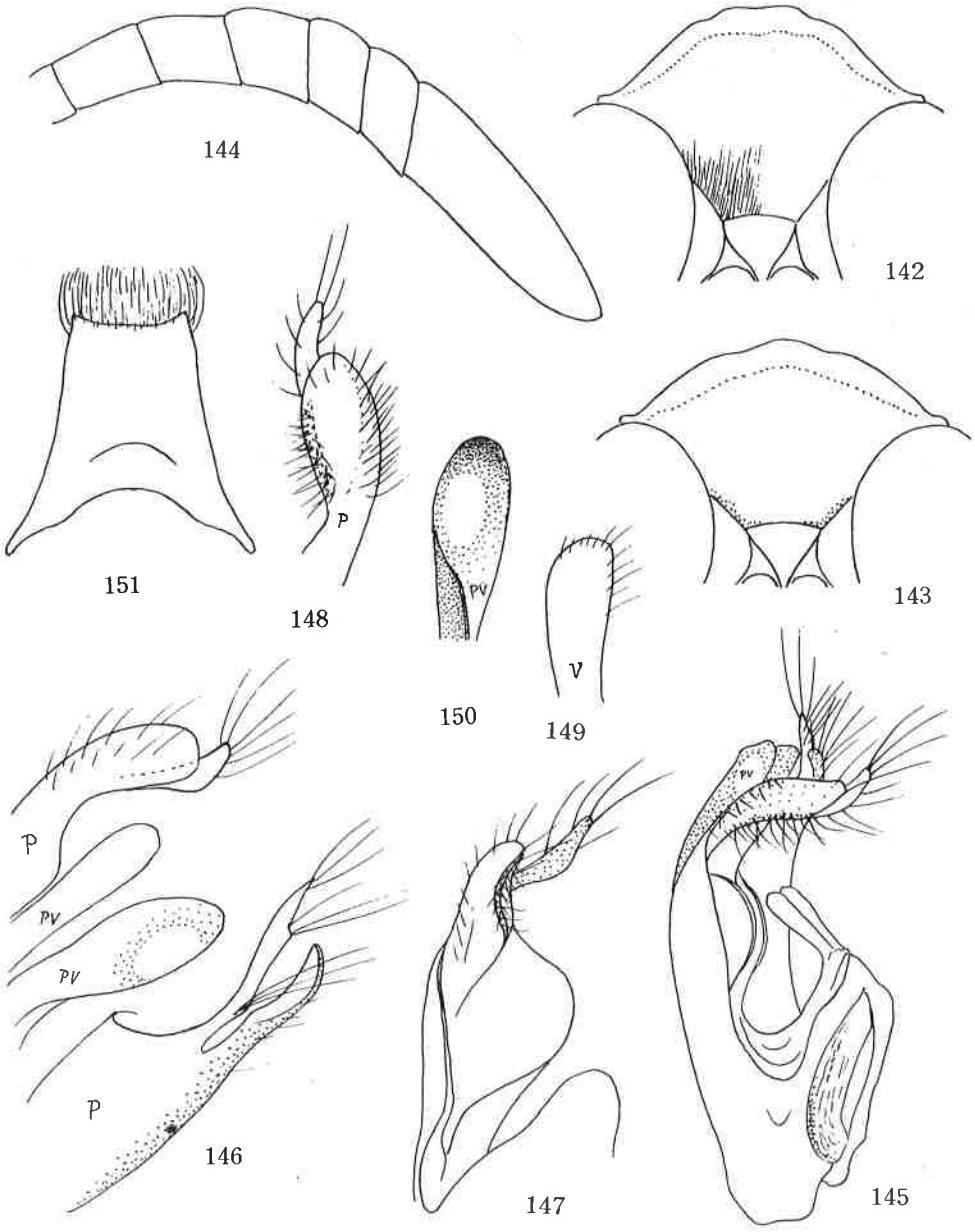
In general structure and sculpture also similar to ♀, but in antenna and clypeus sexual difference observed: A3-12 relatively shorter and A13 longer (measurements and Fig. 144), clypeus less produced anteriorly, apical margin almost simply rounded (Fig. 143, cf. Fig. 142 in ♀) and somewhat different in form from that of the Malayan form, SAT in this specimen without hollow on medio-apical flat shining area, but with a few striae. ASR and PAF similar to those of ♀.

Head in frontal view relatively shorter, W:L=100:82, with sides more rounded, less strongly convergent below, IODs relatively slightly wider. HW,HL,IODv,A3,P=100, 43,22,18,118, A13 relatively 26. IODs=10:10. OOD,Od,POD≒2,5,3. A3=AW×2.3. A3,4, 5≒10,6,5.5. A13 BW×3.3 and ≒A9-12. P,Ma,Mi,2(Ma),3(Ma)=100,22,8,35(32),34(42). RC= V-M. R1 short. CV1≒CV2×6. TCV:CV2≒3:2. TCV sinuate, angle about 100°.

Genitalia seen somewhat obliquely from left side: Fig.145, apical part in latero-dorsal view: Fig. 146 (p=Paramere, PV=Penis-valve). Paramere deeply bifurcate at apex (Fig. 146, P), ventral lobe broader and lamellate, but inner margin thickened and fringed with bristles (Fig. 148, right hand one seen from the widest side), dorsal lobe narrow, slender, sparsely fringed with bristles, inner margin of the main body of paramere widely expanded and rolled inwards (Figs. 145 and 147, left, ventral); volsella spatulate (Figs. 145 and 149, right, ventro-lateral), penis valve quite strange in structure, at apical part it is enlarged into a pair of suboval lobes (Fig. 146, PV, dorso-lateral; Fig. 150 left half, ventral), without shoulder and without any appendage and adorned with an oval semitransparent window. Sternite 8: Fig. 151.

Remarks. The genitalial structure of the present species similar to that of

closely related T. rufigaster (cf. Pt. III, figs. 281-284), but is distinctly different from this in the structure of the penis valve. Sternite 8 is also similar in the fundamental structure to that of rufigaster, but in the form somewhat shorter and broader.



Figs. 142-151. Trypoxylon concinnum Tsuneki, 142, ♀, others ♂.

28. TRYPOXYLON RUFIVENTRE TSUNEKI, 1976

Trypoxylon rufiventre Tsuneki, Steenstrupia (Copenhagen), 4: 81, 1976 (♀ ♂, S. Philip-

pines: Is. Tawi Tawi, Figs. 83-89).

Trypoxylon penangense Tsuneki, SPJHA, 9: 99, 1979 (partim: specimens from Malaya, Is. Penang, Singapore, nec those from Laos. Figs. 376-380, nec Figs. 381-387) (SYN. NOV.).

Trypoxylon penangense: Tsuneki, SPJHA, 11: 51, 1979 (1 ♀ from W. Java, nec 6 ♂ from Laos).

Specimen examined: 1 ♀, Sarawak, Semengoh For. Res., 15 miles South of Kuching 22. IX. 1966, J. R. G. & T. M. Clarke (USNM).

I. Comparison of the Bornean ♀ with the paratype ♀ of rufiventre and the holotype ♀ of penangense.

Generally well agrees with both of them, but slightly differences are observed which are considered the intraspecific variations:

(1) Relative length of A3. It is intermediate between the two, in rufiventre A3=AW×4.2, in penangense A3=AW×5, here it is A3=AW×4.7.

(2) Apical transverse carina of SAT. In rufiventre low and rather weak at medio-anterior area (Figs. 152, 153), in penangense higher and well defined, in the Bornean specimen close to penangense (Fig. 154).

(3) Colour of pronotum. It has a fine brownish band on anterior part of collar and at lateral margin from tip of lamina posteriorly. Types of rufiventre and also the Malayan and Javanese representatives without such brownish bands.

(4) Colour of hind leg. In the Bornean wholly yellow except basal 4/5 of coxa and arolium. In rufiventre besides coxa and arolium femur medianly broadly, tibia on outer apical 2/3 and tarsi except articulations brown, in penangense similar in pattern to rufiventre, but much darker and dark brown.

While, in all the specimens compared mesoscutum finely closely punctured, PIS mat and under high magnification delicate microsculpture can be seen. G1 ferruginous and always with a blackish patch on anterior part of apical swelling and rest of gaster ferruginous (taking into consideration of the postmortem partial darkening).

On the Javanese female. In the specimen legs are more broadly black than in two others compared, having coxa, trochanters and femora nearly wholly darkened and hind tibia except base and tarsus dark brown. In this specimen gaster is lacking and in my key to the Javanese species I included it in the group having G1 black, following the attached label "T. gracilescens Sm.", but this is considered erroneous, possibly it is as in rufiventre.

II. Comparison of the so-called penangense ♂ with the penangense ♀ and rufiventre ♂.

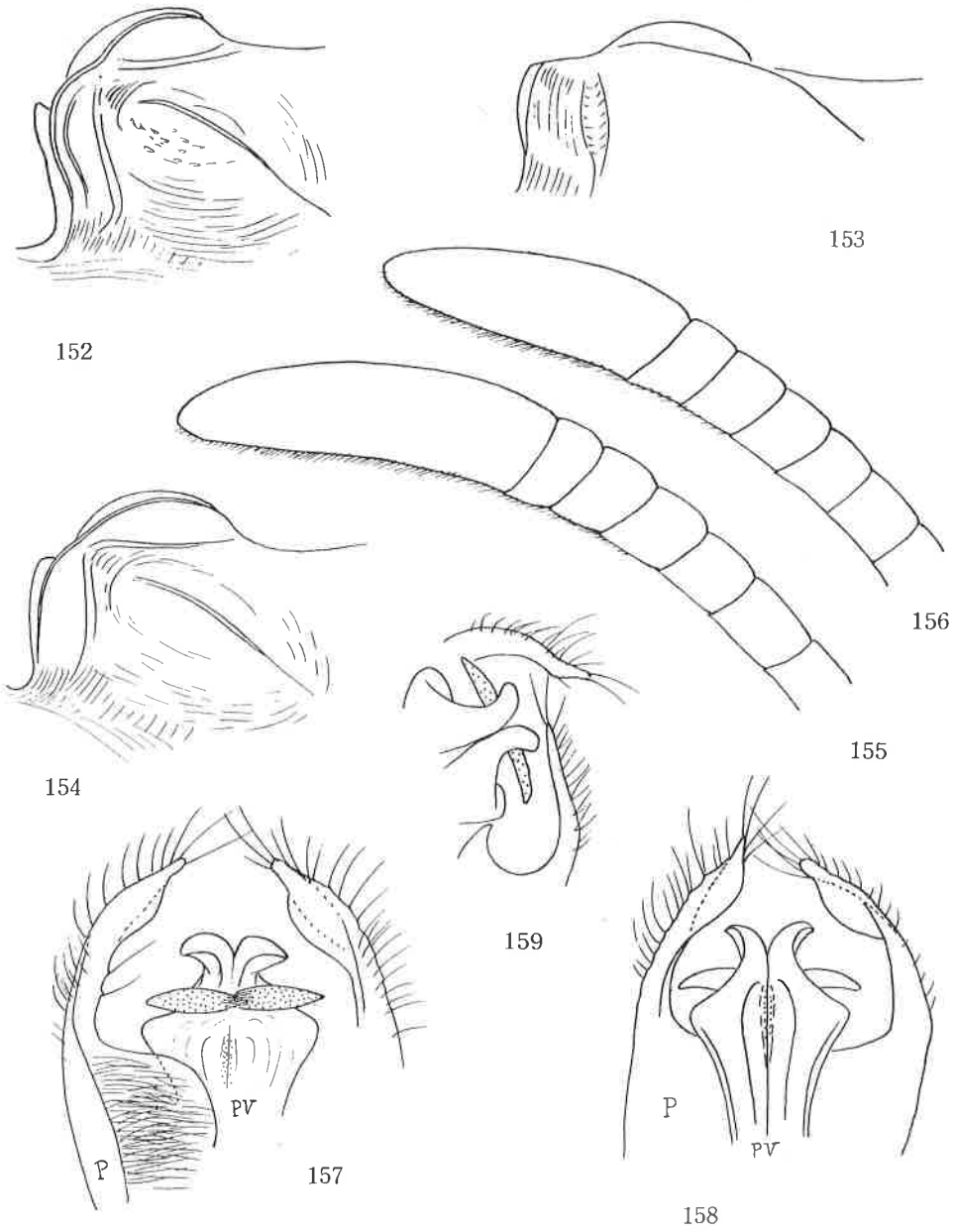
The male of penangense was described with the Laotian specimens (Pt. III, p. 99) and it was supplemented in detail in connection with the Javanese from (Pt. V, p. 51). Through the recomparison of it with the penangense ♀ and new comparison with the paratype male of rufiventre the following relations could be made clear among them:

Apart from the colour of legs (which is considered local variations) the so-called penangense ♂ is certainly very similar in appearance, especially in the characters of SAT-ASR, clypeus, pronotum with lamina, wing venation and propodeum to the female of penangense, taking into account the sexual characters, and also to the male of rufiventre. Detailed observations, however, revealed the following differences between the compared pair:

(1) From penangense ♀. Mesoscutum without microsculpture, finely sparsely punctured, surface shining. In ♀ surface mat, indistinctly finely closely punctured and under high magnification delicate microsculpture can be seen. Gastral petiole completely ferruginous, without blackish patch on anterior part of apical swelling. In ♀ the blackish patch is always present. At the moment of description of ♂ these differences were considered to have little significance, being only intraspecific variations. But these must be reconsidered in connection with the following facts.

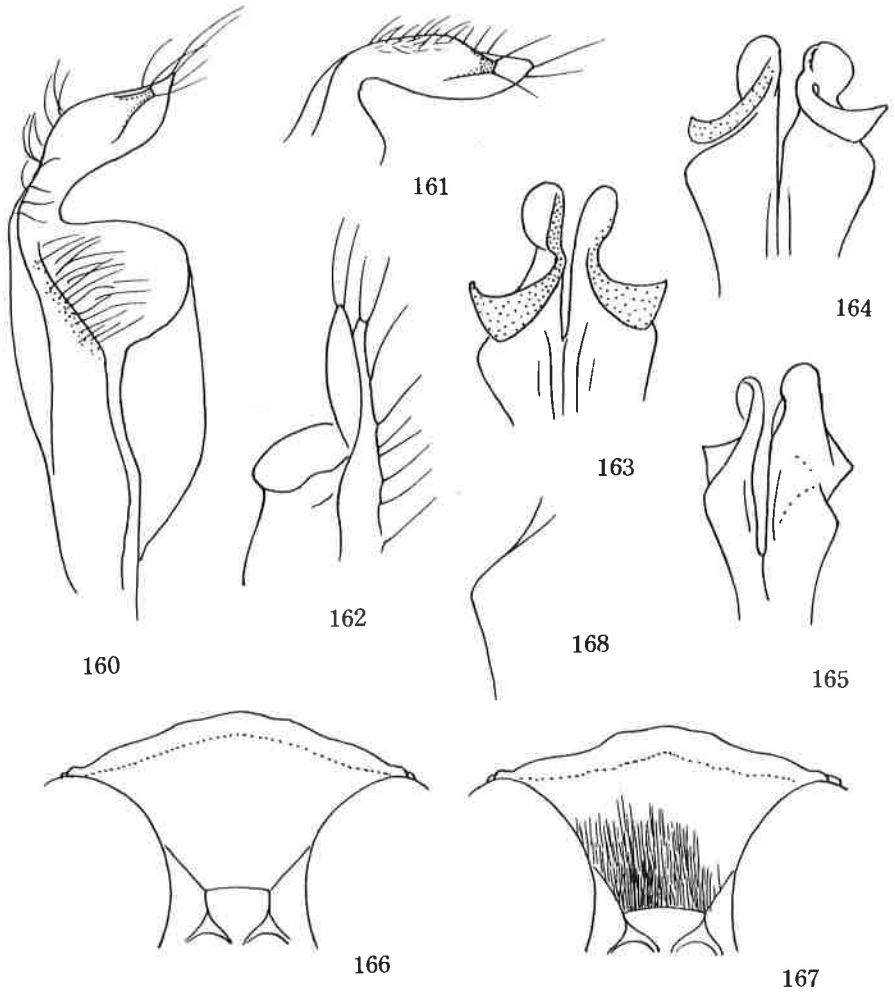
(2) From rufiventre ♂. Flagellar joints of antenna comparatively thicker, A3 = AW × 1.7 (broadest view), in rufiventre ♂ A3 = AW × 2.3. Al3 parallel-sided in the main (Fig. 155), in rufiventre ♂ gradually attenuate apically (Fig. 156), strictly in the former Al3 = A8-12, while in the latter slightly shorter than A8-12, but this may be a variation. Mesoscutum in rufiventre ♂ mat and under high maginification delicately microcoriaceous as in penangense ♀.

In the genitalial structure the differences between them are quite decisive. In the so-called penangense ♂ apical lobe of paramere is narrow and simple, not bifid (Figs. 157, ventral; 158, dorsal; 159, dorso-lateral), the hair on inner surface



Figs. 152-159. 152, 153, 154 and 156 ... T. rufiventre Tsuneki. 155, 157, 158 and 159 ... So-called T. penangense Tsuneki, ♂ (= T. rutilans sp. nov.). 152, 153 (♀), 156 (♂)... Paratype specimens from Tawitawi. 154 ... Sarawak (and Java) specimen. 157-159 ... Specimen from Laos.

of subcylindric part of main body of paramere very dense, volsella comparatively narrow and longer and penis valve at apical part bearing a pair of sickle appendages and and well developed shoulder (Figs. 157, apical half, ventral; 158, ditto, dorsal; 159 apical part, latero-dorsal). While in rufiventre apical lobe of paramere broader and shortly bifid near apex (Figs. 160, ventral; 161, ventro-inner; 162, dorso-lateral), hair on inside of the subcylindric area rather sparse, volsella somewhat shorter and



Figs. 160-168. 160-166 ... T. rufiventre Tsuneki, ♂.
167-168 ... T. rutilans sp. nov., ♂.

broader and penis valve different in the form of appendages and extreme apex (Figs. 163, ventral; 164, dorsal; 165, dorso-lateral). The appendage is elongate triangular, widened towards apex, thin and flat, curved backwards and appears slightly dusky in some light condition. The apex is turned into clear transparent globule, ventral side of which is somewhat darkened and dark colour is extended to appendage (Figs. 163, 164). The globule is completely transparent and special care is necessary to confirm its presence or condition (other parts of apical half of genitalia are largely semitransparent and change in brightness according to the light condition.

From the explanations above given it seems clear that Trypoxylon penangense, ♀ from the region of Malaya and Java is a synonym of T. rufiventre Tsuneki, 1976, and that the so-called penangense ♂ belongs to a species different from rufiventre.

On TRYPOXYLON RUTILANS sp. nov.

Trypoxylon penangense Tsuneki, SPJHA, 9: 99, 1979 (partim, ♂ and possibly Laotian ♀,

nec ♀ from Penang, Malaya and Singapore)
Trypoxylon penangense: Tsuneki, SPJHA, 11: 51, 1979 (♂ from Laos, nec ♀ from Java).

Holotype: ♂, Laos, Vientiane Prov., Ban Van Eue, 30. III. 1966, native collector (BPBM). (= ♂ No. 3 in table annexed to penangense in Pt. V).

Remarks. At present all the Laotian specimens recorded as T. penangense in Pt. III of the present series, except one recorded above as holotype, are already returned to BPBM and can not be reexamined. But, judging from the characters described in two papers above listed the Laotian males recorded as penangense are presumed to belong to the present species. That the single male left at my hand was newly dissceted and showed the same genitalial structure as given in Figs. 383-387 of that paper supports this presumation. As to the female, however, reexamination is necessary, although it is presumed to belong possibly to the present species, judging from the general agreement in characters and the sympatric occurrence.

Main characters of the holotype.

Length about 10 mm, HW:HL in frontal view 100:74, vertex weakly depressed, tops of hing ocelli and of eyes in a line, eye incision broad, gently narrowed towards bottom. HW,HL,IODv,A3,Al3,P=100,46,26,13,35,106; IODs=10:8; A3=AW×1.7; A3,4,5≒10,6, 5.5; OOD,Od,POD≒2,5,3; P,Ma,Mi,2(Ma),3(Ma)=100,24,9,40(35),42(48). RC=C, Rl≒TCV 0.5, CV1≒CV2×5, TCV:CV2≒3:2, angle about 100°. Clypeus: Fig. 167 (cf. Fig. 166 in rufiventre, ♂), at its centre gently broadly roundly elevated, in colour till apex black, only with an ambur-yellow patch near each side of marginal glabrous area (in rufiventre marginal glabrous area yellow and at extreme margin castaneous). Al3: Fig. 156 (cf. Fig. 155, in rufiventre). Frons rather strongly microcoriaceous and somewhat sparsely superimposed with comparatively large, deep distinct punctures, PIS 1-3 times PD. Pronotal lamina: Fig. 168. Area dorsalis enclosed with furrow, the furrow posteriorly well defined, but anteriorly broader and weaker, median furrow posteriorly broader and transversely finely closely striate, at its base provided with a distinct medial carina, disc polished and sparsely punctured, series of striae along lateral carina thorough and distinct (in natural condition covered with hair), GSR roundly and highly raised and discoloured.

Antenna dark brown, Al, 2 and greater part of 3 orange yellow, underside till A9 wholly or partly ferruginous, mandible dusky brown, apex reddish brown, palpi, posterior margin narrowly of pronotal tubercle, tegula, gaster wholly ferruginous. Legs till near apices of femora black or dark brown, but fore femur brownish beneath, rest of legs except black arolia completely ferruginous. Hair brassy, on frons and clypeus in some light appears silvery.

29. TRYPOXYLON SHAKHA TSUNEKI, 1979

Trypoxylon shakha Tsuneki, SPJHA, 9: 106, 1979 (♀, Malaya incl. Is. Penang).

Specimens examined: 2 ♀ 5 ♂, North Borneo, Sandakan, dates undescribed, C. F. Baker (USNM); 1 ♀, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 4. XI. 1962, K. J. Kuncheria (BPBM); 1 ♀, North Borneo, Tawau, Qucin Hill, 26-29. VII. 1962, Y. Hirashima (BPBM).

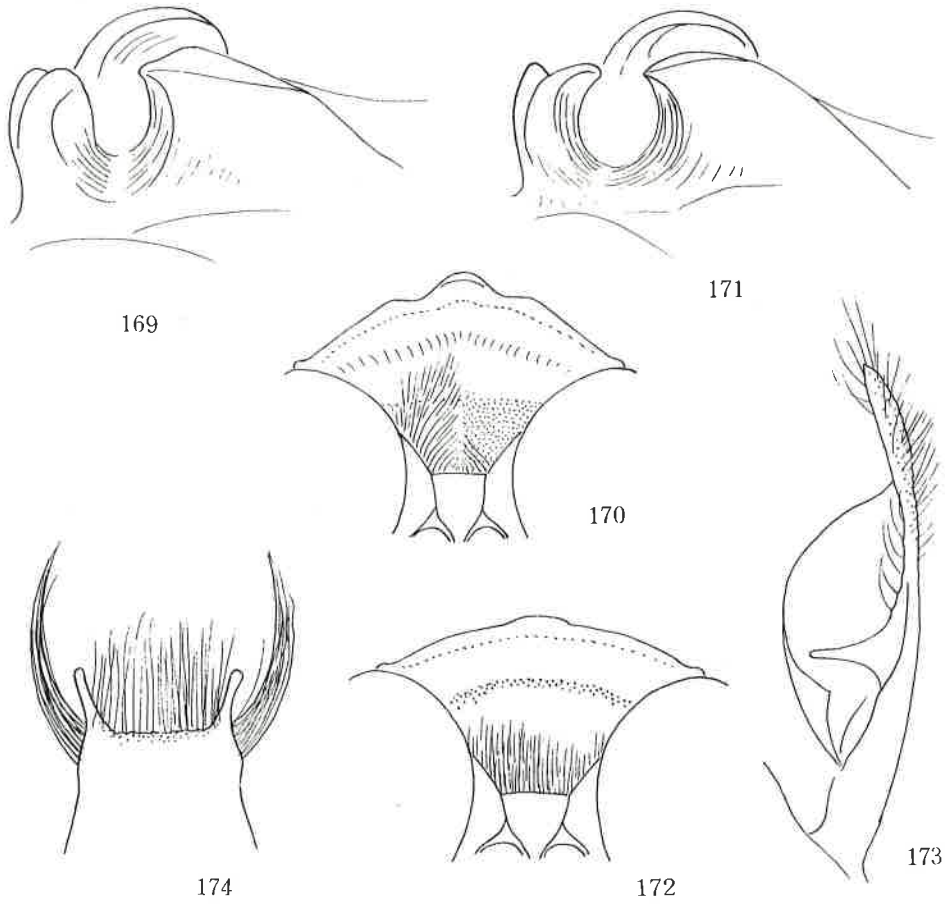
♀. All the specimens observed well agree in characters with the Malayan specimens. Main characters:

Length 12-14 mm. Antenna from base till part of A5 yellow. Ferruginous are clypeus on apical half, mandible, mouth parts, pronotal collar largely, area of lamina, tubercle, tegula, apical sides of G1, G2-3, base of 4, apices of 4 and 5, whole of 6, all legs except base of coxae and arolia, but hind leg on median part of femur and tarsus except articulations and T4 dark brown, tibia apically sometimes more or less brownish. SAT moderately high nasiform, apical inclination with polished and hollowed area, PAF in dorso-lateral view: Fig. 169, notice the structure of ASR. Clypeus: Fig. 170, disc at base with hair strongly sinuately convergent towards medial line, at apex strongly reflected. Lateral carinae of propodeum very feeble, intermediate between presence and absence. Measurements in Table 4, RC=C, Rl about half of CV2, CV1≒CV2×6, TCV:CV2≒3:2, angle about 100°.

♂ (hitherto unknown). 11-12 mm. Similar in colour to ♀ and in structure to T. fumi m., 1979, but as to lateral carinae of propodeum as in the present females.

Table 4. Measurements on Trypoxylon shakha Tsuneki of Borneo, ♀ and ♂

Sex	HW	HL	IODv	A3	Al3	P	IODs	ODOdPD	A3	Al3	A3--4--5	P	Ma	Mi	2(Ma)	3(Ma)
♀	100	47	23	27	-	176	7.0	1 5 2	5.0	-	10 6.5 6	100	15	6	26(15)	35(24)
♀	100	50	23	30	-	190	7.0	1 5 2	6.0	-	10 6.5 6	100	14	5	26(18)	30(23)
♀	100	50	23	30	-	174	7.0	1 5 2	5.7	-	10 6.5 6	100	15	5	30(20)	30(26)
♀	100	48	23	29	-	180	7.0	1 5 2	6.0	-	10 6.5 6	100	15	5	28(17)	32(26)
♂	100	48	24	18	23	172	8.0	2 6 3	3.3	3.0	10 8.0 7	100	14	5	28(15)	30(21)
♂	100	49	24	18	22	170	8.5	3 6 4	3.3	3.0	10 7.0 7	100	14	5	26(15)	28(23)
♂	100	48	24	18	22	164	8.5	2 5 2	3.3	3.0	10 7.0 7	100	18	6	28(22)	27(28)
♂	100	50	25	18	24	170	8.0	2 5 2	3.3	3.0	10 7.0 7	100	13	5	28(17)	30(22)
♂	100	50	24	19	22	158	7.7	3 5 4	3.0	2.7	10 6.5 6	100	15	6	32(20)	32(26)



Figs. 169-174. Trypoxylon shakha Tsuneki, 169-170, ♀; 171-174, ♂

Antenna till part of A5 or 6 yellow, Al3 longer than A10-12, but shorter than A9-12, apically narrowed and slightly curved. Structure of SAT-ASR (Fig.171) just as in T. fumui, namely posterior carina of ASR flattened, expanded, reflected, produced over PAF and PAF becomes oval in cross section, certainly different from ♀ (cf. Fig. 169). Mesoscutum without microsculpture even under 50 magnification, only finely and sparsely punctured. Clypeus: Fig. 172 (cf. Fig. 170 in ♀). Venation as in ♀.

Differs from fumi in that A1-5 or 1-6 yellow (in fumi A1-2 only yellow), G2,3

without black mark above, mid T2-5 not brown, RC=C (not B) and mesoscutum completely without microsculpture.

Structure of genitalia is also very similar to that of fumi (cf. Fig. 422 of Pt. III). Paramere (Fig. 173) at apex simple, slightly enlarged and covered with hair, inner margin of its main body thinly expanded and rolled, ventro-outer margin also narrowly lamellate, bearing the transverse process that is long extended inwards from about mid point of its length; volsella long, spatulate; penis valve with a pair of sickle-shaped appendages and well developed shoulder. The 8th sternite, however, markedly different from fumi in that the latero-apical processes are much longer, narrower and more strongly standing (Fig. 174, cf. Pt. III. Fig. 421).

30. TRYPOXYLON FULVOCOLLARE CAMERON, 1904

Trypoxylon fulvocollare Cameron, Ann. Mag. Nat. Hist., (7) 13: 217, 1904 (♀, Assam).
Trypoxylon fulvocollare: Tsuneki, SPJHA, 8: 52, 1978 (redescr. of holotype, figs.).
Trypoxylon fulvocollare: Tsuneki, SPJHA, 9: 101, 1979 (♀ ♂, Assam, Laos, Malaya, fig.)
Trypoxylon fulvocollare: Tsuneki, SPJHA, 11: 42, 1979 (♀, Sumatra).

Specimens examined: 1 ♀, North Borneo, Sandakan, date undescribed, C. F. Baker (USNM); 1 ♂, North Borneo, bettotan near Sandakan, 2. VIII. 1927, C.B.K & H.M.P. (BMNH, B.M.1955-354); 1 ♀ 1 ♂, Sarawak, 4th Div. Gn. Mulu, RGS Exp., 17.IX. - 23.X. 1977, D. Hollis (BMNH).

Remarks. Generally well agree in characters with the holotype, but in ♀ ♀, as in those from Malaya and Sumatra, G1 relatively longer and sometimes from base black above. Antenna in Sandakan female with A1 and 2 orange yellow and A3 orange beneath and brown above, while in all other female and the males only A1 and 2 yellow (in one Malayan female A1-3 yellow, A4 brown above and yellow beneath). Clypeus except base yellow in Sarawak female, on apical half yellow in Sarawak male and Sandakan female, but in N. Bornean male only apical margin narrowly yellow. Prothorax in Sarawak specimens with collar and anterior margin somewhat broadly yellow, while in N. Bornean collar only on top-ridge yellow and anterior margin only at lamina yellow. Fore leg except arolia wholly yellow in Sarawak specimens, but in N. Bornean with coxa broadly black on posterior side and femur somewhat reddish above. Mid leg in Sarawak female only T2, 3, 5 except apices dusky, in Sarawak male T1 largely and T2-5 wholly black, in Sarawak female base of coxa black, femur pale brown above and T3-5 somewhat brownish, in Bettotan male similar but T1-2 also brownish and tarsus as a whole slightly more blackish. Hind leg in Sarawak ♂ ♀ trochanter above and beneath, femur beneath and on posterior side and T1 except base and T2-5 wholly black, in N. Bornean ♂ ♀ coxa except apex, trochanter and femur both above and beneath, T1 except base and T2-5 dark brown, in ♀ generally somewhat paler.

Gastral colouration is in general markedly darkened posteriorly due to postmortem change, but mostly G2 and 3 yellow, with black mark or band varying in development. But in Sarawak female gaster retains original colouration in which underside from G1 to end yellow, beside G2 and 3, a large mark on sides of G3-4 and G4-5 at intersegmental area and G6 completely yellow.

Table 5. Measurements on Trypoxylon fulvocollare Cameron of Borneo

♂♀	Lc	L	HL	IODv	A3	A13	P	IODs	ODOdPD	A3	A13	A4	A5	Ma	Mi	2(Ma)	3(Ma)	RC	CV1
♀	NB	15	47	21	24	-	132	10	2 7 3	4.6	-	6	5	22	8	28(30)	40(42)	C-M	6.5
♀	Sa	15	46	21	22	-	122	10	2 7 3	4.6	-	7	6	24	8	30(32)	44(46)	C-M	6.5
♂	NB	14	44	21	18	28	125	10	2 5*2	2.7	3.3	7	7*	21	7	32(30)	40(42)	C	6.0
♂	Sa	11	44	22	16	26	112	10*	2 4 2	2.7	3.3	6	6	24	9	38(36)	46(48)	C	4.7
♀	Ma	16	43	21	24	-	146	11*	2 6 3	4.5	-	7*6		22	7	26(28)	40(40)	C-M	6.5

Lc=Loco. L=Length. HL-IODv-A3-A13-P... HW 100 is omitted. IODs... 10: is omitted. ODOdPD... OOD Od POD. A3... AW× is omitted. A13... BW× is omitted. A4-A5... A3= 10 is omitted. Ma-Mi-2(Ma)-3(Ma)... P=100 is omitted. CV1... =CV2× is omitted. 5* is really 4.5. 7* is really 6.5. 10* is really 9.5. 11* is really 10.5. As to Loco NB=North-Borneo, Sa=Sarawak, Ma=Malaya. Length is mm.

Measurements show that Sarawak male is somewhat abnormal.

31. TRYPOXYLON FEROX SMITH, 1860

Trypoxylon ferox Smith, J. Proc. Linn. Soc. Lond., 4 (Suppl.): 84, 1860 (♀, Makassar).
Trypoxylon ferox: Tsuneki, SPJHA, 9: 13, 1979 (♀, nec ♂).

Specimen observed. No specimen other than the holotype could be found out from among the materials.

Remarks. As mentioned earlier in this paper the male specimen that was combined with the holotype female in Pt. III of the present paper belonged to different species and named wallacei sp. nov. on p. 40 of the present paper.

New measurements of the holotype female:

HW,HL,IODv,A3,P=100,60,28,25,164. IODs=10:4.3. OOD,Od,POD≒2,5,3. A3=AW×4.3. A3,4,5≒10,6,5.5. P,Ma,Mi,2(Ma),3(Ma)=100,22,8,27(31),31(40). RC=C. Rl short. CV1=CV2×7. TCV:CV2≒9:4. Angle about 120°. TCV nearly straight.

32. TRYPOXYLON ORNATIGASTER TSUNEKI, 1979

Trypoxylon ornatigaster Tsuneki, SPJHA, 9: 105, 1979 (♀, Malaya, figs.).
Trypoxylon ornatigaster: Tsuneki, Ibid., 11: 50, 1979 (♀, Sumatra, fig.).

Specimens examined: 1 ♀, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 18. XI. 1962, K. J. Kuncheria (BPBM); 5 ♀, Sarawak, 4th Div. Mt. Mulu, RGS Exp. 17.IX. - 23.X. 1977, D. Hollis (BMNH).

Remarks. ♀, 14-15 mm. closely resembles in structure T. fulvocollare, and similar in colour to some form of the Bornean representatives of this species, but differs from it in that anterior part of collar is not adorned with orange band, legs with trochanters and femora black maculated above and hair at base of clypeus is not so conspicuously convergent towards medial line.

In the Bornean specimens A1-2 yellow and both black maculated above, from 3 apically black, without brownish shifting area. Black mark on fore and mid femora larger, occupying except base and apex whole of the dorsal side, hind femur nearly completely black, hind tibia on median area broadly black and tarsus wholly black, but T4 and 5 brownish, usually mid T3-4 black or dark grey and T5 somewhat paler than these, but in one specimen mid tarsus completely yellow (arolia always black). Gaster at base of G2 and 3 and at apex of G2-5 yellow (apex of G3-5 transparent yellow).

Measurements on North Bornean and on one of the Sarawak specimens (within parentheses):

HW,HL,IODv,A3,P=100,44,23,24,154 (100,44,23,24,148). IODs=10:9 (10:9.5). A3=AW×4.3 (×5.0). A3,4,5=10,6.5,6 (ditto). OOD,Od,POD≒2,5,3 (ditto). P,Ma,Mi,2(Ma),3(Ma)=100,20,6,30(23),40(35) [100,21,7.5, 31(30),38(38)]. IODs in 2 others 9.5 and 9.5 respectively.

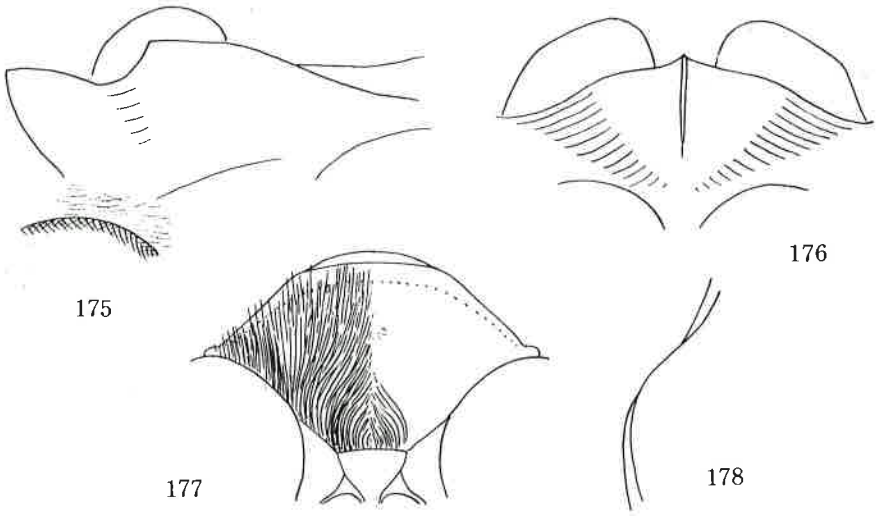
33. TRYPOXYLON RAJANG sp. nov.

♀, about 13 mm. Closely resembling T. ornatigaster m., but separable from it by that propodeum is without lateral carinae, IODs relatively wider, ASR as high as SAT, much broadly expanded forwards and without distinct carinae and fore and mid femora without black mark above. The present species in my keys hitherto published runs to smithi of Pt. III of the present series, but differs from it in that body is much smaller, PAF in wide-opened V-shaped in cross section, ASR as high as SAT, trochanters largely black and hind femur and tibia broadly black.

Black; yellow or light ferruginous are A1-2, and 3 at base and beneath, apical third of clypeus (rather brownish), mandible at base, palpi, tubercle posteriorly widely, apical sides of G1, G2 except a large black mark above, G3 at base and beneath, apical margins of G3,4,5 (transparent and appear dusky yellow), fore and mid legs except coxae, trochanters and arolia (fore trochanter narrowly yellow beneath) and base of hind tibia. Mandible brownish red apically, posterior part of collar discoloured, dusky yellow, articulations of black parts of legs brown or ferruginous, hind T4-5 brownish. Hair golden, on clypeus at base roundly curved inwards (Fig. 177), on

baso-lateral areas of propodeum curled.

Head in frontal view with sides rounded, slightly convergent towards clypeus, vertex not depressed, but each ocellus in a shallow hollow, eye incisions comparatively broad and narrowed towards bottom. HW,HL,IODv,A3,P=100,50,27,23,156. OOD,Od, POD÷1,3,2. A3=AWx4. A3,4,5÷10,7.5,7. P,Ma,Mi,2(Ma),3(Ma)=100,21,7,28(28),34(34). Frontal elevations fairly strong, median furrow broad, deep and wide V-shaped in cross section and broadly and fairly deeply excavated above SAT, SAT low nasiform, distinctly long carinated in middle, medio-apical area rather acutely roundly inclined to IAA, ASR broadly expanded anteriorly, transversely striate, but not carinate, PAF curved down in cross section, SAT-ASR in dorso-lateral view to see through PAF: Fig. 175, in dorsal view: Fig. 176. Clypeus: Fig. 177, disc at base gently roundly elevated, apical margin not suddenly reflected, but broadly weakly up-curved in lateral view, collar with dorsal line gently roundly up-curved in frontal view, anterior part narrow, slightly enlarged laterally, lamina on side broadly rounded (Fig. 178), subalar area of mesopleuron without pent-roof structure, metapleural flange not roundly expanded laterally. Propodeum without lateral carinae, area dorsalis without lateral furrow, median furrow distinct, area apicalis lacking, only lateral carinae defined, GSR weakly roundly elevated, not discoloured, Gl flask-shaped. In fore wing RC=B, Rl short, CV1÷CV2×6.5, TCV:CV2=5:3, TCV sinuate, CV2 nearly straight, angle at base nearly 90°, at apex 105°, veins dark brown, nearly black, stigma pale brown.



Figs. 175–178. Trypoxylon rajang sp. nov., ♀

Frons delicately microcoriaceous and distinctly closely superimposed with strong punctures, SAT closely subrugosely covered with smaller punctures. Mesoscutum polished and finely sparsely punctured. Propodeum with lateral series of striae, posteriorly distinct and anteriorly weaker, striae fine and close, median furrow of area dorsalis finely closely and weakly striate, disc sparsely punctured, sides finely, sparsely punctured, but antero-ventral area broadly smooth and polished.

♂, unknown.

Holotype: ♀, Sarawak, 4th Div. Gn. Mulu, RGS Exp., 17.IX.-23.X. 1977, D. Hollis (BMNH, B.M.77-543).

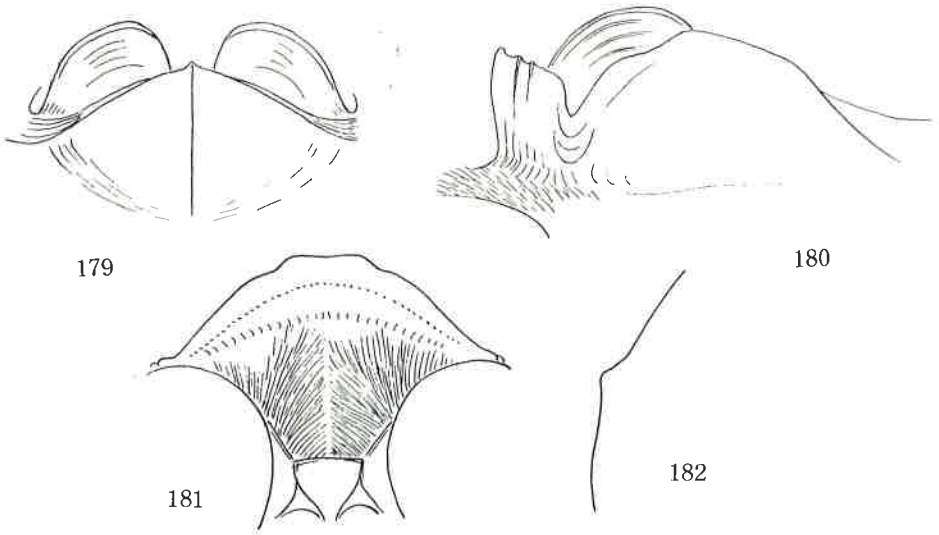
34. TRYPOXYLON KALIMANTAN MENKE, 1976

Trypoxylon annulatum Cameron, J. Str. Br. R. Asiat. Soc., 39: 164, 1903 (nec Taschenberg, 1875) (♀, Sarawak, Mt. Matang).
Trypoxylon kalimanten Menke, in Bohart & Menke, World Sphecid., p. 346, 1976 (nom. nov.)

Trypoxylon annulipes (= kalimantan Menke): Tsuneki, SPJHA, 8:48, 1978 (redescr. holotype, figs.).
Trypoxylon kalimantan: Tsuneki, SPJHA, 11: 47, 1979 (♀, Java, figs. on variat., SAT-ASR and clyp.).

Specimens examined: 1 ♀, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 60 m, 22. X. 1962, K. J. Kuncheria (BPBM); 1 ♀, Sarawak, 4th Div. Mt. Mulu, RGS Exp. X-XI. 1977, N. Collins (BMNH).

Remarks. In both the specimens above listed mesoscutum bears very faint microsculpture under high magnification, lateral carinae of propodeum very weak, especially in the Sarawak specimen, PAF deep, flat-bottomed, V-shaped in cross section, but the bottom line much above level of outer area along inner margin of eye, as in the Javanese specimens (cf. Pt. V, figs. 142-145). SAT in dorso-lateral view to see through PAF: Fig. 180, in dorsal view: Fig. 179, in lateral view very close to Fig. 149 of Pt. V. Clypeus: Fig. 181, marginal area strongly reflected, at base roundly raised and tectate, with hairs distinctly convergent towards medial line, lamina on side of pronotum: Fig. 182. Gaster from apical sides of G1 to sides and underside of G2-3 reddish ferruginous, with dusky mark on each beneath posteriorly.



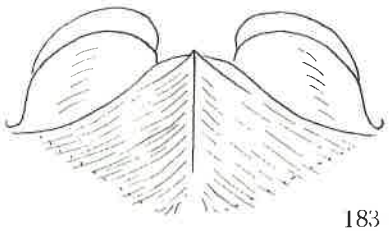
Figs. 179-182. Trypoxylon kalimantan Menke, ♀

Measurements (within parentheses Sarawak specimen): HW,HL,IODv,A3,P=100,46,24, 27,182 (100,48,24,26,180). IODs=10:8 (10:8). OOD,Od,POD≒1,3,2 (1, 2.5, 2). A3≒AW×5 (AW 5). A3,4,5≒10, 6.5, 6.5 (ditto). P,Ma,Mi,2(Ma),3(Ma)=100,16,5,26(18),30(26) (100, 16,5,28(19),32(28)). RC=B (Ditto), CV1≒CV2×8 (×7), TCV:CV2≒5:3 (ditto), angle about 100°, (ditto).

35. TRYPOXYLON CAMERONI sp. nov.

♀, about 15 mm. Very similar to the preceding species, but can be distinguished from it by the following differences (within parentheses kalimantan):
Vertex relatively narrower, HW:IODv=100:21 (100:24). IODs=10:10 (10:8). Frons with median furrow broad and deep and anteriorly just above SAT widened (moderately deep, not particularly widened at above SAT), with surface distinctly microcoriaceous and strongly closely superimposed with deep punctures (surface feebly microcoriaceous and weakly, sparsely superimposed with shallow indistinct punctures). SAT-ASR generally similar, but PAF somewhat shallower: Fig. 184, in dorso-lateral view (cf. Fig. 180), in dorsal view with lateral inclination of SAT acuter and apical carina of ASR

higher and more broadly and distinctly yellowish (Fig. 183, cf. Fig. 179). ASR distinctly broader (Fig. 184, cf. Fig. 180). Clypeus: Fig. 185 (cf. Fig. 181), disc at base weakly roundly raised, not tectate (more distinctly raised and tectate), with hair more weakly convergent medially and at apical area not so strongly reflected. Flagellar joints of antenna relatively longer, A3=AWx6 (x5), A4=AWx3.5 (x3.0), A8= AWx 2 (x1.7), A12=HWx3 (x2.5). Pronotal structure generally similar, but lamina on side somewhat more distinctly produced and pointed at apex: Fig. 186 (Fig. 182). Mesoscutum with strong plumbeous shine (not so strong). Propodeum with strong and distinct lateral carinae (with feebel and sometimes indistinct lateral carinae), area dorsalis with broad shallow but distinct lateral furrows, disc postero-laterally transversely rugoso-striate, striae crossing the lateral furrows (without lateral furrows, disc sparsely, finely punctured). GSR roundly highly elevated, honey yellow in colour (very minutely raised in middle, not discoloured). Wings slightly more clouded, venation generally similar, but CV2 as against CV1 somewhat longer, but this may be variable.



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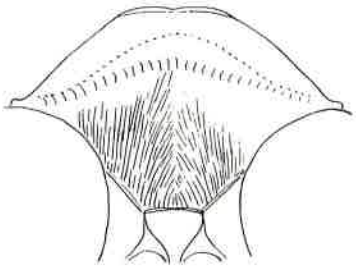

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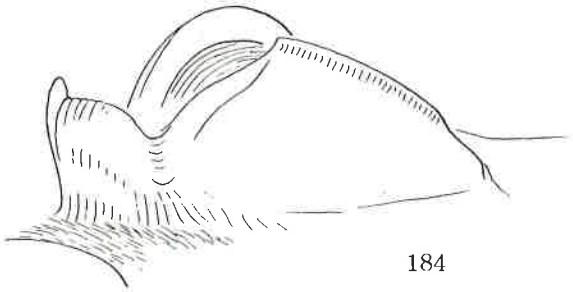

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186

Figs. 183–186. Trypoxylon cameroni sp. nov., ♀

Measurements: Head in frontal view W:L=100:86. HW,HL,IODv,A3,P=100,48,21,28, 172. IODs=10:10. OOD,Od,POD≒2,5,3. A3=AWx6. A3,4,5≒10,6.5,6. P,Ma,Mi,2(Ma),3(Ma) =100,15,6,29(18),33(28). RC=H, Rl short, CV1=CV2x5.5, TCV:CV2≒5:3, angle about 110°.

Subalar area acutely edged and slightly produced at outer margin, but not expanded into pent-roof structure (as in kalimantan), area dorsalis at base obliquely strongly striate (in kalimantan smooth, without carinules). Gaster from apical sides of G1 to G3 reddish ferruginous, with dorsal half brown to dark brown, without black mark on each beneath (constant?). Hair distinctly brassy.

♂, unknown.

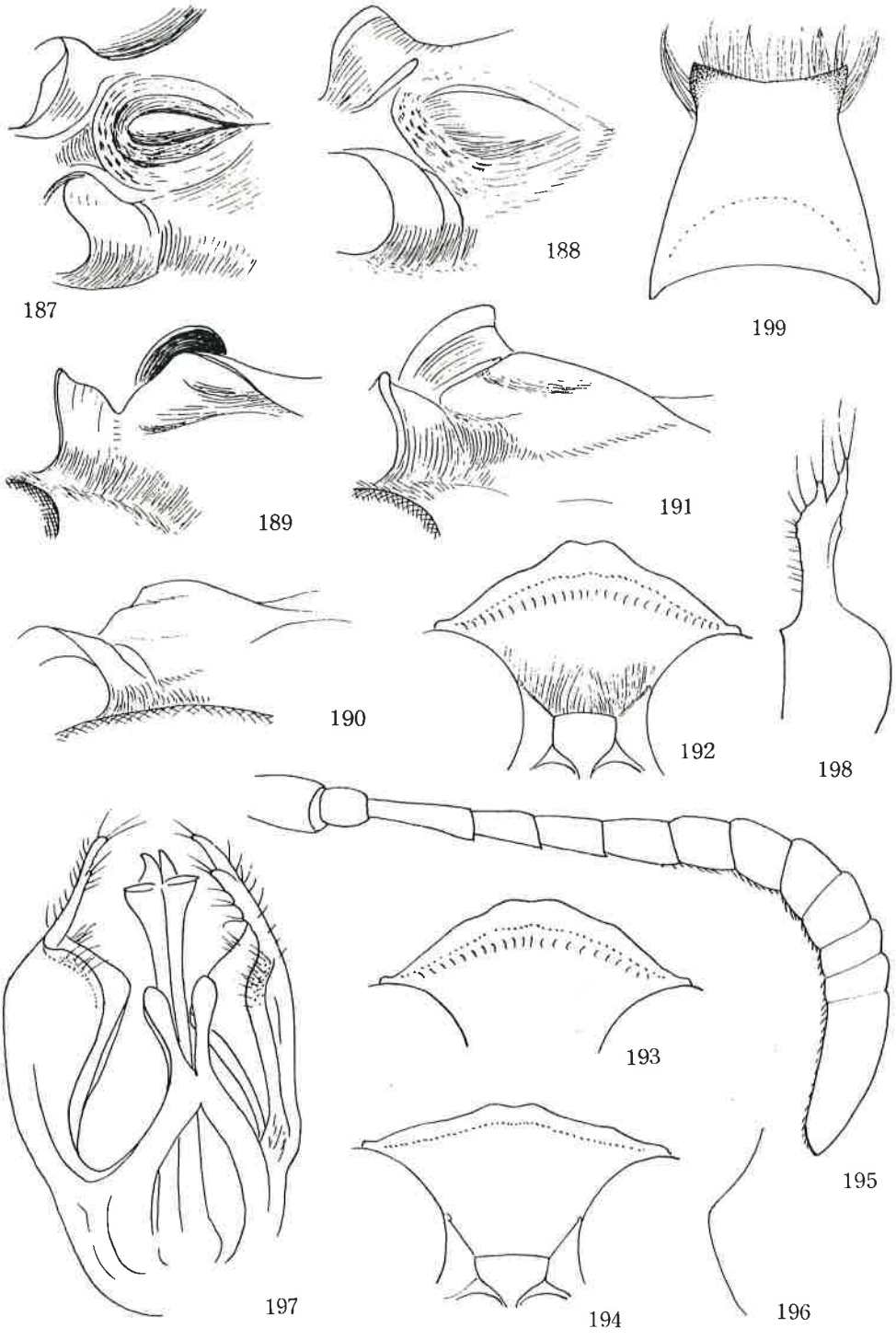
Holotype: ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X. 1977, D. Hollis (BMNH, B.M.77-543).

36. TRYPOXYLON AUROPILOSUM TSUNEKI, 1976

Trypoxylon auropilosum Tsuneki, Steenstrupia (Copenhagen), 4: 79, 1976 (♀, Philippines, Is. Tawi Tawi).

Specimens examined: 3 ♀ 1 ♂, North Borneo, Sandakan, dates undescribed, C. F. Baker (USNM).

Remarks. ♀. Characteristic in the structure of SAT and gastral petiole and can



Figs. 187-199. Trypoxylon auropilosum Tsuneki. 187-193, ♀; 194-199, ♂.
191 in holotype from Is. Tawi Tawi, all others in Bornean specimens.

easily be separated from allied species.

SAT low, nearly flat, but median carinate area raised into a minute nasiform, apical margin of flat area rounded, edged, forming a semicircular step (Fig. 187, nearly vertically from side), the area arcuately rugoso-striate, ASR obliquely raised and expanded anteriorly, PAF shallow, V-shaped in cross section as given in Fig. 189 (dorso-lateral to see through PAF), but the furrow is confined to inner half only (Figs. 187, 188, latero-vertical). Gastral petiole very slender and long, Gl÷AW×10. This is very conspicuous.

Differences of the Bornean specimens (♀) from the holotype (♀) of the Philippines (Is. Tawi Tawi):

1. Legs darker, only tibial spurs and tarsus of fore leg ferruginous, rest all castaneous brown, often fore and mid tibiae slightly paler at base. In the holotype fore and mid tibiae and tarsi and hind tibia at base ferruginous, only tibiae on folded side slightly brownish and fore T5 and mid T3-5 brown.

2. Ferruginous part of gaster darker: Sides of G1 and ventral half of G2 and 3 pale brown, rest castaneous. In holotype sides of G1 and G2 and 3, except a large mark covering posterior half of each above, ferruginous and rest dark brown.

3. The longitudinal blunt ridge extending from ASR and bordering outer end of PAF is not so strong as in holotype (Figs. 189, 190...lateral, cf. Fig. 191, lateral in holotype).

Measurements in one of the Bornean specimens (♀):

Head in frontal view W:L=100:84 (sides rounded, not convergent towards clypeus, vertex not depressed, eye incision narrow and deep, nearly parallel-sided). HW,HL,IODv, A3,P=100,48,24,26,230. IODs=10:9 (constant among the three). OOD,Od,POD÷1,5,3. A3=AW×4.7. A3,4,5÷10,7,6. P,Ma,Mi,2(Ma),3(Ma)=100,9,3,20(12),22(18). RC=C, R1 short, CV1÷CV2×4, TCV:CV2÷6:5, angle about 120°. Clypeus: Fig. 192, 193 (variation).

♂ (hitherto unknown). Length about 10 mm. Similar to ♀, but legs and gaster darker. Legs castaneous dark brown, only fore tibial spurs and T1 ferruginous; gaster wholly castaneous and posterior half nearly black (but the gaster is stained). Clypeus less produced anteriorly (Fig. 194, cf. Figs. 192 or 193 in ♀), with hair parallel, its basal elevation and apical reflection weaker. Antenna different in form as given in Fig. 195. Head in frontal view relatively wider, W:L=100:77, with eye incisions slightly broader. Measurements: HW,HL,IODv,A3,Al3,P=100,48,25,19,27,208. IODs=10:9. A3=AW×3.7. A3,4,5÷10,7,6.5. Al3=Bw×2.7 and ÷A9-12 (compressed dorso-ventrally). P,Ma,Mi, 2(Ma),3(Ma)=100,9,3,19(11),20(17).

Frons flat and gently roundly inclined towards medial line, anterior margin from posterior end of SAT running obliquely straight to inner dorsal corner of eye incisions, thence inclined antero-laterally. Structure of SAT-ASR similar to that of ♀. Occipital carina complete. Anterior part of collar highly raised, moderately widened towards sides, posterior part discoloured, in frontal view dorsal line gently raised straight towards median top which is rounded but not tuberculate, lamina on side: Fig. 196; subalar area with postero-outer margin acutely edged, but not expanded. Propodeum with strong lateral carinae, area dorsalis enclosed with distinct furrow, area apicalis distinctly enclosed with carina, basal carina (= GSR) roundly highly elevated, with apical area discoloured, ambur yellow.

Genitalia seen somewhat obliquely from beneath: Fig. 197, paramere shortly bifid at apex (Fig. 198, right hand one, apical part seen from side), asymmetry in length, main body expanded not only inner margin, but also on outer margin, both rolled inwards to form a half pouch, volsella spatulate, penis valve with ickle-shaped appendages and well developed shoulder. Sternite 8 seen from inside: Fig. 199.

37. TRYPOXYLON COLORATUM SMITH, 1857

Trypoxylon coloratum Smith, J. Proc. Linn. Soc. London, Zool., 2: 106, 1857 (♂, realy ♀, Borneo: Sarawak).
Trypoxylon coloratum: Bohart & Menke, World Sphecid., p. 346, 1976 (listed).
Trypoxylon coloratum: Tsuneki, SPJHA, 8: 8, 1978 (redescr. lectotype).

Specimens examined: 5 ♀ 1 ♂, North Borneo, Sandakan, dates unknown, C. F. Baker (USNM); 1 ♀, North Borneo, W. Coast Residency, Ranau, 8 miles North of Paring Hot Springs, 500 m, 9-18. X. 1958, T. C. Maa (BPBM).

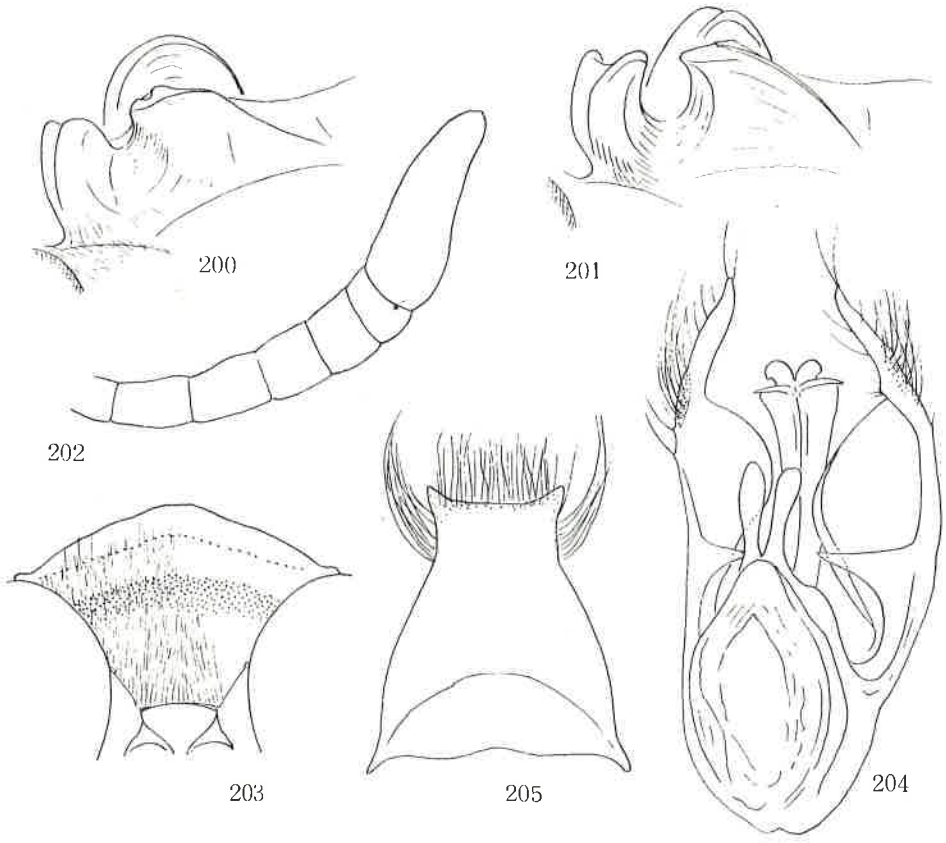
Remarks on ♀. The form of SAT moderately high nasiform, but in lateral view

considerably varied in the curvature of dorsal line, sometimes even near isosceles triangle or cone-shaped, medio-apical inclination flattened to form a round shining area carrying a large fovea on it, PAF fairly deep, but always gently up-curved (not flat-bottomed as given in my redescription). Apical margin of clypeus on each side of medial prominence roundly excavated, the depth of which variable, medial prominence itself sometimes gently emarginate at apex, but sometimes not. Mesoscutal microsculpture is always weak, surface not mat, usually fairly shining. Subalar area of mesopleuron acutely edged at outer margin and slightly produced, but not expanded to form pent-roof structure. Length 13–16 mm, colouration as in the lectotype, but gaster frequently stained and maculation becomes indistinct.

Head in frontal view with W:L=100:86, with sides roundly convergent below, eye incision narrow, gently convergent towards bottom, vertex depressed. HW,HL,IODv,A3, P=100,46,22,30, 180. IODs=10:7.5. OOD,Od,POD≒2,6,3. A3≒AW×5. A3,4,5≒10,6.5,5.5. P,Ma,Mi,2(Ma),3(Ma)=100,16,5,25(19),28(26).

♂ (hitherto undescribed). 11.5 mm. Colouration as in ♀, but Gl except sides completely brownish black (sides brownish ambur yellow), rest of gaster yellowish ferruginous and broadly black (or brownish black) marked on each of G2–5 above, the mark laterally fading to brown and mostly extending to sides and underside.

In structure, except sexual differences also generally as in ♀, but ASR with 2 carinae much higher and posterior one strongly reflected posteriorly, as a result PAF becomes aval in cross section and deeper and flat-bottomed (Fig. 201, dorso-lateral to see through PAF, cf. Fig. 200 in ♀) just as in shakha. Antennal joints relatively shorter except Al3 (Fig. 202), clypeus (Fig. 203) less produced anteriorly, undulation of anterior margin weaker, disc less strongly raised at base, with hair nearly parallel and more weakly reflected at apex. Microsculpture on mesoscutum very much weaker, under 50× magnification hardly defined, surface almost smooth and shining.



Figs. 200–205. T. coloratum Smith. 200, ♀; others ♂.

Head in frontal view with W:L=100:85. HW,HL,IODv,A3,P=100,45,23,19,160, Al3 relatively 24. IODs=10:8.5. OOD,Od,POD≒1,3,1. A3=AW×3. Al3=BW×5, >A10-12, <A9-12. A3,4,5≒10,7,6.5. P,Ma,Mi,2(Ma),3(Ma)=100,17,6,32(22),32(30). RC=C, CV1≒CV2×7, TCV: CV2=5:3, angle about 100°.

Structure of pronotum including lamina, subalar area of mesopleuron and propodeum just as in ♀ (lamina under natural condition appears to have pointed apex due to bundle of hair at apex, but in reality apex broadly rounded as given in Fig. 25 pf Pt. II.).

Genitalia seen somewhat obliquely from beneath: Fig. 204. Paramere simple at apex, with a fringe of long hair, inner margin of main body expanded, lamellate, half rolled inwards, outer margin near mid point of its length produced in elongate triangle, volsella spatulate, penis valve with well developed shoulder and a pair of shickle-shaped appendages. General structure similar to that of khasiae-group. Sternite 8 seen from inside: Fig. 205.

38. TRYPOXYLON ELEGANTULUM SMITH, 1860

Trypoxylon elegantulum Smith, J. Proc. Linn. Soc. London, Zool., 4 (Suppl.): 84, 1860 (♀, Makassar).
Trypoxylon elegantulum: Bohart & Menke, World Sphecid., p. 346, 1976 (listed).
Trypoxylon elegantulum: Tsuneki, SPJHA, 8: 12, 1978 (redescr. Holotype, figs.).

Remarks. No new specimen could be discovered among the present material.

Main characters: Gaster, antenna and legs ferruginous, only bases of coxae and arolia black. Generally similar in form to coloratum. Propodeum without lateral carinae, mesoscutum without microsculpture, SAT low broad nasiform, with a flat shining round area medio-apically that carries a minute fovea, PAF deep, oval in cross section, flat-bottomed, ASR bicarinate, posterior carina markedly reflected posteriorly, clypeus as in coloratum, subalar area of mesopleuron normal.

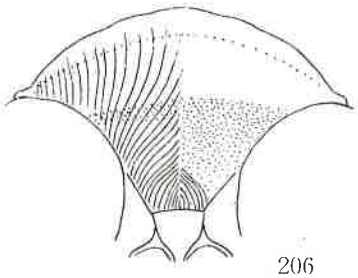
39. TRYPOXYLON GRACILESCENS SMITH, 1860

Trypoxylon gracilescens Smith, J. Proc. Linn. Soc. London, Zool., 4 (Suppl.): 85, 1860 (♀, Makassar).
Trypoxylon gracilescens: Bohart & Menke, World Sphecid., p. 346, 1976 (listed).
Trypoxylon gracilescens: Tsuneki, SPJHA, 8: 18, 1978 (redescr. lectotype, figs.).

Specimen newly examined: 1 ♀, Celebes (a 7 mm round pale purplish label is attached, carrying 58 11. 2 written with black ink in two lines on the surface and Celebes on the back. 58 11 2 = ? 2. XI. 1858 (? collected by A. R. Wallace). Museum label 1977 shows that "under elegantulum").

In the specimen left antenna from A4 apically and gaster from G4 apically are lost. G3 is broken and covers G2. Right mid T4-5 and both hind T4-5 are missing.

Observation. Head in frontal view with lateral margins rounded, slightly convergent towards clypeus, W:L=100:84, vertex slightly depressed, eye incisions narrow and gradually narrowed towards bottom. Clypeus: Fig. 206, hair at base strongly convergent towards medial line, apical reflection fairly strong. HW, HL,IODv,A3,P=100,48,24,29,170. IODs=10:7. OOD, Od,POD≒2,5,3. A3=AW×5. A3,4,5≒10,6,5.5. P, Ma,Mi,2(Ma),3(Ma)=100,18,6,-(-),-(-). Gl black but apical swelling ferruginous, antenna from A5 apically brownish and darker towards apex. Mesoscutum half mat, but microsculpture is not defined under 50× magnification, while on scutellum defined, punctures on scutum fine, PIS 2-3 times PD (antero-lateral area). Propodeum without lateral carinae, but in some light very faint impressed line observalbe, dorsal surface, except area dorsalis, transversely, very finely and closely stri-



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ate, area dorsalis enclosed with shallow broad furrow, the furrow defined till near base, surface finely sparsely punctured, but median furrow transversely weakly striate and at base sparsely crenate.

40. TRYPOXYLON VARIPILOSUM CAMERON, 1901

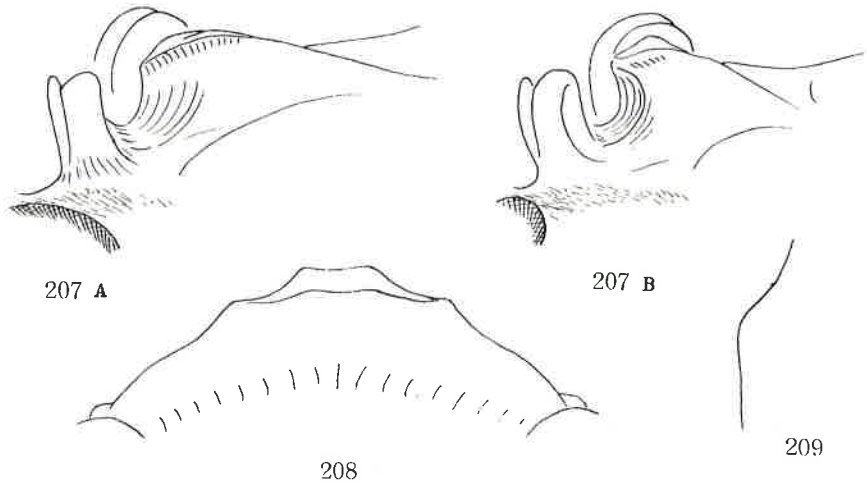
Trypoxylon varipilosum Cameron, Proc. Zool. Soc. London, 2 (2): 28, 1901 (♀, Singapore).
Trypoxylon varipilosum: Bohart & Menke, World Sphecid., p. 348, 1976 (listed).
Trypoxylon varipilosum: Tsuneki, SPJHA, 8: 44, 1978 (redescr. holotype, figs.)
Trypoxylon khasiae: Tsuneki, SPJHA, 9: 84, 1979 (partim, Malayan specimens).
Trypoxylon khasiae: Tsuneki, SPJHA, 11: 36, 1979.

Specimens examined: 1 ♀, East Borneo: Tenggarong, Mt. Pandjang, 100 ft. 2.VII. 1937, M. E. Walsh (BMNH); 1 ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp. XII. 1977 - I. 1978, M. Collins (BMNH).

Remarks. The present species (♀) can be distinguished from the closely allied other species by the apical form of clypeus (from gracilescens), by the form of PAF in cross section and by the characteristic maculae on hind leg (from gracilescens, khasiae and varipiloides nov.).

SAT-ASR in dorso-lateral view to see through PAF: Fig. 207, A and B. Apical margin of clypeus: Fig. 208. Hind femur with two blackish or brownish streaks above (very constant as far as examined), and hind tibia with a small blackish patch at apex on outer side, tarsus except articulations dark brown. A1-3 yellow, A3 at apex on outer side darkened, A4-12 black, but yellowish beneath. Gaster with G1 except apical swelling black, rest ferruginous.

In both the specimens above listed medio-apical smooth area of SAT bears a minute fovea on it. Hair brassy, on clypeus sometimes nearly silvery. Mesopleural scrobe



Figs. 207-209. Trypoxylon varipilosum Cameron, ♀.

shallowly concave, subalar area with outer margin edged at posterior portion, but not expanded. Propodeum without lateral carinae, lateral furrows of area dorsalis very weak, practically lacking, lateral series of striae of the segment not strong, sometimes lacking.

Head in frontal view with lateral margins rounded and gently convergent towards clypeus, W:L=100:88, vertex weakly depressed, eye incision narrow, subparallel-sided. Pronotal lamina: Fig. 209. Measurements (within parentheses: Sarawak specimen): HW,HL,IODv,A3,P=100,47,21,29,182 (100,46,22,30,182). IODs=10:8.5 (10:9). OOD,Od,POD

≒1,4,2 (1,3.5,2). A3=AW×6 (×6). A3,4,5≒10,6,5 (10,6.5,6). P,Ma,Mi,2(Ma),3(Ma)=100, 16,5,22(18),30(23) [100,15,5,28(16),31(21)].

41. TRYPOXYLON VARIPILOIDES sp. nov.

♀. Very closely resembles the preceding species. But in the present species IODs smaller (10:6), medio-apical prominence comparatively broader, lamina on sides of pronotum somewhat toothed, ASR thinly bicarinate and hind carina (with top not roundly swollen in lateral view) obliquely inclined posteriorly to form V-shaped PAF (Figs. 210-212), mesoscutum with strong plumbeous shine, nearly mat, but without microsculpture even under 50× magnification, G5 always with a large blackish patch above and hind femur and tibia different in maculation: femur on apical half only darkened and tibia on about apical third, except outer ridge, blackish.

Length 12-14 mm. Black, ferruginous or yellow are Al-3 (3 darkened at apex on posterior side), apical 2/5 of clypeus, mandible (inner margin and apex darkened), mouth parts (palpi ochre yellow), discoloured posterior part of collar, tubercle, tegula and basal plate of wing, gaster (reddish yellow) from apical swelling of G1 (usually from middle posteriorly) to end, except a black mark covering basal half of G5 above, fore and mid legs except bases of coxae, arolia and mid T2-3 or 2-5, hind leg with coxa largely, on basal half of femur, tibia at base broadly and outer edge, articulations of tarsus and all tibial spurs. Hair usually brassy, sometimes golden, sometimes on clypeus appears nearly silvery.

Head in frontal view with sides rounded, almost not convergent towards clypeus, vertex weakly depressed, eye incision narrow, but distinctly narrowed towards bottom, HW:HL=100:92, frontal elevations gently rounded, comparatively small, medial furrow broad and comparatively deep, SAT moderately high nasiform, medio-apical area obliquely inclined, forming a round flat shining area, without distinct fovea on it (in all the specimens examined). SAT-ASR in dorso-lateral view to see through PAF: Figs. 210, 211 and 212 (from somewhat different direction), PAF flat-bottomed, with bottom line higher at outer end and inclined towards IAA. Clypeus: Fig. 213, medio-apical prominence comparatively broader than in varipilosum, disc at base roundly raised and at apex reflected (shown with dotted line in Fig. 213).

HW,HL,IODv,A3,P=100,48,24,27,166. IODs=10:6. OOD,Od,POD≒2,4,3. A3=AW×5.3. A3, 4,5≒10,6.5,6. P,Ma,Mi,2(Ma),3(Ma)=100,15,3,34(17),39(22).

Occipital carima complete. Pronotum in frontal view with dorsal line triangular, gently raised, with top minutely rounded, but not tuberculate, in dorsal view weakly incrassate laterally, lamina on side somewhat toothed (Fig. 214). Subalar area with postero-lateral margin acutely edged and slightly produced over subalar pit, but not expanded, mesopleural scrobe very shallow and broad. Propodeum without lateral carinae, area dorsalis enclosed with very feeble furrow. GSR almost simple, G1 flask-shaped. MC=B, CV1≒CV2×6.5, TCV:CV2≒5:3, angle about 100°.

Frons very minutely microcoriaceous, nearly mat, superimposed punctures very weak and sparse, indistinct due to covering pubescence, mesoscutum with strong plumbeous shine, half mat, punctures fine, PIS=PD× 2-3. Propodeum smooth and shining all over except delicate hair points, median furrow of area dorsalis without striae, sides except antero-ventral femoral hollow covered with hair-bearing points.

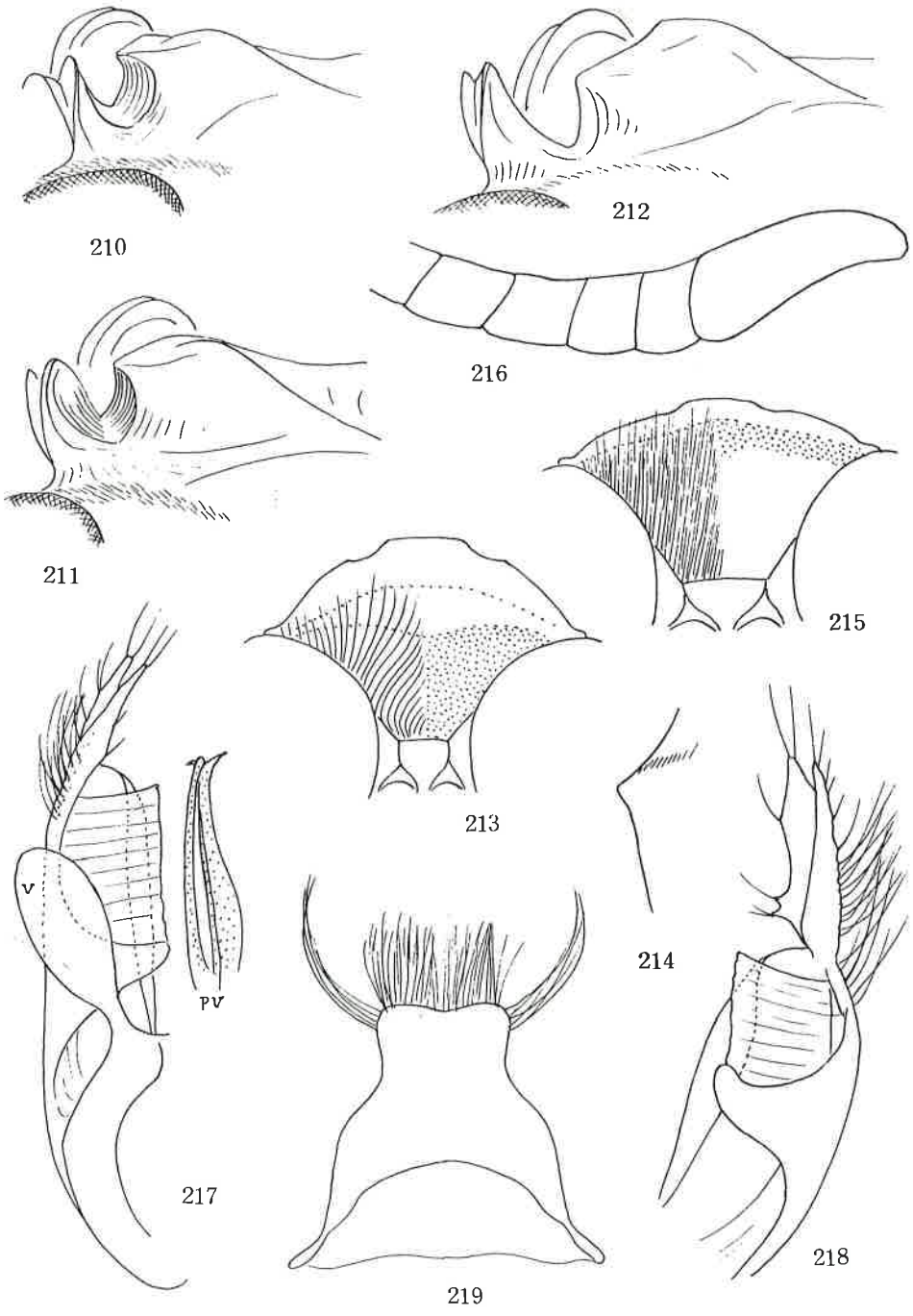
♂. 9-10 mm. Similar in general to ♀, but Al-2 and extreme base of 3 only yellow, hind tibia sometimes nearly wholly ferruginous, apical brown part of hind femur broader, covering about 2/3 of total length. Clypeus, antenna and IODs show sexual character.

Clypeus: Fig. 215, basal elevation weak, with hair nearly parallel, apical reflection weak, apical coloured area narrow (cf. Fig. 213 in ♀); antenna with flagellar joints shorter, A9-13: Fig. 216, A13 distinctly curved at apex, IODs=10:8.

Head in frontal view W:L=100:84, with sides rounded, eye incision wider than in ♀ HW,HL,IODv,A3,A13,P=100,48,24,9,22,126. IODs=10:8, OOD,Od,POD≒1,4,2. A3=AW×2.8. A13=BW×2.6, slightly longer than A10-12 (Fig. 216). P,Ma,Mi,2(Ma),3(Ma)=100,19,7, 38(21),38(32).

Genitalia very characteristic in structure (Figs. 217, left half seen from beneath, V...volsella; PV...penis valve, 218, right paramere from beneath). Paramere deeply bifid at apex into two slender lobes, both with sparse hair, main body not only on inner margin, but also on ventro-outer margin broadly expanded into lamella, the former rolled ventrally as usual, the latter flatly expanded inwards like a flag, Besides this semitransparent lamella, outer margin provided with an elongate triangu-

lar process as in khasiae-group at about mid point of its length which is also stretched inwards, apparently supporting the lower margin of the flag-like lamella, possibly the lamella may be the thin expansion of this triangular process. Volsella at



Figs. 210-219. Trypoxylon varipiloides sp. nov., 210-214, ♀; 215-219, ♂

base narrow, but broadly expanded to flat oviform layer which is not fringed with hair; penis valve without shoulder and sickle-shaped appendages, with apex, strange to say, turned dorsally. Sternite 8: Fig. 219 (seen from inside), the form is very characteristic.

Holotype: ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp. 17.IX.-23.X. 1977, D. Hollis (BMNH, BM77-543).

Paratypes: 1 ♂, Sarawak, Nanga Pelagus, near Kapit, 180-585 m, 7-14. VIII. 1958, T. C. Maa (BPBM); 1 ♂, North Borneo, Liawan, 14-17. I. 1959, T. C. Maa (BPBM); 3 ♀, same data with holotype (BMNH); 1 ♀, same loco as holotype, X.-XI. 1977 M. Collins (BMNH); 1 ♀, Sarawak, 1st Div., Semongoh Forest Res. 1 25 N 110 17 E, 15-19. XI. 1976, P. S. Cranston (BMNH, BM1977-19); 1 ♀, Sarawak, 4th Div., Niah, 3 49 N 113 46 E, 9-17. X. 1976 (Malaise trap in primary forest), P. S. Cranston (BMNH, B.M.1977-19).

Other specimens: A. Gaster lacking. 1 ♀*, Borneo, 31. VII. 1897 (Cameron Coll.) (BMNH); 1 ♀, North Borneo, Forest Camp, 19 km North of Kalabakan, 19. XI. 1962, K. J. Kuncheria (BPBM).

B. Aberratio in colouration. 1 ♀, Sarawak, Kuching, Santubong, 797-1500 m, 18-30. VI. 1958, T. C. Maa (BPBM). In this specimen yellow colour is better developed than usual. A4,5 pale brown and gradually slightly more darkened apically and blackish mark on 3 indistinct; similarly black mark on G5 and of hind tibia also very pale and indistinct, hence it was removed from paratypes.

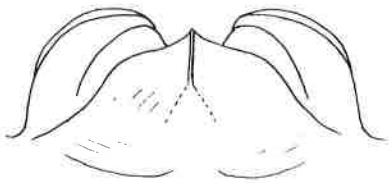
Remarks. The specimen marked with an asterisk is attached with a name label, "Trypoxylon erythropodum Cameron' type Borneo" written in 4 lines by the hand of P. Cameron. But this is a nomen nudum.

42. TRYPOXYLON CIMMOLUM sp. nov.

♀, 13 mm. Characterized by the combination of the form of clypeus, structure of SAT-ASR and colouration of gaster and legs.

Diagnosis. ♀, 13 mm. Al-2, legs broadly and gaster medianly beneath ferruginous, hair brassy, gastral petiole flask-shaped, mesoscutum smooth, under high magnification fainly microsculptured, propodeum with very feeble (practically without) lateral carinae, area dorsalis with weak lateral furrows, IODs=10:9, SAT-ASR: Figs. 220-222, clypeus: Fig. 223, RC=C.

Black, ferruginous are Al-2, basal half of 3, apical 2/5 of clypeus, mandible,



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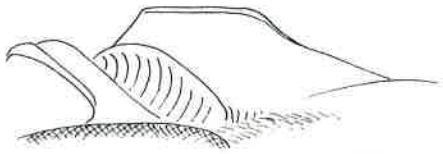

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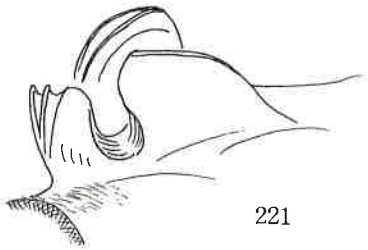

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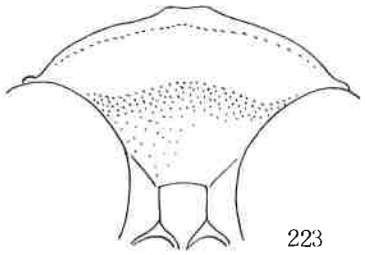

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Figs. 220-224. Trypoxylon cimmolum sp. nov., ♀

palpi (ochre yellow), discoloured posterior part of collar, tubercle, tegula, basal plate of wing and legs except following black: Coxae except apices, lengthened mark on fore (small and brown) and mid femora, hind femur nearly wholly, -tibia except base, mid T3-5 (brown) and hind T1 at apex (a brown spot), T2 on apical half and T3-5 (5 with 2 yellow spots at bases of claws) and all arolia. Hair on sides of frons brassy, on clypeus nearly silvery, on thorax-complex golden, on clypeus nearly parallel and at baso-lateral areas of propodeum curled but sparse.

Head in frontal view with side rounded, but somewhat quadrate as a whole, W:L=100:92, vertex fairly depressed, eye incision narrow and narrowed outwards, but with upper margin somewhat raised outwards over horizontal; frontal elevations moderate, comparatively large, medial furrow broad and fairly deep near fore ocellus, but wider and shallower towards SAT, SAT moderately high nasiform, nearly tuberiform, strongly carinated in middle, apical margin transversely triangular, but medio-apical area rounded, verge more or less edged and at PAFs slightly produced over them, ASR nearly as high as SAT, tricarinate on top, hind carina thick and roundly curved down to PAF, PAF deep, flat-bottomed, U-shaped in cross section. The structure in dorsal view: Fig. 220, in dorso-lateralview to see through PAF: Fig. 221, in lateral view: Fig. 222. Clypeus: Fig. 223, basal elevation and apical reflection weak.

HW,HL,IODv,A3,P=100,55,18,27,196. IODs=10:9. OOD,Od,POD≒1,7,3 (OOD very narrow). A3=AW×4.5. A3,4,5≒10,7,6. P,Ma,Mi,2(Ma),3(Ma)=100,15,5,33(16),34(24). RC=C. Rl moderately long, reaching almost wing apex, CV1≒CV2×4.5. TCV:CV2≒6:5, sinuation and curvature of TCV and CV2 very weak, angle between them about 100°.

Occipital carina almost complete, narrowly interrupted behind buccal cavity by a furrow coming from buccal carina. Collar of pronotum narrow, weakly incrassate laterally, in frontal view dorsal line gently up-curved and weakly roundly raised in the middle, lamina on side: Fig. 224, mesopleural scrobe deep and distinct, subalar area with outer margin acutely edged and slightly produced over subalar pit, but not expanded into pent-roof structure. Propodeum without lateral carinae, but in some condition very faint impressed line at dorsal part of the side observable, lateral furrows of area dorsalis also very feeble, practically absent, area apicalis with lateral carinae distinct, curved up dorso-interiorly, but broadly open between the ends of the two, GSR roundly raised, discoloured to honey yellow, but basal width of the raised area comparatively narrow.

Frons strongly microcoriaceous and distinctly superimposed with punctures, punctures on dorsal portion sparse, but anteriorly close, SAT closely, rather coarsely covered with punctures, mesoscutum with weak plumbeous shine, finely, somewhat sparsely (PIS=PD×2-3) punctured, PIS under high magnification weakly microcoriaceous. Propodeum without lateral series of striae, instead with a zone of hair-bearing punctures, area dorsalis sparsely punctured, medial furrow on basal half strongly punctured, but without striae.

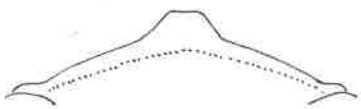
♂, unknown.

Holotype: ♀, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 4. XI. 1962, K. J. Kuncheria (BPBM).

43. TRYPOXYLON SUMATRAENSE BORNEONIS ssp. nov.

Trypoxylon sumatraense Tsuneki, SPJHA, 11: 30, 1979 (♀, Sumatra, figs.).

♀. Differs from the Sumatran form in the following respects:



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Body is larger and robuster, about 10 mm. Head in frontal view somewhat more distinctly subquadrate, antennal joints relatively somewhat longer (e.g. A3=AW×2.5, in the nominate race AW×2.0), mid leg wholly black, only T4-5 slightly brownish. Hind tibia without pale ring at base. Otherwise well agrees in characters. Measurements:

Head in frontal view with W:L=100:90 (eye incision broad and shallow, strongly narrowed towards bottom, vertex not depressed). HW,HL,IODv,A3,P=100,58,27,16,180. IODs≒10:6. A3=AW×2.5. A3,4,5≒10,7.5,7. OOD,Od, POD≒1,5,4. P,Ma,Mi,2(Ma),3(Ma)=100,21,6,26(30),32(36). RC=M. Rl not long, about half of CV2, but almost reaching wing apex, CV1≒CV2×4, TCV:CV2≒5:4, TCV nearly straight, CV2 strongly down-curved, angle about 110°.

Apical margin of clypeus: Fig. 225. Lateral carinae of propodeum practically

lacking, but strictly in some light condition very faint vestigial impressed line can be seen.

♂, unknown.

Holotype: ♀, Sarawak, Mt. Dulit, 4000 ft. Moss Forest, 25. X. 1932, Oxford Univ. Exp. B. M. Hobby & A. W. Moore (BMNH, B.M. 1933-254).

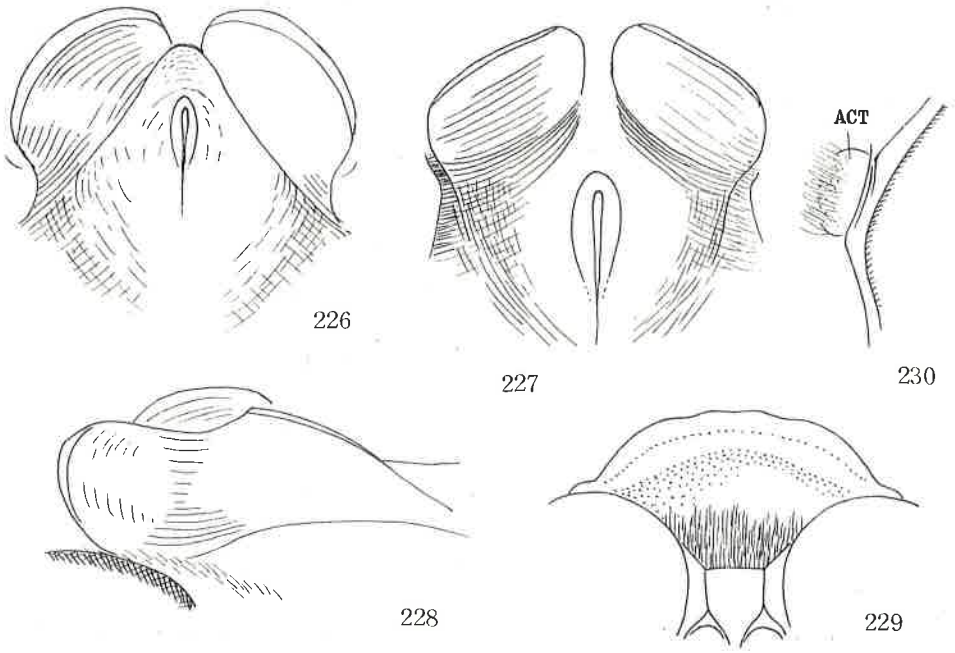
44. TRYPOXYLON VENATICUM sp. nov.

In the structure of SAT-ASR the present species resembles T. vardyi or yebissum, but here mesoscutum distinctly microcoriaceous and clypeus different in form.

Diagnosis. ♀, about 10 mm. Al-3 and legs, both broadly, and gaster medianly ferruginous, hair silvery. P flask-shaped, mesoscutum microcoriaceous, propodeum without lateral carinae, area dorsalis without lateral furrows, IODs=10:7, SAT-ASR: Figs. 226-228, clypeus: Fig.229, RC=B. Sarawak.

♀, 10-11 mm. Black, ferruginous are Al-3 (3 brown above) and 4 beneath, apical third of clypeus, mandible (apically reddish brown), palpi (ochre yellow), discoloured posterior part of collar (slightly dusky), apical margin narrowly of tubercles, tegula, basal plate of wing, from apical area of G1 to G4 (each carrying a blackish mark above, larger posteriorly), fore and mid legs except coxae, trochanters (ferruginous beneath) and arolia and hind leg except following black: coxa, trochanter (yellowish beneath), apical half of femur and of tibia (shifting area brown) and tarsus except brownish articulations and T4-5. Hair silvery, on clypeus parallel.

Head in frontal view subquadrate, W:L=100:96, vertex not depressed, eye incision broad, comparatively shallow, markedly narrowed towards bottom, frons gently raised, median furrow broad and shallow, SAT-ASR in dorsal view: Fig. 226, SAT in lateral view with dorsal line in same level with frons, surface nearly flat, only median carinate area rather suddenly raised, but apex of the carina considerably remotely separated from medio-apical margin of SAT (Fig. 227, vertical view), ASR broadly expanded anteriorly, surface nearly smooth, PAF shallow, simply down-curved in cross



Figs. 226-230. Trypoxylon venaticum sp. nov., ♀.

section (Fig. 228, dorso-lateral view to see through PAF), clypeus: Fig. 229, disc flat and gently roundly reflected at apex. HW,HL,IODv,A3,P=100,56,26,23,172 (100, 55,26,23,174). IODs=10:6 (10:6.5). A3=AW×3 (do.). OOD,Od,POD≒1,4,3 (≒1,5,3). A3, 4,5≒10,6,6 (10,7,6). P,Ma,Mi,2(Ma),3(Ma)=100,22,7,26(26),32(32) (100,21,6,24(28), 28(32)). (within parentheses... paratype). Occipital carina complete. Collar with dorsal line gently up-curved in frontal view, in dorsal view anterior part slightly incrassate laterally, lamina on side (Fig. 230, ACT... ante-coxal tubercle) with apical margin broadly rounded and roundly inclined to outer side, mesopleural scrobe large and deep, subalar area normal, propodeum without lateral carinae, area dorsalis without lateral furrows, area apicalis with curved lateral carinae only, GSR almost simple, very weakly roundly elevated, not discoloured, P distinctly flask-shaped, RC=B, Rl rather long, as long as CV2, but not reaching wing apex, CV1≒CV2×5, TCV :CV2≒5:3, TCV weakly sinuate, angle roughly about 110°.

Frons microcoriaceous and distinctly closely superimposed with comparatively large punctures, SAT finely closely punctured, mesoscutum strongly microcoriaceous, half mat, punctures fine and fairly close, but PIS=PD×1-2. Propodeum without lateral series of striae, whole the dorsal surface except area dorsalis and bottom line of medial furrow of posterior inclination closely covered with fine hair-bearing punctures, area dorsalis which is defined by the difference of punctuation is finely sparsely punctured, with surface shining, only on median furrow very feeble striae are seen.

♂, unknown.

Holotype: ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp. 17.IX.-23.X. 1977, D. Hollis (BMNH, B.M.77-543).

Paratype: 1 ♀, Sarawak, 4th Div., Niah, 9-17. X. 1976, 3°49'N, 113°46'E, P. S. Cranston (BMNH, B.M. 1977-19).

45. TRYPOXYLON LUMPURENSE TSUNEKI, 1979

Trypoxylon lumpurense Tsuneki, SPJHA, 9: 161, 1979 (♀, Malaya, figs.).

Specimens examined. 1 ♀, North Borneo, Sandakan Bay (SW), Sapagaya Lumber Camp, 2-20 m, 2. XI. 1957. (the other label: North Borneo, Ranau, 12.X.1958. Both without collector's name) (BPBM); 1 ♀, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 60 m, 14. XI. 1962, K. J. Kuncheria (HPBM); 1 ♀, Sarawak, 4th Div., Long Teru, 20-22. X. 1976, 3°52'N 114°15'E, P. S. Cranston (BMNH, B.M.1977-19).

♀. Measurements on two Bornean specimens (one from North Borneo and one from Sarawak, the latter within parentheses):

Head in frontal view subquadrate, W:L=100:98 (100:97), vertex not depressed, eye incision broad and shallow, distinctly narrowed towards bottom. HW,HL,IODv,A3,P =100,60,30,20,172 (100,60,30,20,150). IODs=10:3.3 (10:3.5)*. OOD,Od,POD≒1,4,2 (1,3, 2). A3=AW×3.5 (×3.7). A3,4,5≒10,6,6 (10,6,5.5). P,Ma,Mi,2(Ma),3(Ma)=100,20,6,28 (25),30(29) (100,24,8,28(32),32(38)).

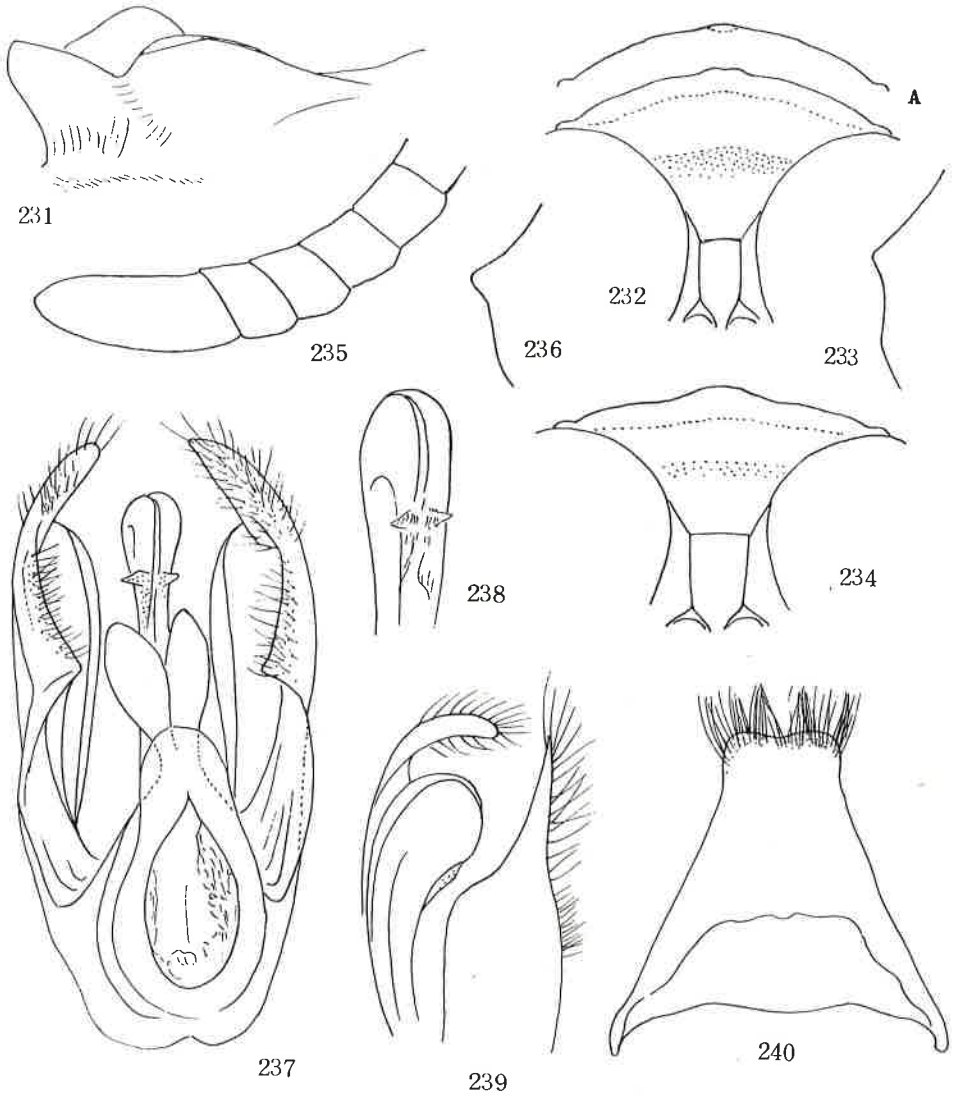
Remarks on *. In the original description of this species IODs is given as 4:1, remeasurement confirms that it is 10:3.5, namely ≒3:1. In the holotype specimen the head is partly crashed and fission runs inside inner orbit and this brought about the above error.

SAT moderately high nasiform, acutely carinated in middle, carina at anterior end enlarged into a flat shining round area that carries a minute fovea on it (in the Malayan specimen without hollow), in dorso-lateral view to see through PAF: Fig.231. Clypeus: Fig. 232, annexed A is a variation. Pronotal lamina: Fig. 233. Antenna and legs similar in colour to holotype. Gaster black, bases of G2 and 3 and apical margin of G2 narrowly frrruginous red. RC=B, Rl fairly long, but not reaching wing apex, CV1=CV2×3, TCV:CV2≒5:4, TCV nearly straight, CV2 down-curved, angle roughly about 110°.

♂ (hitherto unknown). About 6 mm. Similar to ♀ in general, differs, besides the general sexual characters, in the form of antenna and clypeus and relative width of IODs.

Head in frontal view similarly subquadrate, but slightly shorter, W:L=100:86, vertex, eye incisions, SAT-ASR also similar, clypeus: Fig. 234. HW,HL,IODv,A3,A13, P=100,60,32,16,23,144. A3,4,5=10,8.5,7.5. IODs=10:4.5. OOD,Od,POD=1,3,2. A3=AW 1.8. A13=HW×2.6 and >A10-12, but <A9-12. P,Ma,Mi,2(Ma),3(Ma)=100,26,8,30(37),26

(43). A9-13: Fig. 235. Collar with anterior part narrow, transversely fairly acutely ridged, almost not incrassate towards sides, in frontal view with dorsal line gently up-curved, without tubercle in middle, Lamina on side: Fig. 236, posterior part half discoloured, posterior marginal area only dusky yellow. Subalar area of mesopleuron normal. Propodeum without lateral carinae, area dorsalis without lateral furrows, GSR roundly elevated, not discoloured, RC=B, R1 fairly long, longer than half TCV, TCV nearly straight, TCV:CV2÷5:4, angle roughly about 120°, distinctly larger than in ♀.



Figs. 231-240. Trypoxylon lumpurense Tsuneki, 231-233, ♀; 234-240, ♂.

In colour generally similar to ♀, but A3 at base yellow, whole of fore and mid femora nearly completely ferruginous (mid T3-5 slightly brownish - similar in pattern to ♀, but paler) and hind tarsus from apex of T1 to base of T5 pale brown.

Genitalia in ventral view: Fig. 237. Paramere simple lobe at apex, ventral surface covered with hair, inner margin of main body expanded and rolled as usual, volsella comparatively broad spatulate, nearly oval in form, penis valve very curious in structure, it is rounded at apex, in ventro-lateral view: Fig.238 (ventral side

not accurately observed), in dorso-lateral view: Fig. 239 (with apices of paramere). Apparently it seem that a pair of very primitive short sickle-shaped appendages (in reality triangular) present. 8th sternite: Fig. 240, characteristic in the absence of latero-apical processes, comparatively narrow apical margin and presence of very long hair bundle on each side.

46. TRYPOXYLON MINDANAONIS MULU ssp. nov.

(Trypoxylon mindanaonis Tsuneki, Steenstrupia, Copenhagen, 4: 84, 1976, ♀, Mindanao, figs.)
(Trypoxylon bakerianum Tsuneki, SPJHA, 9: 135, 1979, ♀, Singapore).
(Trypoxylon bakerianum fortius Tsuenki, SPJHA, 11: 33, 1979, - ♀ ♂, Java, figs.).

The reexamination of the holotype specimen (♀) of Trypoxylon mindanaonis revealed that this species is in the subspecific relationships with T. bakerianum Tsuneki and the close relative newly discovered in Borneo belongs also to this group.

The Bornean female specimen similar in colour of legs (completely black) and sculpture and punctuation of frons and mesoscutum to those from Mindanao and Java, while the male specimens somewhat different in the punctuation on frons and in the sculpture of area dorsalis from those of Java. But the structure of genitalia completely agrees with each other (cf. Pt. V, figs. 104-106). But the slight difference is observed regarding the 8th sternite. In the Bornean specimens the apico-lateral hair bundle is distinctly longer than that at apical margin and the constriction before apex is much weaker and located more basally (Fig. 241, cf. Pt. V. Fig. 107).

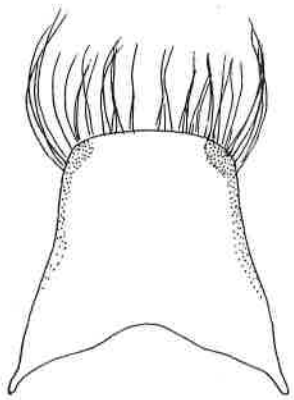
Table 6. Some measurements on Trypoxylon mindanaonis mulu ssp. nov.

Sex	BL	A3	IODv	P	Ocelli	IODs	P	Ma	Mi	2(Ma)	3(Ma)	CV1	T:C
♀	8.0	21	26	164	1 5 4	9.5	100	18	8	28(24)	30(34)	3.0	5:4
♂	7.0	16	31	150	2 4 3	9.0	100	16	8	28(21)	30(33)	3.8	5:5
♂	6.5	14	30	150	2 4 3	9.0	100	15	8	28(22)	30(30)	3.2	5:4

Remarks. BL ... Body length (mm). Ocelli ... OOD:Od:POD.

The geographical races of mindanaonis (the first named) can be distinguished by the following table:

1 Gaster medianly reddish (apical margin of SAT in vertical view comparatively narrow triangular, area dorsalis enclosed with weak furrow, ♀, about 8 mm .. (2)
- Gaster black (apical margin of SAT in vertical view comparatively broad triangular, mesoscutum with punctures and microsculpture distinct) ..... (3)
2 Microsculpture and punctuation on mesoscutum weak, the former under high magnification only defined, Singapore mindanaonis bakerianum Tsuneki, 1979, ♀
- Microsculpture distinct and punctuation stronger, (A3=AW×3.7, A5=AW×2.2, IODs=10:9.5-10, frons slightly concave, medial furrow of area dorsalis moderately deep, SAT at verge to PAF edged and weakly raised, Java mindanaonis fortius Tsuneki, 1979, ♀
3 ♀ ..... (4)
- ♂ ..... (5)
4 A3=AW×4, A5=AW×2.3 (frons flat, SAT at verge to PAF carinate and raised, PAF comparatively broad, IODs=10:9, Mindanao mindanaonis mindanaonis Tsuneki, 1976, ♀
- A3=AW×3.3, A5=AW×2 (frons broadly concave, SAT at verge to PAF bluntly edged, but not raised, PAF comparatively narrow, IODs=10:10, Borneo mindanaonis mulu ssp. nov., ♀
5 Microsculpture on frons strong and well defined, punctures also distinct, lateral



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furrows of area dorsalis comparatively deep and distinct, transverse striae of the area only on medial furrow and on posterior portion defined (Al3=BWx2.8, A3=AWx2.2, IODs=10:8.5-9, CVL=CV2x2.5-2.8, sternite 8 narrower and more distinctly constricted before apex, latero-apical hair bundle shorter), 7 mm, Java

mindanaonis fortius Tsuneki, 1979, ♂

- Microsculpture on frons very delicate and ill defined, punctures also weak and indistinct, lateral furrows of area dorsalis distinct but weak, transverse striae of the area rather coarse and covering whole the surface (Al3=BWx3.0, A3=AWx2.3, IODs =10:9, CV1=CV2x3-3.3, sternite 8: Fig. 241), 6.5-7 mm, Borneo

mindanaonis mulu ssp. nov., ♂

Holotype: ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X. 1977, D. Hollis (BMNH, B.M.77-543).

Paratypes: 2 ♂, same data (BMNH, B.M.77-543).

47. TRYPOXYLON MOLUCCANUM sp. nov.

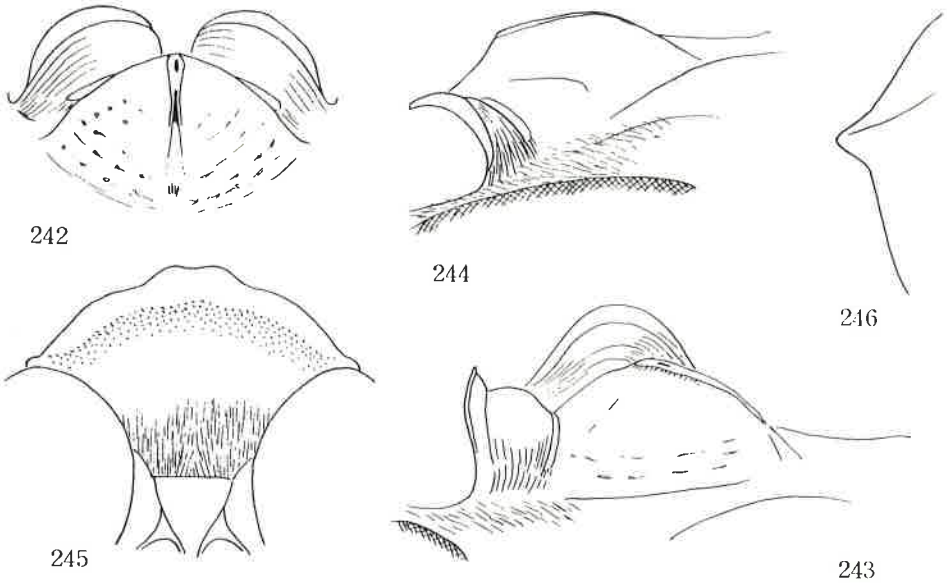
In structure the present species is very closely allied to T. longicorne m. described from New Guinea, but is different from this in the sculpture of mesoscutum. It is characterized by that subalar area is provided with well developed pent-roof structure, mesoscutum distinctly microcoriaceous, Gl flask-shaped, IODs=10:9, propodeum with lateral carinae, area dorsalis with lateral furrows, antenna, legs except part of tibiae, and gaster dark brown or black and hair silvery.

♀. 14.5 mm. Black; ferruginous are mandible (apically reddish brown), palpi, tegula, fore tibia in front and bases of mid and hind tibiae (rather whitish). Apical margin of clypeus castaneous and laterally paler, posterior part of pronotal collar discoloured, somewhat yellowish, tubercle brown; antenna, rest of legs and gaster brownish black, Al and 2 at apices, sides of Gl-3 slightly pale. Wings somewhat more strongly clouded than usual, veins black or dark brown. Hair silvery, on clypeus parallel.

Head in frontal view with sides rounded and slightly convergent towards clypeus, W:L=100:90, vertex somewhat depressed, eye incision narrow and deep, with margins subparallel, dorsal margins of both sides in a straight line, frons gently elevated, median furrow broad and moderately deep and broadly enlarged on lower area above SAT, SAT short, broad, rounded and moderately high nasiform, close to tuberiform, distinctly but broadly carinated in middle, apical area obliquely roundly inclined to IAA and PAFs, ASR slightly below level of top of SAT, with apical margin highly carinated, top area with a few transverse obtuse striae, PAF moderately deep, flat-bottomed and roundly inclined at outer end. SAT-ASR in dorsal view: Fig. 242, in dorso-lateral view to see through PAF: Fig. 243, in profile: Fig. 244. Clypeus: Fig. 245. Hw,HL,IODv,A3,P=100,46,20,30,186. IODs=10:9, OOD,Od,POD≒1,7,3. A3=AWx6. A3,4,5≒10,6,5.5. P,Ma,Mi,2(Ma),3(Ma)=100,14,6,30(17),32(22). Occipital carina weak and weaker downwards, but complete, feebly defined beneath head behind buccal cavity. Pronotal collar with anterior part very short and weakly incrassate towards sides and dorsal line in frontal view gently raised towards middle, there minutely rounded, lamina on side triangularly toothed (Fig. 246). Pent-roof structure at subalar area with expanded marginal area not discoloured, covering subalar pit, vertical wall of the pit provided with a few rugosed carinae, one of which densely black haired (constant?), mesopleural scrobe large and deep, mesopleural sulcus nearly straight. Propodeum with comparatively weak lateral carinae, area dorsalis distinctly enclosed with furrow, area apicalis only margined with curved lateral carinae, on dorsal area widely opened, but well defined by its polished surface, GSR roundly raised, semi-transparent brown. In fore wing RC=C, Rl short, but reaching close to wing apex, CV1=CV2x7, TCV:CV2=2:1, TCV sinuate, angle roughly about 120°.

Frons distinctly microcoriaceous, superimposed punctures irregular in distribution, mostly PIS≒PD, but on round elevations sparse, on median furrow and lower part closer, partly subrugosely confluent; mesoscutum also distinctly microcoriaceous, surface half mat, superimposed punctures slightly finer than those on frons, more regular in distribution, close, PIS slightly smaller than PD, but on median area somewhat sparse; mesopleuron with strong plumbeous shine, weakly microcoriaceous, with punctures slightly larger than those on scutum and slightly sparser. Propodeum with series of striae along lateral carinae, but striae not strong, anteriorly rather indistinct, area dorsalis obliquely (nearly longitudinally) rugoso-striate, medial furrow transversely striate, rest of dorsal aspect and posterior inclination closely

covered with fine hair-bearing punctures, sides except antero-ventral femoral hollow



Figs. 242-246. Trypoxylon moluccanum sp. nov., ♀

closely covered with punctures, punctures larger than those on mesoscutum.

♂, unknown.

Holotype: ♀, South Moluccas, Ambon, X. 1949, M. A. Lieftinck (RMNH).

48. TRYPOXYLON STRIOLATUM TSUNEKI, 1979

Trypoxylon striolatum Tsuneki, SPJHA, 9: 113, 1979 (♀, Laos, Singapore, figs.)
Trypoxylon striolatum : Tsuneki, SPJHA, 11: 54, 1979 (♀, Sumatra, W. Java).
Trypoxylon tawitaeiense Tsuneki (♀, nec ♂), Steenstrupia, Copenhagen, 4: 86, 1976 (♂ is the holotype, Philippines: Is. Tawi Tawi).

Specimens newly examined: 23 ♀ 1 ♂:

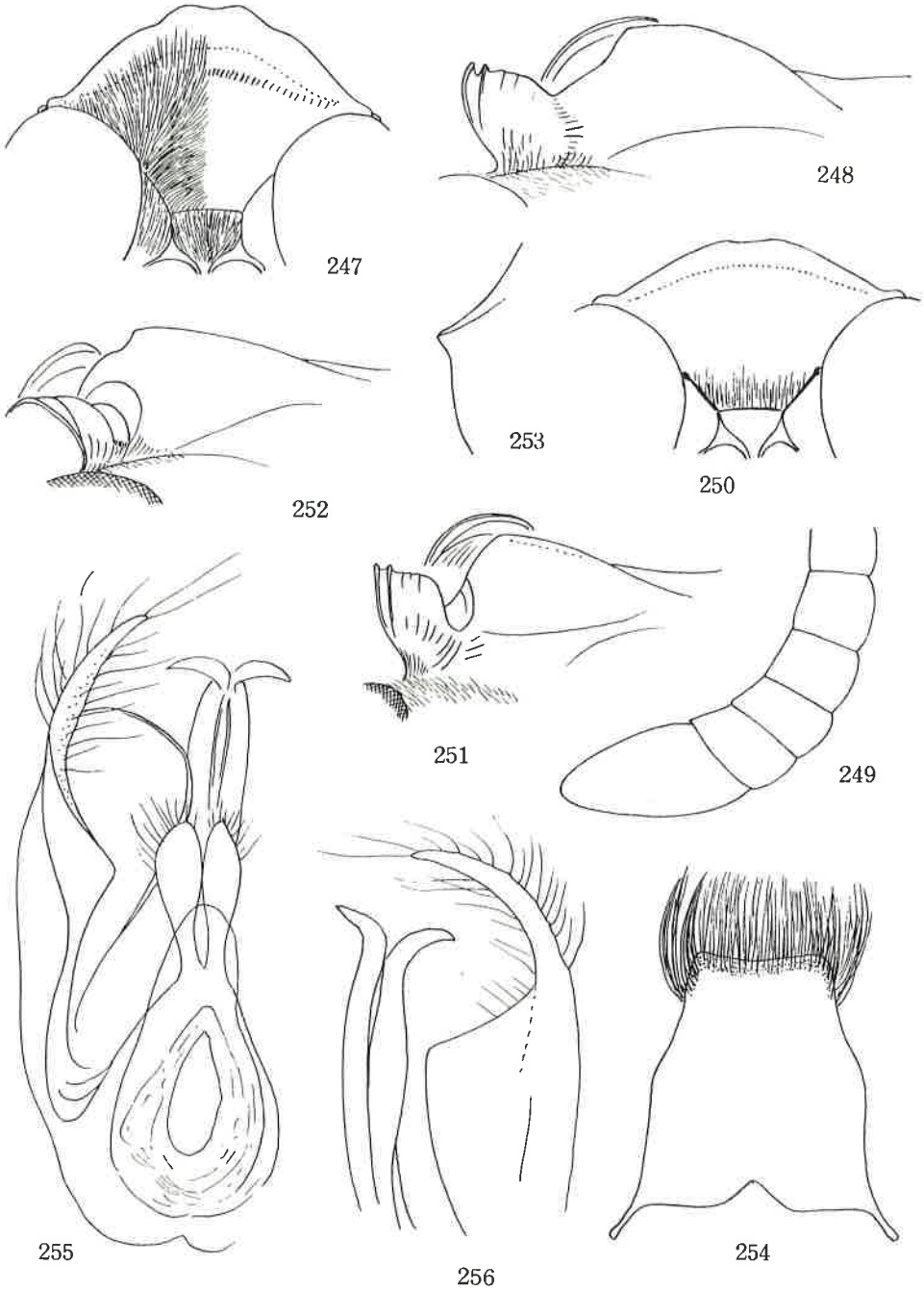
(A) Normal form: 6 ♀, North Borneo; 13 ♀, Sarawak; 1 ♀, Borneo: 1 ♀, Sandakan, date undescribed, C. F. Baker (USNM); 1 ♀, Samawan near Sandakan, Jungle, 15. VII. 1927, C.B.K & H.M.P. (BMNH); 4 ♀, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 15,25,30. X, 13. XI. 1962, K. J. Kuncheria, Y. Hirashima (HPBM). 1 ♀, Sarawak, 4th Div., Gn. Mulu, RGS Exp. 17.IX.-23.X. 1977, D. Hollis (BMNH, B.M.77-543); 8 ♀, same loco, X-XI. 1977, 1 ♀, XI-XII. 1977, M. Collins (BMNH); 1 ♀, Sarawak, 4th Div., Niah, 3 49 N 113 46 E, 9-17. X. 1976, P. S. Cranston (BMNH); 1 ♀, Sarawak, 1st Div., Semongoh Forest Res., 1 25 N 110 17 E, 15-19. XI. 1976, P. S. Cranston (BMNH); 1 ♀, (a white 7 mm round label with SAR and a purplish 7 mm round label as usually used by A. R. Wallace, with 56 44 in 2 lines, another oblong label with Smith Coll.) (BMNH); 1 ♀, Borneo, Museum label with R. C. Perkins Coll. B.M.1942-95 (BMNH).

(B) Black-gastered form: 3 ♀ 1 ♂: 1 ♀, North Borneo, Sandakan, date ?, C. F. Baker (USNM); 1 ♀, North Borneo, Tawau, Quoin Hill, Cocoa Research Station, 26. VII. 1962, Y. Hirashima (BPBM); 1 ♂, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X. 1977. D. Hollis (BMNH); 1 ♀, same loco, X-XI. 1977, M. Collins (BMNH).

Remarks. ♀. Length 10-11 mm. Considerably variable in the surface condition of mesoscutum and in the colour of gaster and legs.

Mesoscutum usually without microsculpture or under high magnification only with feeble microreticulation, but in some specimens microsculpture under low magnification can be seen.

Gaster usually from apex of G1 to base of G4 beneath or on sides reddish, but in the bright coloured ones sides and underside of the said part broadly reddish yellow and pale brown above, while in the melanic form gaster completely black, only G2



Figs. 247-256. Trypoxylon striolatum Tsuneki, 247-248,,♀; others ♂

very narrowly reddish at base. Of course intermediate forms present.

Legs black and usually with the following portions ferruginous or yellow: knees, fore tibia except folded side, fore tarsus except arolium, mid and hind tibiae at base and apex with spurs, mid T1 and 2 except brownish apices, and all claws. Mid T3-5 and often hind T4 pale brown. Extent of black area in fore tibia and ferruginous area of other tibiae more or less variable.

In the melanic specimens, however, fore tibia except base in front black or dark brown, fore T5 also dusky, mid and hind tibiae nearly wholly black, only somewhat brownish at base, and brown part of mid tarsus turns black, but rarely mid tarsus alone coloured as in the usual form.

Mandible usually ferruginous yellow, pale reddish brown at apical area, in the melanic form basal half yellow and apical half black; strange to say, some of usual form bear the similarly coloured mandible.

The hair on clypeus silvery, on thorax-complex silky white, very rarely, however, some have brassy hair on thorax.

Lateral carinae of propodeum always distinct, but lateral furrows of area dorsalis variable, sometimes well defined, but sometimes quite obscure.

The form of apical margin of clypeus variable according to the degrees of nesting activity, when fresh it is constant (Fig. 247), more constant are elevation at its base (medianly ridged, with hair strongly convergent towards median line) and reflection at its apex, ratio of IODs (10:8), character of PAF (V-shaped in cross section, with bottom line markedly up-curved - Fig. 248) and sculpture of area dorsalis (fine and close transverse striae covering whole the surface), but the form of dorsal line of SAT seen in profile is considerably variable (depending mainly on the variation in length of medial carina), though the general pattern is similar to each other.

The specimen of Smith Coll. above listed (in which both antennae from A4 apically and G6 lacking), bearing particular labels is somewhat exceptionsl. It is a bright coloured specimen and distinctly larger (13.5 mm) than usual and much robuster, having propodeum not only on dorsal aspect, but also on posterior inclination transversely finely closely striate. (Clypeus is abreded to subtruncate medio-anteriorly, but otherwise similar to the others).

Description of ♂. 8.5 mm. Colouration melanic, mandible at base black, then greyish yellow and at apex dark red, palpi ochre yellow, posterior part of collar not discoloured, only on posterior margin narrowly brownish, tegula dark brown, semitransparent, gaster at intersegmental areas of G1-2-3 brown beneath; fore and mid legs till apex of tibiae and hind leg wholly black; fore T1-4, mid T1-2 and tibial spurs whitish yellow, fore tarsus in some light appears brownish, mid T1 and 2 at apices and T3-5 wholly dark brown, hind tibial spurs slightly brownish. Hair silvery, on clypeus parallel.

Head in frontal view with W:L=100:80, HW,HL,IODv,A3,A13,P=100,52,30,15,18,128. IODs=10:7. OOD,Od,POD=2,3,4. A3=AW×2.2. A3,4,5=10,5,6. A13=BW×1.7 and ≒A10-12. P,Ma,Mi,2(Ma),3(Ma)=100,19,6,34(25),36(38).

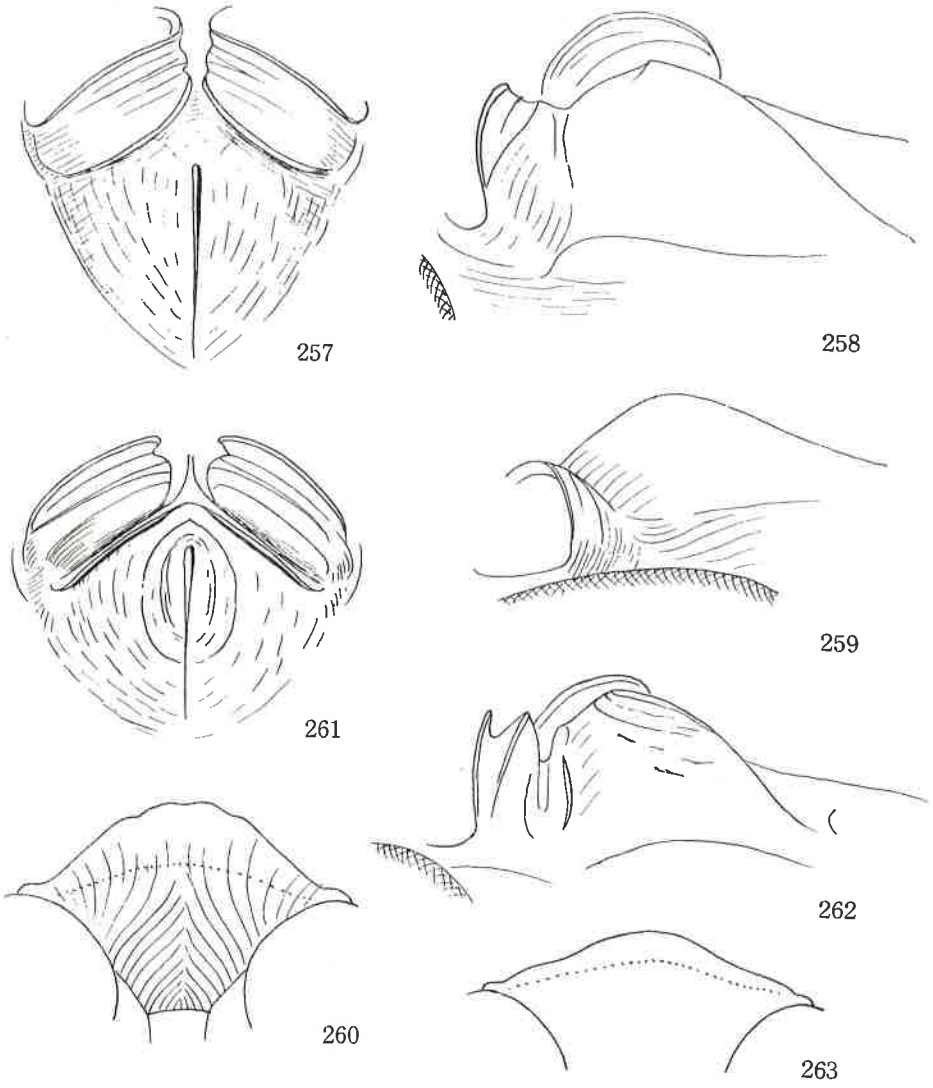
Comparison with ♀. Head in frontal view shorter (in ♀ W:L=100:92), eye incision wider and shallower, IODv broader (in ♀ HW:IODv=100:25), IODc as against HW is similar, hence IODs becomes smaller. Antenna different in structure (measurement and Fig. 249), clypeus (Fig. 250) shorter, with elevation of disc gentler and broader, its top located nearer to centre and apical reflected area shorter (cf. Fig. 247 in ♀). As to wing venation CV2 relatively longer. RC=B. RI short, CV1=CV2×4, TCV:CV2≒1:1, angle about 120°, (in ♀ usually CV1=CV2×5, TCV:CV2=5:3 - 5:4 and angle 110°). SAT-ASR similar in pattern, but PAF deeper (moderately deep), flat-bottomed, U-shaped in cross section (such difference is frequently observed between sexes), the structure in dorso-lateral view to see through PAF: Fig. 251 (cf. Fig. 248), seen nearly in profile: Fig. 252, outer end of flat-bottomed PAF abruptly end, thence curved down towards inner orbital scapal hollow. Lamina on side of pronotum: Fig. 253.

Sternite 8 seen from outside: Fig. 254, apical fringe of hair abundant, it grows on both inner and outer sides of the sternite. Genitalia (right paramere omitted) seen from beneath: Fig. 255, paramere simple-lobed at apex, with inner margin markedly expanded and rolled, volsella spatulate, comparatively broad and sparsely fringed with hair at apex, penis valve without shoulder and sickle-shaped appendages, seen obliquely from dorsal side: Fig. 256. The general structure of genitalia closely resembles that of T. prominens m.

On TRYPOXYLON TAWITAWIENSE TSUNEKI, 1976

Trypoxylon tawitawiense Tsuneki, Steenstrupia, Copenhagen, 4: 86, 1976 (2 ♂ 1 ♀, Is. Tawi Tawi, S. Philippines, holotype: ♂).

This species was described with 2 ♂ 1 ♀ specimens collected on the Island of Tawi Tawi, South Philippines (Tarawakan, 1 ♂, 3.XI.1961, 1 ♀, 8.XI.1961, 1 ♂, 12.X. 1961). The general agreement of the characters between sexes (sexual difference on the antennae and clypeus were taken into consideration) and the sympatric occurrence of the specimens led me to combine them together. At the moment of writing, however, no special observation was made concerning the detailed structure of SAT-ASR and viewed from the recent method of classification of this genus adoped by me it was necessary to review the specimens in order to confirm whether the combination of the sexes was correct or wrong. Through the courtesy of Dr. O. Lomholdt, the Zoological



Figs. 257-263. T. tawitawiense Tsuneki. 257-260, so-called its ♀, 261-263, ♂.

Museum of Copenhagen, the chance was given.

By the reexamination of the specimens it was revealed that there was a considerable difference between the sexes in regard to the structure of supraantennal area and that the difference seemed to surpass the usual sexual characters.

Certainly the review of the specimens at once confirms that the female of tawitawiense is almost completely consistent with striolatum m. treated in the preceding section, while the male is different from this species.

In ♀, SAT-ASR in vertical view: Fig. 257, in dorso-lateral view to see through PAF: Fig. 258, in profile: Fig. 259 and clypeus: Fig. 260. The characters are just as in striolatum. The slight and delicate differences are that the antero-lateral inclination of frontal elevation (at the sides of SAT) slightly acuter and microsculptured surface of frons sparsely but distinctly punctured (in striolatum specimens from other areas superimposed punctures almost imdistinct) and that area dorsalis, although transversely finely closely striate, further punctured in addition on the anterior part of the disc, punctures shallow and indistinct on outline, but comparatively large and fairly close. Such slight differences are, however, considered to belong to local variations. Measured values are:

HW,HL,IODv,A3,P=100,50,25,25,140. IODs=10:7.5. OOD,Od,POD=1,4,3. A3=AW×4. A3, 4,5÷10,6.5,6. P,Ma,Mi,2(Ma),3(Ma)=100,23,7,34(28),36(36). RC=C, Rl short, CV1=CV2×4, TCV÷CV2, angle about 110°.

In colour of legs and gaster it belongs to the bright coloured form of striolatum.

While, in ♂ SAT-ASR in vertical view: Fig. 261, in dorso-lateral view to see through PAF: Fig. 262 and apical margin of clypeus: Fig. 263. SAT in ♂ much shorter than in ♀, anterior margin transversely roundly edged and verge to PAF distinctly elevated, medio-apical inclination, after crossing the transverse edge, extending on the median line of IAF as a raised ridge (Fig. 261), in form SAT of ♂ more broadly roundly elevated than in ♀, bearing a nearly flattened top area (Fig. 261). Frontal elevation and its antero-lateral inclination as in ♀, but far strongly and closely superimposed with punctures. Area dorsalis enclosed with deep distinct furrow (in ♀ the lateral furrows lacking) and on posterior portion with a few transverse strong striae present, median furrow anteriorly crenate and disc smooth and polished and sparsely scattered with indistinctly outlined punctures. Measured values:

HW,HL,IODv,A3,Al3,P=100,48,27,17,22,131. IODs=10:8. OOD,Od,POD=2,4,3. A3,4,5= 10,6,5.5. Al3=BW×2.5 and >Al0-12, but <A9-12. RC=C, Rl short, CV1=CV2×5, TCV:CV2≒ 5:3, TCV sinuate, angle roughly about 100°. (A3=AW×3.3)

It is certain that the form of clypeus is different between sexes as a rule and that SAT-ASR, especially PAF, often differs between sexes. However, in the present instance it seems that the differences are beyond the usual range.

Base upon the facts above mentioned the female of T. tawitawiense is identified here with T. striolatum and separated from that species, because the holotype of tawitawiense is the male. The difference between the male of tawitawiense and that of striolatum described in the preceding section gives further support to the present conclusion. The two males differ not nnly in the external characters (compare the figures and measured values given to each), but also in the structure of genitalia, especially penis valve. In tawitawiense it bears well developed shoulder and sickle-shaped appendages (cf. Fig. 255 of the present paper and Fig. 103 of the original description of tawitawiense).

Remarks. Notwithstanding the above conclusion I can not absolutely free from the doubt that the female in question from Tawi Tawi may be the true female of tawitawiense ♂ as was combined at first. The reasons for this are that besides the general agreement in characters and in the collecting data, they are well coincident with each other in the delicate configulation of the frons (the state of antero-lateral inclination and the distinct punctuation) and punctures on area dorsalis (though in ♀ mixed with striae) and in these respects distinctly different from striolatum of other localities. The differences shown by the sexes in the supraantennal structure and clypeal form can be taken as exceptional, because they do not deviate from the fundamental rule of sexual difference, but only in degrees.

I must leave the matter as a problem to be solved or confirmed in future to those investigators who will have the chance to study the fauna and biology of Hymenoptera on the Island of Tawi Tawi. If this combination will be proved true it will become one of the most difficult indentifications to separate tawitawiense and striolatum in the female sex.

At the present state of knowledge, however, it seems better to separate the described sexes of tawitawiense into different species as above explained.

49. TRYPOXYLON KINABALUM sp. nov.

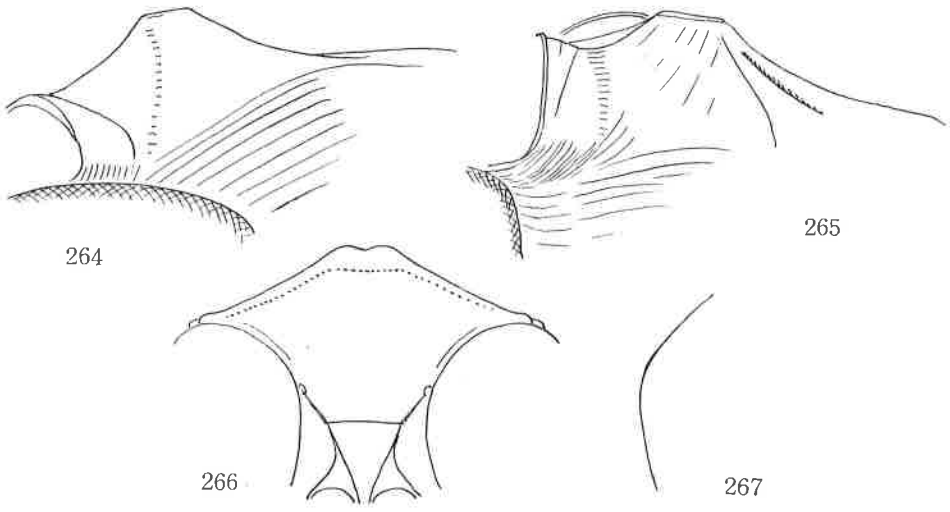
♀, about 11 mm. No closely resembling species. Black, antenna basally pale brown beneath, legs partly yellowish white, hair silvery, Gl robust, but slightly longer than Gl+2, intermediate between clavate and flask-shaped, mesoscutum distinctly microcoriaceous, propodeum with lateral carinae, area dorsalis practically without lateral furrows, subalar area normal, IODs=10:8, SAT nasiform, PAF shallow, down-curved in cross section, clypeus with apical margin bidentate in middle. North Borneo.

Black; antenna dark brown, Al-2 and base of 3 all pale brown beneath, mandible also dark brown, slightly paler apically, palpi ambur yellow, all coxae at apex, both ends of trochanters and of femora, fore and mid Tl and 2 except apices and bases of hind tibia yellowish whitish, rest of fore and mid tarsi pale brown, apically slightly darker. Hair silvery (on clypeus lost).

Head in frontal view with sides rounded, slightly narrowed below, W:L=100:84, vertex slightly depressed, eye incision comparatively broad and narrowed towards bottom. Frontal elevation moderately high, medial furrow shallow and broad, hence round elevations on both sides weak, SAT occupies apical triangle of frontal elevation, small and narrow, moderately high, median carina short, seen in profile: Fig. 264, ASR obliquely shortly raised, PAF shallow, down-curved in cross section (Fig. 265, dorso-lateral view), SAT anteriorly smoothly inclined to IAA. Clypeus: Fig. 266, disc broadly roundly tectate, narrow apical glabrous area reflected.

HW,HL,IODv,A3,P=100,53,25,23,106. IODs=10:8. OOD,Od,POD≒1,4,2. A3=AW×4.3. A3, 4,5≒10,7,6. P,Ma,Mi,2(Ma),3(Ma)=100,26,12,40(48),48(62). RC=B-C. Rl somewhat long, about half of TCV, CV1=CV2×4.5. TCV:CV2≒5:4, angle roughly 120°.

Antenna markedly incrassate towards apex, AW of A3 nearly half the width of BW of Al2. Occipital carina indistinct behind buccal cavity. Pronotal collar with anterior part very narrowly ridged, incrassation towards sides also very slight, posterior part discoloured, yellowish, lamina on side: Fig. 267. Scutellum roundly convex, subalar area of mesopleuron without pent-roof structure, propodeum with lateral carinae, area dorsalis with very faint lateral furrows, GSR slightly raised and ambur yellowish, gastral petiole comparatively short, but in form subflask-shaped, rather stumpy (see measurements).



Figs. 264-267. Trypoxylon kinabalum sp. nov., ♀.

Frons distinctly microcoriaceous and closely superimposed with fine punctures, mesoscutum similarly microcoriaceous and punctured, mesopleuron also microcoriaceous, punctures superimposed slightly larger than on scutum and weaker and sparser upwards, propodeum without lateral series of striae, area dorsalis at base obliquely, shortly but coarsely striate, median furrow transversely striate, disc distinctly, somewhat closely punctured, sides polished and sparsely scattered with very fine punctures,

posterior part covered closely with hair-bearing points.

♂, unknown.

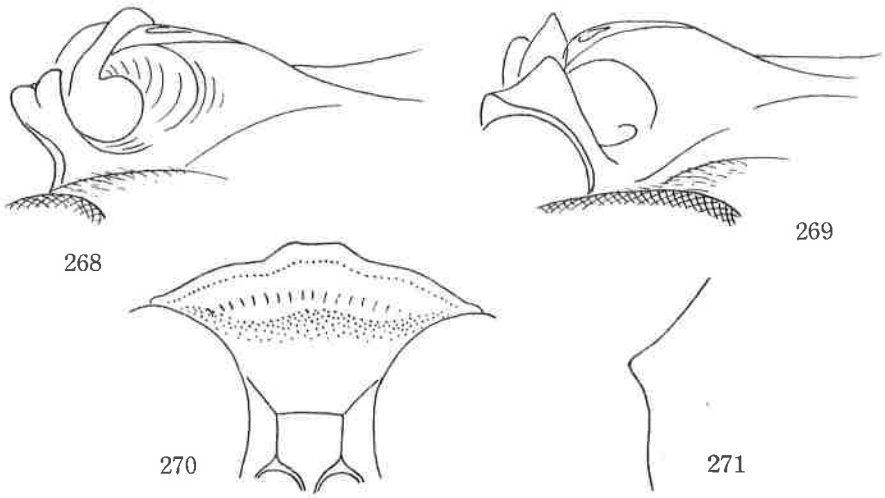
Holotype: ♀, North Borneo, Mt. Kinabalu, Lumu Lumu, 5500 ft. 13. IV. 1929, H. M. Pendlebury (BMNH).

50. TRYPOXYLON COLLINSI sp. nov.

♀. Closely resembles rufigaster known from Singapore and Laos, but in the present species legs are nearly wholly ferruginous and clypeus medially produced and sinuate.

Diagnosis. ♀, 10 mm. Al-3, gaster except a patch on G1 and legs nearly wholly ferruginous, hair silvery, P flask-shaped, mesoscutum without microsculpture, but half mat, propodeum with lateral carinae, area dorsalis enclosed with furrow, subalar area without pent-roof structure, IODs=10:7, SAT-ASR: Figs. 268-269, clypeus: Fig. 270, RC=C. Sarawak.

9.5 mm. Black, with the following portions yellow or ferruginous: Al-3 (3 apically dusky above), apical 3rd of clypeus, mandible, palpi (whitish), discoloured posterior part of pronotal collar, tubercle, tegula and basal plate of wing, gaster except a black patch on apical swelling of G1 and legs except coxae (apices yellow) and arolia. Hind femur darkened on apical half beneath and hind tarsus slightly brownish. Hair silvery, on clypeus parallel.



Figs. 268-271. Trypoxylon collinsi sp. nov., ♀.

Head in frontal view with lateral margins rounded, not convergent below, W:L= 100:82, vertex gently depressed, eye incisions narrow and deep, parallel-sided, frons weakly raised, medial furrow broad and shallow and enlarged at above SAT, SAT moderately high nasiform, lateral inclinations oblique, slightly roundly curved, median carina distinct, at apex ending in a small flattened, somewhat shining area, the area rhombic in form and curved down, reaching IAA, without distinct fovea on it, ASR almost as high as SAT, bicarinate on top, fore carina ambur yellow, hind carina black and somewhat expanded and markedly reflected posteriorly, PAF deep, flat-bottomed and oval in cross section (Figs. 268, dorso-lateral, 269, lateral), clypeus: Fig. 270, broadly gently roundly raised at base and broadly weakly reflected at apex.

HW,HL,IODv,A3,P=100,54,25,25,127. IODs=10:7, OOD,Od,POD=2,7,4. A3=AW 5. A3,4, 5=10,7,6. P,Ma,Mi,2(Ma),3(Ma)=100,26,8,34(30),38(40). RC=C, R1 thick, about half of TCV, reaching close to wing apex, CV1=CV2 5.5, TCV:CV2=5:3, angle roughly 120 .

Antenna filiform, not markedly incrassate apically, occipital carina complete.

Collar with anterior part narrowly ridged and slightly widened laterally, dorsal line gently upcurved, not tuberculate in middle, lamina on sides triangularly shortly toothed (Fig. 271). Mesopleural scrobe deep, subalar area with postero-lateral margin edged, but not expanded; propodeum with distinct lateral carinae, long, but not reaching spiracle and apex, area dorsalis enclosed with furrow, area apicalis with curved lateral carinae only, GSR highly elevated, discoloured.

Frons microcoriaceous and indistinctly sparsely superimposed with fine shallow punctures, punctures anteriorly dense, mesoscutum with strong plumbeous shine, half mat, but without microsculpture, finely closely, but quite indistinctly punctured. Propodeum with lateral series of striae, not strong and somewhat sparse, area dorsalis at base almost smooth, only with a few short crenae, median furrow transversely coarsely striate and at its base with two long longitudinal carinae (constant?), posterior portion of disc and of lateral furrows transversely striate, striae are the extended ones from medial furrow, side weakly fairly closely punctured, antero-ventral femoral sinus smooth and polished, posteriormost part coarsely rugoso-striate and punctate.

♂, unknown.

Holotype: ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp., XII. 1977 - I. 1978, M. Collins (BMNH).

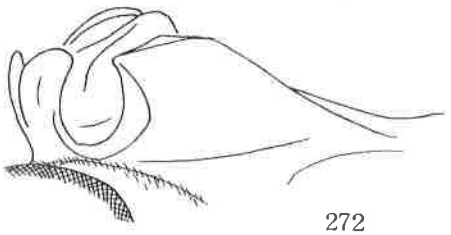
51. TRYPOXYLON BALABACENSE OVATUM ssp. nov.

(Trypoxylon balabacense Tsuneki, Steenstrupia, Copenhagen, 4: 89, 1976, ♀, Is. Balabac, S. Philippines)

♀. Differs from the nominate form in that the body is larger, gaster more distinctly reddish on median area and apical margin of clypeus medianly more strongly produced. As the description of balabacense is incomplete the full description of the female, together with the newly discovered male, is given below.

Diagnosis. ♀ about 11 mm, ♂ 8 mm. Gaster medianly red (♀), dark brown or black (♂), A1-2 and legs fairly broadly ferruginous, hair silvery, P flask-shaped, mesoscutum without microsculpture, propodeum with lateral carinae, area dorsalis enclosed with furrow, surface smooth, IODs=5:2 (♀), 2:1 (♂), SAT-ASR: Figs. 274-277, clypeus: Figs. 278 (♀), 280 (♂), A13: Fig.281, RC=C-B.

♀. 10-12 mm. Black, ferruginous or yellow are A1-2, often 3 beneath, apical area narrowly of clypeus, mandible, mouth parts (palpi whitish yellow), tubercle, tegula and basal plate of wing, apices of coxae narrowly, trochanters (fore often with a brownish streak above), fore tibia except folded side (often medianly brownish), mid and hind tibiae at base, mid also at apex, fore tarsus, mid T1-2 and fore and mid tibial spurs. Mid T1 and 2 pale brown at apex. Gaster from apical area of G1 beneath to base of G4 yellowish red, but broadly brown or dark brown above. Hair silvery, on clypeus parallel.



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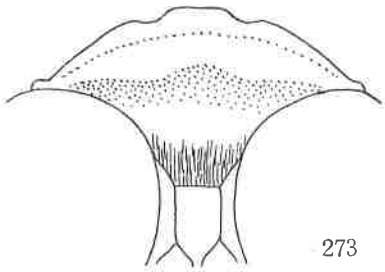

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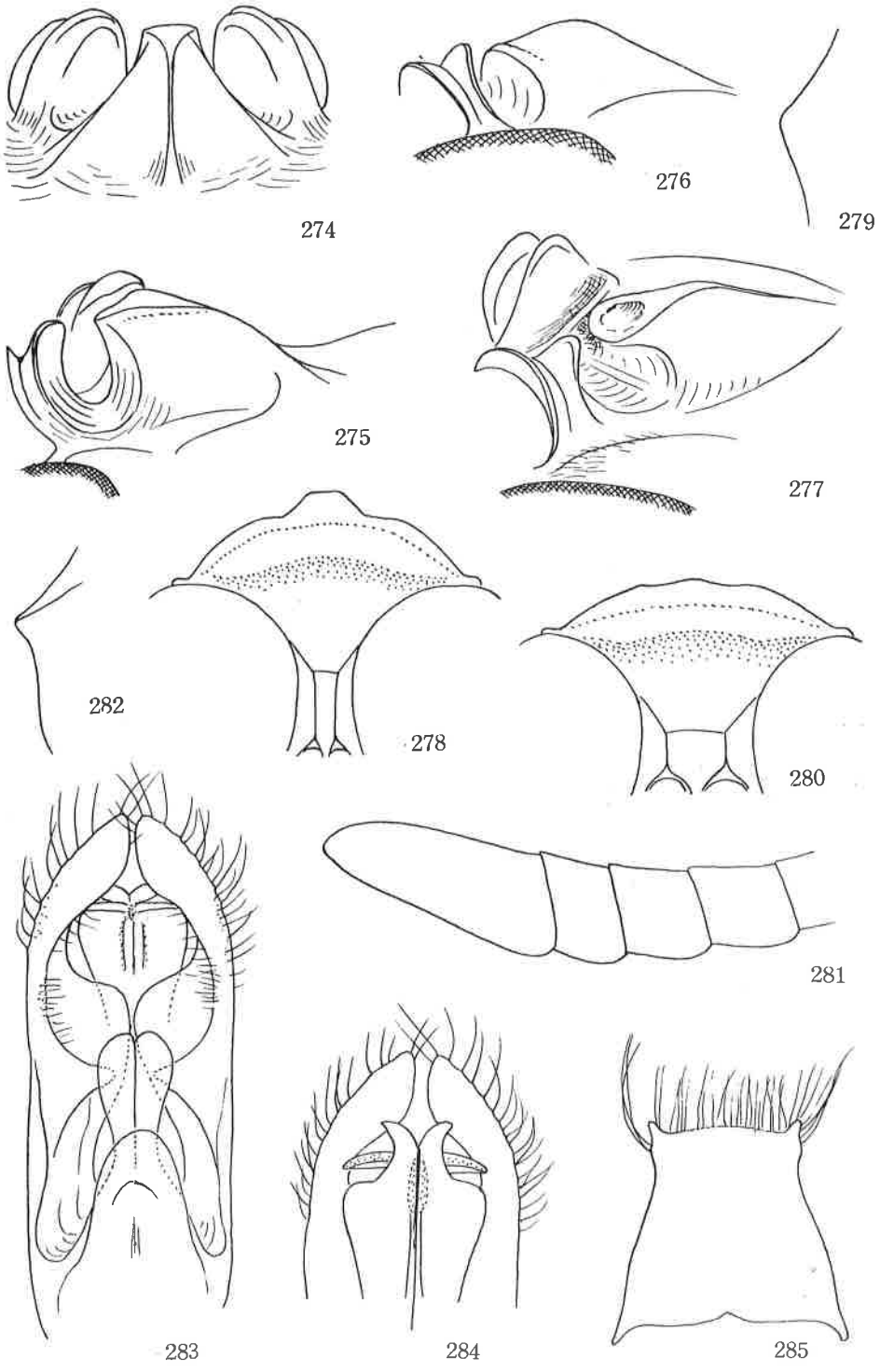
Figs. 272-273. T. balabacense Tsun., typical ♀.

Head in frontal view with lateral margins roundly convergent below, W:L=100:84, vertex depressed, eye incision narrow and deep, subparallel-sided, upper margin slightly raised upwards, frons rather weakly elevated, but medial furrow broad and deep, hence rounded elevations on both sides become marked, SAT-ASR similar to those of preceding species, but here medial carina flattened and enlarged anteriorly, carrying



Figs. 274–285. Trypoxylon balabacense ovatum **ssp. nov. 274–279, ♀; 280–285, ♂**

a large shallow fovea on it and then steeply, perpendicularly falling down to IAA, ASR nearly as high as SAT, highly bicarinate on top, hind carina strongly reflected, PAF deep, flat-bottomed, level with inner orbital area. SAT-ASR in dorsal view: Fig. 274, dorso-lateral to see through PAF: Fig. 275 (cf. Fig. 282 in balabacense), in profile: Fig. 276, obliquely from left side: Fig. 277; clypeus: Fig. 278 (cf. Fig. 273 in balabacense); occipital carina complete.

HW,HL,IODv,A3,P=100,48,22,28,172. IODs=10:4.2. OOD,Od,POD÷1,4,2. A3=AW×6. A3,4,5=10,6,5. P,Ma,Mi,2(Ma),3(Ma)=100,16,6,27(17),28(22). RC=C-B, Rl short, CV1÷CV2×5, TCV:CV2÷5:3, angle roughly about 100°.

Anterior part of collar narrow, slightly incrassate towards sides, in frontal view dorsal line low-triangularly raised towards middle and minutely roundly angulate there, lamina on side: Fig. 279, on mesoscutum admedian line broad, margined on both sides with distinct impressed lines, similar in length and state to notauli and the 4 impressed lines at apices equidistantly located and reach about 1/4 of the segment from base, subalar area of mesopleuron acutely edged at outer margin and slightly produced over subalar pit, but not expanded; lateral carinae of propodeum located at dorsal area of the side, up-curved, posterior end not directed towards lateral carina of area apicalis and fairly remotely separated from this, area dorsalis distinctly enclosed with fine deep furrow, area apicalis widely open upwards, GSR gently and roundly elevated, brown in colour.

Frons weakly microcoriaceous, half mat, superimposed punctures comparatively large, but shallow and indistinct in outline, on frontal elevations sparse, but on anterior gently concave area close, mesoscutum with plumbeous shine, surface smooth and fairly shining, finely and sparsely punctured. Propodeum including area dorsalis smooth, with plumbeous lustre and shining, only weak series of strioles along lateral carinae of posterior part alone, sides also smooth, only with feeble rugosed striae on posterior part.

♂, 7-9 mm. In general characters similar to ♀, but gaster black and on medial area brownish beneath, all trochanters broadly brown, hind tibial spurs yellowish white, only longer one partly brownish.

Head in frontal view with sides more rounded, almost not convergent below, W:L similar (100:82), IODv, IODo relatively broader, eye incisions also broader, shallower, more strongly narrowed towards bottom, dorsal marginal line slightly inclined towards bottom, frons and supraantennal structure similar, clypeus: Fig. 280, surface condition similar.

HW,HL,IODv,A3,Al3,P=100,56,28,16,21,140. IODs=10:5.5. OOD,Od,POD=3,7,4. A3=AW×2.7. A3,4,5÷10,6,6. Al3=BW×2.3 and ÷Al0-12. P,Ma,Mi,2(Ma),3(Ma)=100,17,7,30(22),34(27). A9-13: Fig. 281. Pronotal lamina slightly more pointed and produced than in ♀ (Fig. 282). Venation of fore wing and surface condition generally similar to ♀.

Genitalia seen from beneath: Fig. 283, apical half seen from above: Fig. 284. Paramere simple lobed at apex, inner margin of main body expanded and rolled, outer-ventral margin at about mid point of its length stretched inwards in triangle. Volsella spatulate, slightly broader than usual, without fringe of hair at apical margin. Sternite 8: Fig. 285, latero-apical angle narrowly produced in tooth, hair bundle before this longer than those at apical margin.

Holotype: ♀, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 25. X. 1962, K. J. Kuncheria (BPBM).

Paratypes: 3 ♀, same loco, 15,23,25. X. 1962, K. J. Kuncheria (BPBM); 1 ♀, same loco., 12. XI. 1962, Y. Hirashima (BPBM); 4 ♂, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X. 1977, D. Hollis (BMNH, B.M.77-543); 1 ♀, Sarawak, 4th Div., Niah, 9-17. X. 1976, 3°49'N 113°46'E (Malaise trap in primary forest), P. S. Cranston (BMNH, B.M.1977-19).

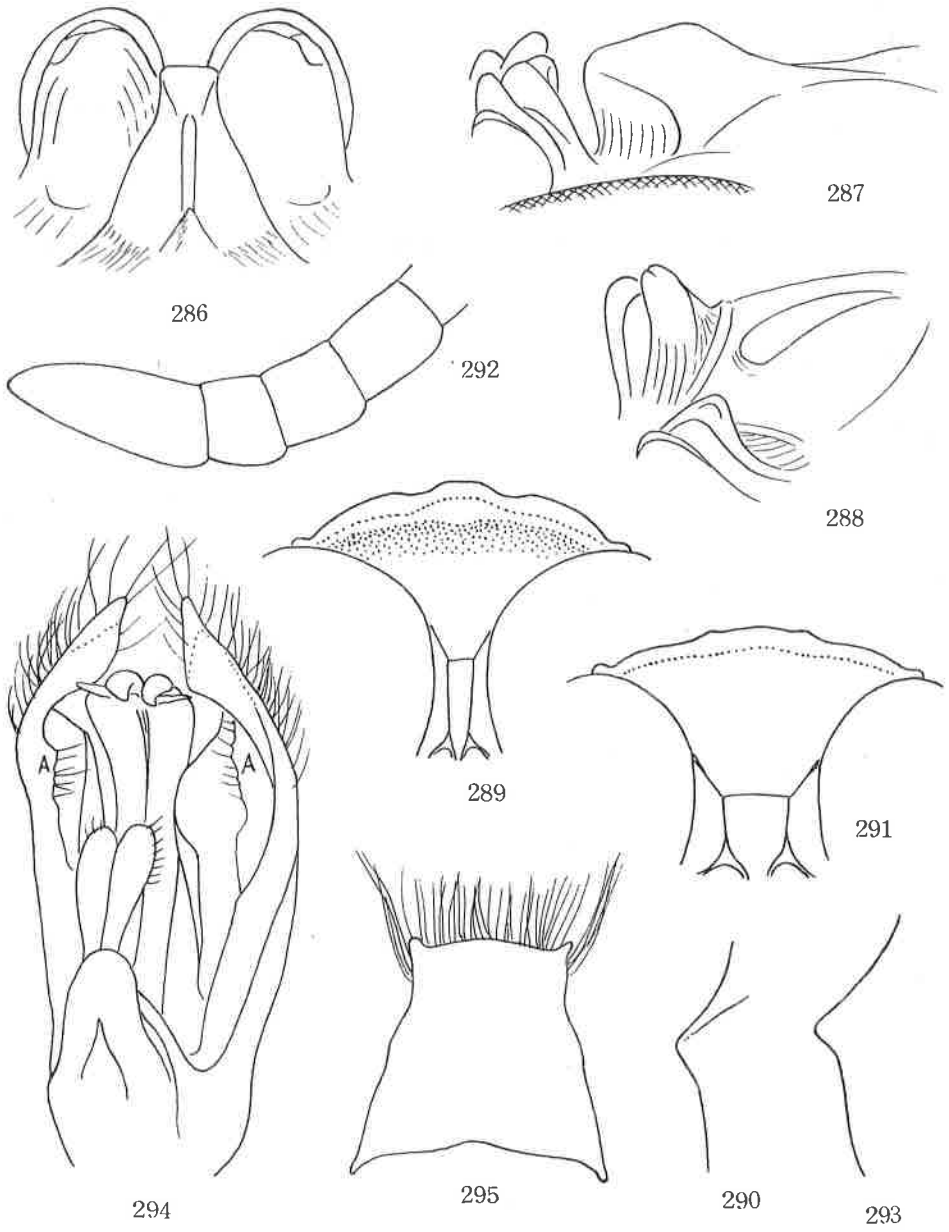
52. TRYPOXYLON MINIOVATUM sp. nov.

Closely allied to the preceding species, but ♀ smaller, with IODc much narrower, apical margin of clypeus much more weakly, rather indistinctly sinuate and A3 relatively shorter; ♂ more closely resembles the preceding species, but clypeus till apex black and A3 relatively shorter.

Diagnosis. ♀ 8, ♂ 6.5 mm. Gaster medianly partly red (♀), brown (♂), Al-2, fore and mid legs broadly ferruginous, hair silvery, P flask-shaped, mesoscutum

without microsculpture, propodeum with weak lateral carinae, area dorsalis enclosed with furrow, IODs=3:1 (♀), 5:3 (♂), SAT-ASR: Figs, 286-288, clypeus: Fig. 289 (♀), 291 (♂), Al3: Fig. 292. RC=B-C.

♀. 7.5-8.5 mm. Black; ferruginous are Al-2, 3 beneath, apical margin of clypeus narrowly (brownish), mandible (at base yellow and at apex reddish brown), mouth parts (palpi ochre yellow), posterior part of collar (discoloured and brownish), tubercle on posterior margin (yellow), tegula and basal plate of wing (brownish), all trochanters except brown patch above, base and apex of femora narrowly, fore and mid tibiae



Figs. 286-295. Trypoxylon miniovatum sp. nov. 286-290, ♀; 291-295, ♂.

except folded side (in mid medianly more or less brownish), hind tibia at base, fore tarsus except arolium, mid Tl-2 and fore and mid tibial spurs. Gaster from apex of G1 to base of G4 all beneath (dark brown, rarely pale brown above) and often G6 beneath also reddish brown.

Head in frontal view with lateral margins rounded, almost not convergent below, W:L=100:82, vertex very weakly depressed, top of hind ocellus above level of dorsal margins of eyes, eye incision narrow and deep, very gently narrowed towards bottom. Frons gently raised, but median furrow broad and deep, and round elevations on both sides fairly marked, the furrow anteriorly widened and then narrowed to connect with deep furrow above SAT. SAT-ASR very similar in structure to that of balabacense ovatum, but slightly different in some details: In dorsal view SAT narrower, with lateral inclination much acuter and ASR with anterior carina (ambur-yellow lobe) broader than posterior one (black lobe), the latter strongly reflected posteriorly (Fig. 286 cf. Fig. 272), and as a whole broader than in b. ovatum, this is due to that ASR in the present species lies in more transverse, therefore, in lateral view here both PAFs are seen through before SAT (Fig. 287, cf. Fig. 274). The structure seen oblique-vertically: Fig. 288, (cf. Fig. 275). Median carina of SAT anteriorly enlarged, flattened, forming a shining area, but without fovea on it (in 3 specimens examined) and the width of the area is narrower than in the compared species. Clypeus: Fig. 289, disc flat and broadly reflected at apex, antenna gently thickened towards apex, occipital carina complete.

HW,HL,IODv,A3,P=100,54,25,24,154. IODs=10:3. OOD,Od,POD≒2,7,5. A3=AW×5. A3,4,5=10,6,5.5. P,Ma,Mi,2(Ma),3(Ma)=100,16,6,28(16),30(19). RC=B-C, Rl short, about half CV2, CV1=CV2×4.5. TCV:CV2≒5:3, angle about 100°.

Anterior part of collar narrow, weakly incrassate towards sides, dorsal line triangularly raised, top minutely rounded, lamina on side: Fig. 290. Four impressed lines at base of mesoscutum weaker than in preceding subspecies, subalar area with outer margin acutely edged and slightly produced over subalar pit, but not expanded (as in ovatum). Lateral carina of propodeum in Sarawak specimens distinct, but in N. Bornean weaker, sometimes very indistinct, area dorsalis enclosed with distinct furrow, area apicalis with curved lateral carinae, but widely open upwards, GSR roundly, highly elevated, apical area discoloured.

Frons distinctly microcoriaceous and closely, partly subrugosely superimposed with fine but strong punctures, punctures on round elevations somewhat sparse, mesoscutum with plumbeous shine, but surface smooth and polished and sparsely scattered with fine shallow punctures, propodeum with distinct lateral series of strioles, area dorsalis smooth and shining, but at base obliquely sparsely shortly and not strongly striate, at apex with a few transverse striae and on lateral furrows irregularly and weakly crenate, sides polished, on posterior constricted area finely punctured, half mat.

♂. 5.5-7.5 mm. Similar to ♀, except sexual characters and gastral colouration, and more similar in general to the male of ovatum. Main difference from this: Antennal segments relatively shorter and clypeus without apical ferruginous colouration. Clypeus: Fig. 291, A10-13: Fig. 292 (cf. Fig. 278 and Fig. 279).

Head in frontal view with sides rounded, not convergent below, W:L=100:82, vertex weakly depressed, top of hind ocelli higher than level of dorsal margins of eyes, eye incision wider and shallower than in ♀ and more distinctly narrowed towards bottom. Pronotal lamina: Fig. 2 .

HW,HL,IODv,A3,A13,P=100,56.28,14,20,142. IODs=10:6. OOD,Od,POD≒3,6,4. A3=AW×2.4. A3,4,5≒10,8,7. A13=BW×2.4 and <A10-12. P,Ma,Mi,2(Ma),3(Ma)=100,16,6,29(20), 28(31), in one of other specimens: 100,17,6,30(24),34(32). RC=B-C, close to C, Rl short, CV1=CV2×3.5-4. TCV:CV2≒5:4, angle about 100°.

Genitalia seen from beneath: Fig. 294, closely resemble those of ovatum, but differ in that apical lobe of paramere slenderer and somewhat longer, it is provided at its base with a haired flap shown by A in the figure, its outer ventral margin not produced into a triangular process and volsella is fringed with hair at the apical outer margin (in ovatum not). Paramere apparently consists of two layers closely overlapped. But the presence of two layers can not be confirmed under observation from every direction. Possibly the apparent faint border shown with a dotted line in the figure may merely be a pigmental line (the organs are semitransparent pale yellow and partly pale brownish). Sternite 8 (Fig. 295) very similar to that of ovatum.

Holotype: ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X. 1977, D. Hollis (BMNH, BM77-543).

Paratypes: 1 ♀, same data as holotype (BMNH); 1 ♂, same loco., X-XI. 1977, M. Collins (BMNH); 1 ♀ 2 ♂, Sarawak, 4th Div., Niah, 9-17. X. 1976, 3°49'N 113°46'E, P. S. Cranston (primary forest Malaise trap); 2 ♀, North Borneo (SE), Forest Camp

19 km North of Kalabakan, 30. X, 8. XI. 1962, Y. Hirashima (light trap) (BPBM); 1 ♂, same loco., 60 m high, 25. X. 1962, K. J. Kuncheria (BPBM).

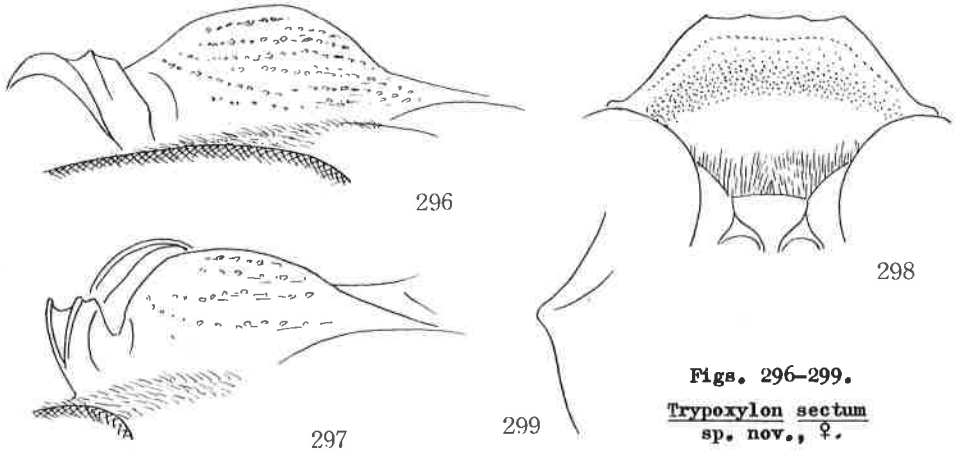
Remarks. The present species is also similar to T. balabacense, differs from it in that IODc is relatively much narrower and form of apical margin of clypeus less strongly undulate and in the type of RC (in balabacense RC is M-type).

53. TRYPOXYLON SECTUM sp. nov.

♀. About 12 mm. Characteristic in the form of clypeus and easily be separated from closely allied congeners.

Diagnosis. Gaster ferruginous and brown maculated above, fore and mid legs broadly whitish, hair silvery, P flask-shaped, mesoscutum without microsculpture, propodeum with lateral carinae, area dorsalis enclosed with furrow, IODs=5:4, SAT-ASR: Figs. 296–297, clypeus: Fig. 298, RC=B. Sarawak.

Black; from apex of G1 to end ferruginous red, but dorsal side of G2–3 dark brown and that of G4–5 black; Ferruginous or yellow are mandible, palpi, tegula, knees, fore tibia except folded side, fore tarsus, mid tibia except folded side and apex, mid T1 except brownish apex and base of hind tibia. A1 and 2 at apices, apical margin of clypeus narrowly, discoloured posterior part of collar, rest of fore and mid tibiae and mid T2–5 brown, arolia always black. Hair silvery, on clypeus at base weakly convergent towards medial line, but as a whole parallel.



Figs. 296–299.
Trypoxylon sectum sp. nov., ♀.

Head in frontal view distinctly wider than long (W:L=100:80), with sides rounded and somewhat narrowed below, vertex depressed, tops of hind ocelli below level of upper margins of eyes, eye incision comparatively broad, narrowed towards bottom, with dorsal margin inclined outwards, frontal elevations gently rounded, but distinct due to deep and broad medial furrow, SAT moderately high nasiform, with lateral inclination oblique in dorsal view, in lateral view dorsal line roundly curved (Fig. 296), ASR highly raised, but slightly below level of top of SAT, tricarinate on dorsum, fore carina highly raised, lamellate and ambur yellow in colour, hind two forming a mass, black, PAF deep, but bottom line gently upcurved, U-shaped in cross section, in dorso-lateral view to see through PAF: Fig. 297, SAT at verge to PAF not edged; clypeus: Fig. 298, apical margin nearly truncate, but the area is not rubbed down, at base broadly gently roundly elevated, at apex with glabrous area weakly reflected.

HW,HL,IODv,A3,P=100,46,25,23,150. IODs=10:8. OOD,Od,POD≒4,7,4. A3=AW×4.5. A3,4,5≒10,6,6. P,Ma,Mi,2(Ma),3(Ma)=100,17,6,31(17),36(22). RC=B, R1 short, CV1=CV2×7, TCV:CV2≒5:3, angle roughly 100 .

Anterior part of collar narrow, but not linear ridge-like, slightly widened laterally, lamina triangularly produced (Fig. 299); mesopleural scrobe shallow, subalar

area normal; propodeum with distinct lateral carinae, area dorsalis enclosed with broad furrow, area apicalis enclosed with round carina on both sides, but widely open medio-dorsally, GSR highly raised, discoloured to honey yellow, G1 distinctly flask-shaped.

Frons distinctly microcoriaceous and closely and subrugosely superimposed with comparatively large distinct punctures, mesoscutum with plumbeous shine, but shining, punctures fine, distinct, PIS on antero-lateral area PD×1-2, on central area slightly sparser. Propodeum with distinct lateral series of striae, striae comparatively long and on posterior portion extended medially, forming transverse striae covering dorsal side of area apicalis, area dorsalis at base smooth, medial and lateral furrows transversely striate, disc strongly punctured.

♂, unknown.

Holotype: ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X. 1977, D. Hollis (BMNH, BM77-543).

54. TRYPOXYLON ERRANS SAUSSURE, 18 7

Trypoxylon errans Saussure, Voyage de Novara, Hym., p. 84, 1967 (♀, Mauritus Is.).
Trypoxylon intrudens Smith (in Horne), Trans. Zool. Soc. London, 7 (3): 188, 1870.
Trypoxylon intrudens (= errans Saussure): Tsuneki, SPJHA, 8: 28 (redescription, figs. synonyms, etc.).
Trypoxylon errans: Tsuneki, Ibid., 9:114, 1979 (♀ ♂, figs. distribution).
Trypoxylon errans: Tsuneki, Ibid., 10: 20, 1979 (♀, Ceylon).
Trypoxylon errans: Tsuneki, Ibid., 11: 28, 1979 (♀, Java, Sumatra, Sumba).

Specimens examined: 1 ♀, M. Celebes, Palu-Valley, 5. III. (? 3. V). 1955, H. H. F. Hamann (RMNH); 1 ♀, Celebes, Paré, 10. II. 1949, Collector ? (RMNH).

Remarks. In the Celebes specimens above listed IODv is relatively somewhat wider than usual (see Table 5 of Pt. III). Body length 11.0 and 10.5 mm respectively. In both all trochantrrs bear brown streak above. Measurements (within parentheses 2nd specimen): HW,HL,IODv,A3,P=100,50,29,22,152 (100,50,29,22,160). IODs=10:5 (10:5.5). OOD,Od,POD≒4,10,8 (4,9,8). A3=AW×4.3 (×4.0). A3,4,5≒10,6,6 (10,6,5). P,Ma,M1,2(Ma) 3(Ma)=100,20,6,30(22),32(32) (100,16,6,22(20),28(28)).

It seems strange that no specimen of this species is found in the abundant material from Borneo, because it has been known from Taiwan.

55. TRYPOXYLON DJUN sp. nov.

Diagnosis. ♀, 10-11 mm, black, gaster medianly reddish beneath, legs partly yellow, hair silvery, P flask-shaped, propodeum with lateral carinae, mesoscutum without microsculpture, subalar area normal, area dorsalis enclosed with furrow, IODs=10: 7, SAT-ASR: Figs. 300-302, clypeus: Fig. 303, RC=C. Sarawak.

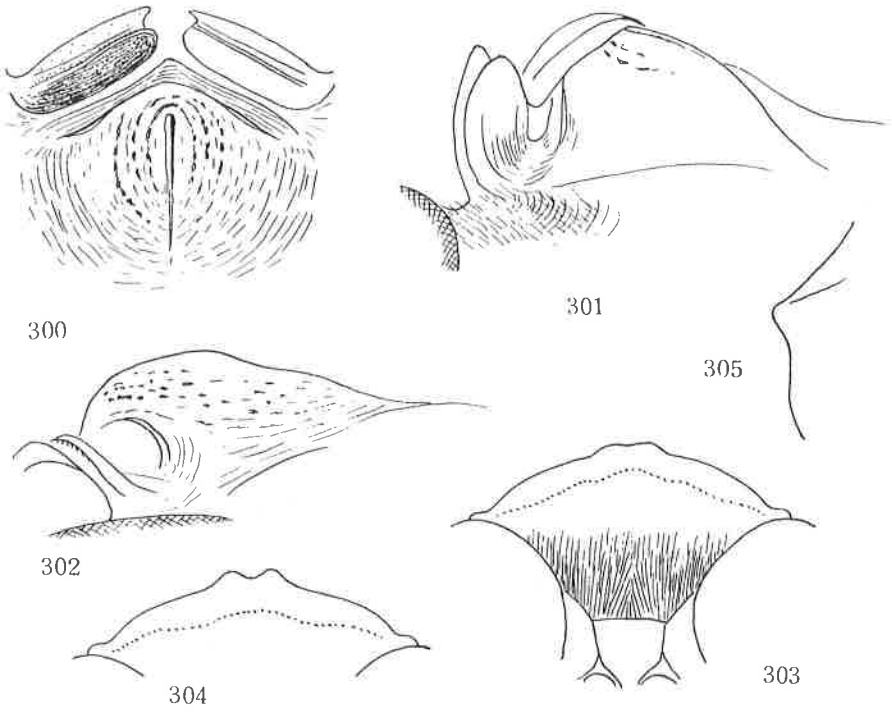
Somewhat resembles ngum, but in the present species IODs=10:7, A3=AW×5 and easi-separable from it.

Black, ferruginous are mandible (apical half reddish brown), palpi, discoloured posterior part of collar, posterior margin of tubercle, tegula, apical sides of G1 and G2-3 except triangular mark at each apex beneath and large marks covering nearly whole of dorsal side (extreme base of each ferruginous), knees narrowly, bases of tibiae, fore tibia in front and behind (not reaching apex), fore T1 and 5, basal half of mid T1, all tibial spurs and all claws. (Colour of legs very constant among the 4 specimens observed). Clypeus with apical margin sometimes narrowly castaneous, fore T2-4, apical half of mid T1 pale brown, rest of tarsi dark brown, arolia black. Hair silvery, at base of clypeus slightly convergent medially, but generally parallel.

Head in frontal view with sides rounded, slightly narrowed below, W:L=100:76, vertex almost not depressed, tops of hind ocelli slightly above level of upper margins of eyes, eye incision somewhat broad and shallow, gently narrowed towards bottom, frons weakly and broadly raised, medial furrow broad and shallow, and rounded elevations on both sides inconspicuous, SAT short broad nasiform, rather moderately high tuberiform, thickly carinated in middle, apical margin roundly curved in vertic-

al view, but on medio-apical area behind IAA not edged, while at verge to PAFs acutely edged, ASR lower than top level of SAT, not broadly expanded anteriorly, bicarinate on top, PAF moderately deep, but flat-bottomed, U-shaped in cross section. SAT-ASR: Figs. 300 (vertical), 301 (dorso-lateral) and 302 (lateral). Clypeus: Fig. 303, apical margin sometimes more distinctly bidentate (Fig. 304), at base gently raised and at apex considerably reflected; occipital carina complete, not depressed behind buccal cavity.

HW,HL,IODv,A3,P=100,50,25,22,134. IODs=10:7. OOD,Od,POD=1,4,3. A3=AW 5. A3,4,5=10,7,6. P,Ma,Mi,2(Ma),3(Ma)=100,21,7,32(26),32(36). RC=C, Rl short, but about half of CV2, reaching fairly close to wing apex, CV1=CV2 4.5, TCV:CV2=5:4, angle roughly about 100 .



Figs. 300-305. Trypoxylon djun sp. nov., ♀

Anterior part of collar narrow, weakly widened laterally, dorsal line gently roundly, somewhat triangularly raised, top minutely rounded, but not tuberculate, lamina on side: Fig. 305; subalar area acutely edged on postero-lateral area, but not expanded. Propodeum with lateral carinae, area dorsalis distinctly enclosed with furrow, area apicalis only with short lateral carinae, GSR nearly simple, posterior margin mintely slightly roundly elevated, P distinctly flask-shaped.

Microsculpture on frons very minute and delicate, punctures fine and PIS=PD 1-2 mesoscutum nearly mat, punctures fine and somewhat sparse, PIS mostly 2-3 times PD. Lateral series of striole of propodeum well developed and long, partly mixed with hair-bearing punctures, area dorsalis at base smooth, median and lateral furrows transversely striate, disc sparsely punctured, sides polished, with fine shallow weak punctures sparsely scattered on dorsal area, posterior area with a few feeble striae.

♂, unknown.

Holotype: ♀, Sarawak, 4th Div., Gn. Mulu, RGS Exp., X-XI. 1977, M. Collins (BMNH).

Paratypes: 3 ♀, same loco., 17.IX.-23.X. 1977, D. Hollis (BMNH-BM77-543).

Remarks. In the structure of SAT-ASR the present species fairly closely resem-

bles T. tawitawiense m., ♂ and general other characters also tolerably well agree. But in djun IAA without medial ridge that is extended from SAT (cf. Fig. 261), pronotal lamina shortly toothed and fore tarsus not completely yellow; further in the detailed configulation of the frons both the species are not coincident with each other.

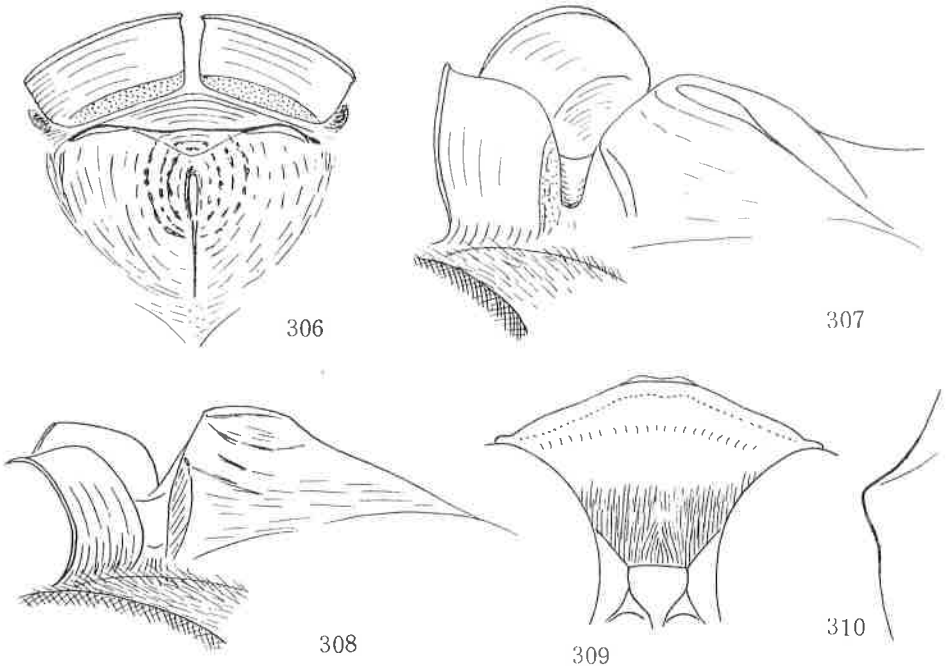
Between the closely allied species of the present genus it is not a certain way to combine the specimens derived from different localities, however closely they resemble in most of the non-sexual characters. It seems a better way to wait until the time when closely similar both sexes are collected in the same place and at the same time.

56. TRYPOXYLON CINDJUN sp. nov.

Diagnosis. ♀, 10 mm. P flask-shaped, propodeum with lateral carinae, mesoscutum without microsculpture, area dorsalis enclosed with furrow and transversely striate, IODs=10:6, A3≒AW×4, SAT-ASR: Figs. 306–308, clypeus: Fig. 309. Gaster medianly reddish beneath, legs with apical half more or less ferruginous. Sarawak and North Borneo.

The present species (♀) is very similar to the preceding species and also to tawitawiense ♂ in the non-sexual characters, but differs from both in the structure of ASR and in the configulation of vertex and especially from the first in the form of clypeus, relative length of A3, in the sculpture of mesoscutum and area dorsalis and in the colour of fore tarsus.

Black; ferruginous are mandible at base, palpi, tegula, apex and apical sides of G1, G2–3 except a large brown or black mark on each above (extreme base and apex of G2 and base of G3 ferruginous), knees, fore tibia except folded side and a patch at apex on outer side, mid and hind tibiae at base, spurs, fore tarsus except arolium and mid T1 except apex. A1 at apex and 2 at apex and beneath, apical margin of clypeus light brown; apical half of mandible reddish brown. Hair silvery, on clypeus nearly completely parallel.



Figs. 306–310. Trypoxylon cindjun sp. nov., ♀.

Head in frontal view with lateral margins rounded, very slightly convergent below, H:L=100:90, ocellar area broadly depressed and slightly raised between ocelli, hence each ocellus in a hollow, seen in front with tops of hind ocelli below level of upper margins of eyes that are level with the posteior raised margin of vertical depression. Frons very weakly but broadly raised, median furrow shallow and broad, elevations on both sides inconspicuous, surface nearly flat and antero-lateral inclination also gentle (not so marked as in tawitawiense ♂), SAT moderately high short broad tuberiform, medianly with a thick short carina, the carina often surrounded by arculte puncture lines, seen vertically (Fig. 306) semicircular, apical margin nearly transverse and at verge to PAF edged and slightly raised. ASR much below level of SAT top, pale brown in colour, broadly expanded anteriorly, anterior margin carinate, dorsum transversely finely closely striate, striae feeble, PAF deep, bottom line gently upcurved and slightly oblique, U-shaped in cross section (Fig. 307, dorso-lateral to see through PAF), the structure seen in profile: Fig. 308, notice that both PAFs can be seen through, clypeus: Fig. 309, apical margin sometimes nearly entire, disc at base gently roundly raised and at apex broadly reflected; occipital carina complete, weakly incised behind buccal cavity.

HW,HL,IODv,A3,P=100,54,30,20,136. IODs=10 : 6. OOD,Od,POD≒3,4,4. A3=AW×3.8. A3,4,5≒10,6.5,6.5. P,Ma,Mi,2(Ma),3(Ma)=100,22,8,36(30),42(35). RC=C-B, R1 short, CV1=CV2×4.5, TCV:CV2≒5:4, angle roughly about 100°.

Anterior part of collar narrow, but not linear, dorsal line gently rounded in frontal view, sometimes weakly depressed on each side of medial elevation, posterior part incompletely discoloured, sometimes nearly completely so, lamina on side: Fig. 310, mesopleural scrobe shallow and broad, but distinctly pitted at centre, subalar area normal, postero-lateral area with edged outer margin, lateral carina of propodeum extended posteriorly towards lateral carina of area apicalis, but not reaching there, area dorsalis enclosed with broad shallow furrow, distinct till base, area apicalis only with curved lateral carinae, GSR roundly raised, elevation comparatively small, with apical part only discoloured.

Frons distinctly microcoriaceous and distinctly superimposed with fine punctures, PIS=PD×1-3, SAT on top area slightly flattened and slightly coarsely punctured, punctures confluent arcuately and running concentrically around medial carina; mesoscutum distinctly finely closely punctured, PIS shining; lateral series of strioles of propodeum distinct, on posterior portion the strioles extended medially to turn to transverse arcuate striae in front of area apicalis, area dorsalis transversely fairly closely striate, striae consist of strong and weak ones and sometimes on posterior portion broadly weaker and surface shining, sometimes mixed with punctures on disc; sides shining, but except anterior femoral sinus sparsely punctured.

♂, unknown.

Holotype: ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X. 1977, D. Hollis (BMNH, BM77-543).

Paratype: 1 ♀, North Borneo, Forest Camp, 19 km North of Kalabakan, 19.XI.1962 K. J. Kuncheria (HPBM).

57. TRYPOXYLON PLACIDUM SMITH, 1864

Trypoxylon placidum Smith, J. Proc. Linn. Soc. London, Zool., 7:35, 1864 (♀, Mysol).
Trypoxylon placidum: Tsuneki, SPJHA, 8:23 (redescr. lectotype, figs.), 81 (postscr. & correction), 1978.

Remarks. No new specimen could be discovered among the material newly examined.

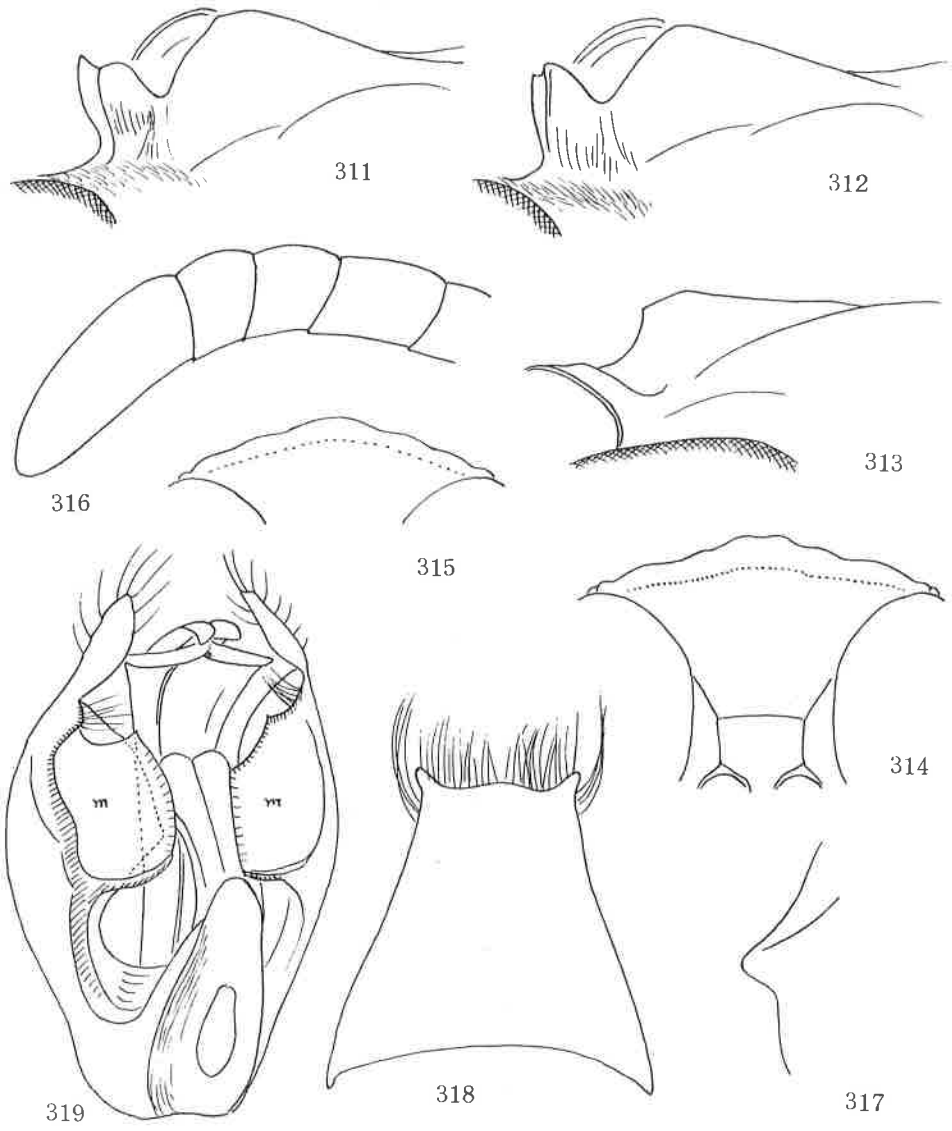
In the lectotype specimen the gaster is lacking and I presumed at first from the combined length of the head and thorax-complex that it had possibly the clavate gastral petiole.

Later, however, I found among the Papuan material a possible placidum specimen that had the flask-shaped gastral petiole and from this I knew the error of my presumation and corrected the related part of the key in the Postscriptum of that paper.

58. TRYPOXYLON AMATORIUM sp. nov.

The specimens are long preserved ones and the gaster and legs are strongly brownish. At present the gaster is medianly pale brown beneath, but it is presumed that it is originally black and only slightly brownish beneath (usually included in the group of black-gaster). In the key, therefore, it was put in two branches. In the legs it becomes difficult to distinguish ferruginous from brown.

Diagnosis. ♂, about 8 mm. Black, gaster medianly brownish beneath, fore tarsus ferruginous white, hair silvery; Gl flask-shaped, mesoscutum without microsculpture, propodeum with weak lateral carinae, area dorsalis enclosed with shallow groove, IODs 4:3, Clypeus: Fig. 314, 315, SAT-ASR: Figs. 311-313. Al3=Al0-12. RC=C.



Figs. 311-319. Trypoxylon amatorium sp. nov., ♂

Black, Al and 2 at apices pale brown, mandible at base yellowish, palpi ochre yellow, posterior part of collar, tegula and basal plate of wing pale brown, gaster from apex of G1 to G4 brown beneath (at present brown above and paler beneath), fore tibia (at present) brown and somewhat paler at base, fore tarsus pale brown (possibly yellowish white in fresh condition). Hair silvery, on clypeus parallel.

Head in frontal view with sides rounded, slightly narrowed below, W:L=100:80, vertex not depressed, eye incision broad and shallow, narrowed towards bottom, frons weakly raised, but median furrow considerably deep, hence rounded elevations on both sides distinct, the furrow anteriorly broader, SAT low nasiform, apical and apico-lateral inclinations smoothly oblique, PAF obliquely lies as usual, moderately deep, with bottom line up-curved, V-shaped in cross section, ASR much below level of SAT top, slightly different between the specimens observed, in holotype: Fig. 311 (dorso-lateral to see through PAF), in paratype: Fig. 312 (do.), seen in profile: Fig. 313 (holo), clypeus also somewhat different between them: Figs. 314 (holo) and 315 (para), (occipital carina unobservable beneath). Measurements (within parentheses paratype):

HW,HL,IODv,A3,A13,P=100,50,29,16,20,146 (100,52,26,17,21,145). IODs=10:7 (do.). OOD,Od,POD≒2,5,3 (5,9,6). A3=AW×3.3 (×3.6). A3,4,5≒10,6,6 (do.). A13=BW×2.5 (do.) and ≒A10-12 (do.). P,Ma,Mi,2(Ma),3(Ma)=100,15,6,30(22),30(30) (100,16,5,28(23),32(26)). A13: Fig. 316. RC=C, but somewhat approaching B, R1 short, CV1=CV2×4, TCV≒CV2, angle about 95° (do.).

Anterior part of collar narrow, gently enlarged laterally, in frontal view gently raised towards middle and minutely rounded there, weakly tuberculate, lamina: Fig. 317, mesopleural scrobe large and deep, subalar area with outer margin acutely edged but not expanded, lateral carinae of propodeum weak, posteriorly ending at about mid point of posterior inclination, lateral furrows of area dorsalis broad and shallow, lateral carinae of area apicalis curved up, weaker dorsally and not connected with each other, being separated by the apex of medial furrow of posterior inclination, GSR vertically highly raised, discoloured.

Frons strongly microcoriaceous and sparsely superimposed with fine shallow punctures, mesoscutum smooth and polished, without plumbeous shine, very faintly and very sparsely punctured, propodeum with distinct lateral series of striae, the striae on posterior portion more or less extended inwards, area dorsalis partly transversely weakly striate and mixed sparsely with punctures, but in paratype the striae indistinct and surface somewhat opaque.

Sternite 8: Fig. 318, apico-lateral corners long toothed, genitalia: Fig. 319 (somewhat oblique ventral view), greater part transparent pale brown, paramere simple lobed at apex, the lobe provided with a small haired expansion at its inner ventral base, main body expanded lamellately and half rolled at its dorso-inner margin as usual, but besides this, at its ventro-outer margin broadly expanded into a flat transparent membrane (shown with m in the figure), it is supported at its base by a slender process stretched out of outer margin of paramere (homologous one with the elongate triangular process often observed in some species) and at its outer margin apparently somewhat thickened. Volsella long and spatulate, penis valve with well developed shoulder and a pair of sickle-shaped appendages.

♀, unknown.

Holotype: ♂, North Borneo, Sandakan, date undescribed, C. F. Baker (USNM).
Paratype: 1 ♀, same data as holotype (USNM).

Remarks. Despite the slight difference in the form of ASR and clypeus the structure of the genitalia is completely same in both specimens. The possession of the flag-like membrane of paramere is similar to varipiloides described earlier in this paper, but the present species is utterly different from this in the structure of penis valve.

59. TRYPOXYLON YANOI sp. nov.

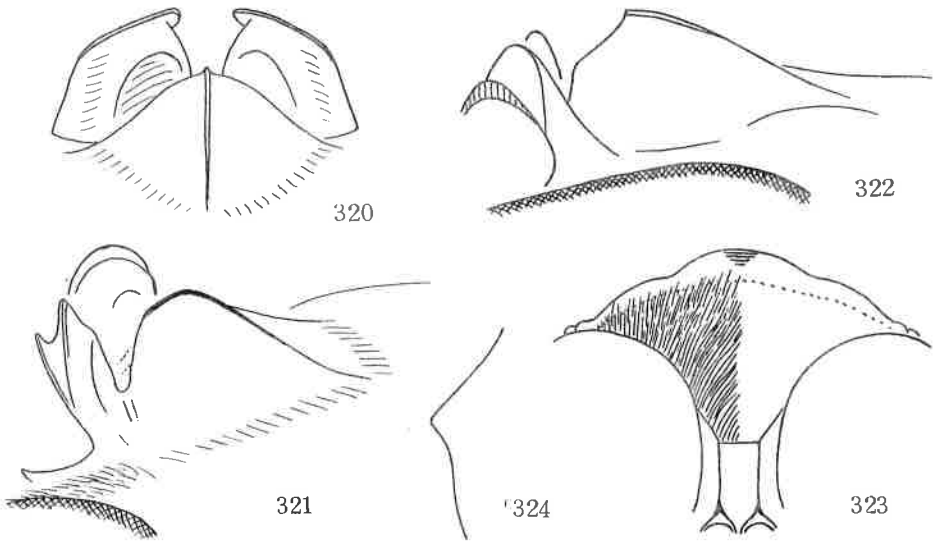
Closely resembling T. errans Saussure, but is distinguishable from this by that IODs is relatively much narrower, A3 is much longer and mesoscutum more finely and more sparsely punctured, with PIS smooth and polished.

Diagnosis. ♀, 10 mm. Gaster medianly reddish, all trochanters, fore leg broadly, mid and hind legs partly yellowish white, G1 flask-shaped, mesoscutum simply punctured, propodeum with lateral carinae, area dorsalis enclosed with furrow, IODs=

3:1, A3÷AWx5, SAT-ASR: Figs. 320-322, clypeus: Fig. 323, RC=C, North Borneo.

Black, Al and 2 with apices ferruginous, clypeus with apical glabrous area and mandible pale castaneous, palpi yellow, discoloured posterior part of collar yellowish, tubercle, tegula and basal plate of wing brown, G1 at apex beneath, G2 beneath reddish brown; ferruginous on legs: apices of coxae, trochanters wholly, knees, fore tibia except folded side, tarsus except arolium, mid tibia at base and apex, T1 and 2 except apex, hind tibia at base and all tibial spurs. Hair silvery, on clypeus all convergent towards medial line.

Head in frontal view with sides rounded and almost not convergent below, W:L= 100:82, vertex not depressed, upper margins of hind ocelli above level of upper margins of eyes, eye incisions narrow, subparallel-sided, dorsal margin in a transverse line, frons weakly raised, median furrow broad and fairly deep and widened at above SAT, SAT nearly conical, dorsal part slightly longer and medianly distinctly carinate (Figs. 320, dorsal; 322, lateral), carina slightly widened anteriorly, turning into narrow smooth area, but without fovea on it, ASR nearly as high as SAT, not broadly expanded anteriorly, acutely bicarinate on top, hind carina higher (Fig. 321 dorso-lateral to see through PAF), PAF very deep, flat-bottomed, U-shaped in cross section (do.); clypeus: Fig. 323, disc roundly raised in middle and gently tectate, apical margin including haired, punctured and black area distinctly reflected.



Figs. 320-324, Trypoxylon yanoi sp. nov., ♀

HW,HL,IODv,A3,P=100,56,27,24,142. IODs=10:3. OOD,Od,POD÷2,5,4. A3=AWx5. A3, 4,5÷10,6,6. P,Ma,Mi,2(Ma),3(Ma)=100,19,6,28(20),34(30). RC=C, R1 short, CV1=CV2x5, TCV:CV2÷3:2, angle about 110°.

Occipital carina complete. Anterior part of collar very narrow, carina-like, slightly widened towards sides, dorsal line in frontal view gently raised straight, in middle minutely roundly angulate, lamina on side: Fig. 324. Subalar area of mesopleuron normal, only acutely edged at postero-lateral margin, lateral carinae of propodeum distinct, curved on dorsal part of the side, posteriorly not directed towards lateral carina of area apicalis, lateral furrows of area dorsalis strong and crenate, lateral carinae of area apicalis curved up, but at dorsal middle interrupted by the apex of median furrow of posterior inclination.

Frons distinctly microcoriaceous and finely weakly, but fairly closely and in part subrugosely punctured, mesoscutum polished, with very fine and very sparse punctures, propodeum with distinct series of striae along lateral carinae, striae on posteroor part extended dorsally to a few transverse arcuate striae in front of area apicalis, area dorsalis obliquely shortly striate at base,on deep basal part of median furrow strongly crenate, posterior flattened area weakly transversely striate, disc sparsely punctured, with PIS and rest of dorsal side smooth and polished, sides also polished, but except anterior femoral sinus broadly covered with

sparse fine shallow punctures.

♂, unknown.

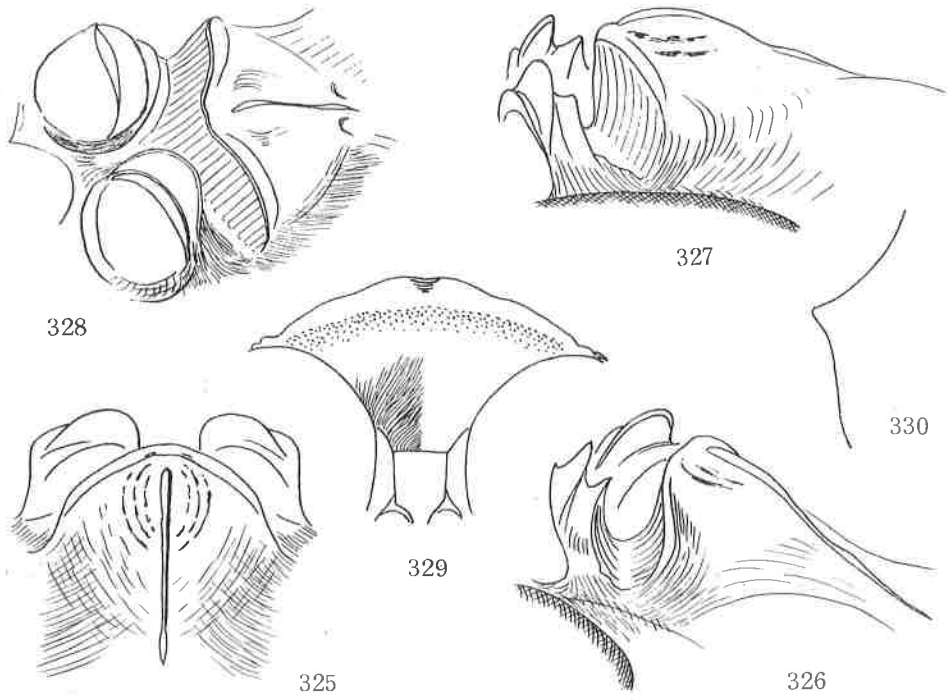
Holotype: ♀, North Borneo, Forest Camp, 19 km North of Kalabakan, 60 m, 27. X. 1962, K. J. Kuncheria (HPBM).

Remarks. The present species is dedicated to my teacher, the late Dr. M. Yano.

60. TRYPOXYLON MAKASSARENSE sp. nov.

The present species (♀) is similar in the structure of SAT-ASR to T. prominens m., but is easily separable therefrom by that propodeum is provided with strong lateral carinae and all trochanters are whitish. In such characters, together with SAT-ASR, it considerably resembles T. kandyianum m. known from Ceylon, but differs markedly from this at least in the colour of antenna and gaster.

Diagnosis. ♀, 11 mm. P flask-shaped, mesoscutum without microsculpture, propodeum with distinct lateral carinae, area dorsalis enclosed with furrow, hair silvery, IODs=2:1, SAT-ASR: Figs. 325-328, clypeus: Fig. 329, RC=C-B, all trochanters, fore leg broadly and mid and hind legs partly yellow, gaster black, Celebes.



Figs. 325-330. Trypoxylon makassarense sp. nov., ♀

♀, 10.5 mm. Black; antenna brown (originally black ?), Al and 2 at apices paler, ferruginous are apical margin of clypeus narrowly, mandible, palpi (not ochre yellow), tubercle, tegula, apices of coxae, trochanters wholly, all femora at base and apex narrowly, bases of tibiae, fore tibia and tarsus, mid Tl-2 and all tibial spurs. Hair silvery, on clypeus at base strongly sinuately convergent towards medial line.

Head in frontal view with sides rounded, very slightly convergent below, W:L= 100:81, vertex not depressed, eye incision narrow and deep, subparallel-sided, dor-

sal margin slightly raised towards apex, frons feebly raised, mddian furrow broad and shallow, SAT roundly highly raised, apical margin transversely rounded, highly raised, acutely edged, at verge to PAF carinated and thickened, in middle with a strong carina, the carina not reach apical margin, the area surrounding apical part of median carina somewhat flattened, forming a weak step, ASR nearly as high as SAT, acutely tricarinated on top, median carina higher and hind one slightly reflected, PAF deep, flat-bottomed, broad oval in cross section. The structure: Figs. 325 (dorsal view), 326 (dorso-lateral to see through PAF), 327 (lateral) and 328 (ventro-lateral); clypeus: Fig. 329, at base roundly raised, at apex moderately reflected, apical margin longitudinally excavated in middle.

HW,HL,IODv,A3,P=100,52,26,22,140. LODs=10:5. OOD,Od,POD=2,7,4. A3=AW 4.3. A3, 4,5=10,6,5. P,Ma,Mi,2(Ma),3(Ma)=100,22,7,24(25),34(32). RC=C-B, Rl short, CVl=CV2 5, TCV:CV2=5:3, angle about 120 (at base about 100).

Antenna considerably incrassate towards apex, occipital carina complete. Anterior part of collar narrow, acute ridge-like in middle, but considerably thickened laterally, dorsal line gently rounded, in middle not tuberculate, but slightly incrassate there, posterior part not perfectly discoloured, but greater part appears ambur yellowish, lamina on side: Fig. 330. Subalar area of mesopleuron normal, only posterolateral margin acutely edged; propodeum with strong lateral carinae, originating from slightly behind spiracle, running on dorsal margin of the side, but not reaching apex, area dorsalis enclosed with deep strongly crenate distinct furrow, median furrow broad and deep, area apicalis distinctly enclosed with carina, carina dorsally low and depressed in middle, but not interrupted, GSR highly raised, apical area ambur yellow.

Frons distinctly microcoriaceous and closely somewhat rugoso-reticulately punctured, SAT without microsculpture, closely covered with fine weak punctures, but anteriorly punctures sparse and somewhat large and in front of apex of median carina weakly arcuately arranged, mesosctum distinctly, somewhat closely punctured, PIS≒PD 1-2, propodeum with strong series of striae along lateral carinae, area dorsalis at base obliquely striate, striae laterally longer, median furrow transversely strongly striate, disc with fine punctures sparsely scattered, posterior inclination posteriorly transversely arcuately striate, sides except glittering femoral sinus closely covered with fine weak punctures.

♂, unknown.

Holotype: ♀, Celebes, Makassar, XII. 1908, F. Muir (BPBM).

61. TRYPOXYLON KEPONGIANUM MISERUM ssp. nov.

(Trypoxylon kepongianum Tsuneki, SPJHA, 9: 139, 1979 - ♂, Malaya, figs.)

The Bornean form differs from the nominate race in that area dorsalis is distinctly enclosed with moderately deep crenate furrow, otherwise well agrees in characters. Main distinctions: ♂, 8 mm, black, legs partly yellowish white, hair silvery, gaster flask-shaped, mesoscutum simply punctured, propodeum with lateral carinae, area dorsalis enclosed with furoow, IODs=3:2, Al3 slightly longer than All+12, SAT-ASR, especially ASR, very characteristic (cf. Pt. III, figs. 585-590), clypeus: Fig. 591 of Pt. III. Measurements of the Bornean male:

HW,HL,IODv,A3,Al3,P=100,50,28,16,16,126. IODs=10:6.5. OOD,Od,POD=2,7,4. A3=AW 3. A3,4,5=10,7,6. Al3=BW 2 and =All+12. P,Ma,Mi,2(Ma),3(Ma)=100,19,8,36(30),32 (38). RC=C-B, Rl moderately long, CVl=CV2 5, TCV:CV2=7:5, TCV straight, CV2 downcurved, angle roughly about 110 .

IODv is relatively slightly wider (in holotype of nominate race 25), others tolerably well agree.

♀, unknown.

Holotype: ♂, North Borneo (SE), Forest Camp, 19 km North of Kalabakan, 30. X. 1962, Y. Hirashima (BPBM).

62. TRYPOXYLON MEMBRANACEUM TSUNEKI, 1979

Trypoxylon membranaceum Tsuneki, SPJHA, 9: 121, 1979 (♀ ♂, Singapore, Laos, figs.).

Trypoxylon membranaceum: Tsuneki, SPJHA, 11: 56, 1979 (♀, Sumatra, Java, fig.).

Specimens examined. 1 ♂ *, North Borneo, Kudat, 11. IX. 1927, C. B. K. & H. M. P. (BMNH); 1 ♀ 1 ♂, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X. 1977, D. Hollis (BMNH, B.M.77-543).

Remarks. The gaster of the female specimen above listed is completely black, only G2-3 slightly brownish beneath. In the three specimens (♀ ♂) examined there is always a minute scrobe on the side of propodeum just below about mid point of lateral carinae which is always not strong. In the three male specimens from Singapore a similar scrobe is present, but in the holotype female there is no such a scrobe there (the Laotian and Indonesian material is already not present here).

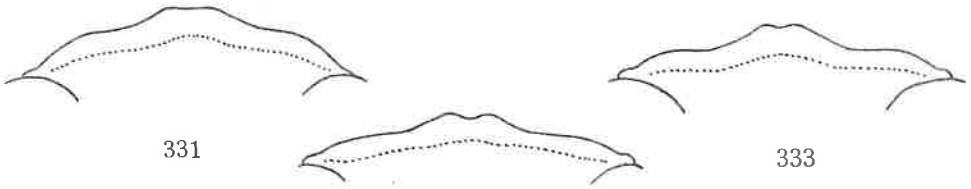
Measueements: Head in frontal view somewhat quadrate, W:L ♀ 100:92, ♂ * 83, ♂ 82.

Table 7. Measurements on the Bornean material of T. membranaceum Tsuneki.

Sex	HW	HL	IODv	A3	Al3	P	IODs	Ocelli	A3	Al3	A3-4-5	P	Ma	Mi	2(Ma)	3(Ma)
♀	100	58	23	19	-	152	9.0	1 6 3	3.1	-	10 7 6	100	20	8	30(26)	34(34)
♂*	100	54	28	12	20	138	8.5	1 2 2	2.2	2.3	10 6 7	100	24	8	32(34)	32(42)
♂	100	58	27	12	22	136	8.5	1 2 2	1.8	2.4	10 6 8	100	20	7	32(30)	34(40)

Remarks. Between the male specimens from North Borneo and Sarawak there is a considerable difference in the relative length of antennal joints. In the North Bornean slenderer and longer, but in other characters no note-worthy difference can be observed. The form of apical margin of clypeus is more or less different locally or individually. This was already mentioned in connection with Javanese & Sumatran specimens. In the specimens examined ♀: Fig. 331 (similar to that of the Javanese), ♂*: Fig. 332 and ♂ Fig. 333, in all with hair parallel, apical margin pale castaneous in ♀, black in ♂♂. Yellowish white colour of legs in the fresh Sarawak ♀: Fore tibia and tarsus, mid and hind tibiae at base, basal half of mid Tl, bases of T2-5 and spurs of fore and mid tibiae (hind ones distinctly brown), while in Sarawak ♂: median part of fore tibia in front, fore T4-5 and fore and mid tibial spurs only; in the N. Bornean ♂ legs are wholy markedly changed to brown.

It seems uncertain whether the gaster of the female of the Bornean specimens is constantly black or not.



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Figs. 331-333. T. membranaceum Tsuneki, ♀ (331) and ♂ from Borneo.

63. TRYPOXYLON OBIENSE sp. nov.

♀. Closely resembling the black form of T. striolatum m., but differs from it in that IODo is relatively narrower (IODs=10:5), apical margin of clypeus different in form and lateral furrows of area dorsalis is absent.

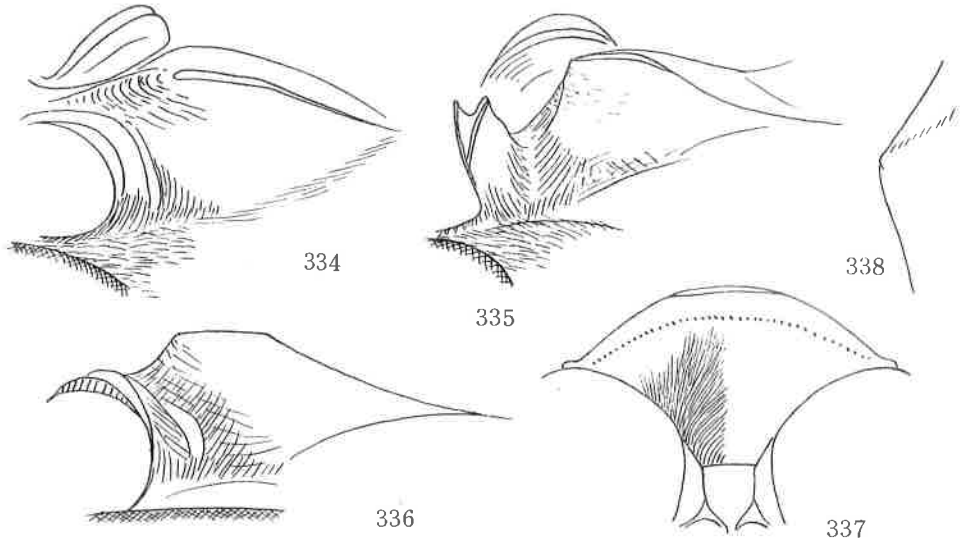
Diagnosis. ♀, 11 mm. Black, legs partly yellowish white, hair silvery, P is flask-shaped, mesoscutum without microsculpture, propodeum with lateral carinae, SAT ASR: Figs. 334-336, clypeus: Fig. 337, IODs=2:1, area dorsalis transversely closely striate, RC=C, Is. Obi.

Antenna black, not ferruginous beneath, Al,2 at apices brownish, clypeus with apical margin castaneous, mandible, palpi, tubercle posteriorly, fore tibia except

folded side and tarsus except arolium, mid tibia at base and apex, mid Tl–4 and hind tibia at base whitish ferruginous; mid spur slightly brownish, hind ones dark brown, articulations of hind tarsus pale; tegula and basal plate of wing brown, posterior part of collar incompletely discoloured, somewhat brownish. Hair silvery, on clypeus convergent towards medial line.

Head in frontal view with lateral margins rounded, slightly convergent below, vertex not depressed, W:L=100:92, eye incision narrow, subparallel-sided, dorsal margins of both sides in a straight line, frons gently raised, medial furrow broad and comparatively deep, lateral elevations gently rounded, supraantennal structure similar to that of striolatum, SAT moderately high nasiform, strongly carinated in middle and antero-laterally inclined smoothly to PAF, but on medio-apical area transversely arcuately striate, striated area obliquely inclined to IAA (Fig. 334), ASR slightly below level of SAT top, not broadly extended anteriorly, bicarinate on top, PAF V-shaped in cross section, higher inwards than outwards, namely from top of IAA inclined postero-laterally, but as a whole in a strongly up-curved state (Figs. 334, oblique lateral, 335, dorso-lateral to see through PAF), the structure seen in profile: Fig. 336; clypeus: Fig. 337, disc at base raised and tectate in middle, apical marginal area reflected (certainly apical margin somewhat rubbed down), antenna weakly incrassate towards apex, occipital carina complete.

HW,HL,IODv,A3,P=100,50,23,26,136. IODs=10:5.5. OOD,Od,POD=1,5,3. A3=AW×5.3. A3,4,5≒10,6.5,5.5. P,Ma,Mi,2(Ma),3(Ma)=100,22,8,34(28),36(36). RC=C, CV1=CV2×6, TCV:CV2≒5:3, angle about 90°.



Figs. 334–338. Trypoxylon obiense sp. nov., ♀.

Anterior part of collar narrow, ridge-like, slightly widened laterally, dorsal line in frontal view in gentle triangular and minutely tuberculate in middle, lamina on side triangular (Fig. 338), not toothed; subalar area normal, only acutely edged at postero-lateral margin, mesopleural scrobe large and deep, propodeum with distinct lateral carinae, but fine, upcurved in lateral view, ending at about mid point of posterior inclination, area dorsalis without lateral furrows, medial furrow widened posteriorly, but not deep, area apicalis enclosed with carina, carina lowering upwards and interrupted narrowly at dorsal middle by the apex of medial furrow of posterior inclination, GSR roundly highly elevated, not completely discoloured.

Frons very minutely microcoriaceous and very indistinctly superimposed with fine shallow and sparse punctures. Mesoscutum closely (PIS≒PD) covered with comparatively large distinct punctures, punctures medianly somewhat sparse, propodeum with distinct series of striae along lateral carinae, striae fine and close, area dorsalis at base obliquely striate, rest of the area and greater part of dorsal and posterior aspects

ransversely finely closely striate, side except anterior femoral sinus finely close-punctured.

♂, unknown.
Holotype: ♀, Is. Obi, Kali Telaga, 31. X. 1953, A.M.R. Wegner (RMNH).

64. TRYPOXYLON HOLLISI sp. nov.

♂. The present species is closely related to T. nesianum m. known from Sumatra, Java and Is. Sumba, but is different from this in that PAF deeper, distinctly V-shaped in cross section, pronotal lamina more acutely pointed, parapsidal sutures on mesoscutum not impressed lines, but raised lines and RC in fore wing C-B type (not C-M). Genitalial structure also resembles that of nesianum, but paramere shows a delicate difference in its apical structure.

Diagnosis. ♂, 11 mm. Completely black, mandible and palpi partly brown, tibial spurs only ferruginous. Hair silvery, P flask-shaped, mesoscutum without microsculpture, propodeum with lateral carinae, area dorsalis enclosed with furrow, IODs=1:1, SAT-ASR: Figs. 339-342, clypeus: Fig. 343, Al3: Fig. 344. Sarawak.

Mandible on basal half black, apically ferruginous, palpi dark brown, articulations and apically somewhat pale, tegula semitransparent brown, tibial spurs ferruginous. Hair silvery, on clypeus parallel.

Head in frontal view with sides roundly, not strongly convergent below, markedly wider than long, W:L=100:80, frons weakly raised, medial furrow at base moderately deep, anteriorly broadly enlarged and very shallow, round elevations on both sides weak, SAT fairly high nasiform, rather subconical, smoothly inclined (without step as seen in nesianum) to IAA and PAF (Figs. 339, dorsal; 342, lateral), from top of the cone posteriorly carinated, carina at top thick and tapering, ASR broadly expanded anteriorly and laterally (Figs.340, dorso-lateral, 341 low dorso-lateral) as in nesianum or in vardyi, but separated from SAT by a much deeper PAF than in these, PAF moderately deep, bottom line strongly up-curved, V-shaped in cross section (not down-curved as in compared species): Fig. 341, SAT-ASR in lateral view: Fig. 342 (PAF is seen behind ASR). Clypeus: Fig. 343, disc gently roundly tectate, apical margin almost not reflected, A9-13: Fig. 344.

HW,HL,IODv,A3,Al3,P=100,52,27,14,20,154. IODs=10:10. OOD,Od,POD≒4,7,6. A3=AW×2.3 (in dorsal view 2.8). A3,4,5≒10,7,7. Al3=BW×2 and ≒A10-12. P,Ma,Mi,2(Ma),3(Ma)=100,14,5,27(20),28(28). RC=C, but close to B (in nesianum close to M), CV1=CV2×4.5, TCV strongly bent inwards near middle, TCV:CV2≒5:3, angle roughly about 100°.

Occipital carina complete; anterior part of pronotal collar short, but not so narrow as linear ridge, slightly widened laterally, posterior part discoloured, dark yellowish, lamina on side: Fig. 345. Parapsidal sutures of mesoscutum, strange to say, linearly raised, subalar area of mesopleuron normal, postero-lateral margin only acutely edged; lateral carinae of propodeum strong and strongly upcurved in lateral view, area dorsalis distinctly enclosed with furrow, area apicalis completely margined with carina, median furrow of posterior inclination not running through the carina (in this respect similar to nesianum), GSR highly elevated, not discoloured.

Genitalia seen from beneath: Fig. 346, general pattern of structure belongs to that of daicoccum, vardyi and nesianum, namely, paramere bifurcate at apex,ventral lobe bent inwards, carrying haired tubercles on its ventral surface, main body provided with a stretched protrusion at about mid point of its outer-ventral margin, volsella broad spatulate, with a fringe of hair on apico-lateral margin, penis valve with well developed shoulder and a pair of sickle-shaped appendages. In the present species, however, the ventral one of apical lobes of paramere without a crossing ridge, and by this character easily separable from daicoccum and further, the ventral surface of this lobe is not so broadly covered with haired tubercles as in vardyi or in nesianum, but only with a row of several haired tubercles along inner margin and in this respect distinctly different from the two compared species (cf. Pt. V, p. 61, figs. 185-192).

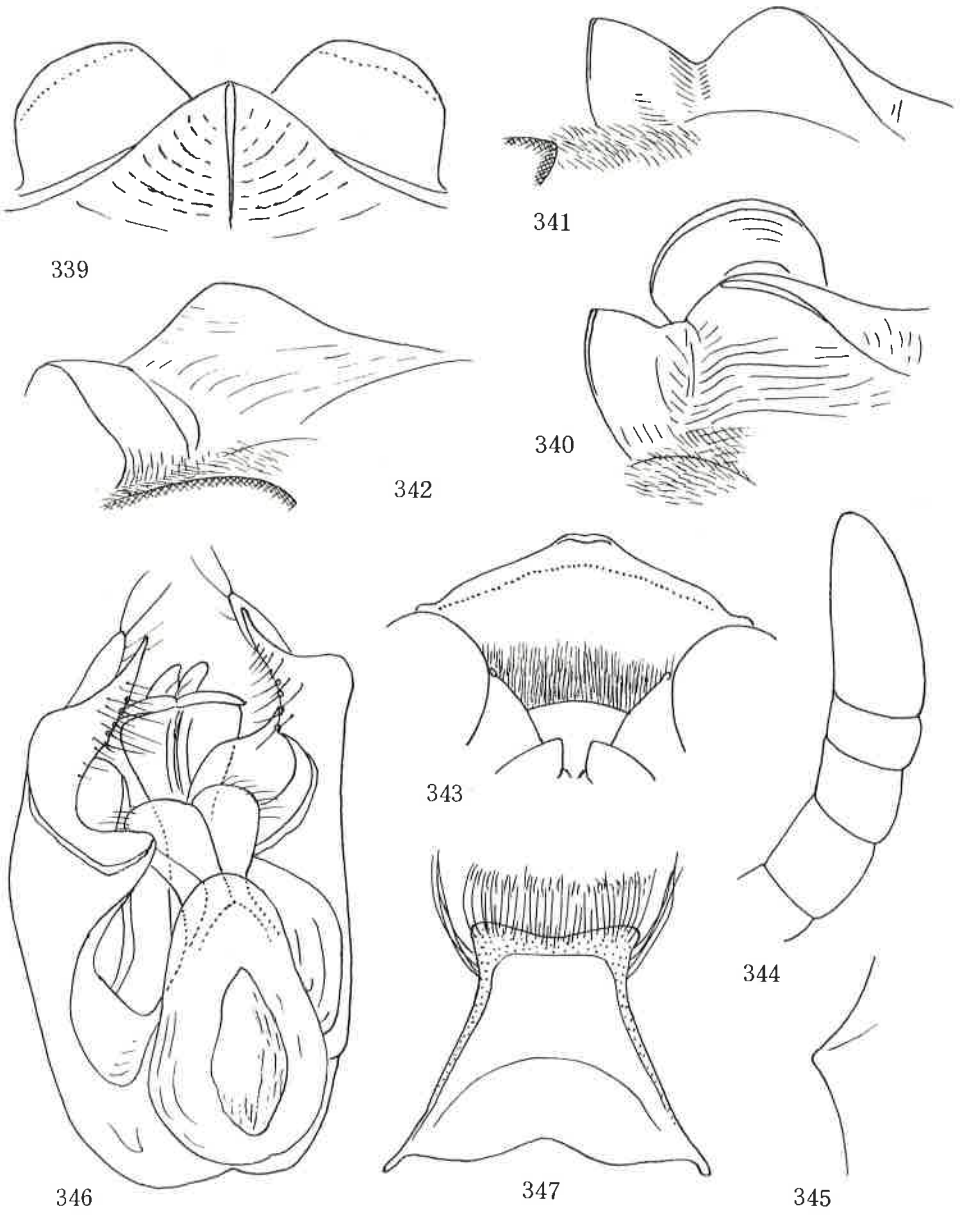
Eight sternite (Fig. 347) also differs from any of them. Here apico-lateral angle more distinctly produced and pointed than in any of the species compared.

Frons distinctly microcoriaceous and closely superimposed with punctures, punctures on round swellings slightly sparser and anteriorly closer and partly subrugosely confluent, punctures on SAT also confluent arcuately, and concentrically arranged,

posteriorly comparatively larger, anteriorly smaller and weaker; mesoscutum smooth and shining, but with plumbeous shine and finely sparsely punctured; propodeum with strong series of striae along lateral carinae, on posterior portion striae extending inwards to form arcuate striae in front of area apicalis, area dorsalis at base obliquely, on median furrow transversely striate, disc strongly sparsely punctured and weakly striate on posterior portion, lateral furrows crenate, sides except anterior femoral sinus sparsely covered with medium-sized punctures.

♀, unknown.

Holotype: ♂, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X. 1977, D. Hollis (BMNH, B.M.77-543)



Figs. 339-347. Trypoxylon hollisi sp. nov., ♀.

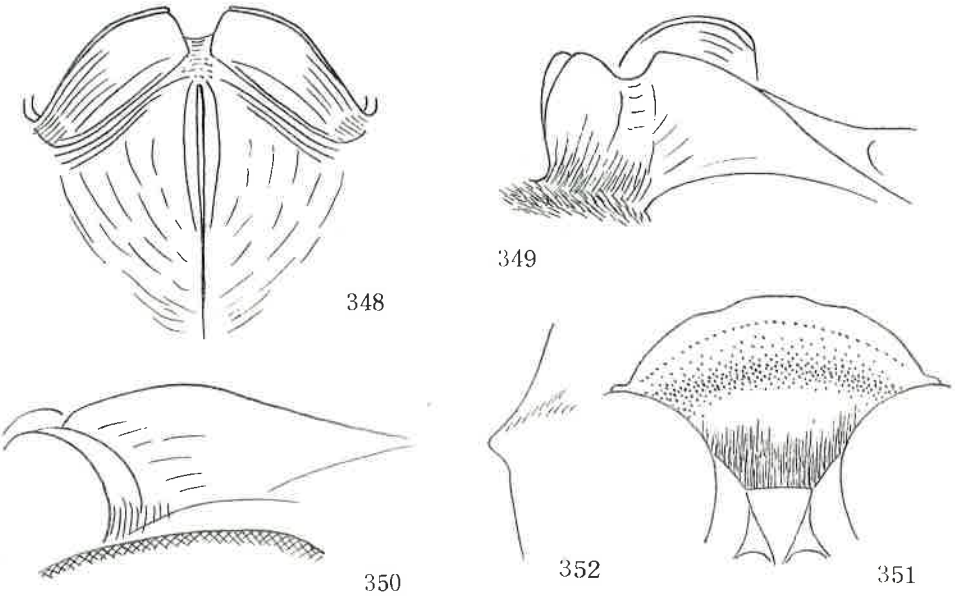
65. TRYPOXYLON SEMONGOH sp. nov.

The present species runs in my keys published previously always to bicolor-petiolatum group, but is different from this in the structure of clypeus and SAT-ASR and in the punctuation of mesoscutum.

Diagnosis. ♀, 10 mm, antenna black, gaster medianly red and black above, legs variegated with yellowish white, petiole flask-shaped, mesoscutum without distinct microsculpture, propodeum without lateral carinae, area dorsalis with feeble lateral furrows, IODs=4:3, ASR expanded anteriorly, PAF wide U-shaped in cross section, clypeus with apical margin nearly rounded, disc flat, RC=B-C. Sarawak.

Black, Al,2,3 narrowly brown at each apex, clypeus anteriorly broadly and mandible wholly ferruginous, palpi ochre yellow, discoloured posterior part of collar somewhat yellowish, tubercle on posterior part yellow, tegula and basal plate of wing pale brown. G1 at apical sides, G2 and 3 on sides and beneath yellowish red, posterior margins of G2, 3, 4 and 5 transparent honey yellow, G4 with irregular reddish patches on sides; legs with following portions ferruginous yellow: knees, fore and mid tibiae and tarsi except arolia, basal half of hind tibia with spurs; base of hind T2 and whole of T4 and claws pale brown. Hair silvery, on clypeus parallel.

Head in frontal view with sides roundly convergent towards clypeus, vertex not noticeably depressed, tops of hind ocelli slightly above level of upper margins of eyes, W:L=100:88, eye incisions comparatively broad and narrowed towards bottom, but dorsal margins of both sides in a straight line. Frons gently raised, median furrow broad and fairly deep, lateral rounded elevations distinct, SAT moderately high nasiform, strongly carinated in middle, without step at anterior area, ASR broadly expanded anteriorly, apical margin weakly bicarinate, surface transversely finely closely striate, PAF shallow, wide U-shaped (not down-curved) in cross section, the structure: Fig. 348 (vertical), 349 (dorso-lateral), 350 (lateral). Clypeus: Fig. 351, disc flat, apical 3rd roundly reflected; occipital carina complete.



Figs. 348-352. Trypoxylon semongoh sp. nov., ♀.

HW,HL,IODv,A3,P=100,48,25,25,170. IODs=10:7.5. OOD,Od,POD≒2,5,4. A3=AW×4. A3,4,5≒10,7,6. P,Ma,Mi,2(Ma),3(Ma)=100,17,6,28(20),31(27). RC=C-B, Rl short, CV1≒CV2×6, TCV:CV2=5:3, angle roughly about 110°.

Anterior part of collar short, slightly widened laterally, dorsal line gentle triangular, medianly broadly roundly raised and somewhat down-curved on each side, lamina on side: Fig. 352, subalar area of mesopleuron normal; propodeum without lateral carinae, area dorsalis enclosed with feeble furrow, area apicalis margined with carina, but the carina interrupted medio-dorsally by the extension of median furrow of posterior inclination, GSR weakly (almost not) raised, not discoloured.

Frons distinctly microcoriaceous and regularly superimposed with fine punctures, PIS=PD× 1-1.5, SAT rugoso-punctate with hair-bearing punctures, mesoscutum distinctly, rather regularly punctured, punctures fine but distinct, PIS=PD× 2-3. Propodeum with lateral series of striae, posteriorly distinct and anteriorly weak, area dorsalis smooth, median furrow only transversely weakly striate in part, sides except antero-ventral femoral sinus somewhat sparsely covered with fine hair-bearing points.

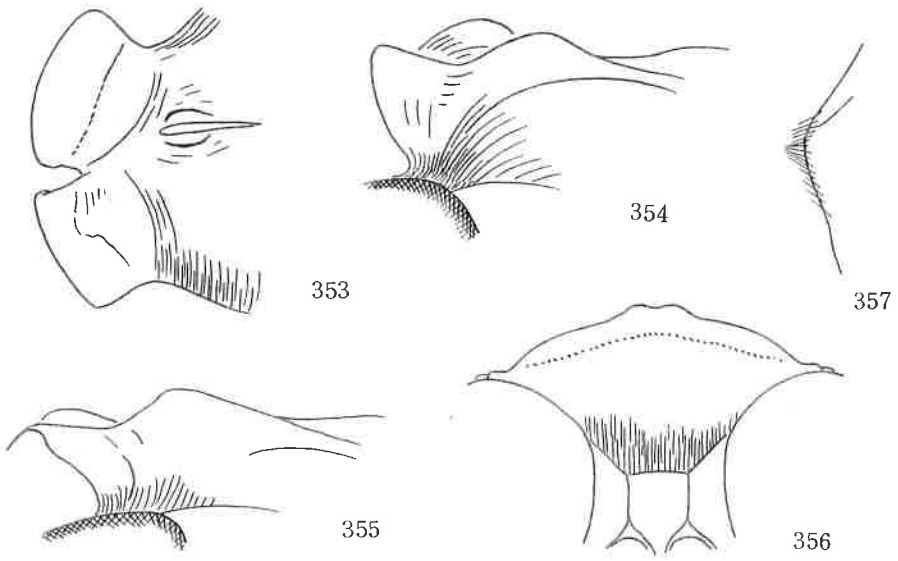
♂, unknown.

Holotype: ♀, Sarawak, 1st Div., Semongoh Forest Res., 1°25'N 110°17'E, 16-19. XI. 1976 (Malaise trap over stream), P. S. Cranston (BMNH, B.M.1977-19).

66. TRYPOXYLON BETTOTAN sp. nov.

♀. In my keys previously published the present species always runs to bicolor-petiolatum group as in the preceding species, but is different from this at least in the structure of SAT-ASR and clypeus. In the character of SAT-ASR this species resembles members of daicoccum, vardyi group, differs from this, however, in the structure of propodeum.

Diagnosis. ♀, 10 mm. Black, legs partly ferruginous, G2-3 largely red, hair silvery, P flask-shaped, mesoscutum without microsculpture, propodeum without lateral carinae, area dorsalis with feeble lateral furrows, IODs=10:9, SAT-ASR: Figs. 353-355, clypeus: Fig. 356, RC=C-M. North Borneo.



Figs. 353-357. Trypoxylon bettotan sp. nov., ♀.

Black, ferruginous are mandible, fore tibia in front, bases of mid and hind tibiae, fore and mid tibial spurs and fore tarsus; apical margin of clypeus, discoloured posterior part of pronotal collar, posterior margin of tubercle, tegula and basal plate of wing brown; palpi yellow; apical margin of G1, base and underside of G2 and

3 yellowish red. Hair silvery, on clypeus parallel.

Head in frontal view with sides rounded, not convergent below, W:L=100:87, vertex slightly depressed, tops of hind ocelli and eyes on the same level, eye incisions broad and gently narrowed towards bottom, with upper margins of both sides in a straight line frons moderately raised, almost without medial furrow, very shallowly concave, nearly flat, SAT slightly roundly raised above level of frons, but laterally deeply inclined to scapal hollows, medial carina short and thick, ASR broadly expanded, lamellate and brown in colour, surface smooth and shining and separated from SAT by a gently depressed PAF. The structure: Fig. 353 (latero-vertical), 354 (dorso-lateral) and 355 (lateral). Clypeus: Fig. 356, disc gently roundly tectate, occipital carina very weak behind buccal cavity.

HW,HL,IODv,A3,P=100,54,23,20,166. IODs=10:9. OOD,Od,POD≒1,5,2. A3=AWx4. A3,4,5≒10,7,6.5. P,Ma,Mi,2(Ma),3(Ma)=100,17,6,28(23),32(30). RC=C-M, Rl short, about 2/5 of TCV, but reaching wing apex, CV1≒CV2x6, TCV:CV2≒5:3, angle about 100°.

Anterior part of collar narrow, dorsal line gently rounded, almost without medial tubercle, lamina on side: Fig. 357. Subalar area with postero-lateral margin acutely edged, but not expanded, propodeum without lateral carinae, area dorsalis enclosed with feeble furrow, lateral carinae of area apicalis curved up, but broadly separated from each other apex in dorsal middle, GSR obliquely roundly elevated, marginal area discoloured to ambur yellow, P distinctly flask-shaped.

Frons distinctly microcoriaceous and somewhat sparsely, but regularly superimposed with fine shallow punctures, PIS 1-2 times PD. SAT also microcoriaceous and more finely and more closely punctured; mesoscutum with strong aeneous shine, half mat and very finely, somewhat sparsely, rather indistinctly covered with feeble punctures; propodeum with feeble lateral series of striae, but the striae posteriorly distinct, area dorsalis and rest of dorsal aspect smooth, only some faint striae are present on medial furrow of the former.

♂, unknown.

Holotype: ♀, North Borneo, Bettotan, near Sandakan, 17. VIII. 1927, C. B. K. & H. M. P. (BMNH, B.M.1955-354).

67. TRYPOXYLON PROVIDUM SMITH, 1860

Trypoxylon providum Smith, J. Proc. Linn. Soc. London, Zool., 5 (Suppl.): 125, 1860 (♀, Bachian).
Trypoxylon providum: Tsuneki, SPJHA, 8: 20, 1979 (Lectotype desig. & redescr., figs).

Specimens newly examined: 1 ♀, Celebes* (7 mm purple round label with 58 142 on the back side, possibly 1858, No. 142, collected by A. R. Wallace, judging from the nature of the label) (BMNH); 1 ♀, Ternate (same label, with 60 113 on the back)(BMNH); 1 ♀, Celebes, Minahasa, Tomohan, 22. VII. 1954, A. H. G. Alston (BMNH, B.M.1954-414); 5 ♀, Celebes, Liroeng, Galaudj, X. 1949, C. Franssen (Coll. J.v.d.Vecht) (RMNH); 4 ♀, Is. Obi, Kali Telaga, 31. X. 1953, A. M. R. Wegener (RMNH); 1 ♂, Celebes, Manado (Minahasa), VI. 1949, C. Franssen (Coll. J.v.d.Vecht) (RMNH); 1 ♂, Celebes, Bantemoeroeng, 3.X.1930, J. v. d. Vecht (with identified label by Vecht "Trypoxylon providum Smith (?) (comp. w. type ♀ in Oxford").

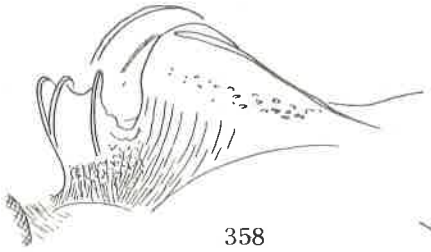
Desvription of ♂ (hitherto undescribed).
Length 16-16.5 mm. Generally similar to ♀, differing in the head form, antenna, clypeus, IODs and somewhat regarding frontal elevations, SAT, PAF, sculpture of propodeum and colour of legs.

Black, mandible light ferruginous, apically reddish brown (in ♀ castaneous brown), palpi ochre yellow, discoloured posterior part of collar, tegula and basal plate of wing brown, legs strongly brownish and somewhat paler on fore tibia in front, fore tarsus and fore and mid tibial spurs (not ferruginous white as in ♀). Hair silvery, on clypeus nearly completely parallel.

Head in frontal view with sides roundly gently convergent below, W:L=82 (80 in the other, in ♀ 100:90 or so), vertex broadly depressed, each ocellus in a hollow, tops of hind ocelli below level of upper margins of eyes, eye incision shallower and broader than in ♀ and more strongly narrowed towards bottom (but rather narrow among the males of other species), frontal elevations more roundly and more highly raised than in ♀, with medial furrow deeper, SAT slenderer, with lateral inclinations acuter, but

apical area somewhat incrassate, with dorsal side nearly flattened, PAF distinct, fairly deep (Figs. 358, dorso-lateral, 359, lateral), clypeus: Fig. 360, disc at base broadly, gently roundly elevated, not tectate, elevation reaching about middle of total length, Al3: Fig. 361.

HW,HL,IODw,A3,Al3,P=100,45,27,19,20,156 (100,43,27,20,21,158). IODs=10:8. OOD,Od, POD=7,10,6 (8,9,6). A3=AW×3 (do.). A3,4,5÷10,7,6 (do.). Al3=BW×3 (do.). P,Ma,Mi, 2(Ma),3(Ma)=100,17,5.5,30(19),32(25) (100,15,5,34(19),32(25)). RC=C-B, Rl short, CV1÷CV2×6, TCV:CV2÷5:3, TCV sinuate, angle roughly 90° (100°).



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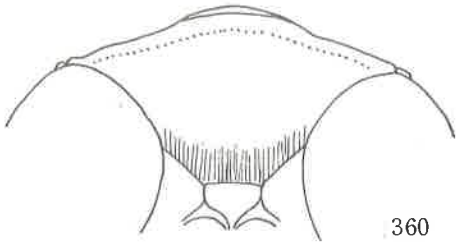

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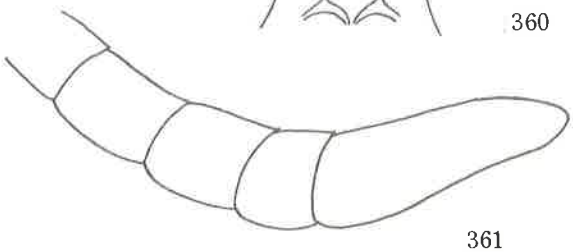

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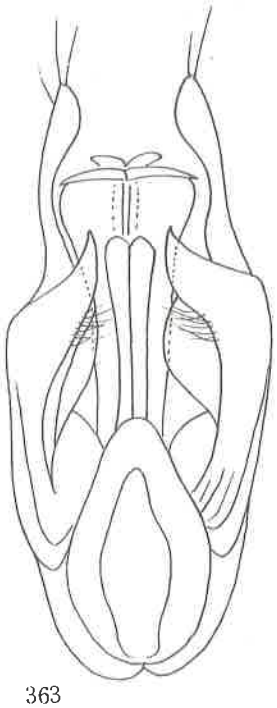

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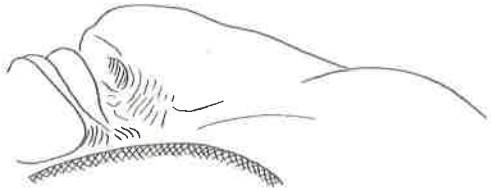

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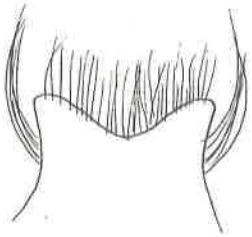

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Figs. 358–364. Trypoxylon providum Smith, ♂

Collar with both parts similar in length at middle (anterior part thicker than usual among allied species), slightly widened laterally, dorsal line gently rounded, almost without tubercle in middle, lamina on side: Fig. 362, subalar area normal; propodeum without lateral carinae, lateral furrows of area dorsalis weak, lateral carinae of area apicalis interrupted at dorsal middle by the narrow extension of medial furrow of posterior inclination, GSR roundly raised, discoloured.

Frons microcoriaceous and fairly closely superimposed with comparatively large punctures, PIS=PD, but on round elevations somewhat sparser, SAT also strongly close-

ly punctured, punctures smaller than on frons, but closer and partly rugosely confluent, mesoscutum with weak plumbeous shine, but smooth and fairly shining, with fine punctures sparsely, somewhat irregularly scattered, PIS 2-4 times PD, propodeum with lateral series of striae, the striae close and distinct, much stronger than in ♀, area dorsalis at base crenate, lateral and medial furrows in one specimen transversely closely striate and striae extending parts of the disc, but in the other lateral furrows nearly smooth and medial furrow on basal narrow part only crenate, but on posterior marginal part of the area transversely strongly striate and disc, together with rest of the dorsal side, distinctly somewhat closely punctured; sides in the former closely, in the latter sparsely and more feebly covered with fine punctures.

Genitalia (Fig. 363, from beneath) very similar in structure to those of petiolatum and without direct comparison it is difficult to find out difference between the two. Paramere bifid at apex into slender long lobe and elongated triangular lamellate lobe, the former is in the present species slightly broader and somewhat different in the details in form, and the latter seems to be slightly broader than in petiolatum (but not so broad as in bicolor s. str.); volsella and penis valve are also very similar to those of the compared species. Sternite 8 (Fig. 364, apical area) also closely resembles that of petiolatum or bicolor.

Remarks. The females range in body size from 18 mm to 23 mm, mostly 21-22 mm. All tibiae at base and in front except apex, all tibial spurs, fore tarsus and mid T1 whitish ferruginous, in mid and hind tibiae the colour frequently becomes more or less dusky, often fore T3-5 with a brownish spot respectively above and mit T2 sometimes largely whitish.

In the specimen asterisked in the above list G2 and 3 turned into reddish brown, with dorsal side dark brownish. This is possibly due to postmortem change. In this specimen from G2 apically is glued to the tip of G1, but judging from the character of the segments and state of the colour it is not of the other species mistaken.

Measurements in the largest and the smallest (within parenthesis) female specimens: HW,HL,IODv,A3,P=100,46,24,28,182 (100,45,25,28,170). IODs=10:8 (10:7.5). OOD,Od,POD=3,10,5 (4,9,6). A3=AW×5.2 (×5.0). P,Ma,Mi,2(Ma),3(Ma)=100,20,6,32(24), 32(29) (100,17,6,32(20),35(24)).

68. TRYPOXYLON EXIMIUM SMITH, 1859

Trypoxylon eximium Smith, J. Proc. Linn. Soc. Lond., 3 (11-12): 161, 1859 (♀, Aru and Key Is.).
Trypoxylon eximium: Smith, Ibid., 5 (Suppl.): 84, 1860 (Makassar and Key Is.).
Trypoxylon eximium: Tsuneki, SPJHA, 8: 9, 1978 (lectotype desig. redescr. figs.)
Trypoxylon gracillimum Smith, J. Proc. Linn. Soc. Lond., Zool., 7: 24, 1864 (♂, Mysol) (SYN. NOV.).
Trypoxylon gracillimum: Tsuneki, SPJHA, 8: 24, 1978 (lectotype desig., redescr., figs.)
Trypoxylon dorsale: Tsuneki, SPJHA, 6: 5, 1977 (nec bicolor dorsale Tsuneki, Akitu, N. S., 9: 4, 1977) (♀, Bismarck Arch. and New Guinea).

Specimens newly examined:

1 ♀, Sarawak, Kapit District, Merirai V, 30-300 m, 1-6. VIII. 1958, T. C. Maa (secondary forest) (BPBM - No. M.B.-164).
4 ♀, Is. Obi ... New spp. and described later.

Remarks. In the Bornean specimen above listed SAT-ASR in dorso-lateral view to see through PAF: Fig. 366; of the inclinations on both sides of PAF that of SAT is distinctly longer than that of ASR. In the specimen from Key compared both are subequal in length (Fig. 365).

Measurements of the Bornean specimen (♀, length 17 mm) (within parentheses are on a specimen from Key - length 19 mm).

HW,HL,IODv,A3,P=100,48,24,27,150 (100,46,23,26,174). IODs=10:9 (do.). OOD,Od, POD=1,4,2 (1,3,2). A3=AW×5 (do.). A3,4,5=10,7,6 (do.). P,Ma,Mi,2(Ma),3(Ma)=100, 20,7,32(23),38(31) (100,20,6,30(22),32(26)).

In the Bornean specimen apical margin of clypeus castaneous, posterior part of collar almost not discoloured, gaster generally as in the Key specimen, but reddish area somewhat narrower and fore and mid tarsi less yellowish and more ferruginous. Noteworthy is the fact that in this specimen mesoscutum fairly distinctly microcoriaceous on PIS (but not fundamentally so as in figulus, but within the variation

range of the surface condition, sometimes met with in other species, e.g. striolatum.

Trypoxylon eximium obicola ssp. nov.

Differs from the nominate race only in colour: Gaster completely black, ferruginous part of fore tibia narrowly restricted to base, basal rings of mid and hind tibiae faintly brownish and sometimes completely lacking, mid and hind tarsi as a rule black, often mid T1-4 brown. Length 16.5-18.5 mm, distinctly smaller.

Measurements (holotype): HW,HL,IODv,A3,P=100,48,23,26,166. IODs=10:9. OOD,Od, POD÷1,4,2. P,Ma,Mi,2(Ma),3(Ma)=100,19,6,31(22),35(28). RC=B, CV1=CV2×7, TCV:CV2÷ 5:3, angle about 100°. A3=AW×5, A3,4,5÷10,6.5,6.

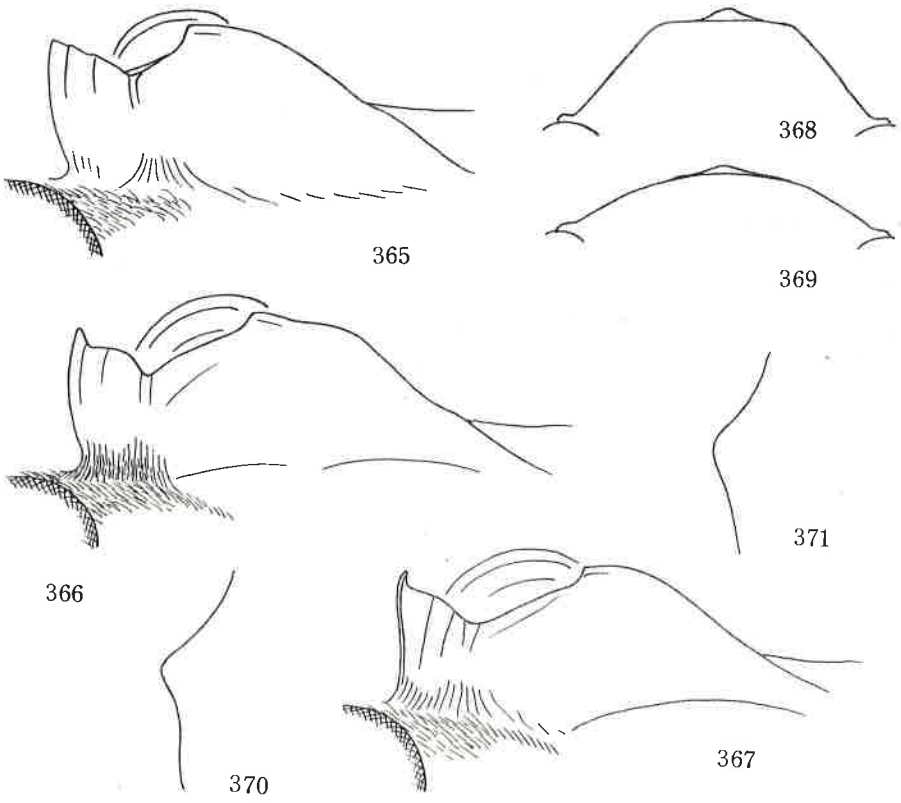
SAT-ASR in dorso-lateral view to see through PAF: Fig. 367, length relation of the inclinations of SAT and ASR is similar to that of Bornean specimen of eximium s. str. (cf. Fig. 366). Lamina on side of pronotum (Fig. 370) is more pointed than those of the nominate race (Fig. 371, in Key and Bornean specimens).

Propodeum without lateral carinae, but with distinct lateral series of strioles, area dorsalis enclosed with shallow broad weak furrow, area apicalis always enclosed with arcuate carina, but it is accompanied with 2-3 similar carinae in front and behind. GSR weakly roundly raised, usually black, often slightly brownish at apex.

♂, unknown.

Holotype: ♀, Is. Obi, Kali Telaga, 31. X. 1953, A. M. R. Wegner (RMNH).

Paratypes: 1 ♀, same data as holotype (RMNH); 2 ♀, West Obi, Obi Iake, 160-260 m, VII-XI. 1953, A. M. R. Wegner (RMNH, in one of them gaster from G2 apically lacking).



Figs. 365-371. Trypoxylon eximium Smith. 369, ♂; others ♀.
367, 370... ssp. obicola. 365, Key; 366, Borneo and 371 Key and Borneo.

Remarks. (1) T. gracillimum Smith is considered the male of eximium. It differs from this in non-sexual characters only in that mid T1 is dark brown instead of ferruginous. This is considered to fall within the range of variation of the species.

(2) T. dorsale Tsuneki, 1977 which was believed to be identical with T. bicolor dorsale Tsuneki, 1977, is, according to the reexamination of the type of bicolor dorsale (renamed from bicolor marginale Tsuneki, 1976), quite a different species from this and in reality belongs to the nominate race of the present species.

(3) Apical margin of clypeus in the female of this species: Fig. 368, while in the male (= gracillimum): Fig. 369.

69. TRYPOXYLON WEGNERI sp. nov.

Very closely resembles T. eximium obicola, but can be distinguished from it by the following distinctions:

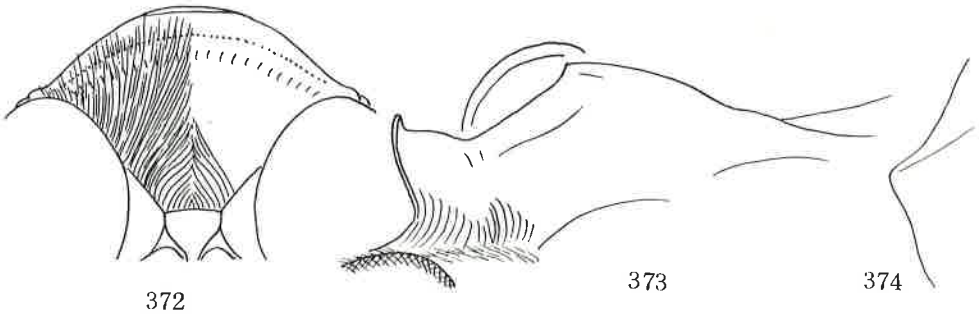
(1) Apical margin of clypeus not so distinctly truncate and not medianly toothed (Fig. 372, cf. Fig. 368).
(2) A3 distinctly longer, =AW×6 (in eximium obicola AW×5).
(3) ASR not transversely striate, surface smooth and shining and ambur yellow in colour.
(4) PAF shallower, almost simply down-curved (Fig. 373, cf. Fig. 367).

Diagnosis. ♀, 17 mm, fore and mid tibiae and tarsi largely yellowish white, P flask-shaped, mesoscutum without microsculpture, propodeum without lateral carinae, area dorsalis enclosed with feeble furrow, IODs=10:9, SAT-ASR: Fig. 373, clypeus: Fig. 372, RC=B. Is. Ambon.

Antenna dark brown, very slightly paler beneath, mandible at base ferruginous, apical 2/3 brown to reddish brown, palpi ochre yellow, posterior part of collar almost without discolouration, tegula brown, basal plate of wing dark brown. On legs (strongly stained with black rasin and at first appear completely black, but after cleaning) ferruginous white are fore tibia and tarsus, bases of mid and hind tibiae comparatively broadly, all spurs and mid T1 and 2 except each apex. Mid T3–4, hind T4 and articulations of hind tarsus light brown. Hair silvery, on apical margins of gastral segments forming silvery bands.

HW,HL,IODv,A3,P=100,48,23,30,178. IODs=10:9. OOD,Od,POD≒2,7,4. A3=AW×6. A3, 4,5≒10,7,6. P,Ma,Mi,2(Ma),3(Ma)=100,17,6,30(20),32(26). RC=B, R1 short, CV1=CV2×5, TCV:CV2≒5:4, TCV markedly bent inwards at about middle, angle at base less than 90°, at apex about 90°. Lamina on side of pronotum: Fig. 374.

Punctures on frons and mesoscutum strong and close, PIS≒PD, as in eximium, sculpture on propodeum fundamentally also similar to that of eximium (possibly with



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considerable individual variation), in the specimen lateral series of striae distinct, striae fine and close and on posterior part extending inwards to a band of arcuate striae in front of area apicalis, median furrow of area dorsalis transversely striate, but posteriorly smooth, extreme posterior marginal area distinctly transversely striate, disc fairly closely punctured, sides on central area somewhat sparsely, not strongly punctured.

♂, unknown.

Holotype: ♀, Moluccas, Is. Ambon, Waai, 19. III. 1966, A. M. R. Wegner (Cal. Acad. Sci. Acc. 1972).

Remarks. In the specimen the gaster is from G2 apically dropped off and mounted on a slit of card paper.

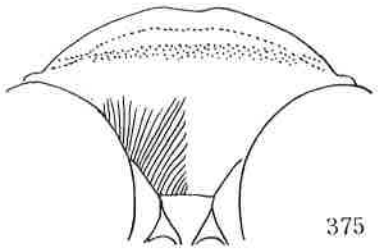
70. TRYPOXYLON PROMINENS TSUNEKI, 1979

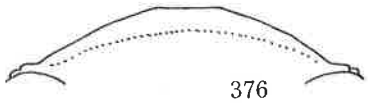
Trypoxylon prominens Tsuneki, SPJHA, 9: 149, 1979 (♀ ♂, Laos, Malaya, S. India, figs.).
Trypoxylon prominens: Tsuneki, Ibid., 11: 38, 1979 (♀, Java).

Specimens examined. 1 ♀, North Borneo, Sandakan, date undescribed, C. F. Baker (USNM); 1 ♀, Sarawak, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X. 1977, D. Hollis (BM NH, B.M.77-543); 1 ♀, same loco., XI-XII. 1977, M. Collins (BMNH); 1 ♂, North Borneo, Bettotan near Sandakan, 22. VII. 1927, C.B.K. & H.M.P. (BMNH).

Remarks. As mentioned in my previous reports above listed the fusing state of the posteriormost carinae of both ASRs at IAA is individually variable. Sometimes it is complete, forming a high wall in front of the transverse deep furrow that is turned from PAFs, but sometimes incomplete, leaving a round incision in middle, varying in depth. In one of the female specimens examined the second carinae are also fused together with each other, though not perfectly and IAF becomes very short and acutely inclined. In the Bornean specimens apical margin of clypeus: Fig. 375 (♀) and 376 (♂).

Measurements:
♀ (Sarawak, Collins leg.). HW,HL,IODv,A3,P= 100,48,22,26,160. IODs=10:7. OOD,Od,POD÷2,7, 4. A3=AW×5.0. A3,4,5÷10,6,5.5. P,Ma,Mi,2 (Ma),3(Ma)=100,19,6,30(20),34(26). RC=C, Rl short, CV1÷CV2×7, TCV:CV2÷7:4, angle roughly about 100°.
♂ (North Borneo). HW,HL,IODv,A3,Al3,P=100, 49,24,18,20,128. IODs=10:7. OOD,Od,POD=1, 3,2. A3=AW×3.2. Al3=HW×2.5, and >Al0-12 but <A9-12. P,Ma,Mi,2(Ma),3(Ma)=100,20,7, 35(26),34(29). RC=C, Rl short, CV1÷CV2×8, TCV:CV2÷7:4, angle about 90°.





Figs. 375-376
Trypoxylon prominens Tsuneki, ♀ ♂

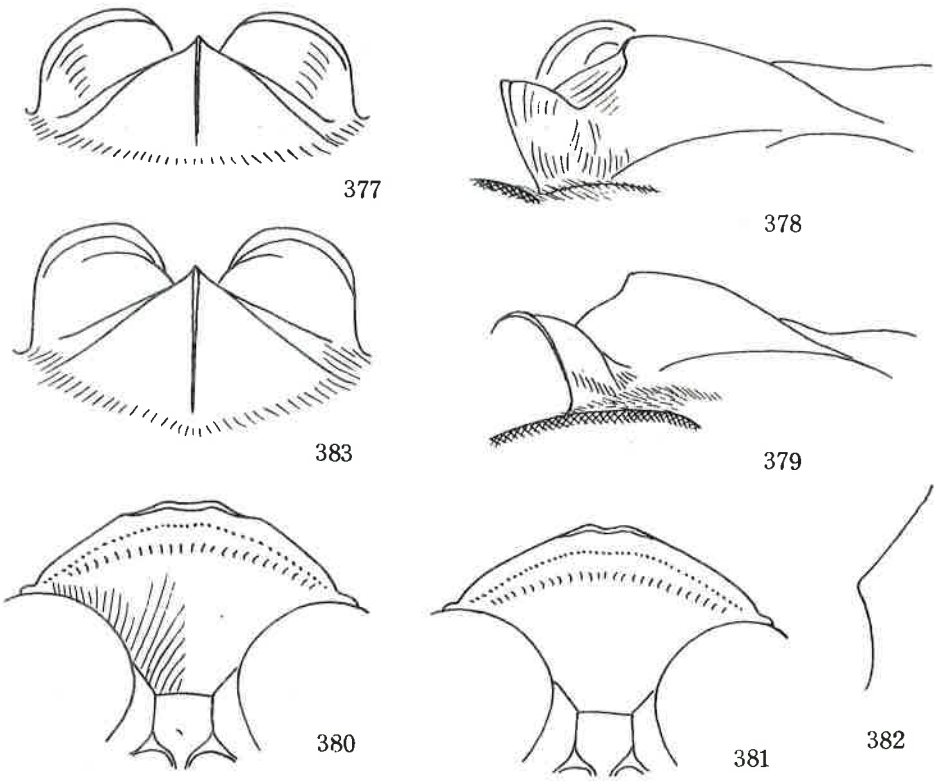
71. TRYPOXYLON OUTANG sp. nov.

Very closely related to T. tjiangsanum m. occurring in Java and may be in subspecific relationships. Basing mainly upon the differences in IODs and propodeal lateral carinae, however, the present specimen is dealt with rather provisionally as a distinct species.

Diagnosis. ♀, 10-11 mm. Gaster medianly reddish and black above, legs partly yellow, hair silvery, P flask-shaped, mesoscutum simply punctured, propodeum with feeble lateral carinae, often carinae indistinct, area dorsalis enclosed with shallow furrow, SAT-ASR: Figs. 377-379, clypeus: Figs. 380-381, IODs=10:6, RC=C, subalar area normal. North Borneo.

♀. Black, ferruginous yellow are Al, 2, 3 at each apex, mandible at base, palpi, fore tibia and tarsus, bases of mid and hind tibiae, mid T1-2 and fore and mid tibial spurs. Mid T3-4 or 3-5 pale brown. Clypeus at apex, rest of mandible, tegula and basal plate of wing castaneous brown; posterior part of pronotal collar half discoloured, slightly yellowish, G2 and 3 on sides and beneath red, but a pair of small blackish patches on each at apical part beneath. Hair silvery, on clypeus at base slightly (much less strongly than in tjiangsanum) convergent towards medial line.

Head in frontal view with sides roundly convergent towards clypeus, vertex gently depressed, tops of eyes and hind ocelli in the same level, eye incisions comparatively broad and distinctly narrowed towards bottom, frons gently raised, medial furrow broad and fairly deep, with lateral round elevations distinct, SAT low nasiform,



Figs. 377-383. 377-382, T. outang sp. nov., ♀; 383, T. tjiangsanum Tsuneki, ♀.

nearly tuberiform, distinctly carinated in middle, anteriorly smoothly inclined to IAF and PAFs, ASR obliquely raised, nearly as high as SAT, not particularly broad (somewhat shorter than in tjiangsanum), apical margin carinated, dorsum transversely weakly striate, PAF moderately deep, with bottom line upcurved, V-shaped in cross section; SAT-ASR: Figs. 377 (dorsal, cf. Fig. 383 in tjiangsanum), 378 (dorso-lateral to see through PAF), 379 (lateral); apical margin of clypeus: Figs. 380 (holotype), 381 (paratype); occipital carina complete, minutely roundly depressed behind buccal cavity. Measurements (within parentheses paratype):

HW,HL,IODv,A3,P=100,52,24,24,160 (100,54,24,24,—). IODs=10:5.5 (10:6). OOD, Od,POD=2,5,3 (do.). A3=AW×4.4 (×4.2). A3,4,5÷10,6,5.5 (10,6.5,6). P,Ma,Mi,2(Ma), 3(Ma)=100,16,5,27(19),31(27) (lacking). RC=C, R1 short, CV1=CV2 × 5.3. TCV:CV2÷3:2, angle about 100°.

Measured values generally similar to those of tjiangsanum, but OOD relatively broader, P shorter and CV2 markedly shorter.

Anterior part of collar narrow, ridge-like, slightly widened laterally, dorsal line gently rounded and feebly tuberculate in middle, lamina on side: Fig. 382, subalar area with outer margin acutely edged and slightly produced over subalar pit, but not expanded. Propodeum with lateral carinae very feeble, in some light almost unobservable (in the compared species strong and distinct), area dorsalis enclosed with shallow weak furrow, area apicalis provided with only lateral carinae, carinae not curved up, GSR almost flat.

Frons distinctly microcoriaceous and very sparsely indistinctly superimposed

with shallow weak punctures; mesoscutum smooth and shining and sparsely scattered with comparatively large punctures; lateral series of striae of propodeum in the holotype specimen strong and coarse, in the paratype weak, disc of area dorsalis distinctly punctured and partly transversely striate and median furrow also distinctly striate in the holotype, while in the paratype disc weakly punctured without striae and median furrow also weakly striate on anterior portion alone.

♂, unknown.

Holotype: ♀, North Borneo, Sandakan, C. F. Baker (USNM).
Paratype: 1 ♀, North Borneo, Bettotan near Sandakan, C.B.K & H.M.P. leg. (BMNH).

Remarks. In the holotype specimen both antennae (right one 1-5 only) are glued respectively on the eye of each own side and in the paratype left antenna and gaster are completely missing.

72. TRYPOXYLON BICOLOR SMITH, 1856

Trypoxylon bicolor Smith, Cat. Hym. Brit. Mus., 4: 377, 1856 (♀, really ♂, Singapore and Java).
Trypoxylon bicolor: Tsuneki, SPJHA, 8: 1, 1978 (partim)
Trypoxylon bicolor: Tsuneki, Ibid., 8: 3, 1978 (lectotype and paralectotype only).
Trypoxylon bicolor: Tsuneki, Ibid., 9: 158, 1979 (♀ ♂, Thailand, Malaya, Singapore).
Trypoxylon bicolor: Tsuneki, Ibid., 11: 38, 1979 (♂ ♀, Sumatra and Java).
Trypoxylon bicolor marginatum Tsuneki (nec Cameron, 1912), Steenstrupia, 4: 76, 1976 (Is. Palawan, the Philippines).
Trypoxylon bicolor dorsale Tsuneki, Akitu, N.S. 9: 4, 1977 (= b. marginatum Ts., renamed, nec T. dorsale: Tsuneki, SPJHA, 6, 1977).

Specimens examined. 2 ♀ 3 ♂, North Borneo, Sandakan, date ?, C. F. Baker (USNM); 2 ♀, North Borneo, Bettotan near Sandakan, 25. VII, 3. VII. 1927, C.B.K. & H.M.P. (BMNH); 1 ♀, North Borneo, Kudat, 15. IX. 1927, C.B.K. & H.M.P. (BMNH); 1 ♀, East Borneo, Maloewi, V. 1931, M. E. Walsh (RMNH).

Remarks. The Bornean specimens of this species are distinctly smaller in body size than the typical race occurring in Malaya, Sumatra and Java, measuring ♀ 16-17 mm and ♂ 12-13 mm, and moreover, they have the legs broadly dusky, the lamina on pronotal side often not so acutely pointed (Figs. 384, ♀, 385, ♂) as in the typical form and A3 in ♂ also somewhat shorter. Thus, they are liable to be confused with petiolatum (cf. Fig. 391, ♀). But in them (♀ and ♂) G2-4 distinctly and completely yellowish red and pronotal lamina is comparatively more produced, though not so marked as in the typical form, and they can be distinguished from petiolatum. The reliability of the two characters above mentioned is proved by the examination of the male genitalia. The shorter and wider one of the apical lobes of paramere is distinctly of the bicolor-style (Figs. 386, left, 387, right, both ventral view and 388, left, lateral view). Aternite 8 (Fig. 389) also bicolor-style. Measurements on 3 of each sex are given in Table 8.

Table 8. Measurements.

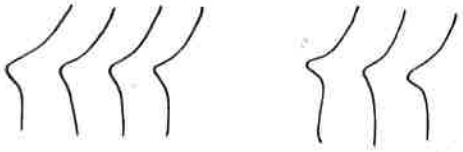
No.♀♂	BL	HL	VW	A3(L/W)	A13(L/W)	P	OD-d-PD	IODs	MaMi	2(Ma)	3(Ma)	CV1	T:C
1 ♀	17	46	24	28(4.5)	- -	170	2 5 3	8.3	18 6	29(20)	28(25)	5.3	5:4
2 ♀	17	50	24	27(4.8)	- -	172	3 4 3	8.0	21 6	30(20)	32(26)	6.5	5:3
3 ♀	16	44	24	28(5.0)	- -	176	2 5 3	8.0	17 6	28(19)	30(23)	6.0	5:3
4 ♂	13	48	26	18(3.0)	29(3.8)	160	3 4 3	8.3	16 6	30(22)	30(27)	5.0	5:4
5 ♂	13	45	27	18(2.7)	28(3.8)	160	4 4 3	8.0	15 6	31(18)	36(23)	5.0	5:4
6 ♂	12	48	27	18(2.8)	28(3.7)	154	4 4 3	8.0	16 6	30(16)	34(21)	5.5	5:3

Remarks. BL=Bodt length, mm. VW=IODv. OD-d-PD=OOD:Od:POD. CV1... =CV2 is omitted. T:C=TCV:CV2. No. 1... Specimen from Bettotan. No. 2 from East Borneo. No. 3 from Sandakan. Nos. 4-6 from Sandakan.

Colour of legs. ♀. Ground colour of fore and mid tibiae and tarsi yellowish

white, dusky are fore tibia on folded side and apical portion, mid tibia except base and apex and mid T3–5 (apical part of mid T1 and 2 brownish). Rarely mid tibia is coloured as in fore tibia and mid T3–5 pale brown, but in one of the specimens even fore T5 is brown. On hind leg base of tibia alone whitish. Tibial spurs whitish, but longer one of hind spurs is always dark.

♂. In two specimens fore and mid legs dark brown, only fore tibia at base in front somewhat pale, in the remaining one fore tibia in front largely and articulations of fore tarsus pale brown but tibial spurs always as in ♀.



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Figs. 384 (♀) and 385 (♂). Pronotal lamina of the Bornean specimens.

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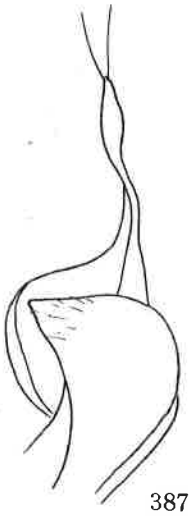

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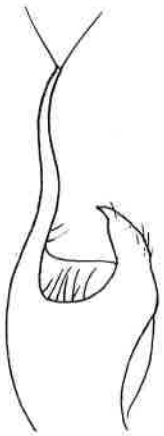

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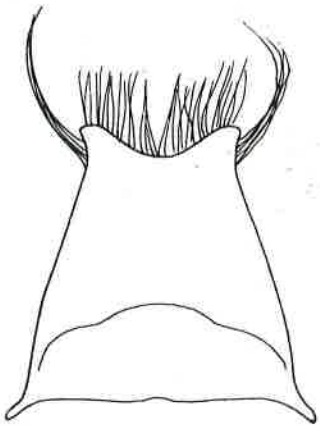

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Figs. 384–389. Trypoxylon bicolor Smith, s. str. from Borneo.

Judging from the differences above mentioned, the Bornean representatives seem to form a local race.

73. TRYPOXYLON PETIOLATUM SMITH, 1857

Trypoxylon petiolatum Smith, J. Proc. Linn. Soc. London, Zool., 2: 105, 1857 (♀, Borneo).
Trypoxylon bicolor: Tsuneki, SPJHA, 8: 1, 1978 (partim, mixed with bicolor s. str.).
Trypoxylon petiolatum: Tsuneki, Ibid., 8: 6, 1978 (redescr. lectotype).
Trypoxylon petiolatum: Tsuneki, Ibid., 9: 160, 1979 (♀ ♂, Singapore, Malaya, Tenasserim, Thailand, Viet-Nam, Laos, S. China, Nepal, India and Maldive Is.).
Trypoxylon petiolatum: Tsuneki, Ibid., 11: 39, 1979 (♀ ♂, Sumatra, Java & their adjacent Is., Sumba, Flores).

Specimens examined.

Ambon Is. 6 ♀ 6 ♂:
1 ♀, 29.IV.1962; 1 ♀, 11.XII.1960, A.M.R. Wegner (RMNH); 2 ♀, Waai, 11, 26.III.1966, A.M.R. Wegner (CAS); 1 ♂, Waai, VII.1966, A.M.R. Wegner (BPBM); 1 ♀ 1 ♂, date

and collector unknown (BMNH - R.C.L. Perkins Coll., B.M.1942-95); 5 ♂, 1908, 1908, IV.1908, V.1908, V.1909, F. Muir (BMNH).

Binongko 1 ♂, Toekang, Besi Kil, 7-10.III.1933 (RMNH - Snellius Exp.).

Celebes 3 ♀:

1 ♀, date ? A.R.Wallce (BMNH); 1 ♀, South Celebes, Tanette, 19.III.1949, C. Franssen (RMNH); 1 ♀, Middle Celebes, Palu Valley, 7.V.1955, H.H.F. Hamann (RMNH).

Sarawak 9 ♀ 2 ♂:

1 ♀, Matang Rd., 22.IX.1950, M.A. Lieftinck (RMNH); 7 ♀ 1 ♂, 4th Div., Mt. Mulu, RGS Exp., 17.IX.-23.X.1977, D. Hollis (BMNH, B.M.77-543); 1 ♀, 1st Div., Semongoh Forest Res., 1° 25'N 110° 17' E, 15-19.XI.1976, Malaise trap in secondary growth, P.S. Cranston (BMNH, B.M.1977-19).

North Borneo 10 ♀ 22 ♂:

4 ♀ 8 ♂, Sandakan, date ? C. F. Baker (USNM); 2 ♀ 3 ♂, Bettotan near Sandakan, 31.VII, 3, 5, 5.VIII., 23.IX.1927, C.B.K. & H.M.K. (BMNH); 3 ♀ 3 ♂, Kudat, 7, 8, 8, 13, 13, 13.IX.1927, C.B.K. & H.M.K. (BMNH); 1 ♂, Ranau, 30.IX.-5.X.1958, L.W. Quate (BPBM); 1 ♀, Tawau, Quoin Hill, Cocoa Res. Stat., 30.VI.1962, Y. Hirashima (BPBM).

East Borneo 1 ♀, Sangkoelirang Bay, 30.IV.1937, M.E. Walsh (BMNH, B.M.1938-99).

Table 9. Measurements (♀)

Loco	IODv	A3	L/W
Ambon	27	25	4.7
Ambon	27	25	4.7
Ambon	27	25	4.6
Ambon	28*	25*	4.5
Celebes	28	24	4.3
Celebes	28	24	4.5
Celebes	27	25	4.5
Sarawak	26	26	4.7
Sarawak	27	26	4.7
Sarawak	26	26	4.8
Sarawak	27	25	4.7
Sarawak*	29*	24	4.3
Sandakan	27	26	4.8
Sandakan	27	26*	4.7
Sandakan	26	26*	4.7
Sandakan	27	26	4.8
Bettotan	27	25	4.6
Kudat	28*	26	4.8
Kudat	28	26	4.7
Kudat	27	26	4.7

IODv and A3 ... Ratio to HW as 100. L/W is of A3. 28*, 25* etc. are really 27.5, 24.5 etc. Sarawak* is an aberratio, see text.

On some characters.

(1) Colour of legs.

♀. Fore and mid tibiae at base and apex, hind tibia at base and fore and mid T1 and 2 yellowish white, sometimes (somewhat locally) fore T3-4 also whitish and carrying a brown mark above (T1,2 of both pair usually pale brownish at apex). In the Ambon specimens mid T2 always dusky and in 2 of them (out of 6) fore T3-4 whitish. In Celebes specimens fore T3-4 and base of 5 always pale brown. Similarly the specimens collected by Baker at Sandakan, North Borneo, always have the fore T3-4 broadly whitish. Tibial spurs white, but hind ones always, especially longer one more strongly, dusky.

♂. All legs brown to dark brown, no bright ring at base of any tibia, but often fore tibia at base and fore tarsus somewhat paler than others, especially in the specimens recently collected (in the long preserved ones legs are all strongly brown). Tibial spurs in the old specimens ferruginous yellow, in the fresh ones yellowish white, always longer hind one alone dusky.

Table 10. Measurements (♂)

Loco	IODv	A3	(L/W)	A13	(L/W)
Ambon	30	16	2.3	28	3.5
Ambon	29	16	2.3	27	3.5
Ambon	29	17	2.8	27	3.4
Ambon	28	16	2.6	28	3.5
Binongka	31	16	2.3	28	3.5
Sarawak	31	17	2.6	28	3.5
Sarawak	29	17	2.6	26	3.3
Sandakan	28	16	2.6	28	3.5
Sandakan	30	16	2.5	28	3.5
Sandakan	30	17	2.4	28	3.6

(2) Colour of gaster (♀ ♂).

G2 and 3 yellowish red and usually more or less dusky above, sometimes G4 at base narrowly red. In most of the Ambon and Celebes specimens dorsal side dark brown, only rarely pale brown. In the Bornean specimens pale brown is comparatively more frequent and sometimes completely without dusky mark above, but never G4 completely red.

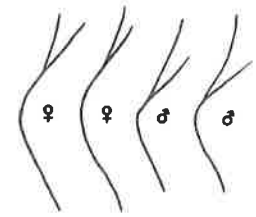
(3) Colour of antenna (♀).

Flagellum more or less paler beneath, but usually not so distinct as in the

Japanese specimens (= ssp. obsonator Smith, 1873)

(4) Relative length of IODv (under the scale of HW as 100).

As given in Tables 9 and 10 the value is larger in ♂ than in ♀. In ♂ it varies between 28–31 and in ♀ between 26–28 (29* is an exception), with somewhat a tendency to local variation.



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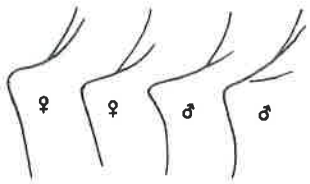

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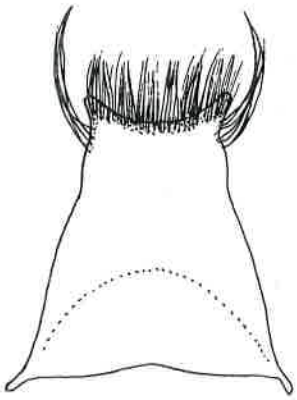

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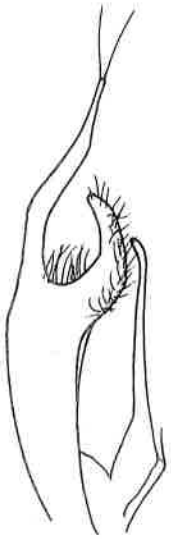

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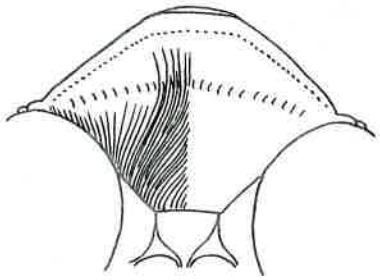

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Figs. 390–395. Trypoxylon petiolatum Smith (395 ... aberrant ♀).

(5) Relative length of A3 to HW and its AW (Tables 9 and 10).

Relative length of A3 to HW as 100 varies in ♀ between 24–26 and in ♂ between 16–17. That to its width at apex is comparatively stable in ♀, but in the Celebes specimens somewhat smaller than in those of other areas (asterisked Sarawak specimen is an aberratio), while in ♂ considerably varied individually. This is due to that the relative width of the segment is more variable in ♂ (see relative length to HW is far more constant).

(6) Relative length of A13 to HW and to its BW (Table 10).

Both are comparatively constant, in the former mostly 27–28 and in the latter mostly 3.5. Its relative length to some preceding segments is usually = or ≒ to A9–12 united. But it varies considerably by the stretched condition of the segments.

(7) SAT-ASR.

SAT always has at medio-apical area a nearly flat and nearly round step around apical part of median carina. It is much more distinct and much stronger than in bicolor s. str. and may be used as one of the separating characters between them. ASR in ♀ bi- or tricarinate on dorsum, more or less varying in strength. When bicarinate, posterior inclination is rounded out and not markedly different from the tricarinate one

in the form as a whole. In ♂, however, variation is very marked. It is bi-, tri- or quadricarinate on dorsum. When tri- or quadricarinate, the form of ASR as a whole is not markedly different. But when it is bicarinate in some case it becomes short, with the carinae highly raised and in lateral view it appears thin, with top acutely bidentate, but in other case the carinae not so highly raised, with posterior inclination roundly swollen out and in lateral vies it is thick and top appears generally rounded as in tri- or quadricarinate instances. The difference is very marked, but this is due to variable character of ASR.

(8) Lamina on side of pronotum.

In the Ambon specimens (♀ ♂) broadly rounded at apex, not strongly produced, though triangular as a whole (Fig. 390). In the specimen from Binongko minutely rounded at apex, but distinctly produced. In two of the Celebes females the apex is obtuse but in the remaining one of them apex is pointed and produced. In the Bornean specimens (♀ ♂) the apex triangular and distinctly produced (Fig. 391).

(9) Genitalia.

The male genitalia seen from beneath: Fig. 392. The shorter and wider one of the apical lobes of paramere is distinctly of the petiolatum style. Left paramere seen from left side: Fig. 393. The hair covering the ventral surface of the lobe seems to be somewhat thicker and more distinct than in bicolor s. str.

(10) Sternite 8.

This is also distinctly of the petiolatum style (Fig. 394), relatively narrower and longer than in bicolor s. str. (cf. Fig. 389). Apical form of the sternite is closest to that of the Malayan representative (cf. Pt. III, Figs. 696-698).

(11) Lateral carinae of propodeum.

Lateral series of strioles are always distinct and fairly strong (♀ ♂), but the outer ends of the strioles are not impressed in a longitudinal line. In no specimen, therefore, except the following one, is there an apparent raised line just outside of the series of strioles.

(12) An aberrant female.

The specimen asterisked in Table 9 which is caught at Mt. Mulu, Sarawak, is considerably diviated from the usual form of petiolatum and I hesitated at first to identify it with the present species. Because it is slightly smaller, about 11 mm in length, with the gaster from apex of G1 to base of G4 bright ferruginous red, having the propodeum weakly carinated at lateral margins, its vertex slightly wider and A3 distinctly shorter than in the sympatric specimens of petiolatum (Table 9). The apparent lateral carinae of propodeum arise from the apparent feeble impressed line formed of the impressed ends of the lateral longitudinal series of strioles of the segment and not of the formal ones. Further, in this specimen the characters of SAT-ASR, IODs, clypeus and colour of gaster and legs are certainly within the variation range of the present species (in the Sarawak female specimens sometimes G2 and 3 are completely ferruginous red). Based upon the facts mentioned it was determined to treat the specimen as an aberratio of petiolatum.

Supplement.

(13) Body length.

Measurement of body length is usually not eady due to curced gaster. The following values includes many that are combined from partial measurements or presumed from the state of the curvature.

Table 11. Body length of Trypoxylon petiolatum Smith (mm).

Sex	7	8	9	10	11	12	13	14	15	16	17	18
♀	-	-	-	-	2	6	7	7	1	2	-	
♂	-	3	4	10	6	3	3	-	-	-	-	

Generally speaking, the specimens treated here are somewhat smaller (especially ♀) than those of the Southeast Asiatic region (cf. Pt. III, p. 157, Table 9).

(14) PAF.

PAF is slightly deeper in ♂ than in ♀, as already pointed out in Pt. III of the present paper, with bottom line in ♀ always distinctly upcurved and in ♂ mostly flat-bottomed and at outer end curved down. Sometimes, however, there are males in which the bottom line of PAF is gently upcurved. But in this case the curvature of the bottom line is distinctly weaker than in ♀ and rather close to flat-bottomed state.

A D D E N D U M

74. TRYPOXYLON BITUBERCULATUM MYSOLENSE ssp. nov.

(Trypoxylon bituberculatum Tsuneki, SPJHA, 6: 17, 1977 (♀, New Guinea)).
(Trypoxylon bituberculatum biroi Tsuneki, Ibid., 6: 18, 1977 (♀, New Guinea)).
Trypoxylon bituberculatum Tsuneki, var. Tsuneki, Ibid., 8: 28, 1978 (♀, Mysol).

This is one of the syntype specimens of T. gracillimum Smith and is labeled by Smith as ♂ of this species. In reality, however, it is a female of a different species, as pointed out by me in Pt. II of the present paper, and closely related to T. bituberculatum m, known from New Guinea.

According to the detailed comparison with the holotype specimen of T. bituberculatum, it was made clear that the specimen differs only slightly from this species in the structure of SAT-ASR and clypeus, and in the colour of legs and gaster and is considered merit of separation at the subspecies rank.

Differences: (1) SAT highly and narrowly raised, thick keel-like as a whole, longer than in the nominate species (Figs, 396, dorso-lateral view to see through PAF, 397 lateral view, 398 vertical view; cf. corresponding Figs. 400, 401 and 402 in bituberculatum s. str.). (2) ASR highly unicarinate at apical margin, in nominate form bicarinate (Figs. 396, 398, cf. Figs. 400, 402), but this is not important, because ASR variable in form. (3) Frontal rounded elevations relatively smaller (but in both similarly remarkably highly elevated (Fig. 397, cf. Fig. 401). (4) Clypeus less strongly produced anteriorly (Fig. 399, cf. Fig. 403). (5) Bright coloured parts of legs (yellowish pale ferruginous): Fore tibia in front thoroughly, fore tarsus except arolium, mid and hind tibiae at base, fore and mid tibial spurs and mid T1 (apically frownish, rest of mid tarsus and hind tibial spurs brown) (in the nominate species mid T1-2 and all tibial spurs yellowish). (6) Gaster completely black, marginal areas of ecch segment somewhat brownish (in the nominate race from apical part of G1 to G3 broadly pale brown beneath).

Length about 12 mm. Mandible and palpi ferruginous, the former at base black, posterior part of collar not discoloured, tegulae pale brown; hair silvery, on clypeus as in Fig. 399. Head in frontal view with lateral margins rounded, slightly convergent towards clypeus, vertex not depressed, W:L=100:96, eye incisions narrow, with dorsal margins of both sides in a straight line, frontal elevations roundly very markedly raised, medial furrow very deep. SAT-ASR: Figs. 396, 397 and 398; clypeus: Fig. 399. HW,HL,IODv,A3,P=100,54,25,24,150. OOD,Od,POD=2,5,4. IODs=10:7. A3=AW 4.7. A3, 4,5=10,6,6.5. P,Ma,Mi,2(Ma),3(Ma)=100,22,7,32(28),36(36). Collar fairly markedly roundly emarginate in front, thus considerably widened laterally, in frontal view dorsal line obtuse triangle, top weakly tuberculate, mesopleuron normal, propodeum with lateral carinae, carina in lateral view roundly up-curved, area dorsalis with feeble lateral furrows, area apicalis lunate in form, dorsal margin weakly marked off with arcuate striae, GSR not elevated, gastral petiole flask-shaped. RC=C, R1 short, CV1= CV2 7, TCV:CV2=5:3, angle about 110 .

Frons very delicately microcoriaceous, with very sparsely fine punctures on round elevations, SAT shining, with sparse fine punctures, mesoscutum finely, rather sparsely punctured, PIS 2-5 times PD. Propodeum with distinct series of striae along lateral carinae, 3 furrows of area dorsalis transversely distinctly striate, sides except anterior femoral sinus fairly closely punctured and on posterior portion mixed with transverse striae.

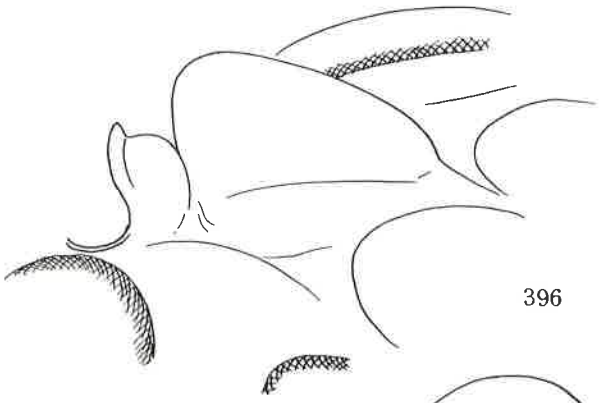
♂, unknown.

Holotype: ♀, Is. Mysol, leg. A.R. Wallce (UMO).

Remarks. In the long elongated SAT and in the more weakly produced medio-apical part of clypeus the present specimen is much closer to ssp. biroi known from West New Guinea, but here the elevation of SAT is acuter and higher (Figs. 396-398, cf. Figs. 404-406), legs and gaster darker (in biroi as in nominate form), G1-3 not so short and especially the frontal elevations are much smaller.

Fore comparison measurements in bituberculatum and b. biroi (within parenthese) are given: Head in frontal view W:L=100: 96 (100:94). HW,HL,IODv,A3,P=100,54,25, 23,150 (100,54,24,23,120). OOD,Od,POD=2,5,5 (2,7,6.5. A3=AW 4.0 (3.8). IODs=10:6.5 (10:7.5). A3,4,5=10,6,5.5 (10,6.5,6.5.). P,Ma,Mi,2(Ma),3(Ma)=100,19,7,36(20),40(30) (100,29,9,40(30),48(38)). RC=C (C-B), CV1=CV2 6 (6.3), TCV:CV2=8:5 (9:5), angle about 130 (120).

Gastral petiole in biroi very short and thick, it may be an abnormal specimen.



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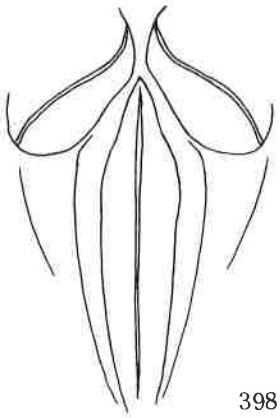

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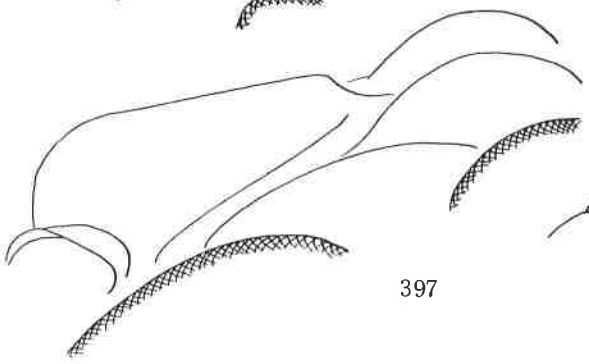

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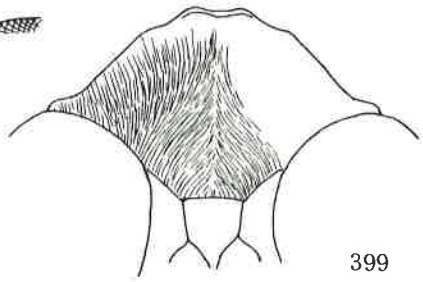

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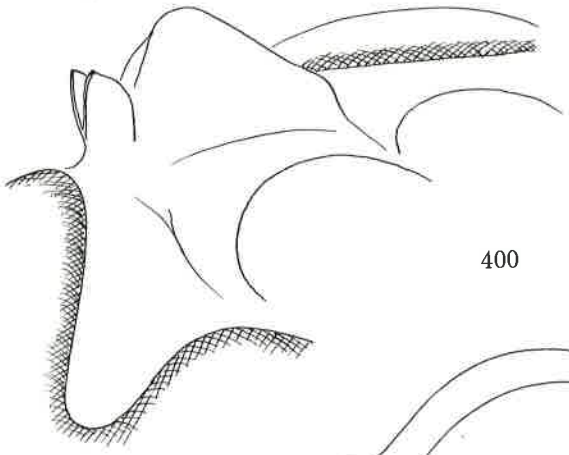

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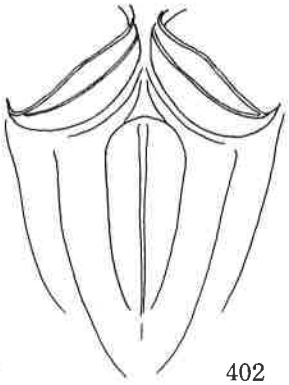

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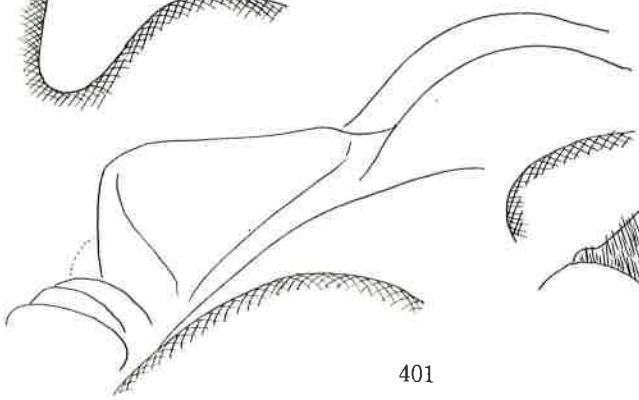

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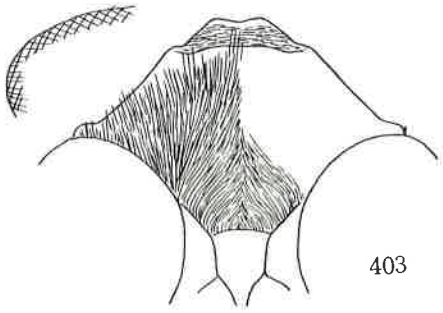

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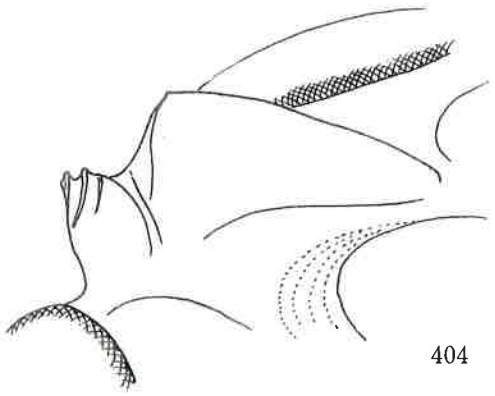
The present subspecies can be distinguished from T. placidum Smith in which the frons has a markedly high rounded elevation on each side of medial furrow and in this character very similar to b. mysolense by the following distinctions:
(1) Body much larger (in placidum only 8 mm). (2) IODs= 3:2 (in placidum 2:1). (3) Gaster wholly black (in placidum basal 3 segments ferruginous).

The present subspecies can be inserted in the key to the species as follows:
It runs through 2 - 19 - 46 - 57 - 59 - and reach couplet 72. It should be altered as follows:

72a Frontal rounded elevations on both sides of medial furrow markedly high, tuberiform (IODs=3:2, OOD:POD=1:2, RC=C, legs partly ferruginous), 12 mm, Is. Mysol bituberculatum mysolense ssp. nov., ♀

— Frontal elevations on both sides of medial furrow not so markedly high 72



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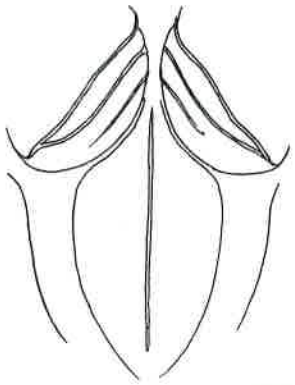

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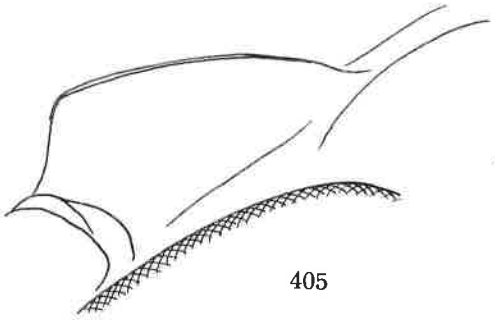

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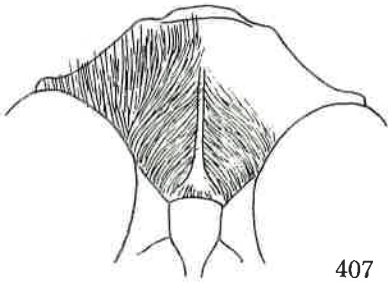

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Explanation to Figs. 396–407.

Figs. 396–399. Trypoxylon bituberculatum mysolense ssp. nov., ♀.

Figs. 400–403. Trypoxylon bituberculatum bituberculatum Tsuneki, ♀.

Figs. 404–407. Trypoxylon bituberculatum biroi Tsuneki, ♀

396,400,404 ... SAT-ASR in dorso-lateral view.
397,401,405 ... SAT-ASR in lateral view.
398,402,406 ... SAT-ASR in vertical view.
399,403,407 ... Clypeus.

REFERENCES

Bohart, R. M. and A. S. Menke. 1976. Sphecid Wasps of the World. A Ge Generic Revision. Univ. Calif. Press, 695 pp.

Tsuneki, K. 1974. Sphecidae (Hymenoptera) from Korea. Ann. Hist. Nat. Mus. Nat. Hung., 66: 359-387.

Tsuneki, K. 1976. Sphecoidea taken by the Noona Dan Expedition in the Philippine Islands (Insecta, Hymenoptera). Steenstrupia, Copenhagen, 4: 33-120.

Tsuneki, K. 1977. Further notes and descriptions on some Formosan Sphecidae (Hymenoptera). SPJHA (Spec. Publ. Jap. Hymen. Ass.), 2: 1-33.

Tsuneki, K. 1977. Corrigenda. Akitu, N. S., 9: 4.

Tsuneki, K. 1978. 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. SPJHA, 7: 1-87 (346 figs.).

Tsuneki, K. 1978. Idem. II. Revision of the type series of the species described by F. Smith, P. Cameron, C. G. Nurse, W. H. Ashmead, R. E. Turner and O. W. Richards. Ibid., 8: 1-84 (289 figs.).

Tsuneki, K. 1979. Idem. III. Species from the Indian Subcontinent, including Southeast Asia. Ibid., 9: 1-178 (786 figs.).

Tsuneki, K. 1979. Idem. IV. Species from Sri Lanka. Ibid., 10: 1-20 (64 figs.).

Tsuneki, K. 1979. Idem. V. Species from Sumatra, Java and the Lesser Sunda Islands. Ibid., 11: 1-68 (222 figs.).

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