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A NEW SPECIES OF PASSALOEUCUS FROM JAPAN,
WITH ITS BIOLOGY (HYM., PEMPHREDONINAE)

By K. TSUNEKI

PASSALOEUCUS MISHIMAENSIS SP. NOV.

The present species has a more close affinity with the Korean relative, koreanus m.* than with the Japanese one, nipponicola m.*, in having the brightly annulated antennae (δ) provided with the tyloidea on A4-12 (in nipponicola on A4-9) (Fig. 1, cf. Figs. 8, 9 in my 1974 paper), but differs from that in having the clypeus (δ) much shorter, with the median produced part nearly truncate at apex (Fig. 2) and legs (δ & ♀) much brighter (yellowish) in colour.

δ . Length 4-5 mm. Black; ivory white are palpi, humeral tubercles, elongate mark on mandibles (Fig. 3), apical spot on A5-12 (Fig. 1), often a patch at base of A1 in front and basal half of hind tibiae; orange yellow are greater part of A2-4, apices of all trochanters, in fore beneath also, fore and mid femora, except above and beneath (in fore blackish areas narrower), hind femora at apex, fore and mid tibiae and tarsi completely (usually tibiae in front whitish yellow) and apical part of whitish area of hind tibiae; labrum translucent pale yellow; hind tarsi dark brown to black, but often together with inner side of tibiae orange yellow.

Head from above with VW=29, median L till top of interantennal tooth (=1) =29, OOD:Od:POD=7:5:6; head from in front with MxIOD at mid frons : MiIOD at antennal base=30:24, clypeus: Fig. 2, with W:l=28:9, right mandible: Fig. 3; collar of pronotum with postero-lateral angles acutely pointed as in koreanus; mesopleuron (left) with C-shaped furrow, formed of episternal, hyposternal and scrobal sulci, the first two are strongly crenate and the last without crenae and slightly separated from the episternal; furthermore, a longitudinal, weakly crenate suture present on mesosternum in front of mid coxa and median line of the sternum plainly carinate. Structure and sculpture of propodeum similar to those of the two East Asiatic species compared; posterior inclination fairly acute in profile, forming about 120° with the dorsal surface, with median furrow on upper half, surface of its sides comparatively finely and irregularly reticulate, while lower half medianly carinate, with its sides broadly concave and shining, dorsal area medianly comparatively coarsely and irregularly reticulate and laterally obliquely striate, the area separated from the posterior inclination by a pair of arcuate carinae and from each side by a longitudinal carina; side obliquely (from postero-dorsal to antero-ventral), finely and closely striate. G1 shortly petiolate at base (its l=6), with BW, W at petiole, a^w and median L (from above) =9:7:28:34, intersegmental constriction between G1 and 2 and basal hollow of GS2 as usual, the latter extended as a broad shallow furrow near its apex; L of femur-tibia of fore, mid and legs =27-25, 27-25, 31-36. Wings: Fig. 4, also similar to those of the compared species.

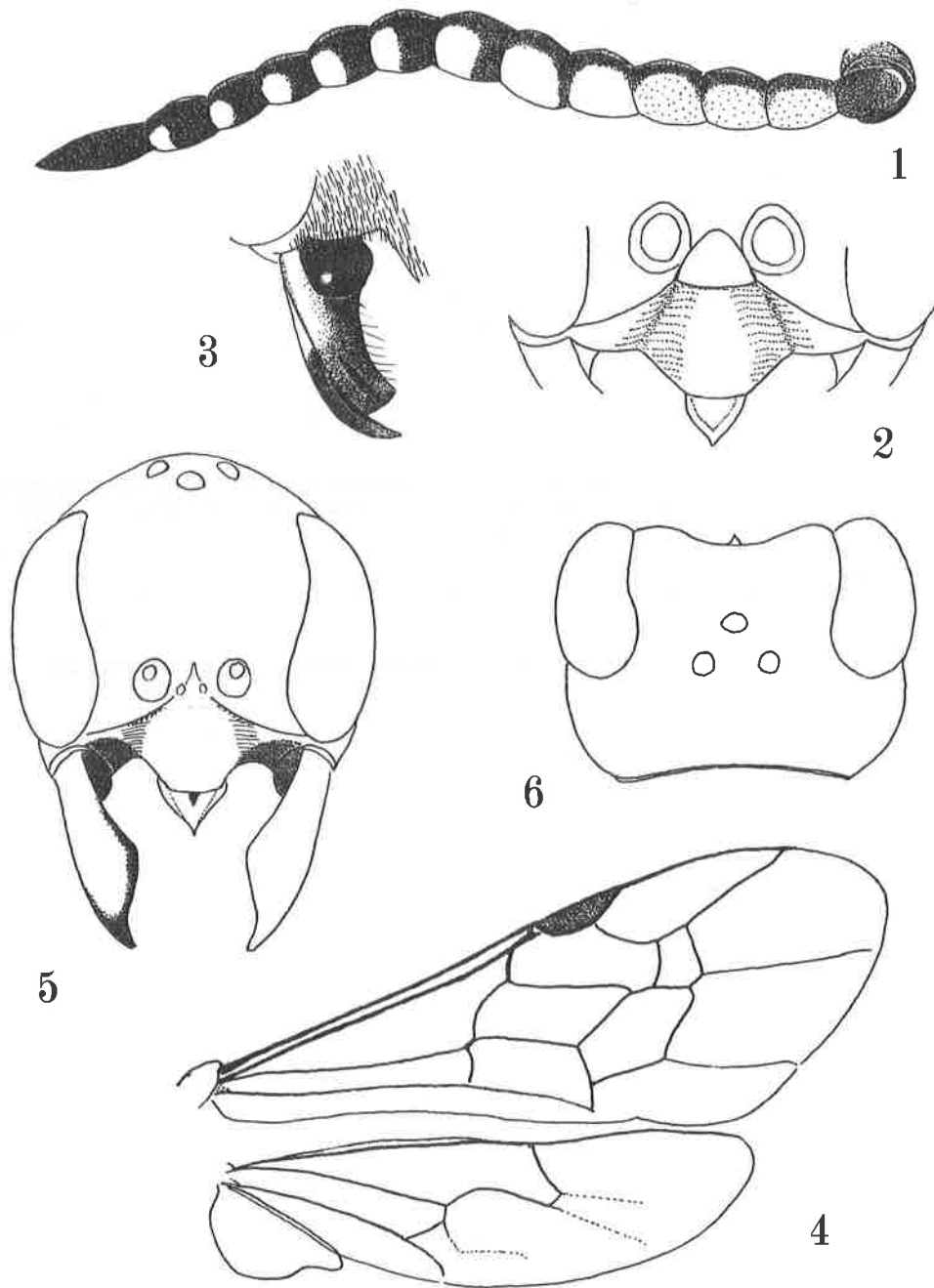
Differs from the male of nipponicola, besides the antennal structure and coloration in that head seen from in front appears more elongate, based on outer margins of eyes less strongly rounded out and GT6 without a pair of protuberances at medio-apical margin.

♀ . 5-6 mm. Closely resembles P. roettgeni Verhoeff, differs from this in that the gaster more strongly constricted between G1 and 2, clypeus at apex in middle slightly roundly produced (Fig. 5) and legs fairly broadly yellow or pale brownish yellow.

Black; mandibles yellow, with apical area broadly reddish yellow (basal condyle shining black), labrum medianly opaque yellow and laterally translucent yellow, but sometimes wholly amber-yellow; A1 whitish yellow beneath, A2 apically and beneath pale brown, A3-12 each with a brownish spot beneath, palpi pale yellowish white, humeral tubercles also yellowish white, tegulae translucent pale brown, basal plates of wings brown; wings hyaline, pterostigma black, veins dark brown to brown; fore trochanters except above and beneath yellowish white; fore femora at base narrowly, at apex broadly, mid and hind femora at apices narrowly orange yellow; all tibiae at base on outer side yellowish white; rest of fore and mid tibiae broadly orange yellow, but on outer side slightly fuscous; tarsi brown, gradually much darker apically on mid and hind ones.

Head in frontal view: Fig. 5, with median L =50, MxIOD at mid frons and MiIOD at

* Originally described as a subspecies of N. American P. annulatus (Say, 1837)



base of antennae =30:27, clypeus with $W:L=32:10$, medianly strongly produced, with apex broadly, gently rounded (in Fig. 5), labrum and mandibles also shown in the figure; antennae filiform, $A3/aW=1.5$, $A6/aW=1.2$ and $A12/bW=2.5$, interantennal spine distinct and frontal median furrow broad and shallow, but distinct. Head in dorsal view: Fig. 6, $VW=28$, median $L=32$, $OOD:Od:POD:OCD=8:4:6:13$; scutum with notauli weak, short, reaching $1/3$ of the segment, without crenae, scutellum without median furrow, furrows on mesopleuron, structure, sculpture of propodeum and wing venation as in ♂. Gaster generally as

in ♂, except sexual characters (GT6 without a pair of pointed elevation in middle), but with a pair of feeble tubercles on GS2.

Holotype: ♂, Mishima (Asahigaoka) (all the following same), 19.VI.1987, K. Tsuneki.

Paratypes: 2 ♂, 29.IV.1987; 1 ♂ 1 ♀, 30.V; 5 ♂ 1 ♀, 16, 3 ♀, 18, 2 ♂, 19, 2 ♂, 22, 1 ♀, 23, 1 ♀, 25.VI.1987; 1 ♂, 29.IX.1987.

Other specimens: 1 ♂, 30.IV.1988, 1 ♂, 1.V.1988; 1 ♀, 19, 2 ♀, 22, 2 ♂ 2 ♀, 30.X.1988; 1 ♀, 22.V.1989.

Biology:

The wasps of this make their nests in the fine abandoned beetle burrows in dried wood at sheltered niches in nature, separating the linearly arranged cells with the resin of coniferous trees. The structure and the contents of the nest can well be observed by inducing the wasp to nest in the trapnest of a bamboo-grass having the empty hollow of about 2 mm in diameter, settled horizontally at the proper place near their natural nests. The cells are 8-10 mm in length, the inner the longer, and the prey biven to the larvae are aphids including at least 3 different species, with the number to one cell being 30-40 and compactly and irregularly packed. The egg of the wasp in each cell is found to have been attached to one of the larger prey, located at about 2/3 from the inner partitioning wall, glued with its cephalic end between the head and one of the fore coxae of the prey and placed longitudinally along its length axis, reaching with its caudal end the caudal end of the prey. It is somewhat yellowish white in colour, 0.8-0.9 mm in length, 0.3 mm in maximum width, gently curved as a whole, with the cephalic end slightly and the caudal end somewhat more strongly tapered and minutely rounded at each apex.

The nest sometimes has a preliminary plug at base and usually with the vestibular cell, different in length, before closing plug, but so far examined no intercalary cell at all. The partitioning wall as well as preliminary plug, when present, is made of resin, about 1.5 mm in thickness, usually with saw dust scraped off the lateral wall and attached to the outer surface, but the closing plug is always a thicker earthen wall placed at the entrance of the nest. The burrow is usually reutilized. The fact is distinctly shown by the presence of irregular traces of old partitioning walls in the burrow wall. It is also frequently superseded.

The wasp of this species appears twice a year, May-June and September-October. We can learn many things from the following instance: It is made in a trap nest of bamboo grass, 2 mm in inner diameter and 11 mm in length, to which the mother wasp was provisioning on May 31 and I examined it on June 17 by splitting it into two asymmetrical halves. The preliminary plug is at 28 mm from the interior node. The inner half of it is earthen wall, possibly the architecture of *Ancistrocerus* wasp and upon this a resin layer is placed by this species. Thence outwards five cells were constructed, 10, 10, 9, 8, 8 mm in length respectively from inside, and outside of the outermost resin partitioning wall 12 dried aphids were discovered, without the egg or the larva of the wasp. The offspring of cell 1 was already metamorphosed into a pupa, not as yet black coloured, but those of cells 2-5 were the prepupae. Probably the mother wasp would have been died in the course of provisioning of cell 6. I put this nest in a test-tube, plugged it with a cotton wall and placed it on my table. May 18 the pupa in cell 1 markedly darkened and on 21st it had been emerged to a female wasp and was quietly resting in her cell, but remaining prepupae unchanged in appearance. On 22, 23, 24 and 25 the wasp was still alive. She sometimes came out of her cell, walked on the nest wall or cotton plug, but mostly sat quietly on the cut wall of the nest. On the 26th at noon she was walking on the cotton plug, but the next day in the morning when I observed, the wasp had been died. The fact clear shows that the wasp which is layed earlier in the inner cell can wait quietly for a long period alive for the time when she feels the activity of wall breaking of the wasp of the next outer cell. The prepupae of cells 2-5 were unchanged in appearance until September 10, thence gradually they pupated and blackened and during 24-25 they emerged and appeared in the test-tube. The result of this nest shows that cell 1 was made in the autumn of the previous year as a superseded one to *Ancistrocerus* wasp, possibly without competition as a utilized one of the abandoned cavity and cells 2-5 were made as a superseded nest without competition in the spring while I observed the activity of the wasp.

While provisioning, the female wasp very frequently comes back, capturing a prey aphid between her mandibles and pressing it under her head. She alights near the entrance of her burrow, walks to it hurriedly and enters it without hesitation. Usually she comes out at once and flies off. When the entrance of her burrow is on the inside of the large wooden box, she alights near the opening of the box and hurries to her

nest, without making a mistake, even when some nests of other wasps are opening in front of it.

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