NOMIA UMESAOI SP. NOV., AN ABERRANT BEE FROM THAILAND

(HYMENOPTERA: APOIDEA)[1]

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Among species of the enormous bee genus, *Nomia*, the enlargement of hind-femora and -tibiae, a generic character, often attains to a grotesque expression, in combination with the appearance of some aberrant features. In examining the bee specimens collected by the Osaka City University Biological Expedition to Southeast Asia, 1957–'58, the writer found such an aberrant species from Thailand, seemingly new to science as described below:

Nomia umesaoi sp. nov.

Diagnosis: With respect to the combination of large pale coloured tegulae, enormously swollen hind-femora, and hind-tibiae bearing large inner sac-like projection, the males at hand resemble *Nomia oxybeloides* Smith (1875, Tr. Entom. Soc. Lond.: 43) and allied species, especially the following three species:

1. *N. biroi* Friese (1913, Deut. Entom. Zs: 85) regarding a) white, peculiarly spatulate "hairs" at hind-trochanters and -femora ventrally, b) dull ventral projection of mesopleura, and perhaps c) paler hind-tarsal segments I-III, but readily distinguished by a) broadly oval, flat tarsal segment V in fore- and mid-legs, b) hind-tibial projection apically not triangular, but truncate, axe-blade-shaped.

2. *N. siamensis* Cockerell (1929, Ann. Mag. Nat. Hist. 4, (10): 134) with respect to a) truncate tibial projection, b) broadly oval mid-tarsal segment V (no account as to fore-tarsal segment V in the original description), but easily distinguishable by spatulate hairs at hind-trochanters and -femora ventrally.

3. *N. tadzhica* Popov (1956, Entom. Oborzr. 35: 159) with respect to a) enlarged, black fore- and mid-tarsal segment V and b) spatulate hairs on hind-femora and -trochanters, but distinguished by a) difference in arrangement of spatulate hairs, b) enormous hind-tibial projection and c) differences in forms of gonocoxites, gonostyli and metasomal sternum VII.

1) Contribution No. 507 from the Zoological Institute, Faculty of Science, Hokkaido University, Sapporo, Japan.

2) The writer is much indebted to Prof. Kunio Iwata, Hyogo Univ. Agriculture, Prof. Tadao Umesao and Dr. Kimio Yoshikawa, Osaka City University, for the loan of valuable material to be studied. His cordial thanks are also offered to Dr. Chihisa Watanabe, Entomological Institute, Hokkaido University, Dr. Yoshiaki Ito, National Institute of Agricultural Sciences, for kindness shown in the course of the present study, and finally to Prof. Tohru Uchida for his kind direction.

[Insecta Matsumurana, Vol. 24, No. 1, March, 1961]

A single female specimen suspected to be conspecific seems to be very close to *N. biroi*, but distinguishable by the possession of spatulate, apically truncate hairs on apical margins of hind-basitarsi.

Because of the remarkable mouth-parts with very short glossa and paraglossa, peculiarly differentiated galea, the present species might deserve to rank as an independent subgenus. But the infrageneric classification of the Old World *Nomia* still remains in a chaotic state so that the writer preferred to avoid proposing a new name. The following description may include some of such supraspecific characters.

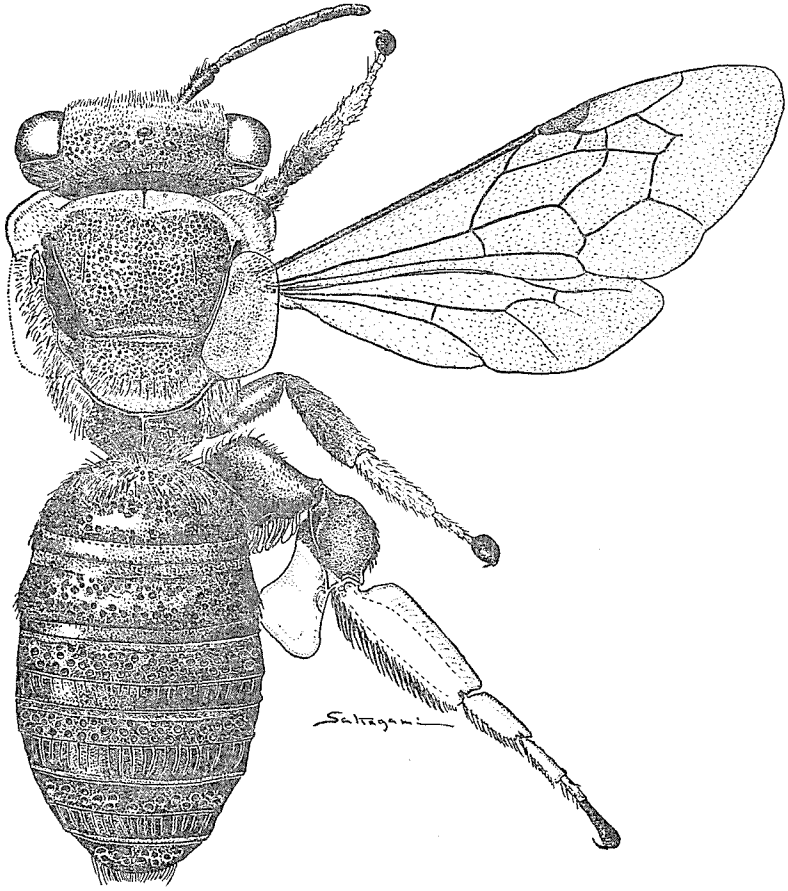

Fig. 1. *Nomia umesaoi* sp. nov., male.

Description: Male (Fig. 1).

Head: (Fig. 3, A) Black, antennal flagella reddish brown below, dark brown to black above. Slightly wider than long (9:7). Inner orbits distinctly convergent below. Vertex distinctly raised, angulate posteriorly. Stemmaticum raised, ratios in ocello-ocular area: Diameter of median ocellus (4): of lateral ocelli (3): post-ocellar distance (6): ocello-ocular distance (5.5): distance between median and lateral ocelli (2). Vertex with even,

coarse punctures; interspaces shining, measuring slightly less than diameters of punctures; with sparse, erect, long, ochraceous hairs. Ocello-ocular area naked; punctation sparser, especially anteriorly. Face above with punctures smaller, denser and more even than in vertex; with sparse and short hairs; punctures becoming larger below. Supraclypeus, clypeus and lower paraocular areas with dense, even, pale ochraceous hairs of special parallel-sided form, with punctures similar to those in face (only partly examined by removing hairs). Anterior part of clypeus naked, with punctures slightly coarser, margin gently curved. Labrum smooth and shining, with long ferruginous marginal hairs. Genae narrow, about 4/11 times as wide as eyes, with dense, silvery white, long and appressed hairs. Mandibles acute, without apical dentition. Scape about as long as pedicel and flagella I and II combined, with long, ochraceous hairs apically. Flagellum I almost as long as II, flagella III to X approximately equal in length.

Mouth-parts (Fig. 2). Glossa and paraglossa very short, not attaining to apex of labial palpal segment II. Palpal segment I about as long as II and III combined. Segments of maxillar palpi subequal in length. Laciniae membraneous except for strongly chitinized streak along stipes. Galeae enlarged apically, furnished with long marginal hairs and apical lamella demarcated by weak secondary suture.

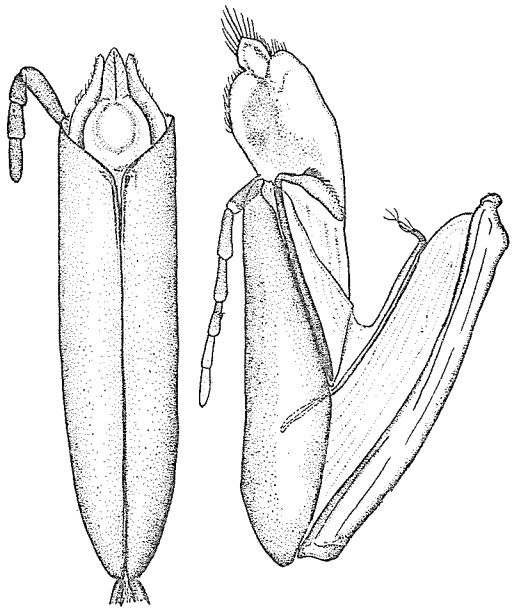

Fig. 2. Dorsal view of labium (left) and outer view of maxilla (right).

Mesosoma (Fig. 3, K, left). Black. Tegulae reddish brown, basally black, marginally semitransparent. Lateral extension of pronotum pale yellow, completely transparent. Pronotum completely sunken beneath mesoscutum, smooth and shining; lateral lobe transforming to a thin enormous lamella, round in contour, concave above, with thick white tomenta except peripheral margins. Anterior part of mesoscutum crescently separated by sharp carinae, invaginated below together with pronotum, smooth and shining. Remainder of mesoscutum with even, dense and coarse punctures; anterior margin with a broad transverse band of pale ochraceous tomenta projecting posteriorly at middle; posterior margin with similar but narrower tomental band. Remainder of mesoscutum with sparse, ochraceous hairs. Tegulae enormously large, posteriorly reaching middle of mesoscutellum, about 7/13 times as wide as long, minutely punctured; pubescence dense and velvety especially at anterior area, pale testaceous except over wing bases where dark brown. Mesoscutellum with punctures as in mesoscutum, coarser and sparser at postlateral angles, with sparse, moderately long, ochraceous hairs, relatively longer along lateral and posterior margins.

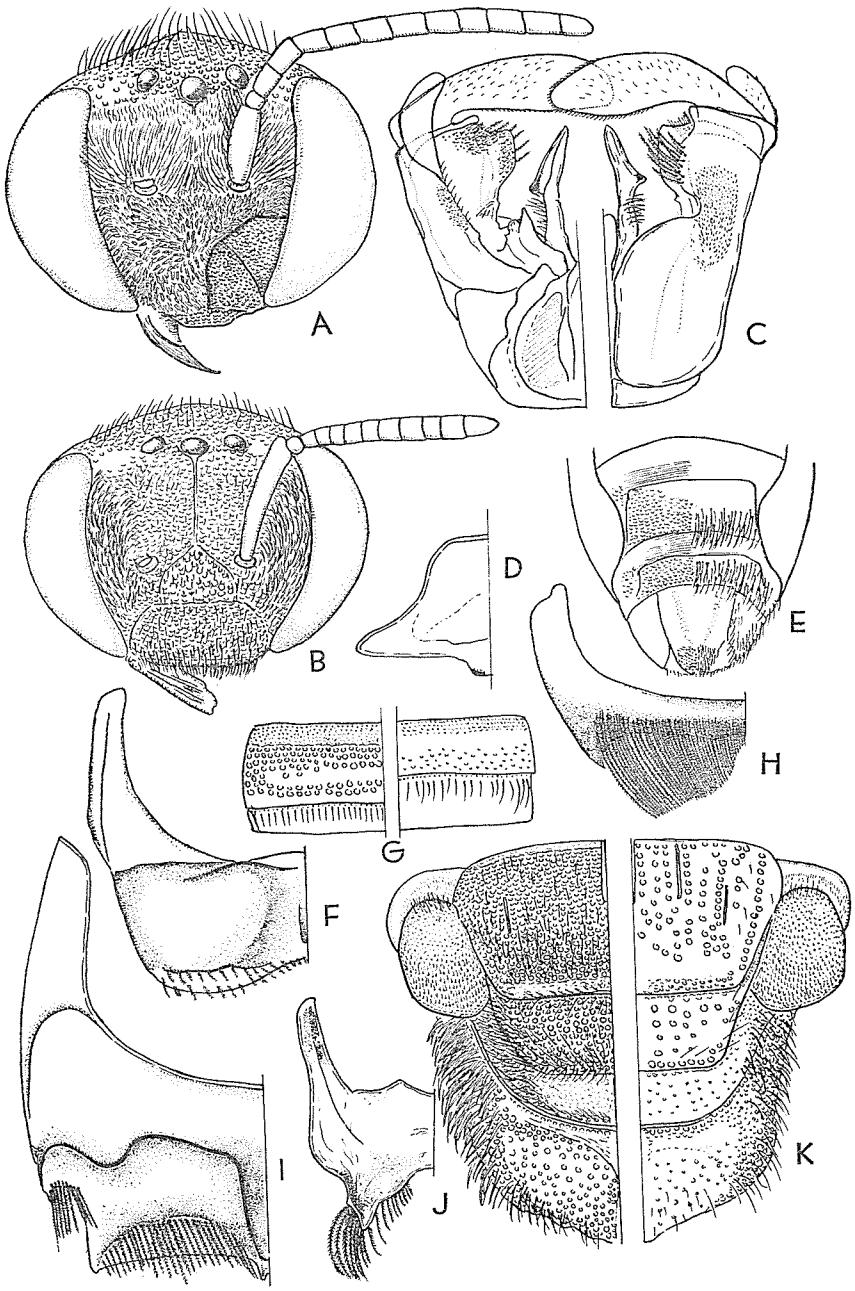

Fig. 3. A and B. Head of male and female. C Male genitalia, ventral (left) and dorsal (right) views. D. Male metasomal sternum VIII. E. Ventral view of female metasomal apex. F. Male metasomal sternum VI. G. Sculpture of metasomal tergum II of male (left) and female (right). H. Male metasomal tergum VII. I and J. Male metasomal terga V and VII. K. Sculpture of male (left) and female (right) mesosoma. Postdorsal view.

Metanotum with dense tomenta as in anterior margin of mesoscutum. Mesopleura with a pair of dull ventral projections; with very coarse punctures, interspaces shining; upper part with sparse, long, ochraceous hairs, lower part with dense, long, silvery white, lanceolate hairs. Horizontal area of propodeum very narrow; anteriorly transversely depressed, with row of coarse punctures; remainder smooth and shining, extending posteriorly at middle and continuous to deep median groove in vertical area. Vertical area with coarse punctures, interspaces variable, medially naked, laterally haired as in mesopleura.

Wings. Transparent, marginal areas slightly dusky, veins and stigma dark brown. Ratios of anterior and posterior sections of three marginal cells are: I (2/11.5), II (3.5/3.5), III (6/10). Vein 1 r-m directly receiving 1 m-cu. Anterior margin of hind wings with five fine bristles, five stout ones and eleven hamuli in a row.

Fore-legs. Black to dark brown, apical half of tibiae and tarsal segments I–IV pale testaceous to yellowish, tarsal segment V with claws black, abruptly contrasting. Coxae dully punctured, with yellowish hairs ventrally. Trochanters smooth and shining, with short, yellowish hairs ventrally and a few longer ones apically. Femora smooth and shining, naked except silvery white hairs at apical one third posteriorly. Tibiae dully shining, with long, yellowish hairs dorsally and ventromedially; with highly polished area basolaterally (Fig. 4, C). Tarsal segments I–IV with dense, stout hairs, silvery white dorsally and yellowish to pale ferruginous ventrally; segment I as long as the rest combined. Tarsal segment V flat, broadly oval, microscopically coriaceous and dully shining, with very fine yellowish hairs (Fig. 4, G).

Mid-legs. Similar in coloration and structure to fore-legs. Femora with short, silvery hairs dorso-apically and ventrally. Tibiae (Fig. 4, H) with sparse, moderately long, yellowish hairs ventrally; ventral area with sparse, minute yellowish hairs except antero-apical corner, anteriorly with rather stout yellowish hairs, slightly ridged both anteriorly and posteriorly; anterior ridge produced medially, forming dull, median projection seen laterally. Tibiae with blunt projection dorso-apically. Tarsal segments as in fore-legs (Fig. 4, F).

Hind-legs (Fig. 4, A and B). Black, basal part of tibial projection dark brown. Postapical corner of tibiae, main bulk of tibial projection and tarsal segments I to III milky white, basal segment IV pale brown, V with claws black. Bases of tarsal segments II–IV inserted preceding semitransparent segments darker. Smooth and shining. Coxae ventrally with long, silvery white hairs, intermingled with lanceolate hairs as in mesopleura. Trochanters ventrally with a few white hairs of remarkably spatulate form (Fig. 4, D). Femora greatly swollen above, helmet-like, with long, silvery white hairs dorso-anteriorly, length of hairs gradually decreasing to apex of segment; highly polished posteriorly, with minute, sparse hairs dorsobasally and dense patch of same hairs apically; antero-ventrally with rows of spatulate hairs as in trochanters, length of hairs decreasing to apex of segment; post-ventrally sharply carinate, with minute process near base, and row of minute hairs along carina. Tibiae about two-thirds as long as femora, ventrally transforming to enormous axe-blade-like projection; main bulk of segment conspicuously

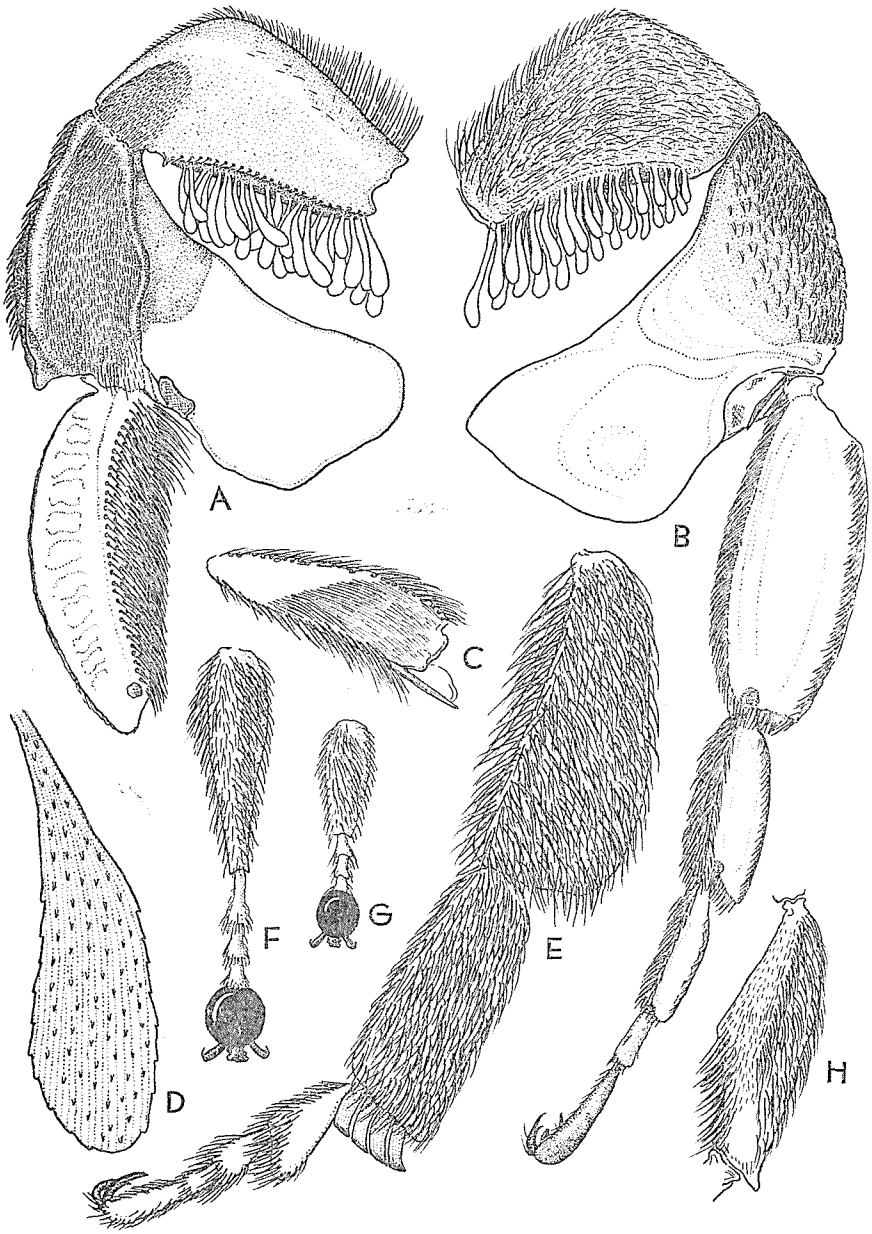

Fig. 4. A and B. Posterior and anterior views of male hind leg. C. Anterior view of male left fore-tibia. D. Spatulate "hair" in male hind-trochanters and -femora. E. Anterior view of left hind tibia and tarsi of female. F. and G. Dorsal views of left fore- and mid-tarsi of male. H. Posterior view of right mid-tibia of male.

convex anteriorly, with silvery white, lanceolate hairs, denser dorsally; posterior face flat, separated dorsally from anterior convexity by low ridge, ventrally from axe-blade-like projection by sharp carina extending apically to projection beyond limit of main bulk; except narrow marginal area covered with even, dense and very fine punctures giving off pale yellowish microtrichiae. Ventral projection distinctly longer than tibial bulk, about as long as basitarsi, truncate apically; frontal face with distinct basal concavity extending as a deep groove to subapical portion of tibial bulk; postlateral margin basally transforming to transparent window-like lamella, toward which a conspicuous spine projecting from apex of tibiae. Basitarsi about three times as long as wide, semi-transparent, basally strongly constricted; ventral margin nearly straight; with dense, yellowish bristles, longer basally; dorsal margin distinctly curved, with similar but slightly curled bristles; anterior surface flat with dull reticulation and a few fine, yellowish hairs, with basal depression demarcated by ridges; posterior surface differentiated into three longitudinal areas, ventral, median and dorsal: ventral area with dense bristles as in ventral margin of segment, shorter nearer to median area; median area very narrow, smooth and shining, separated by distinct ridge from ventral area and gradually tapering to dorsal area, the latter with indistinct undulation. Tarsal segment II about four times as long as wide, similar to basitarsi but less differentiated especially in posterior surface and dorsal fringes. Tarsal segments II and IV quite normal with dense, yellowish bristles postventrally. Tarsal segment V not dilated.

Metasoma. Anterior vertical disc of metasomal tergum I with even and coarse punctures; interspaces highly shining, less in extent than diameters of punctures; with ochraceous hairs sparse and short medially, denser and longer marginally; median longitudinal depression sparsely punctured, with deep median groove. Posterior horizontal area of tergum I differentiated into anterior and posterior marginal areas by sharp transverse carina. Anterior area about two-thirds as long as total horizontal area; with lateral patches of white, lanceolate hairs as in mesopleura ventrally; with coarse punctures and shining interspaces as in vertical disc, punctures coarser posteriorly, holding transverse impunctate bands. Posterior marginal area depressed anteriorly, with minute punctures with sparse, appressed, fulvotestaceous, spinous hairs anterio-laterally; remainder microscopically coriaceous and shining, marginally pallid, with minute tomenta as in mesoscutum. Terga II (Fig. 3, G, left) to V similarly sculptured. Anterior area depressed anteriorly, densely covered with pale ochraceous tomenta, posterior two-thirds swollen, with coarse punctures, smaller and sparser in tergum V; interspaces smooth and highly shining, forming transverse impunctate bands in tergum II. Posterior marginal areas of terga II to V as in tergum I, but longer, anteriorly depressed and coriaceous (seemingly densely covered with tomenta as in anterior depression of anterior area of each tergum)[1] in terga III to V; spinous hairs issuing from whole anterior margin in each tergum.

1) In both male specimens examined, the posterior marginal areas of each tergum are naked except spinous hairs as shown in Fig. 1. But it is probable that these areas are provided with tomenta in fresh conditions, for 1) such tomenta were detected in tergum V of the paratypic specimen, and 2) such tomenta have been described in most related species.

Tergum VI with sparse and relatively smaller punctures, with sparse, short, yellowish hairs; posterior marginal area poorly developed. Tergum VII (Fig. 3, H) incised medially, with inconspicuous submedian projection, submarginally with dense, long, branched hairs. Sterna smooth and shining, apically pallid. Sterna IV and V with a pair of minute, submedian processes apically. Gradulus of sternum V rectangularly bent medially (Fig. 3, I), strongly curved laterally, posterior margin with two rows of dense, branched hairs. Sternum VI (Fig. 3, F) medially invaginated at posterior margin, with marginal and submarginal rows of branched, rather short hairs: median groove and lateral semitransparent discs distinct. Sternum VII (Fig. 3, J) semicircularly incised posteriorly; lateral process large and obliquely truncate apically, bearing branched marginal hairs externally and unilaterally branched hairs internally. Sternum VIII (Fig. 3, D) simple, bluntly projected postmedially. Genitalia (Fig. 3, C) similar to those of *N. tadzhica*, but gonocoxites, seen dorsally, with patch of minute microtrichiae, internal process projected inwards, with dense, long, branched hairs; seen ventrally, projected apically beyond insertion of spatulate gonostyli, the latter with scattered short hairs as well as marginal fringes. Penis valve and volsellae rather simple.

Female: Similar to male except following points:

Head. Ratios in ocello-ocular area: Diameter of median ocellus (3): of lateral ocelli (2.5): post-ocellar distance (7): ocello-ocular distance (5.5): distance between median and lateral ocelli (1.2). Face, supraclypeus and clypeus sparsely covered with short, rather appressed, silvery white hairs. Clypeus underside with similar but denser and longer hairs. Paraocular areas with patches of dense, lanceolate, silvery-white hairs. Punctures of clypeus apically and supraclypeus larger and sparser than in face. Scape about 1.5 times as long as in male, without long hairs, ratio of scape to other antennal segments combined about 25 : 43. Flagellar segments very short, basal five ones slightly wider than long, apical ones about as long as wide. Mandibles brownish and truncate apically, with dull inner dentition, median groove distinct.

Mesosoma (Fig. 3, K, right). Mesoscutum and mesoscutellum shining; with sparse pale ochraceous hairs, longer in scutellum; with sparse, very coarse punctures in rather regular arrangement, smaller and denser in posterior margin of scutum. Metanotum coriaceous, naked and shining. Vertical surface of propodeum with punctures sparser and smaller than in male, with very sparse, yellowish hairs, lateral face of propodeum with silvery white to slightly ochraceous, normal, not lanceolate hairs. Mesopleura without ventral process, lanceolate hairs sparser than in male.

Legs. Dark or black brown throughout. Tarsal segments II to IV slightly paler. Tarsal segment V black. Posterior silvery white fringes in fore-femora very conspicuous; issuing from whole margin, longer basally. Fore-tibiae with hairs silvery white dorsally, orange-yellow ventromedially, both longer than in male; ventrolateral smooth and naked area very conspicuous. Fore-basitarsi slightly longer than other tarsal segments combined, segment V normal. Mid-legs with dense, long hairs except trochanters and femora anteriorly, silvery white dorsally, yellowish ventrally, orange-yellowish in tibiae and basitarsi apically; tarsal segment V normal. Hind-legs normal (Fig. 4, E); with long and dense

hairs, orange-yellow in tarsal segments IV and V, silvery white in other segments. Basitarsi dully projected at postapical angle, apical margin with a few peculiarly spatulate, apically truncate hairs. Tarsal segment II greatly enlarged apically, as long as wide, segment III slightly enlarged apically.

Metasoma. Horizontal and vertical areas of tergum I less differentiated, punctures smaller and sparser, hairs far sparser and shorter, posterior marginal area dully shining. Terga II (Fig. 3, K) to V similar to those in male, punctures of anterior areas smaller and sparser, posterior marginal areas much longer. Epypygium slightly tuberculate medially. Sterna (Fig. 3, E) with broad apical bands of dense and minute punctures bearing silvery white hairs. Sternum IV curved medially, hypopygium smooth with apical patch of dense, short hairs.

Size: Body length about 7 mm, length of fore-wing about 5.5 mm in both sexes.

Holotype: (Male) Mae Hoi, Thailand, January 4, 1958, T. Umesao leg.; Allotype: (Female) Kamphangpet, Thailand, December 26, 1957, T. Umesao, K. Yoda and K. Yoshikawa leg.; Paratype: (Male) Nakon Nayok, Thailand, December 5, 1957, T. Umesao leg. (All deposited in Entomological Laboratory, Hyogo University of Agriculture, Sasayama, Japan).

While the male specimens of this species can be easily distinguished from related species as mentioned in the diagnosis, it is rather difficult in the case of a single female specimen suspected to be conspecific to distinguish clearly from allied species. In general appearance the specimen is close to the females of *N. biroi* and *N. siamensis*, but the pubescence is preserved in a rather poor condition, so that closer comparison is impossible. Even the unique clearly established character, spatulate apical fringes in hind basitarsi, might have been merely overlooked by Friese and Cockerell when they described two species mentioned above. Further it becomes an open question whether conspecificity of sexes in *N. biroi* (Males from Pogahavela, India; Seenigoda, Ceylon, and Thuc Sonun, Annam) and *N. siamensis* (Males from Cjun, females from Cjun and Nan, all Thailand) is valid or not after the discovery of the present species.

The possession of aberrant characters such as described above in various species of *Nomia* may partly be attributed to the closer phyletic relation among such species, but partly to the independent appearance of an inherent common potentiality in the genus. The fact that abnormal tibial and femoral expansions appear among species from different geographical regions, with or without metallic metasomal bands, and the remarkable mouth-parts of the present new species suggest the latter cause as probable. Unfortunately, many previous descriptions of the Old World *Nomia* are often incomplete, without reference to mouth-parts, male genitalia and last metasomal sterna. Closer comparative studies are urgently required to establish the infrageneric groups in this enormous genus.