

Beitr. Ent.	Keltern	ISSN 0005 - 805X
61 (2011) 2	S. 243 - 258	10.11.2011

Studies on the systematics and taxonomy of the genus *Hylaeus* F. (7)

Indialaeus subgen. nov., a new subgenus of *Hylaeus* from the Oriental Region¹

(Hymenoptera: Anthophila, Colletidae)

With 36 figures

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Summary

A new subgenus *Indialaeus* subgen. nov. and new species *Hylaeus (Indialaeus) birmanicus* sp. n. are described from the Oriental Region. The subgenus is characterised by the special form of the male terminalia. Further special characters exist in the form of the mandibles and the supraclypeal area of both sexes. An identification key for the species so far described and a catalogue containing the new combinations is presented.

Zusammenfassung

Für die Fauna der Orientalis werden eine neue Untergattung *Indialaeus* subgen. nov. und eine neue Art *Hylaeus (Indialaeus) birmanicus* sp. n. beschrieben. Die Untergattung ist durch die spezielle Gestalt der männlichen Terminalia gekennzeichnet. Weitere besondere Merkmale bestehen im Bau der Mandibeln und der Supraclypealarea beider Geschlechter. Es werden eine Bestimmungstabelle der bisher beschriebenen Arten und ein Katalog mit den neuen Kombinationen vorgelegt.

Key words

Hymenoptera, Apoidea, Anthophila, Colletidae, *Hylaeus*, new subgenus, new species, Orientalis, Palearctic

1. Introduction

SNELLING (1980) described a set of new *Hylaeus* species from South India (Tamil Nadu, Karnataka and Puducherry), that he recognized as forming a discrete group, but was disinclined to formally fix its taxonomic status because of a lack of material. The group comprised five nominal species, each of which was represented by only one sex:

Hylaeus thyreus SNELLING, 1980. ♂

Hylaeus parmatius SNELLING, 1980. ♂

Hylaeus sedens SNELLING, 1980. ♀

Hylaeus peltates SNELLING, 1980. ♂

Hylaeus eurygnathus SNELLING, 1980. ♀

¹ Herrn Andreas W. Ebmer zum 70. Geburtstag in herzlicher Verbundenheit gewidmet.

The primary similarity, justifying the treatment of the species as a natural group, is the possession of conspicuously broad, flat mandibles. This apparently indicates a special way of life, probably differing from other groups of *Hylaeus*, that however remains unknown. Furthermore, the terminalia of the males exhibit definite autapomorphies that also separate them from other groups. The claw-like prolongations of the gonostyli of the male copulatory apparatus are in this respect especially remarkable.

It was previously impossible to clarify further details. The situation has now changed in several respects. It has been possible to revise the relevant types of British authors, as already urged by Snelling, and new material has become available, in a surprising way.

Specimens of *H. strenuus* were sent to me by Walter T. Nagamine (Honolulu, Hawaii/USA), comprising 4 ♀♀ and 12 ♂♂ that he collected in 2009 mainly in Koko Crater Botanical Garden on Oahu. The species was apparently introduced a short time ago (MAGNACCA et al. 2011); its provenance was unclear. For the first time in a hundred years, fresh material of this species has become available, with the help of which it is possible to clarify the association of the sexes and to answer further taxonomic, bionomic and ecological questions.

I examined, from the Oxford University Museum of Natural History, the following relevant species from Bārākpur near Kolkata (Calcutta), West Bengal:

Prosopis strenua CAMERON, 1897: 91. ♂ (nec ♀)

Prosopis striatifrons CAMERON, 1897: 89-90. ♀

Prosopis bellicosa CAMERON, 1897: 92-93. ♂

These species were revised by DATHE (2010). The two first-named taxa were recognized as conspecific and should be called *H. strenuus* (CAMERON), whilst *H. bellicosus* (CAMERON) is treated as a separate species. However, it is not possible to conclusively prove its status, because its abdomen is missing.

BINGHAM (1897: 411) synonymized *Prosopis striatifrons* CAMERON, 1897 with *P. feai* VACHAL, 1894, but DATHE (2010: 67) treated the former as *Hylaeus strenuus* (CAMERON, 1897). To clarify this discrepancy, the Vachal types in the Museo Civico di Storia Naturale Genova were also studied.

Abbreviations

Abbreviations used in the descriptions are the same as those in SNELLING (1980), thus making easier a direct comparison with the present paper.

ASD	Antennal socket diameter
BCW	Basal clypeal width. The distance between the sub-antennal sutures along the basal margin of the clypeus.
BL	Body length. Instead of Snelling's total length (TL), a simple measure of the given body length is used.
CL, CW	Clypeal length / width. The maximum length / width of the clypeus.
COD	Clypeocular distance. Distance from laterobasal angle to nearest point on eye margin.
HL	Head length. Maximum length between highest point of the vertex and lowermost extremity of the clypeus.
HW	Head width. Maximum width of the head, across the eyes.
LFW	Lower facial width. The minimum distance between the eyes at their lower end.
SL, SW	Scape length / width. The length of scape shaft exclusive of basal condyle.
UFW	Upper facial width. The minimum distance between the upper ends of the eyes, at about the level of the anterior ocellus.
WL	Wing length. The length of the anterior wing from margin of tegula to apical tip.

Abbreviations of the museums

LACM	Natural History Museum of Los Angeles County, Los Angeles, USA
MSNG	Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy
OUMNH	University of Oxford, Hope Entomological Collections, Oxford, U.K.
SDEI	Senckenberg Deutsches Entomologisches Institut, Münchenberg, Germany

2. Description of *Indialaeus* subgen. nov.

Type species:

Prosopis strenua CAMERON, 1897. Loc. typ.: Barrackpore [Bārākpur], West Bengal, India
= *Hylaeus (Indialaeus) strenuus* (CAMERON, 1897) sensu DATHE (2010)

General description:

Medium sized, black coloured species of 5–8 mm body length. – Profile of head in frontal view nearly circular, somewhat wider than high. Orbits clearly converging below. Clypeus long, flat. Supraclypeal area broad and flat, filling the interantennal area, slightly tapered dorsally, smoothly merging with the frons without visible margins. Foveae faciales of females continued above onto the vertex. – Scape simple, also in males small and not expanded. – Mandibles partly conspicuously large, basally very broad, rounded at apex, with subapical tooth; surface striated, without clear ridges or furrows; sometimes white coloured. – Pale mask of the male reduced, clypeus predominantly black; both sexes with medial or apical fleck on the clypeus and long pale stripes along the orbits; similar facial markings are to be found in some eastern species of the subgenus *Nesoprosopis*. – Markings white to intense yellow. Body black, pale stripes or flecks mostly only on the margin of pronotum and tegulae, tibiae normally with basal ring and apical stripe. – Integument shiny, with well developed punctures. – Propodeum rounded, with fine reticulate sculpture and a shiny mesh or fine longitudinal stripes. – Copulatory apparatus of male with elongated gonoforces, similar to the Afrotropic *Nothylaeus*.

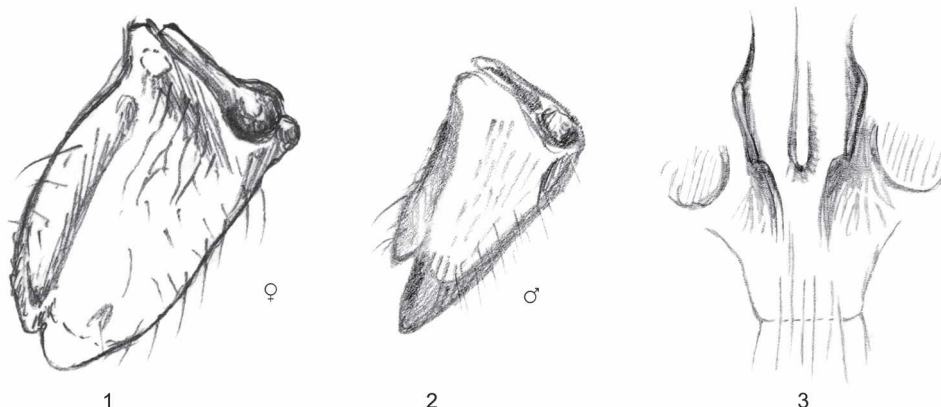
Differential characters:

Mandibles in both sexes of typical species (Fig. 1, 2) conspicuously broadened, barely twice as long as wide, weakly curved, end blunt (♀), upper margin with small subapical tooth. Outer surface flat and smooth, upper part slightly differentiated, but overall without grooves and condylar ridges; upper surface finely sculptured, only basally striated, with scattered bristles. Inner side similarly flat, smooth, with longitudinal groove in middle. Colour dark brown, black or flecked with white. Despite their size, the mandibles do not appear compact and strong, but are rather lamellate.

Supraclypeal area (Fig. 3) broad, broader above than below, flat and running into the frons without a change in the sculpture; transition to clypeus without a clear transverse seam, usually the shared longitudinal striations dominate. Upper part of supraclypeal area between bases of antennae clearly raised, in profile broadened, here with arched, sharp edges. Surface in middle with finely shagreenate longitudinal groove reaching to median ocellus.

Foveae faciales of ♀ continue onto the vertex, ending nearer to the ocelli.

Propodeum strongly arched outwards. Medial area in profile semicircular to elongate-oval, the posterior margin may be conspicuously impressed. Surface little sculptured, mostly only basally with short, irregular longitudinal ridges, silkily shiny.



Figs 1-3: *Hylaeus (Indialaeus) strenuus* (CAMERON, 1897). – 1, 2 left mandibles ♀ and ♂. – 3 Supra-clypealarea ♂. – Without scale.

Metasoma black, densely punctate on smooth upper surface. Tergum 1 with white felty lateral fringes, posterior margins of terga finely pubescent.

Terminalia of ♂ (Figs 19-36) not uniform, but characteristic at species level. All species share the long and narrow gonoforpipes of the copulatory apparatus, which is more or less densely clothed in feathered bristles.² Sternum 8 is compact, extremely so in *H. thyreus* (Fig. 29); the median ridge is more strongly sclerotized, depressed before the posterior margin and bifid, in *H. strenuus* here additionally with long bundles of setae. Sternum 7 in profile mostly triangular and with comb-teeth; their number may be reduced (*H. peltates*, Fig. 27) or they are entirely missing (*H. thyreus*, Fig. 30).

None of the known subgenera exhibits such a combination of characters, and the shape of the mandibles is unique. In general appearance, sculpture and some other characters, particularly the elongated gonoforpipes, the species of the new subgenus resemble the Afrotropical *Nothylaeus* that however can be immediately separated by their sharp, sickle-shaped mandibles.

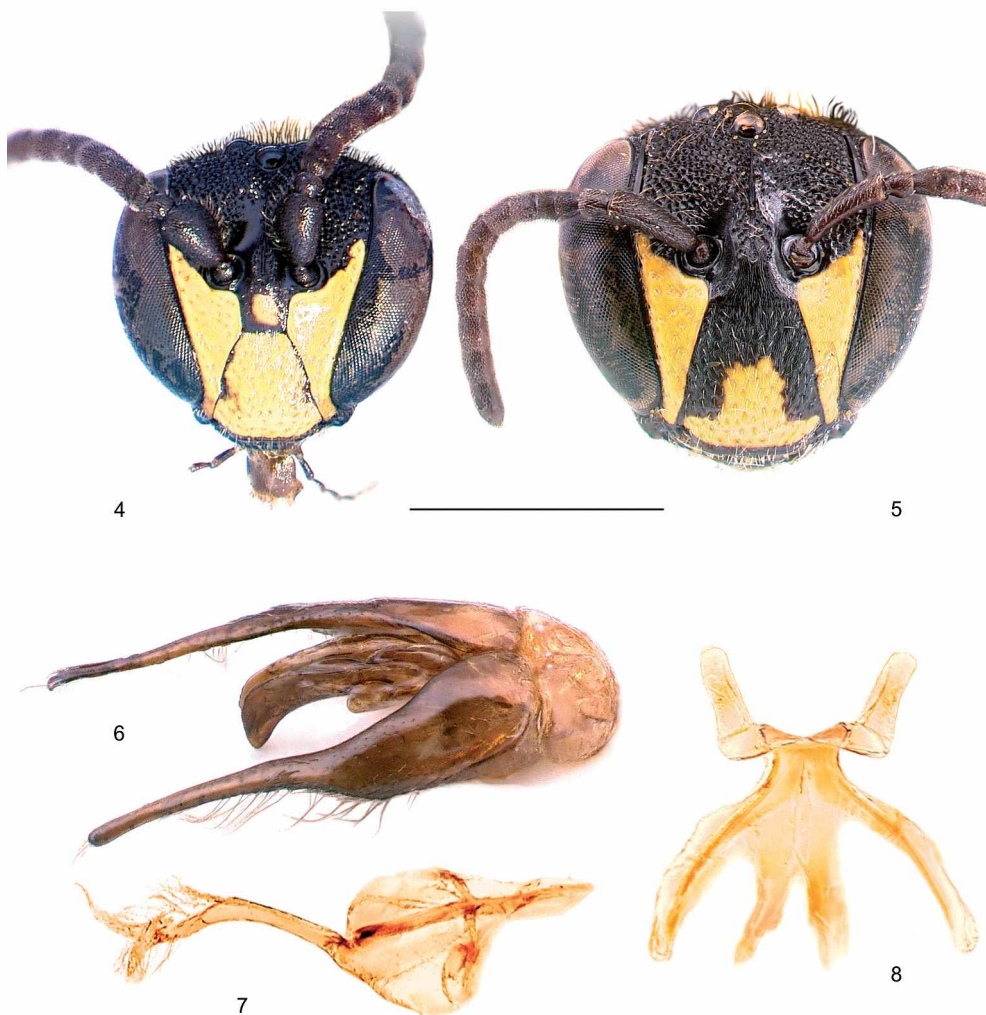
Bionomy:

The bionomy of the species has not been studied. Naturally one of the most interesting questions is the function of the peculiarly shaped mandibles. The specimens captured on Oahu, Hawaii, were flying around a *Scaevola* sp. bush (naupeká). The collector Walter T. Nagamine of the Department of Agriculture, Honolulu, Plant Pest Control Branch, informed me that this bee appears to have been introduced into Hawaii a few years ago and is now established there. It is of particular interest in a Hawaiian context because it does not come from one of the usual areas of origin of alien species, and because it has the potential to directly compete with the native species of *Hylaeus*. There is no doubt that the introduced species comes from south-east Asia, but no clues are available that might allow a more precise identification of its origin.

Geographical distribution:

Palaearctic, Oriental: India (Tamil Nādu, Karnāataka, Puducherry/Karaikal, West Bengal); Myanmar (Kayal); Sulawesi.

² The genital preparations made by Snelling have been intensively treated with KOH, so that setae and other fine structures may have been destroyed.

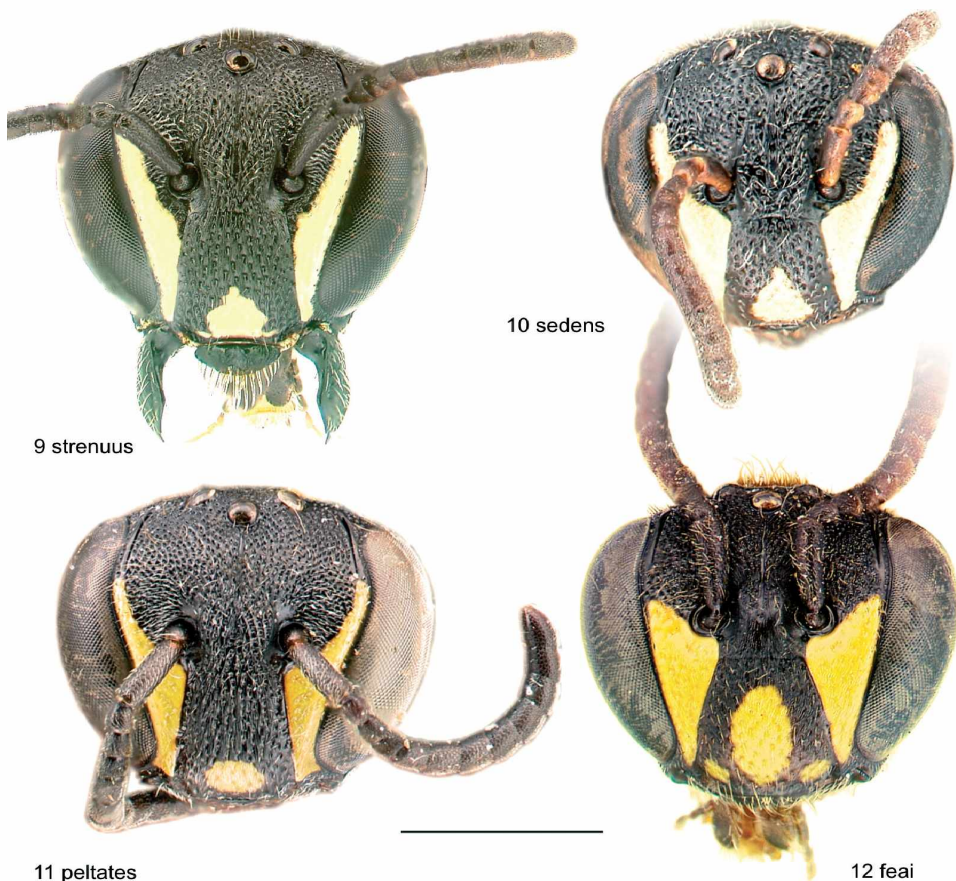


Figs 4-8: *Hylaeus (Indialaeus) birmanicus* sp. n. – 4 Head frontal, typus ♂. – 5 Head frontal, paratypus ♀. – Terminalia of a male paratypus (partly in lateral view): 6 copulatory apparatus, 7 sternum 8, 8 sternum 7. – Scale 1 mm.

I have before me a single female from Sulawesi, that without doubt belongs to this group, but on which no sound species description can be based (Sulawesi: Manado Batuputhi, 15 km N Bitung, 27.11.-2.12.2000, S. Risch leg.). The distribution of the subgenus is accordingly significantly enlarged and nourishes the conjecture, that the area actually inhabited is considerably larger.

Derivatio nominis:

The subgenus is named after India, one of its countries of provenance, and the ending of the zoological name *Hylaeus*.



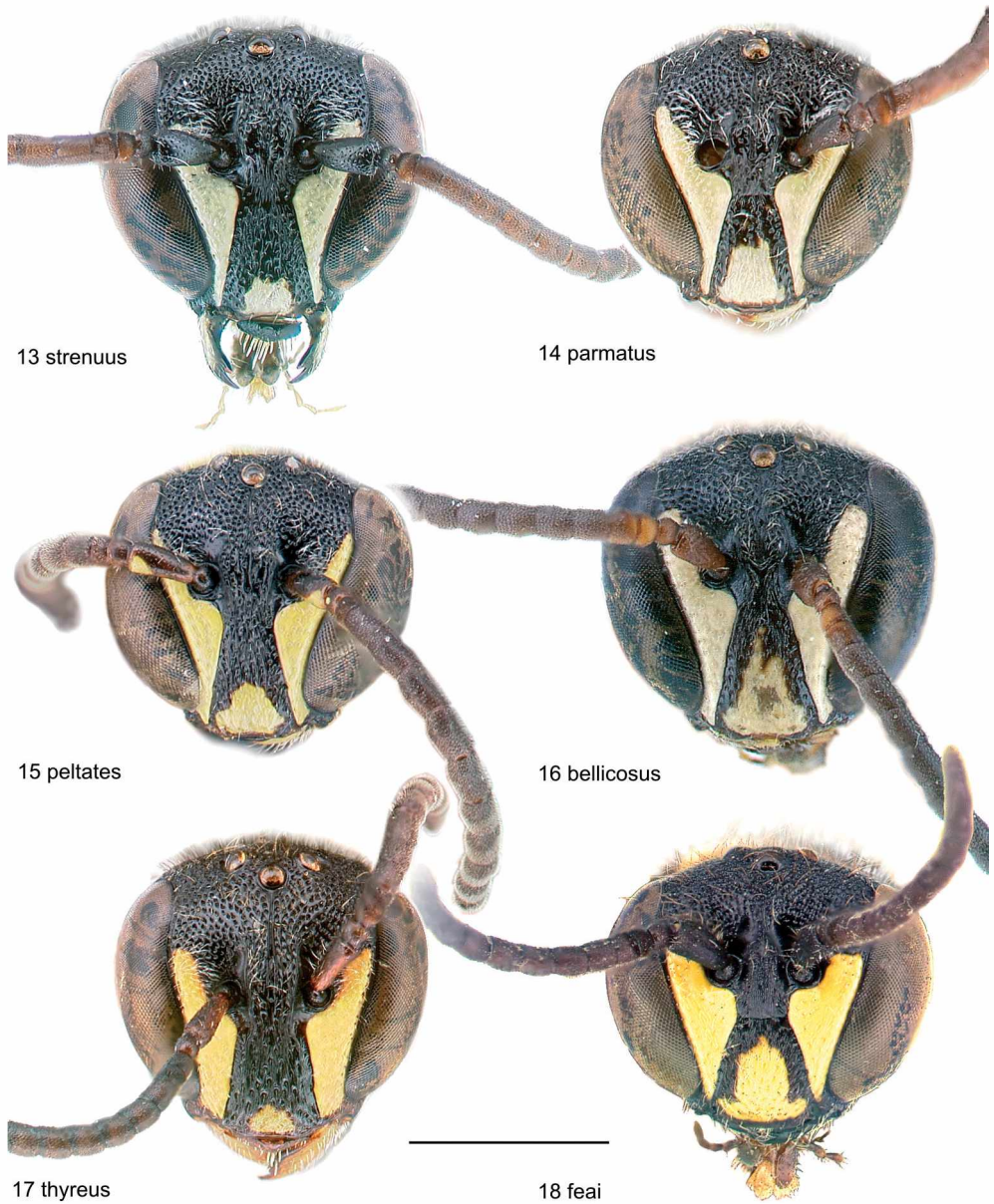
Figs 9-12: *Hylaeus* (*Indialaeus*) species. Head of females, frontal. – 9 *H. strenuus* (CAMERON, 1897) (Oahu, Hawaii). – 10 *H. sedens* SNELLING, 1980 (paratype). – 11 *H. peltates* SNELLING, 1980 (typus of *H. eurygnathus* SNELLING, 1980). – 12 *H. feai* (VACHAL, 1894) (paralectotypus). – Scale 1 mm.

3. Discussion

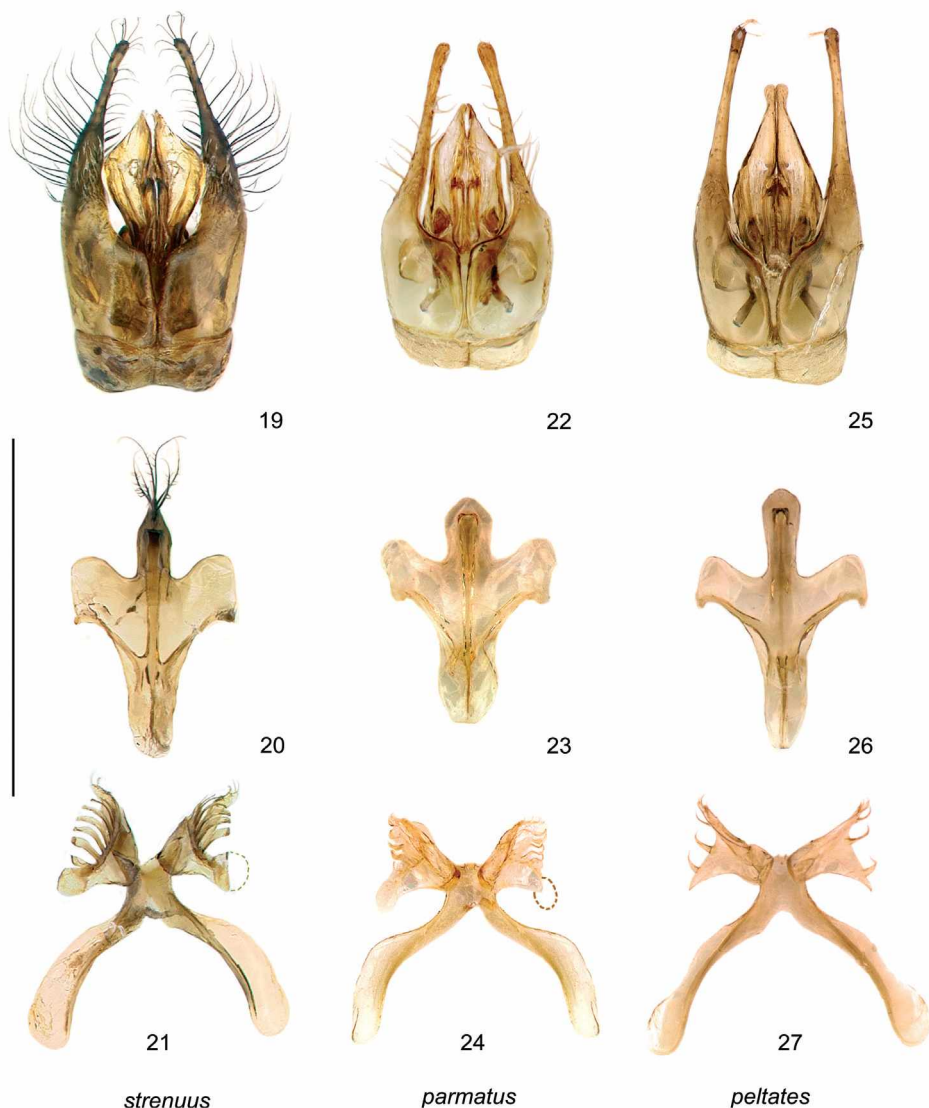
SNELLING (1980: 17) had already attempted to group his species *H. thyreus*, *H. parmatius* and *H. peltates* (♂) as well as *H. eurygnathus* and *H. sedens* (♀). In the process *H. thyreus* was separated from the other two males by a differently formed sternum 7. This species was placed with certain reservations together with the two taxa described only as ♀, so that within his five species he postulated two species groups (“subgenera”):

- (1) *H. parmatius* and *H. peltates* (♂)
- (2) *H. thyreus* (♂), *H. eurygnathus* and *H. sedens* (♀)

The Burmese species form their own group, differing in the typical characters of the mandibles and supraclypeal area as stated and the sterna 7 and 8 as well. However, they are included here

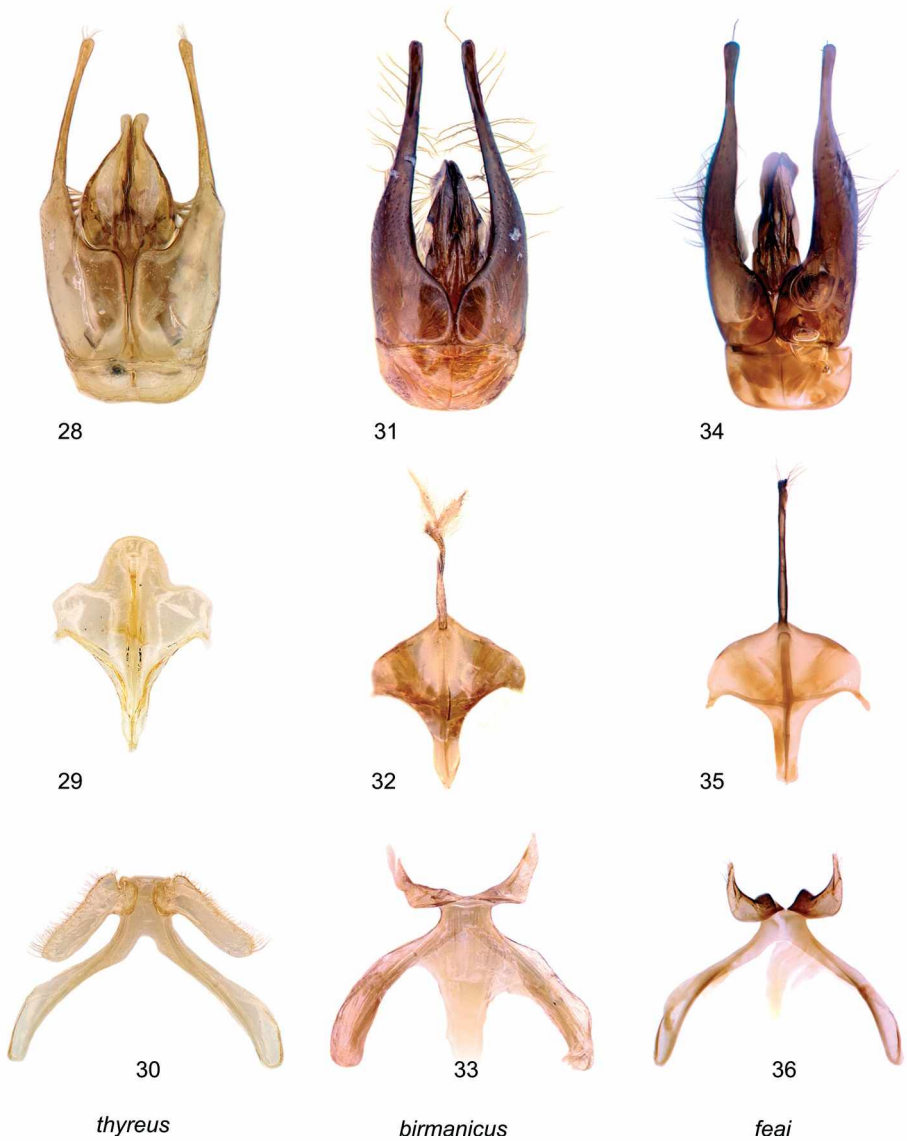


Figs 13-18: *Hylaenus* (*Indialaenus*) species. Head of males, frontal. – 13 *H. strenuus* (CAMERON, 1897) (Oahu, Hawaii). – 14 *H. parmatus* SNELLING, 1980 (typus). – 15 *H. peltates* SNELLING, 1980 (typus). – 16 *H. bellicosus* (CAMERON, 1897) (typus). – 17 *H. thyreus* SNELLING, 1980 (typus). – 18 *H. feai* (VACHAL, 1894) (lectotypus). – Scale 1 mm.



Figs 19-27: *Hylaeus* (*Indialaeus*) species. Terminalia of males: copulatory apparatus, sternum 8 and sternum 7.
 – 19-21: *H. strenuus* (CAMERON, 1897) (Oahu, Hawaii). – 22-24: *H. parmatus* SNELLING, 1980 (typus).
 – 25-27: *H. peltates* SNELLING, 1980 (typus). – Scale 1 mm.

because of the conspicuous similarity in the structure of the male copulatory apparatus. Two species are affected, *H. (Indialaeus) feai* (VACHAL, 1894) and *H. (Indialaeus) birmanicus* sp. n., which are part of the type series worked on by Vachal.



Figs 28-36: *Hylaenus* (*Indialaenus*) species. Terminalia of males: copulatory apparatus, sternum 8 and sternum 7. – 28-30: *H. thyreus* SNELLING, 1980 (typus). – 31-33: *H. birmanicus* sp. n. (typus, gonoforcipes of copulatory apparatus completed). – 34-36: *H. feai* (VACHAL, 1894) (lectotypus). – Scale 1 mm.

***H. (Indialaeus) feai* (VACHAL, 1894)**

Figs 12, 18, 34-36

In the original publication by VACHAL (1894) the following specimens of *Prosopis feai* are mentioned: 12 ♂♂ and 18 ♀♀ from Carin Chebà and 1 ♀ each from Schwegoo and Tenasserim; a further ♂ from Bhamò belongs to a different species. Localities mentioned are denoted thus:

Carin Chebà	–	Karen Hills, area of the Chebà ethnicity, ca. 19°12'N 96°35'E
Schwegoo	–	Shwegu, ca. 24°13'N 96°48'E
Tenasserim	–	12°05'N 98°55'E
Bhamò	–	24°15'N 97°14'E

From the Genova Museum I examined a total of 48 specimens of the type series, mounted on 35 pins. Two specimens donated to Heinrich Friese soon after they were collected are missing. I recognize a total of 4 species in the series. The ♂ that had been originally already separated as well as 2 ♂♂ 1 ♀ belong to two species of the subgenus *Nesoprosopis*. The other two species are regarded as belonging to the subgenus *Indialaeus*.

No type has yet been designated for *Prosopis feai*. Handwritten name labels by the describing author are present only on four pins, and these are not quite consistent. Only in one case are both sexes of the same taxon, as written on the label, to be found on the same pin. The ♂ of this preparation is **here designated as lectotype**. The specimen was remounted on a separate pin and its genitalia dissected. It is labelled: “Carin Chebà 900-1100 m L. Fea V XII-88” [printed]; “*Prosopis Feai*, Vachal ♀ ♂ | “commento Bingham [on reverse]” [handwritten]; “Museo Civico di Genova” [printed]; “*Lectotypus Prosopis feai* VACHAL, 1894 ♂, Dathe design. 2010” [red, printed]. 10 ♂♂ and 19 ♀♀ on 22 pins were labelled as paralectotypes. The pairs of specimens were all remounted each on a single pin. The locality is identical with that of the lectotype. The ♀ from Tenasserim is also recognized as *Hylaeus feai* (VACHAL), but is excluded from the type series because of abnormal characters – somewhat longer head and paler coloration.

A short description of the species follows, concentrating on the characters that separate it from the new species *H. birmanicus*.

Male:

Measurements (n=10) (mm). HL 1.43; HW 1.65; WL 4.4-5.0 (4.67); BL 6.0-6.6 (6.25). Head broad, HW:HL 1.15. Scape short, slender, SL:HL 0.21; SL:SW 1.61. Eyes strongly convergent below, UFW:LFW 1.67. Clypeus narrow, CW:CL 0.95; BCW:CW 0.49, 1.50 x ASD, 1.07 x IAD, 0.85 x COD. Clypeus separated from lower end of eye by less than ocellar diameter.

Head in profile transverse elliptical (Fig. 18). Scape small, slender, black. Colour: mask yellow, incomplete, clypeus with bell-shaped marking. Mandibles bifurcate. Pronotum with yellow band, calli and tegulae with spot, anterio-lateral corners of scutellum with small yellow fleck, which may be missing. Middle legs black. Sculpture: Thorax dorsally and laterally densely punctured, interspaces very narrow to unclear, shagreenate, generally matt. Medial area of propodeum shield-shaped, longitudinally ribbed to the midline, intervals smooth. Tergum 1 polished, clearly with scattered punctures, base pubescent, laterally with fringes of hairs. Terminalia: copulatory apparatus Fig. 34; gonoforces strongly elongated, narrow, laterally with long setae, apically with a few short setae. Penisvalves narrow, apically broadened below. Sternum 8 (Fig. 35) very long, narrow, apically with short setae. Sternum 7 see Fig. 36.

Female:

Measurements (n=10) (mm). HL 1.66; HW 1.94; WL 4.8-5.7 (5.30); BL 6.8-7.8 (7.14). Head broad, HW:HL 1.17. Scape slender, SL:HL 0.30; SL:SW 2.97. Eyes moderately convergent below, UFW:LFW 1.32. Clypeus narrow, CW:CL 1.01; BCW:CW 0.58, 2.28 x ASD, 1.37 x IAD, 1.26 x COD. Clypeus separated from lower end of eye by less than ocellar diameter.

Characters analogous to ♂. Clypeus with a single or 3 yellow flecks that may fuse to form a bell-shaped marking (Fig. 12). Anterior corners of scutellum yellow. Mesopleura densely and strongly punctate, but without larger interspaces. Medial area of propodeum with longitudinal ribs that basally may be irregular, but do not exhibit transverse edges. Tergum 1 polished and with only very sparse fine punctures; pubescent at base.

***H. (Indialaeus) birmanicus* sp. n.**

Figs 4-8, 31-33

Diagnosis:

Male: Mandible of usual size and shape, apically acute. Corresponding in many characters with *H. feai*, but above all clearly distinguishable by the structure of sternum 8. Further differences: Scapus roundly widened; mask more extensively yellow, also the supraclypeal area with fleck. Puncture of the mesopleura coarser, axillae black, medial area of propodeum basally with sharp transverse ridge.

Female: Mandibles normal, not enlarged, parallel-sided with edges reinforced. Differences to *H. feai*: collar with two separate yellow stripes; axillae black; mesopleura with coarse punctures; medial area of propodeum basally with transverse carina; abdominal tergum 1 on the basal surface bare.

Description:**Male (n=5).**

Measurements (mm). HL 1.51; HW 1.65; WL 3.8-4.6 (4.32); BL 6.0-6.8 (6.28).

Head (Fig. 4) broad, HW:HL 1.09. Scape enhanced, SL:HL 0.25; SL:SW 1.46. Eyes strongly convergent below, UFW:LFW 1.62. Clypeus narrow, CW:CL 1.04; BCW:CW 0.40, 1.64 x ASD, 1.00 x IAD, 0.82 x COD. Clypeus separated from lower end of eye by less than ocellar diameter.

Scape apically globularly expanded, reverse side flattened. First flagellomere about equal to pedicel in length, second about 1.5 times first, third about 2.0 times first. Interocellar distance nearly equal to ocellocular distance.

Clypeus and sides of face shiny, finely shagreenate between scattered, fine, shallow punctures. Supraclypeal area narrow, very finely longitudinally striated, matt; acute above, distinguishable from frons. Smooth areas adjacent on both sides. Face, vertex, and gena moderately shiny between moderate, subcontiguous punctures. Back of head with continuous sharp edge. Mandible narrow, acute; edges thickened.

Thorax:

Mesonotum slightly shiny between moderate, subcontiguous punctures; scutellum similar; metanotum rough between deep, dense punctures; mesopleuron conspicuously coarsely punctate, intervals ca. 1 puncture diameter, shagreenate, moderately shiny; metapleuron moderately

shiny between fine, subcontiguous punctures. Propodeum laterally sharply margined; side and disc covered with short white tomentose hairs; basal area shield-shaped, smooth and shiny, with irregular sharp longitudinal carinae towards posterior middle; at the base a clear transverse ridge.

Abdomen:

Disc of first tergum smooth and shiny between fine to moderate, sharp punctures at 1-2 puncture diameters apart; disc of second tergum moderately shiny between sparse, fine punctures.

Pilosity. First tergum only laterally with sparse hairs and with apicolateral patch of adpressed pale hairs.

Colour:

Blackish. The following bright yellow: clypeus nearly completely, only the upper margins darkened; supraclypeal area with spot; lateral face mark, ending acutely on eye margin slightly above ocular sinus; pronotal collar interrupted in middle; most of pronotal lobe; outer stripe on protibia, small basal spots on tibiae and basal half of basitarsi. Remainder of tarsi reddish brown. Flagellum dark brown, slightly paler beneath. One specimen with extended marks on the scape, upper supraclypeal area and anterior edges of scutellum, pronotum line not interrupted. Wings clear, brownish, veins and stigma brown.

Terminalia:

Copulatory apparatus (Fig. 6, 31); gonoforcipect strongly elongated, narrow, laterally outside with long setae, apically with few short setae. Penisvalves narrow, apically expanded below. Sternum 8 (Fig. 7, 32) elongated, laterally flattened, apically with three clumps of setae. Sternum 7 see Fig. 8, 33.

Female (n=8).

Measurements (mm). HL 1.76; HW 1.91; WL 4.2-5.8 (5.12); BL 6.4-8.1 (7.14).

Head (Fig. 5) broad, HW:HL 1.08. Scape slender, SL:HL 0.27; SL:SW 3.02. Eyes moderately convergent below, UFW:LFW 1.27. Clypeus narrow, CW:CL 1.00; BCW:CW 0.59, 2.55 x ASD, 1.41 x IAD, 1.43 x COD. Clypeus separated from lower end of eye by less than ocellar diameter.

Scapus long and slender. First flagellar segment about equal to pedicel in length, second about 0.75 times first, third equal to first. Foveae faciales long, reaching to the vertex, ending closer to the orbits.

Clypeus and face only silkily shiny, finely shagreenate between scattered, fine, shallow punctures. Supraclypeal area narrow, very finely longitudinally striate, matt; acute above, distinguishable from frons. Finely shagreenate areas adjacent on both sides. Face, vertex, and genae moderately shiny between moderate, subcontiguous punctures. Back of head with continuous sharp edge. Mandible bilobate; edges thickened.

Thorax:

Mesonotum slightly shiny between moderate, subcontiguous punctures; scutellum similar; metanotum rough between deep, dense punctures; mesopleuron conspicuously coarsely punctate, intervals ca. 0.5 to 1 puncture diameter, shagreenate, moderately dull; metapleuron moderately shiny between fine, subcontiguous punctures. Propodeum laterally sharply margined; side and disc covered with short white tomentose hairs; basal area shield-shaped, smooth and shiny, with irregular sharp longitudinal carinae towards posterior middle; at the horizontal base a clear transverse ridge.

Abdomen:

Disc of tergum 1 smooth, shiny and nearly impunctate; only laterally with very fine scattered punctures; disc of tergum 2 moderately shiny between sparse, fine punctures.

Pilosity. Tergum 1 only laterally with sparse hairs and with apicolateral patch of adpressed pale hairs.

Colour:

Blackish. The following parts yellow: bell-shaped mark on the clypeus; supraclypeal area with spot; lateral face mark ending acutely on eye margin slightly below ocular sinus; pronotal collar interrupted in middle; most of pronotal lobe; outer stripe on protibia, small basal spots on tibiae. Flagellum dark brown, slightly paler beneath. Wings clear, with brownish tint, veins and stigma brown.

Type Material:

Holotype male: Myanmar: Kayin, Carin Chebà (Karen Hills, ca. 19°12'N 96°35'E), V XII-88. L. Fea leg. Paratypes: same locality and data 3 ♂♂ 6 ♀♀; same locality and collector, VIII-88 1 ♂; Schwego Myo (Shwegu, ca. 24°13'N 96°48'E), Fea. X 1885 1 ♀; Carin Asciuii Chebà 900-1000 m. L. Fea. IV-88 1 ♀. All Museo di Storia Naturale Genova (MSNG).

Derivatio Nominis:

Refers to the country where the species was first recorded in the 19th century.

To summarise, the following groups can in my opinion at present be distinguished:

– *H. strenuus* group

H. strenuus (CAMERON)

H. peltates SNELLING

H. sedens SNELLING

H. bellicosus (CAMERON)

– *H. thyreus* group

H. thyreus SNELLING

– *H. birmanicus* group

H. birmanicus sp. n.

H. feai (VACHAL)

However, only further studies with substantially more material from a much larger geographical area can enable a true picture of the new subgenus to be formed.

4. Key to the *Hylaeus* species of the subgenus *Indialaeus*

Females (antenna with 12 articles)

- 1 Supraclypeal area conspicuously wide, only slightly narrower above than at the widest point, merging flatly into the frons. Mandibles broadened, about twice as long as broad; flat, outer face without obvious ridges or grooves; cutting edge with weak preapical notch 4

- Supraclypeal area normal, conspicuously narrowed above, impressed where it joins the frons. Mandibles normal, nearly three times as long as broad, narrowly tapered; outer face with upper ridge, below which is a longitudinal groove; cutting margin oblique, without preapical notch 2
- 2 Preapical notch of mandible weak; markings yellow *peltates*
- Preapical notch of mandible strong, a distinct preapical tooth present; markings whitish 3
- 3 Outer margin of mandible curved; its face minutely striate, bare, shiny, pitch brown; apically sharply dentate *sedens*
- Margins of mandible nearly parallel; surface coarsely sculptured and sparsely pubescent, without shine, mainly black; at end with broad tooth *peltates*
- 4 Mesopleura densely and strongly punctate, but without larger interspaces; collar with complete yellow stripe; axillae yellow. Medial area of propodeum with longitudinal ribs, without transverse edges. Abdominal tergum 1 polished, pubescent at base *feai*
- Mesopleurae conspicuously coarsely punctate, intervals 0.5 to 1 puncture diameter; collar with two separate yellow stripes; axillae black. Medial area of propodeum basally with transverse carina. Abdominal tergum 1 on the basal surface bare *birmanicus*

Males (antenna 13 segmented)

The male of *H. bellicosus* (CAM.) has been excluded because a definite determination is not possible until the terminalia have been examined (they remain unknown); the single specimen, the holotype, lacks its abdomen. The statement in BINGHAM's key (1897: 410) cannot be checked. In this key it would run to couplet 4 (*strenuus* / *parmatius*).

- 1 Supraclypeal area conspicuously broad, also above only slightly narrower as at the broadest point, merging flatly into the frons 2
- Supraclypeal area normal, clearly narrowed above, impressed where it joins the frons ... 5
- 2 Orbits strongly convergent below, distance between lateral margin of clypeus and inner eye margin about equal to the height of the malae. Mandibles inconspicuous; black or yellow or white marked 3
- Orbits weakly convergent below, distance between lateral margin of clypeus and inner eye margin about twice the height of the malae. Mandibles flat and with fine sculpture, without ridges like the female; pitch brown. Terminalia Fig. 28-30 *thyreus*
- 3 Pale markings on head, thorax and legs white; sometimes parts of the mask yellowish. Mandibles clearly bidentate. Scape black. Median area of propodeum surrounded by a smooth impunctate area, bordered by a stout semicircular keel 4
- Pale markings on head, thorax and legs yellow. Preapical tooth of mandibles very low, obscure. Scape maculate. Median area of propodeum with the middle raised, forming a triangle to the middle furrow. Terminalia Fig. 25-27 *peltates*
- 4 Mesopleura with smooth ground sculpture, highly shiny. Copulatory apparatus with long setae; apical lobe of sternum 8 with setae (Fig. 19-21) *strenuus*

- Mesopleura with shagreen ground sculpture, with silky shine. Copulatory apparatus without long setae; apical lobe of sternum 8 without setae (Fig. 22-24; see footnote p. 246 *parmatius*
- 5 Scapus slender, not widened; mask reduced, the supraclypeal area black. Puncture of the mesopleura subcontiguous, axillae yellow. Medial area of propodeum without basal transverse ridge, only with sharp longitudinal ridges. Terminalia Fig. 34-36 *feai*
- Scapus roundly widened; mask more extensively yellow, the supraclypeal area also with fleck. Puncture of the mesopleura coarse, axillae black. Medial area of propodeum basally with sharp transverse ridge. Terminalia Fig. 31-33 *birmanicus*

5. Catalogue of species

strenuus (CAMERON, 1897), ♂. - India: Bārākpur, West Bengal

Prosopis striatifrons CAMERON, 1897: 89-90. ♀. India: Barrackpore. - Typus ♀ OUMNH HYME1951. - Syn. of *strenua*, according to DATHE (2010: 67). The synonymy with *Prosopis feai* VACHAL, 1894 by BINGHAM (1897: 411) is not tenable. See also MEADE-WALDO (1923: 23), but note that *H. strenuus* is completely missing from his lists.

Prosopis strenua CAMERON, 1897: 91. ♂ (nec ♀). - India: Barrackpore. - Typus ♂ OUMNH HYME1953.

parmatius SNELLING, 1980, ♂. - India: Tamil Nādu

Hylaeus parmatius SNELLING, 1980: 10-11, 13. ♂. - India: Singara, Nilgiri Hills. - Typus ♂ LACM.

sedens SNELLING, 1980, ♀. - India: Karaikal, Puducherry

Hylaeus sedens SNELLING, 1980: 13-15. ♀. - India: Karikal, Pondicherry State. - Typus ♂ LACM. – Possibly this is the female of *H. parmatius* SNELLING, but the available material is not sufficient to decide this.

peltates SNELLING, 1980, ♂. - India: Tamil Nādu

Hylaeus peltates SNELLING, 1980: 12-13. ♂. - India: Naduvattam, Nilgiri Hills. - Typus ♂ LACM.

Hylaeus eurygnathus SNELLING, 1980: 14-16. 2 ♀ ♀. - India: Naduvattam, Nilgiri Hills; Karnātaka. - Typus ♀ LACM. - **syn. nov.**

bellicosus (CAMERON, 1897), ♂. - India: Bārākpur, West Bengal

Prosopis bellicosa CAMERON, 1897: 92-93. Gender not mentioned. - India: Barrackpore. - Typus ♂ OUMNH HYME1955 missing abdomen.

thyreus SNELLING, 1980, ♂. - India: Tamil Nādu

Hylaeus thyreus SNELLING, 1980: 7, 9, 11. ♂. - India: Singara, Nilgiri Hills. - Typus ♂ LACM.

feai (VACHAL, 1894) ♀ ♂. - Myanmar: Kayin

Prosopis feai VACHAL, 1894: 444-446. ♀ ♂. - Burma: Carin Chebà. - Lectotypus ♂, this paper (MSNG).

Prosopis feae DALLA TORRE, 1896: 23; MEADE-WALDO (1921: 23), unjustified emendation; the name was dedicated to "M[onsieur] Fea", a male person.

birmanicus sp. n. ♀ ♂. - Myanmar: Kayin, Toungoo district

Hylaeus (Indialaeus) birmanicus sp. n. ♀ ♂. - Burma: Carin Chebà. - Typus ♂ MSNG.

6. Acknowledgements

For the generous loan of type material and manifold support, I thank Dr. Brian V. Brown, Los Angeles, for the types of the Snelling species; Dr. Fabio Penati, Genova, for the Vachal type series and his valuable comments and discussion. Andrew Liston, SDEI Müncheberg, is thanked for his remarks and perceptive translation.

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Subject editor:

Mag. F. GUSENLEITNER

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Zeitschrift/Journal: [Beiträge zur Entomologie = Contributions to Entomology](#)

Jahr/Year: 2011

Band/Volume: [61](#)

Autor(en)/Author(s): Dathe Holger Heinrich

Artikel/Article: [Studies on the systematics and taxonomy of the genus *Hylaeus* F. \(7\) *Indialaeus* subgen. nov., a new subgenus of *Hylaeus* from the Oriental Region \(Hymenoptera: Anthophila, Colletidae\). 243-258](#)