



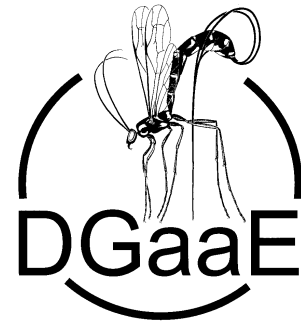
**Beiträge der
Hymenopterologen-Tagung in Stuttgart
(6.-8.10.2006)**

Herausgeber: Dr. Till OSTEN, Stuttgart

Arbeitskreis Hymenoptera der DGaaE

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Zitervorschlag: Beitr. Hymenopt.-Tagung Stuttgart [2006]

ISSN 1614-3140

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Referiert in: *Entomology Abstracts*, *Zoological Record*.

Titelseite: *Anthophora aesivalis* (PANZER, 1801)

Zeichnung: Erwin SCHEUCHL (Original)

The bee fauna (Hymenoptera: Apoidea) of Taiwan

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A historical review of the taxonomy of the bee fauna of Taiwan is presented from the early beginning of the 20th century onward. Since that time when the extensive material collected by Hans Sauter had been examined by specialists the bee fauna of Taiwan has only been insufficiently and poorly studied to date. This concerns especially the highlands of Taiwan which are harboring many new species of bees as shown by the results of recent collecting expeditions (DAAD, PPP D/0039914) to these areas (DUBITZKY 2002, 2005, 2006; DUBITZKY & KUHLMANN 2004).

To date about 150 species of bees, belonging to 32 different genera are known from Taiwan. A determination key for the families and genera of bees of Taiwan is presented as follows, based on the key for bee genera given by MICHENER (2000).

A. Key to the bee families of Taiwan

- 1 Short tongued (S-T) bees; four segments of labial palpus similar to one another, not flattened; galea not distinctly elongate, usually shorter than stipes; volsella of male genitalia well developed 2
- Long-tongued (L-T) bees; first two segments of labial palpus being elongate and flattened; last two segments of labial palpus small, distinctly diverging from axis of first two; galea elongate, at least as long or longer than stipes; volsella of male genitalia minute or absent 4

- 2 Glossa apically pointed 3
- Glossa truncate to bilobed apically **Colletidae**

- 3 Females and some males with distinct facial fovea, in females with typical velvet-like pubescence; subantennal area defined by two subantennal sutures below each antennal socket; lacinia distinctly represented by hairy, scalelike lobe near base of galea. [Only one genus present in Taiwan.] **Andrenidae: *Andrena* FABRICIUS** (6 species)
- Females without distinct facial fovea; subantennal area with only a single subantennal suture below each antennal socket; lacinia inconspicuous or displaced, not forming scalelike lobe at base of galea. **Halictidae**

- 4 Scopa, when present, consisting of long simple hairs on metasomal sterna; labrum usually as long as broad or longer; forewing with two submarginal cells, which are about equal in length. **Megachilidae**
- Scopa, when present, on hind leg, particularly the tibia, consisting of simple to feathered hairs; labrum usually broader than long; forewing with two or three submarginal cells, rarely only one. **Apidae**

B. Key to the bee genera of Taiwan

B.1. Colletidae

- 1 Forewings with three submarginal cells; scopa on hind legs of female clearly developed; pubescence of body distinct, dense; body completely dark coloured, without yellow or ivory markings.
Colletes LATREILLE (*C. taiwanensis* DUBITZKY & KUHLMANN)
- Forewings with two submarginal cells; scopa on hind legs of female absent; pubescence of body sparse, indistinct; head and thorax often with yellow to ivory coloured markings.
Hylaeus FABRICIUS (3 species)

B.2. Halictidae

- 1 Scopa on hind legs of females absent; prepygidial fimbria not divided medially; head and thorax black coloured; metasoma completely red coloured, with black maculations basally and or apically. [Cleptoparasitic bees on *Halictus* and *Lasioglossum* species.]
Sphecodes LATREILLE (3 species)
- Scopa on hind legs of females present 2
- 2 Prepygidial fimbria of females not divided medially 3
- Prepygidial fimbria of females divided medially by distinct groove 7
- 3 Forewings with two submarginal cells; males & females with translucent lamella on dorsolateral angle of pronotum; tegulae large, extending well behind level of scutoscuteellar suture.
Steganomus RITSEMA (*S. taiwana* HIRASHIMA)
- Forewings with three submarginal cells; pronotum without lamella on pronotum; tegulae normally in size, not reaching scutoscuteellar suture 4
- 4 Stigma small, max. about 1/3 of length of marginal cell; 3rd submarginal cell as long as 1st submarginal cell or longer; submarginal cells 2 and 3 together distinctly longer than submarginal cell 1; medium to large sized bees of at least 8 mm body length 5
- Stigma big, nearly as long as marginal cell; 3rd submarginal cell distinctly shorter than 1st; submarginal cells 2 and 3 together about as long as submarginal cell 1 minute to small bees of 3-6 mm body length 6
- 5 Marginal zones of metasomal terga 2 to 4 (in males terga 1 to 5) hairless, impunctate, usually opaque white to yellow, green or blue coloured.
Nomia LATREILLE (ca. 12 species)
- Metasomal terga 2 to 4 with apical bands of hair or tomentum, if hairless not coloured as listed above.
Lipotriches GERSTAECKER (2 species)
- 6 Metasomal sternum 8 of male with long, apical process; inner spur of hind tibia of female without big, distinct teeth.
Nomioides SCHENCK (2 species)
- Metasomal sternum 8 of male without apical process; inner spur of hind tibia of female with two, large teeth. [According to Michener (2000) species of *Nomioides* probably have to be transferred to this genus.]
Ceyalictus STRAND (?)

- 7 Distal submarginal crossveins of forewing as strong as 1st submarginal crossvein; metasomal terga with distinct apical hairbands. *Halictus* LATREILLE (ca. 35 species, together with *Lasioglossum*)
- 3rd and 2nd submarginal crossveins of forewing distinctly weaker than 1st; pubescence of metasomal terga dispersed, without apical hairbands, sometimes with basal hairbands instead. *Lasioglossum* CURTIS (ca. 35 species, together with *Halictus*)

B.2. Megachilidae

- 1 Scopa present on metasomal sterna 2-5(6) 2
- Scopa absent. [Cleptoparasitic bees on *Megachile* and *Lithurgus* species.] 6
- 2 Arolia present 3
- Arolia absent 5
- 3 Claws simple; scutellar spines present. *Heriades* SPINOLA (1 species)
- Claws bidentate; scutellum without lateral spines 4
- 4 Vein cu-v of hind wing less than half as long as second abscissa of M+Cu; omaular carina absent; metasomal tergum 7 of male trilobed. *Bathanthidium* ALFKEN (*B. bifoveolatum* (ALFKEN))
- Vein cu-v of hind wing at least half as long as second abscissa of M+Cu; omaular carina strong; metasomal tergum 7 of male different, never trilobed. *Trachusa* PANZER (2 species)
- 5 Pygidial plate of male present, pygidial plate of female with apical spine or projection; female with lamellate projection below antennal insertion, forming by upper part of clypeus and or supraclypeal area; male genitalia and hidden sterna extremely small and simple. *Lithurgus* BERTHOLD (*L. collaris* SMITH)
- Pygidial plate absent in male, without apical projection in female; female without lamellate projection below antennal insertion; male genitalia and hidden sterna larger, more complex. *Megachile* LATREILLE (25 species)
- 6 Claws simple; arolia absent; scutellum with two lateral spines; metasomal tergum 6 of female apically pointed, of male with lateral or apical toothlike projections; metasoma black, conical. *Coelioxys* LATREILLE (6 species)
- Claws bidentate; arolia present; scutellum and axilla forming plate-shaped, rounded projection reaching up to end of propodeum; metasomal tergum 6 of female apically rounded, of male without distinct toothlike projections laterally or apically, metasoma reddish, cylindrical. *Euaspis* GERSTAECKER (2 species)

B.3. Apidae

- 1 Wings apically papillate 2
- Wings apically not papillate 7

- 2 Submarginal cell 3 larger than submarginal cell 1; stigma absent; 1st recurrent vein joining 3rd submarginal cell. *Xylocopa* LATREILLE (7 species)
 – Submarginal cell 3 smaller than submarginal cell 1; stigma small but present; 1st recurrent vein joining 2nd submarginal cell 3
- 3 Scopa present on hind legs of females 4
 – Scopa absent on hind legs of females 6
- 4 Arolia present; 1st recurrent vein joining 2nd submarginal cell at or near apex 5
 – Arolia absent; 1st recurrent vein joining 2nd submarginal cell near middle.
Amegilla FRIESE (6 species)
- 5 Flabellum present; mandibles tridentate; clypeus extremely protuberant; males with thickened hind legs. *Elaphropoda* LIEFTINCK (*E. taiwanica* WU)
 – Flabellum absent; mandibles bidentate; clypeus normally rounded; males usually with normal, not thickened hind legs. *Habropoda* SMITH (4 species)
- 6 Scutellum flat, posteriorly produced over metanotum as sharply margined plate, bidentate with broad V-shaped emargination between teeth; body with appressed plumose hairs of white, blue or green coloured spots or broken bands. [Cleptoparasitic bees on *Amegilla* species.] *Thyreus* PANZER (3 species)
 – Scutellum rounded, coarsely wrinkled, with two distinct lateral spines; pubescence of body brown orange or yellowish, without spots of white or coloured hairs. [Cleptoparasitic bees on *Habropoda* and *Elaphropoda* species.]
Tetralonioidella STRAND (3 species)
- 7 Submarginal crossveins reduced to absent, only submarginal cell one remaining; apex of marginal cell and submarginal cell one open or closed by weakened vein.
Trigona JURINE (*T. ventralis* SMITH)
 – All veins well developed, marginal cell and submarginal cell closed by by strong vein 8
- 8 Scopa present on hind legs of females 9
 – Scopa absent on hind legs of females *Nomada* SCOPOLI (4 species)
- 9 Forewings with submarginal cells three 10
 – Forewings with submarginal cells two 13
- 10 Pygidial plate and pygidial fimbria present in females; scopa of hind legs consisting of long, sparse hairs; metasomal terga with distinct apical hairbands of short appressed pubescence (especially in females); males usually with elongate antennae and yellow coloured clypeus and paraclypeal area. *Tetralonia* SPINOLA (3 species)
 – Pygidial plate and pygidial fimbria absent in females 11

- 11** Body with distinct medium long to long, regularly to dense pubescence; tibial scopa corbiculate modified; metasoma not broadened apically **12**
- Pubescence of body nearly absent, bare; tibial scopa weakly developed, reduced; shape of metasoma apically distinctly broadened; integumental colour dark, often metallic, with nearly always yellow maculations on clypeus, often also metasomal terga and thorax with yellow coloured stripes ***Ceratina* LATREILLE** (ca. 10 species)
- 12** Spurs of hind tibia absent; marginal cell extremely long, at least 4 times as long as broad, nearly reaching up to apex of wing; basitarsus of hind legs of females without toothlike projection; head normal in shape not distinctly elongate.
- Apis* LINNAEUS** (2 species)
- Spurs of hind tibia present; marginal cell shorter, less than 3 times as long as broad, with distinct space between distal ending of marginal cell and apex of wing; basitarsus of hind legs of females basally with distinct toothlike projection; head distinctly elongate by long malar space. ***Bombus* LATREILLE** (9 species)
- 13** Proboscis conspicuous short, resembling ST-bees; pygidial plate and pygidial fimbria present in female; inner hind tibial spur distinctly expanded at base, with comblike margin. ***Ctenoplectra* KIRBY** (2 species)
- Proboscis long, as typical for LT-bees; pygidial plate and pygidial fimbria absent in female; inner spur of hind tibia basally not distinctly expanded; pubescence of body nearly absent, bare; tibial scopa weakly developed, reduced; shape of metasoma apically distinctly broadened; habitus like *Ceratina*.
***Braunsapis* MICHENER** (*B. marginata* (SMITH))

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