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## **TAXONOMY OF BASSINAE (= AGATHIDINAE NEES 1814) NEES 1812 IN BANGLADESH**

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### **ABSTRACT**

Two genera of Bassinae (Hymenoptera: Braconidae) have been described and illustrated from Bangladesh and a key was prepared. The genera are: *Agathis* Latreille and *Bassus* Fabricius newly recorded from Bangladesh.

**Key words:** New record, Braconidae, Bassinae, endoparasitoid.

### **INTRODUCTION**

Agathidinae is a moderately large subfamily of Braconidae with 1,061 described species worldwide and 238 in the Oriental Region (Yu *et al.* 2005). There are estimated 2,000–3,000 species awaiting description worldwide (Sharkey *et al.* 2006). The subfamily has a worldwide distribution and its members are found in most terrestrial habitats. All known species are koinobiont endoparasitoids of lepidopteran larvae, the life history traits vary considerably. They may be nocturnal or diurnal, gregarious or solitary; attack exposed or concealed hosts of any larval instars. In general, they are solitary and attack 1st-instar Lepidoptera larvae in concealed microhabitats such as leaf-rolls or stems, and emerge from the last larval instar of the host after it has spun its cocoon. Species revision for the New World include those by Muesebeck (1927) on Bassinae of North Mexico, Sharkey (1983, 1986, 1988, 1990) on *Majoriella* Sharkey, *Pharpa* Sharkey, *Alabagrus* Enderlein, and *Zacremnops* Sharkey and Wharton. Sharkey (1992) revised the Bassinae of the world at the tribal level. Shenefelt (1970) cataloged the species of world. The Subfamily Bassinae contains 20 genera in the New World and 52 worldwide but according to Goulet and Huber (1993), there are 54 genera Worldwide. Bhat and Gupta (1977) described 209 species under 22 genera of Agathidinae from Oriental region. In Britain, they have only 24 species in three genera, *Agathis*, *Bassus* and *Earinus*. In Bangladesh we have 4 genera, *Agathis*, *Bassus*, *Earinus* and *Euagathis* (Rahman 2012).

Some attempts have been made to sort out the chaos of names of the oriental species by Bhat and Gupta (1977), but no major taxonomic research has been

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done on the tropical fauna. The genera of Oriental Agathidinae are revised and fully illustrated dichotomous key is presented by Sharkey *et al.* (2009).

### *Distinguishing Features of Bassinae*

Secto radii and median vein (SR+M) mostly undeveloped; marginal cell of fore wing extremely narrow and rather long; vein m-cu of fore wing more or less diverging posteriorly from direction of anterior half of vein 1-M; vein CU1b absent; trace of vein 2-CU of hind wing nearly always present and situated at or above level of vein cu-a; 1<sup>st</sup> discal cell and 1<sup>st</sup> submarginal cell confluent, except in *Earinus* Wesmael; 2<sup>nd</sup> submarginal cell usually very small, triangular or subtriangular, forming an areolet; radial cell always short, narrow, terminating far proximal to apex of fore wing; head in facial view elongate; mouthparts lengthened and drawn out in form of beak; maxillary palpus 5-segmented; labial palpus 4-segmented; metasoma of generalized form; pronotum with deep pit on each side, separated internally by fenestra; metasoma usually polished and smooth; spiracles of tergite 1 situated on dorsal plate.

Bassinae can be recognized by the following combination of characters: fore wings M+CU not tubular in basal third or more (Figs. 3); fore wing SR complete to wing margin and terminating far basal the apex of the wing (Figs. 3, 14-15); occipital carina absent (Figs. 2, 17); second submarginal cell of fore wing usually present, small and quadrate or triangular (Figs. 14-15).

## **MATERIALS AND METHODS**

Collections of specimens of Bassinae were made from different areas of Tangail, Rangamati and Cox's Bazar of Bangladesh. A total of three genera were sorted out during the period from 2000 to 2003. The insects were collected by using sweep net and Malaise Traps. The collected specimens were brought to the laboratory and were mounted dry with pins on cards. Stainless steel, continental size pins with and without head were used for all mounting methods. Some specimens were preserved in 70% alcohol. The specimens were identified on the basis of the external morphological features viewed under a Binocular Microscope. The terminology used to describe the characteristic morphological features of Hymenoptera and Braconidae were followed according to Achterberg (1979, 1988, 1990, 1993 and 1997); Shaw and Huddleston (1991), Goulet and Huber (1993); and Wharton *et al.* (1997). The identification of the specimens upto species level was confirmed by D. L. J. Quicke, Department of Biology, Imperial

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College of Science, Technology and Medicine, London, UK (personal communication). The females of Bassinae genera are described in this paper and the type materials were stored in the ZMCU.

*Abbreviations used:* ZMCU= Zoological Museum of Chittagong University; (\*) = New record to the fauna of Bangladesh.

### RESULTS AND DISCUSSION

#### *Description of Genera*

*Agathis latreille* 1805(\*) (Figs. 1-12)

#### *Head*

Black; head in facial view always elongate; if not markedly so then still clearly triangular; ocelli triangle, the posterior tangent to the anterior ocellus not touching or cutting posterior pair (Fig. 2); malar space usually at least half as long as height (= longitudinal diameter) of eye; stemmaticum in lateral view of the head flat or distinctly prominent; antenna with 38 segments; mouth parts characteristically lengthened, forming a beak (Fig. 11) is important in *Agathis*, in the area between the antennal sockets, there is nearly some median protuberance and notaulices always present.

#### *Mesosoma*

Propodeum with two distinct medial longitudinal keels; surface of keels usually smooth, polished (Fig. 8); spurs of hind tibia short, always less than half as long as basal segment of hind tarsus (Fig. 7); middle tibia with two teeth on its outer side; hind claw without a lobe or tooth (Fig. 10); first discoidal cell and first cubital cell confluent (Fig. 3); 2nd cubital cell always small, triangular; vein 2-R1 of fore wing shorter than vein 1-R1, hind coxal cavity usually not separated from metasomal foramen, but sometimes separated by distinct sclerite; hind trochanter and trochantellus flattened ventrally.

#### *Metasoma*

First tergite varying from entirely smooth to rugose tergites 2+3 rarely striate all over; petiole with sculpture; ovipositor at least as long as metasoma (Fig. 12).

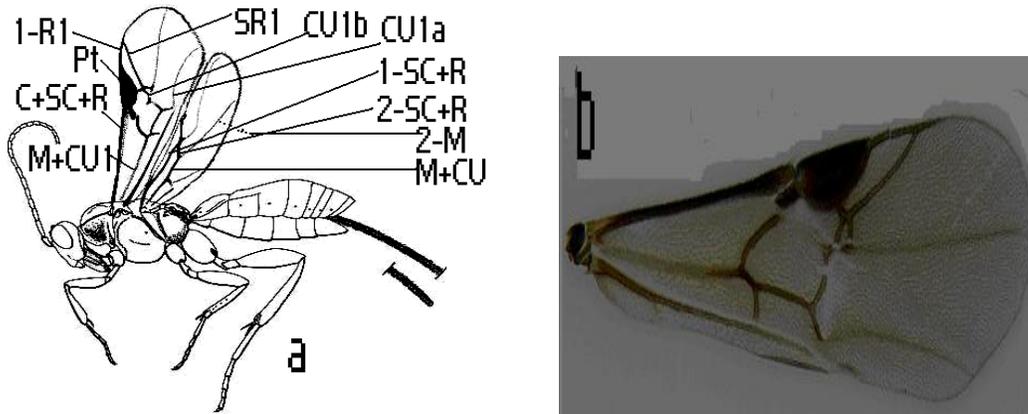
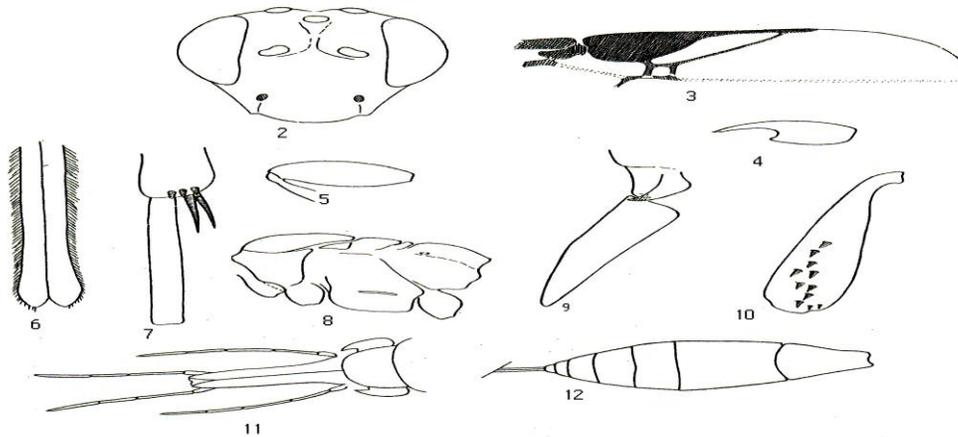


FIG.1: a, LATERAL HABITUS OF *AGATHIS* SP.; b, FORE WING.



FIGS. 2-12: *AGATHIS* SP. 2, HEAD, FRONTAL VIEW; 3, PART OF FORE WING; 4, HIND CLAW; 5, HIND FEMUR; 6, OVIPOSITOR SHEATH, DORSAL ASPECT; 7, HIND TIBIAL SPURS AND BASAL SEGMENT OF HIND TARSUS; 8, MESOSOMA, LATERAL ASPECT; 9, GALEA; 10, MID TIBIA; 11, MOUTH PARTS; 12, METASOMA (WINGS ABBREVIATIONS ARE GIVEN IN FIGS. 13-27).

**DISTRIBUTION: TANGAIL, BANGLADESH.**

Host: Unknown.

*Materials examined*

Two female *Agathis* sp., 27.X.2001; 29.X.2001. Collected by- M. Suza. Specimens deposited in ZMCU.

*Bassus fabricius* 1804(\*) (Figs. 13-26)

*Head*

Head gradually narrowed ventrally, in frontal view trapezoid (Fig. 18); antenna shorter with 30-31 segments, its apex without apical spine (Fig. 21); clypeus partly flattened (Fig. 18), transverse (Fig. 18), concave ventrally; labio-maxillary complex hardly protruding (Fig. 23) and its galea not longer than wide; area behind antennal sockets slightly to moderately depressed (Fig. 17); malar space distinctly longer than basal width of mandible (Fig. 23).

*Mesosoma*

Lateral pronope (= subpronope) absent; precoxal sulcus partly present, narrow and crenulate (Fig. 23); notauli present and usually narrow (Fig. 24); propodeum granulate, reticulate, punctate, and without an elongate medial areola present.

*Wings*

Vein r-m of fore wing present, absent (Fig. 14); second submarginal cell without ramellus; vein 1-SR+M of fore wing at least medially absent (Fig. 14); vein r of fore wing issued near middle of pterostigma; vein 1r-m of hind wing shorter than vein SC+R1 (Fig. 15).

*Legs*

Tarsal claws not bifurcate, medium sized and usually with a lobe (Fig. 19); fore tibial spur normal (Fig. 22), 0.4-0.5 times as long as fore basitarsus; length of inner spur of middle tibia 0.4-0.6 times middle basitarsus; apical half of middle tibia with pegs present above subapical cluster of pegs (Fig. 20); hind trochantellus rounded; hind coxa shiny, punctate; length of inner spur of hind tibia 0.4-0.6 times hind basitarsus; propodeal foramen usually distinctly removed from metasternal hind coxal cavities and separated by a sclerotized bridge.

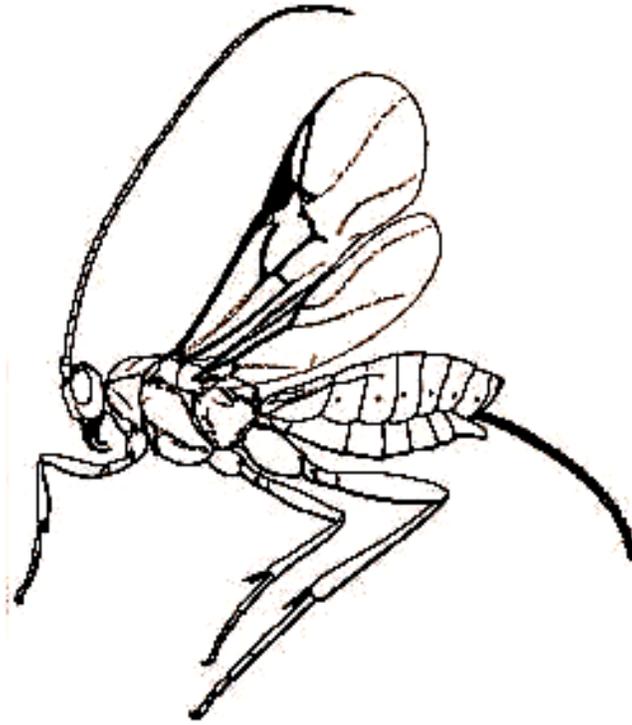


FIG. 13: LATERAL HABITUS OF *BASSUS* SP.

*Metasoma*

First metasomal tergite sessile and robust, length 0.9-1.4 times its apical width, laterope present (Fig. 23); first-third tergites smooth, partly sculptured; second suture distinctly impressed; second and third tergites with a transverse depression; ovipositor medium-sized to long and straight; ovipositor sheath subparallel-sided and subtruncate apically, its length 0.6-2.0 times fore wing.

*Distribution:* Rangamati, Bangladesh.

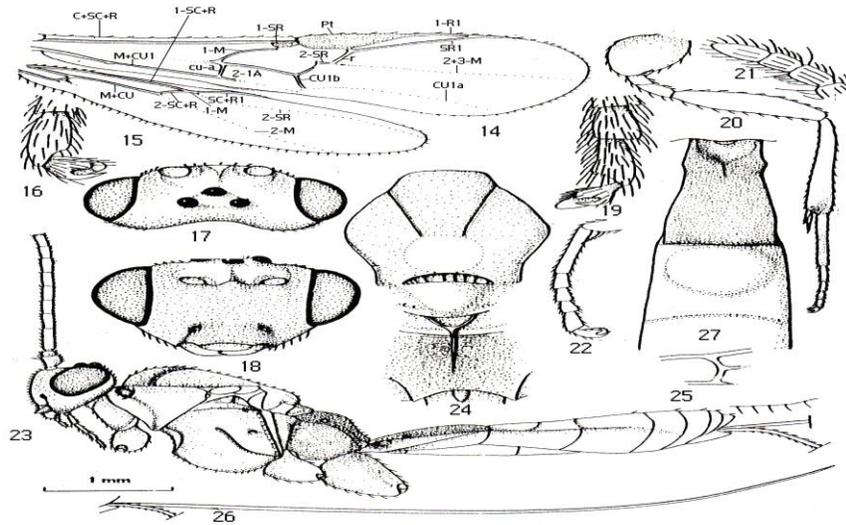
*Host:* Unknown.

*Material examined*

One female *Bassus* sp., 30.X.2000. Collected by- Shafkat;. Specimen deposited in ZMCU.

*Key To The Bangladeshi Genera Of The Subfamily Bassinae (Figs. 1-26)*

1. Fore tarsal claw with 2 sharp teeth.....2
  - Fore tarsal claw without teeth or with basal lobe ..... Not studied
2. SR+ M of fore wing complete; notauli absent ..... Not studied
  - SR+ M of fore wing incomplete notauli variable .....4
4. Labio-maxillary complex elongate; galea longer than wide and usually longer than mandible .....5



FIGS. 14-27: *BASSUS* SP. ♀. 14, FORE WING; 15, HIND WING; 16, INNER FORE CLAW; 17, HEAD, DORSAL ASPECT; 18, HEAD, FRONTAL ASPECT; 19, OUTER HIND CLAW; 20, HIND LEG; 21, APEX OF ANTENNA; 22, FORE TARSUS; 23, HABITUS, LATERAL ASPECT; 24, MESOSOMA, DORSAL ASPECT; 25, DETAIL OF VEIN 2-CU OF HIND WING; 26, OVIPOSITOR; 27, FIRST AND SECOND METASOMAL TERGITES, DORSAL ASPECT. 14, 15, 20, 23,, 26: 1.0X SCALE-LINE; 16, 21, 19, 25: 5.0X 17, 18, 24, 22, 27: 2.0X. [WINGS ABBREVIATIONS: A = ANALIS; C = COSTA; CU = CUBITUS; M = MEDIA; R = RADIUS; SC = SUBCOSTA; SR = SECTO-RADII; SR1 = 1<sup>ST</sup> ABSCISSA OF RADIUS; A = TRANSVERSE ANAL VEIN; CU-A = TRANSVERSE CUBITO-ANAL VEIN; M-CU = TRANSVERSE MEDIO-CUBITAL VEIN; R = TRANSVERSE

RADIAL VEIN; 2R-M/2SR = 1<sup>ST</sup> TRANSVERSE RADIAL VEIN; PT = PTEROSTIGMA; 1-CU1 = 1<sup>ST</sup> ABSCISSA OF DISCOIDELLUS; 2-CU1 = 2<sup>ND</sup> ABSCISSA OF DISCOIDELLUS; 3-CU1 = 3<sup>RD</sup> ABSCISSA OF DISCOIDELLUS; CU1A / 3-CU = APICAL ABSCISSA OF SUBDISCOIDELLUS].

- Labio-maxillary complex of normal dimensions; galea at most as long as wide and usually shorter than mandible (belonging to *Mesocoelus* Schulz, *Pharpa* Sharkey, *Alabagrus* Enderlein, etc.) .....Not studied
- 5. Petiole with granulate microsculpture .....6
- Petiole lacking granulate microsculpture .....7
- 6. Frons not bordered laterally with carina .....7
- Frons bordered laterally with carina (belonging to *Trachagathis* Viereck)..... Not studied
- 7. Strong transverse carina between hind coxae present; hind coxa and metasoma separated by wide sclerite (Figs. 23, 27)....*Bassus* Fabricius (in part)
- Strong transverse carina between hind coxae absent; hind coxa and metasoma sharing common foramen, or hind coxa and metasoma separated by narrow sclerite .....8
- 8. Tarsal claw simple, lacking basal lobe .....9
- Tarsal claw with basal lobe (belonging to *Microdus* Nees) .....Not studied
- 10. Petiole with sculpture (Fig. 23) .....*Agathis* Latreille
- Petiole smooth, lacking sculpture (belonging to *Agathirsia* Westwood)....Not studied

Unfortunately, Sharkey's use of the names Agathidinae (incorrectly ascribed to Blanchard 1845), and Microdini Ashmead 1900, violates article 23 of the International Code of Zoological Nomenclature (1985). The name Bassinae [based on Nees' 1812 use of "Bassi"] has priority over Nees' 1814 "Agathides". Also both Bassini Nees', 1812, and Eumicrodini Foerster, 1862, have priority over Sharkey's "Microdini Ashmead 1900". The Subfamily Bassinae Nees 1812 is used because it is senior to the commonly used subfamily name Agathidinae Nees 1814 (Achterberg and Polaszek, 1996).

The genera *Bassus* Fabricius and *Agathis* Latreille have traditionally been separated on the basis of the shape of head. The traditional division (based on the relative elongation of the head) has been problematic to taxonomists because some species are intermediate. Muesebeck (1927) and Muesebeck and Walkley (1951) united the two genera, but most subsequent authors have separated them by the shape of the head (Telenga 1955; Nixon 1986; Chou and Sharkey 1989; Simbolotti and Achterberg 1992), or on biological grounds. In the present study, more extensive examination of *Agathis* material has demonstrated that the

separation of the two genera, based on head shape, is effective only if attention is paid to the shape of the malar triangle formed by the perpendicular intersection between the prolongation of the longitudinal diameter of the eye and the tangent to the base of the clypeus. The malar triangle always has a characteristic elongate and rectangular shape in *Agathis*-like specimens, but is nearly equilateral for *Bassus*-like specimens.

Thus, the combination of the typical equilateral shape of the malar triangle, together with the flat and wider clypeus, should provide a simple and effective diagnostic tool to recognize *Bassus* specimens from *Agathis* ones.

Another diagnostic character which seems to be of some importance is the ratio between the veins 1-RI and 2-R1 of fore wing (= distal and proximal parts of the post-marginalis, respectively, in Nixon's terminology). Usually, in *Bassus* the vein 2-R1 is longer than vein 1-RI, although rarely, it is shorter than vein 1R1 (Simbolotti and Achterberg, 1992). In *Agathis* the vein 2-R1 is shorter than vein 1-RI, only rarely of equal length or somewhat longer.

Surprisingly, Sharkey (1992) in his paper on the phylogeny of the Agathidinae, assigned these two genera, which are difficult to tell apart, to separate tribes: the genus *Agathis* was included in the tribe Agathidini and the genus *Bassus* in the tribe Microdini. Sharkey (1996) renamed the latter tribe to Eumicrodini, a synonym. The main characters to separate these tribes are the presence or absence of a distinctly sclerotised bridge between the insertions of the hind coxae and the ratio of the length of the third and fourth segments of the labial palp. These characters do not even suffice to separate the genera and certainly do not support the existence of two tribes. Therefore, the tribe Microdini Ashmead, 1900 (= Eumicrodini Foerster 1862) is synonymised with the tribe Agathidini Nees, 1814 (syn. nov.).

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