A review of Indian subgenus Agandrena and Oreomellissa of Andrena

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Abstract

In India Agandrena and Oreomellissa subgenus both were represented by only one species. These species were Andrena (Agandrena) agilissima and Andrena (Oreomellissa) rothenyi, respectively. Andrena (Agandrena) agilissima was first time redescribed here from India while Andrena (Oreomellissa) rothenyi was redescribed more comprehensively here which was earlier described by Cameron (1902). The photographs, line drawing and identification keys for female were also provided. Males were unknown. Also, diagnostic characters for both subgenera were first time established here for Indian species. This research will prove quite fruitful for further taxonomic studies on bees of Andrenidae family.

Keywords: Andrena, Agandrena, India and Oreomellissa

Introduction

Order Hymenoptera, comprises with more than 1,15,000 described species. The family Andrenidae is comes under superfamily Apoidea which comprises 17000 species worldwide. This family is represented by 4 subfamilies and 5 genus worldwide. To date Andrena genus contains about 1443 valid species worldwide [4]. In India only one genus Andrena was reported yet which comprises 23 subgenus and 51 species. Fabricius (1775) first described Andrena and listed 14 species. It was the fourth genus of bees to be proposed after Apis Linnaeus, 1758, Eucera Scopoli, 1770 and Nomada Scopoli, 1770. The only comprehensive work on Indian bees was done by Bingham (1897) [1] who included all the different types, viz., social/ non social bees under a single family Apidae and used characters like shape of the tongue and nature of pubescence on the body and integument colour for their segregation. But, now a day’s Andrenidae is a clearly a distinct family of non-apis bees and Andrena is a genus of this family. Also, a number of new characters have been included in the taxonomy of Andrena. So, there was a need of taxonomic revision of this genus. Till date 96 subgenus have been formed and from India 23 subgenus have been reported and so, the chance of further increase in number by more investigations. The taxonomic revision of these subgenera in the Indian context was totally lacking. So, we formulated the topic entitled “A taxonomic revision of subgenus Andrena (Agandrena) and Andrena (Oreomellissa) (Hymenoptera: Andrenidae: Andrena) of India”.

2. Materials and methods

This study was undertaken at an Indian agricultural research institute, New Delhi during the period of 03-08-2012 to 25-01-2016.

2.1 Materials

The base materials for present studies was based on specimens which were obtained from following different sources

2.1.1 National Pusa Collection (NPC), Division of Entomology, Indian Agricultural Research Institute, New Delhi

The identified and unidentified specimens were available here used as base materials for current studies.

2.1.2 Personal collection

Personal collections were obtained from different parts of the country. These collections were done from Rajasthan, Delhi, Uttarakhand, Uttar Pradesh, Himachal Pradesh, Jammu and Kashmir and Punjab.
2.2 Methods
2.2.1 Collection, killing, mounting, relaxing and preservation
Specimens were collected from insect net. Live bees were put in to the killing bottle. Killing bottle was made of glass bottle with air tight cap in which cotton swabbed with benzene. Then, pinning was done. Pinned specimens were separated, labeled and stored in insect box for further studies. For relaxing of specimens we used plastic boxes with air tight cap. Cotton placed on the bottom, above it butter paper placed.

2.2.2 Methods of study
The whole specimens were studied in detail under LEICA EZ4 stereo zoom binocular microscope. Where ever needed dissections were made. In case of mouth parts, genitalia and hidden sterna (Sternum 7 and Sternum 8) require dissection. First, specimens were softened in a moist relaxing box for overnight. For preparation of mouthparts, the head was removed after removing both antenna from the body and put in 10% KOH for about 4-5 hours at room temperature. After washing in distilled water first mandibles were removed then, labium and a pair of maxilla was removed and studied in 75% ethanol. After that all structures of proboscis were stored in 75% ethanol. Male genitalia, S7 and S8 were removed from the abdomen of fresh or relaxed specimens using a hooked insect pin and were put in 10% KOH for about 5-6 hours at room temperature. Genitalia, S7 and S8 were cleared and examined and then stored in 75% ethanol. This method was a slight modification of Dubitzky, 2005 [3]. For photographs LEICA DFC 425C stereo-zoom microscope using LAS3.8 software was used. All files were processed with Microsoft publisher.


3. Results and discussion
Subgenus Andrena (Agandrena) was erected by Warncke in 1968 [9] based on Type species: *Apis agilissima* Scopoli, 1770. *Andrena* (Agandrena) subgenus was represented in India by only one species that was *A. agilissima*. This species earlier not redescribed by anyone from India so, first time redescribed. But in the world *A. agilissima* was described by Scopoli (1770) [7] and Warncke (1967) [8] under the name of *Apis agilissima* and *Andrena agilissima italic* respectively. But they got synonymized. Subgenus *Andrena* (*Oreomellissa*) was erected by Hirashima and Tadauchi in 1975 [5] based on Type species: *Andrena mitakensis* Hirashima, 1963. *Andrena* (*Oreomellissa*) subgenus was represented in India by only one species that was *A. rothneyi*. This species was described by Cameron in 1902 [2] from India (Shimla and Mussooree) under the name of *Andrena simlaensis*. But, this species was again redescribed here more comprehensively. But they were not provided photograph and identification keys. So, we provided photographs and identification keys for both subgeneric species. Also, we established diagnostic characters of both subgenus first time for Indian species for easy establishment of correct subgenus and further species identification.

3.1 Diagnostic characters of subgenus Andrena (Agandrena)
Long and slender body, integument purple, mandible short, moderately and wholly red, PLR with triangular emargination, FOV 0.26 times wider than long, PT strongly carinate, coarsely rugose whole length, inner hind tibial spurs strongly basally broadened, marginal zone depression strongly developed, pygidial plate without raised area medially, apex of pygidial plate truncate, tufts of silvery white hairs on either side of the thorax and abdominal tergites.

3.2 Diagnostic characters of subgenus Andrena (Oreomellissa)
Extremely long labial and maxillary palpi, PLR triangular without emargination, Clypeus sparsely pubescent, FOV long, distinctly narrow, upper margin (hind) crossing upper margin of compound eye, lower margin (anterior) exactly upto antennal socket, PT broad, not carinate and wholly densely tessellate with distinct small punctation, hindlegs trochanter flocculus complete, silvery white, basal two metasomal terga yellow remaining black, disc of metasomal terga scantly pubescent, prepygidial, pygidial fimbriae silvery white, pygidial plate prominent, narrow raised triangular area medially, wide depressed marginal area.

3.2 Redescription of species of Agandrena and Oreomellissa of Andrena
3.2.1 Andrena (Agandrena) agilissima (Scopoli, 1770) (Fig. 1)
Female: BL: 13.936 mm, FWL: 10.135 mm
Structure: Head: Head oval, 1.19 times wider than long. Mandible short, not crossing each other’s in repose, monodentate. PLR trapezoidal, triangular emargination medially, strongly protuberant and apical margin distinctly protruding front margin of clypeus. PLR W/L= 2.59. UICD/LICD= 0.95. Clypeus smooth, shiny, 1.50 times wider than long, distinct, large size punctuation. Disc of clypeus convex. FOV velvety, long, narrow, depressed whole length. Upper margin (hind) reaching upper margin of the compound eye, lower margin (anterior) distinctly below antennal socket. Outer margin of FOV straight to slightly convex, inner margin without distinct constriction. FOV 0.26 times wider than long. AS3/AS1 = 0.80. Mesosoma: Pronotum shiny and smooth, small sparse punctuation, without humeral angle, lateral part rounded. Scutum and scutellum smooth and shiny, metanotum rough and dull. Punctation of scutum, scutellum and metanotum medium large, distinct and dense. PT strongly carinate, coarsely rugose whole length. DLP, LP and mesepisternum coarsely rugose. Apex of for and mid tibial spurs pointed. Inner hind tibial spurs strongly basally broadened, apex pointed. Dorsal view curved. Forewing three submarginal cell, second recurrent vein joining at 3rd submarginal cell distinctly before 3rd submarginal cross veins.
Metasoma: Metasoma densely punctate with small distinct punctuation. Marginal zone depression strongly developed. Pygidial plate rough and dull, densely punctate with minute indistinct punctuation, triangular, without raised area medially. Apex of pygidial plate truncate.
Pubescent: Pubescences of body unilaterally branched on both sides. Clypeus lower part bare except border densely

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haired with long silvery white hairs, upper part sparsely haired with medium long brown hairs, paraocular area densely haired with long silvery white hairs. FOV black. Vertex and frons sparsely black hairs. Tufts of silvery white hairs on either side of thorax and abdominal tergites. Prepygidial, pygidial fimбриae brownish black. Hind legs trochanter flocculus complete, silvery white. Femur Tibial scopa white.


**Keys to females**

PT carinate, coarsely rugose entirely, tufts of silvery white hairs on either side of thorax and abdominal tergites, PLR rectangular without emargination, pygidial plate triangular, apex truncate, without raised area medially, mandible short and monodentate ……………………... A. agilissima

Male: Unknown

Fig 1: *Andrena rothneyi* (Scopoli) (female): (a) Head; (b) Process of labrum; (c) Mandible; (d) Antenna; (e) Propodeal triangle and (f) Pygidial plate.

### 3.2.2 Redescription of *Andrena (Oreomellissa) rothneyi* Cameron, 1897 (Fig. 2)

Female: BL: 9.902 mm, FWL: 6.394 mm. Structure. Head: Head oval, 1.07 times wider than long. Mandible long, crossing each others in repose, bidentate. PLR triangular without emargination medially, strongly protuberant and apical margin distinctly protruding front margin of clypeus. PLR W/L= 1.87. UICD/LICD= 1.06. Clypeus smooth, shiny, sparse punctuation. Clypeus 1.43 times wider than long. Disc of clypeus convex. FOV velvety, long, distinctly narrow, depressed whole length. Upper margin (hind) crossing upper margin of compound eye, lower margin (anterior) exactly upto antennal socket. Outer margin of FOV straight to slightly convex, inner margin without distinct constriction. FOV 0.23 times wider than long. AS3/AS1 = 0.79. Hind margin of Vertex flat in frontal view. Meta


Specimens examined: 2 ♀♀, INDIA: Himachal Pradesh: Shimla, 20.X.1922, NPC.

**Keys to females:** Extremely long labial and maxillary palpi, basal two metasomal terga yellow, pygidial plate prominent narrow raised triangular area medially, wide depressed marginal area ……………………... A. rothneyi

Male: Unknown

Fig 2: *Andrena rothneyi* Cameron (female): (a) Head; (b) Process of labrum; (c) Mandible; (d) Antenna; (e) Propodeal triangle and (f) Pygidial plate.

### 4. Conclusion

*Andrena* genus bees represent a very small proportion of non-apis bees and taxonomic point of view a very little work was done in the past. So, this work will prove very useful to andrenids bees’ taxonomic studies especially from India and this kind of study on these two subgenus done first time from
India. In this study we have described comprehensively these two subgenus by providing line drawings, keys and microscopic photographs. This will lead to easy, accurate and quick identification and study of species. Moreover, we have described only females because we have got only females and it will open the doors for bees’ investigators to find out and description of males and other species belonging to these two subgenus from India.

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6. References
1. Bingham CT. The fauna of British India including Ceylon and Burma, Wasps and bees. 1897; 1:29+579.
4. Fabricius JC. Systema entomologiae, Sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus. Flensburgi & Lipsiae. 1775; xxxii+832.