Diversity of Some Rutelinae Beetles in and around Pune City

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***Abstract*- Rutelinae is one of the largest subfamilies of family Scarabaeidae. The beetles are conspicuous and attractive. The present study showcases Rutelinae chafers found across Pune city from selected Agricultural, Forest and Urban zones. They're represented by 4 genera Anomala, Rhinyptia, Lissadoretus and Adoretus.**

***Keywords*- Rutelinae, Diversity, Pune.**

I. INTRODUCTION

Family Scarabaeidae is one of the largest, most diverse, widely distributed and identified families of order Coleoptera. It is divided into two groups, Laparosticti (dung beetles) and Pleurosticti (chafers) based on the position of the posterior spiracles on the body [1]. As the name suggests Laparosticti/dung beetles feed on variety of dungs while Pleurosticti/chafers are strictly phytophagous with various feeding habits, including some species that refrain from feeding at all in the adult stage. In India, chafers are included in nine subfamilies of the family Scarabaeidae *i.e.* Sericinae, Melolonthinae, Euchirinae, Rutelinae, Hoplinae, Dynastinae, Valginae, Cetoniinae and Trichiinae [2].

According to reference [3] the name Rutelidae was first used by [4] for the characteristic American genera (Rutela, Pelidnota, etc.) of the group as now understood, but he did not recognize as closely related to these the Oriental forms here dealt with, which he considered as belonging to the Melolonthids. The first recognition of the actual limits and components of the group is to be found in [5]. The most important features for the separation of Rutelinae from other chafer families are the mobile and unsymmetrical claws, the larger one of which is usually cleft at the tip, and the well-developed and externally-visible labrum.

The subfamily Rutelinae is composed of approximately 200 genera and 4,100 species that are distributed worldwide [6], although many taxa remain to be described. The subfamily is divided into six tribes, five of which occur in the New World while the tribe Anomalini is widely distributed and is most speciose in the Old World. The tribe Adoretini is also exclusively distributed in the Old World. (http://museum.unl.edu/research/entomology/Guide/Scarabaeoidea/Scarabaeidae/Rutelinae/Rutelinae-Overview/RutelinaeO.html) These adults of Rutelinae mostly attack fresh leaves and few genera of Rutelinae are common visitors to flowers, where they feed on nectar or pollen [7]. Larvae of Rutelinae are soil- dwelling white grubs that feed on living roots and most of them are destructive to crops.

Present study shows few Rutelinae species found in some areas of Pune city throughout the year 2014.

II. MATERIALS AND METHOD

A. Site Selection

The study was conducted in forest, agricultural and urban zones covering various parts of the Pune city. Despite being an upcoming metro, a lot of greenery is still maintained in forms of few agricultural patches, reserved forests and gardens in city. All the selected stations had large number of indigenous and foreign vegetation attracting many chafers.

B. Collection

Beetles were collected throughout the year covering 3 seasons- Summer, Monsoons and winter using different methods like **Light traps, Chemical lure traps, Food bait traps and Handpicking.** For light trap Mercury vapour and UV lights were used. Chemical lure trap contained pheromones attracting beetles. For food bait trap, a mixture of fruit pulp, honey and water was filled in bottles and were suspended at different heights on the tree branches. While some beetles were handpicked.

C. Preservation and identification

Chafers collected from agricultural and urban areas were first wet preserved and later dried and pinned while those seen at forest patches were photographed and released. The specimens were identified using Fauna of British India key [3] and some internet references. Out of the four genera, genus Anomala, Rhinyptia and Liassadoretus could be identified up to species level but 1 species of genus Adoretus is still under study for species confirmation.

III. OBSERVATIONS

Systematic account
Order: Coleoptera Linnaeus, 1758
***Suborder*:** Polyphaga Emery, 1886
Super family: Scarabaeoidea Latreille, 1802
Family: Scarabaeidae Latreille, 1802
Subfamily: Rutelinae MacLeay, 1819

Division: **Anomalini**

This group contains the great majority of the known species of Old World Rutelinae and almost all the brilliantly coloured Indian representatives of the subfamily belong to it. Extremely varied in their outward form, these insects are yet easily recognised and form a very well-defined group. The antennae consist of nine joints only. The elytra are fringed externally with a narrow colourless membranous border. The claws are variable, the hind ones always undivided, the longer one of the middle feet generally, and that of the front feet almost always, cleft. Occasionally the male has the claws all simple.

***Genus*: Anomala-** Anomala, Samouelle, The Entomologist's Useful Companion, 1819,p. 191; Burm., Handb. Ent. iv, 1, 1844, p. 230; Lacordaire, Gen. Col. iii, 1856, p. 328.

The clypeus is transverse, rounded or straight in front, rarely at all excised and never produced or rostriform. Pronotum not excised before the scutellum. All the tibiae armed with terminal spurs.

1. Anomala varicolour (Gyll)

Melolontha varicolor, Gyll., Schonh. Syn. Ins. i, 3, 1817, App. p. 114.

Base of the pronotum completely margined. Non-metallic. Pale-coloured (sometimes partly dark above). Larger; dark patches upon the pronotum coalescing before reaching the base. ♂: The terminal tooth of the front tibia is sharp, and the inner front claw very slightly dilated. Clypeus with rounded or obtuse front angles

Distribution: United Provinces; Bengal, Sarda,Pusa (May), Buxar; Madras, Bangalore, 3000 ft. (May)

2. Anomala ruficapella

Anomala ruficapilla, Burm.,* Handb. Ent. iv, '2, 1855, p. 499.

Smaller; dark patches upon the pronotum not coalescing before reaching the base. Testaceous, with the head, the extremities of the tibia and the tarsi dark red, and with a large patch on each side of the pronotum, the extreme edges of the elytra, a broad sutural line and another extending obliquely from the shoulder almost to the sutural angle and partly or entirely fused with the lateral margin, black or nearly black. ♂: The terminal tooth of the front tibia is sharp, and the inner front claw is slightly dilated. Length, H-5-13'5 mm.; breadth, 7-8 mm.

Distribution: Bombay : Belgaum (H. E. Andrews} Mysore : Bangalore, 3000 ft. (Anstead, May)

3. Anomala dorsalis

Anomala. dorsalis, Bunu., Handb. Ent. iv, 1, 1844, p. 232.

Large species, with tridentate front tibia. Testaceous or reddish, generally with the vertex of the head, the elytral suture, the hind tibiae and the tarsi blackish, or with a broad sutural stripe, or with the upper surface largely or entirely black. This variable insect seems to be almost universal in the plains of India and is constantly attracted by light. Length, 14-17 mm. ; breadth, 8-9 mm.

Distribution: Coimbatore Sept., Oct., Bangalore, 3000 ft.; Bombay: Surat June, Khandesh, Dhulia (June); Central Provinces : Nagpur (E, A. d'Abreu) ; Punjab : Lyallpur (July), Amballa

4. Anomala dorsalis var (B) ventralis

Testaceous, with the vertex, pronotum (except the lateral margins) and the elytra black, the clypeus, hind tibiae and all the tarsi deep red.

Distribution: Punjab : Simla (Paris Mus.) ; Haiderabad : Secundarabad (A. K. Weld Downing) ;

5. Anomala leporalis

Testaceous, with the head, the pronotum (except broad lateral margins and a narrow median line), an elongate triangular patch upon the anterior part of the elytra (enclosing, but not including, the scutellum) and sometimes a small posterior spot on each side of the suture and a transverse bar at the base of the pygidium, dark brown or nearly black. Length, 10 mm.; breadth, 5-5 mm.

Distribution: Burma: Paungde (G. Q. Corbett), Shenmaga (L. Feet

6**. Anomala andamanica**

Pale-coloured (sometimes partly dark above); Elytra not entirely black. Front tibia tridentate (the uppermost tooth sometimes very feeble). The body is moderately elongate, rather parallel-sided and depressed. Testaceous, with the vertex of the head, a spot on the humeral callus, an indistinct one on the apical callus, and the extreme margins of the elytra, black. ♂The body is a little narrower than in the female, the eyes larger, the clypeus rather smaller, the antennae very long and the front tibia broader, with very short and sharp teeth. Length, 13-15 mm.; breadth, 6-5-7'5 mm.

***Genus* Rhinyptia-** Barm., Handb. Eutom. iv, 1, 1844, p. 227; Lacord.,Gen. Col. iii, 1856, p. 324.\

Clypeus produced into a truncate rostrum. Pronotum broadly transverse, not hairy

1. Rhinyptia indica

Rhinyptia indica, Burm.,* Handb. Ent. iv, 1, 1844, p. 228.

Elongate parallel-sided and moderately convex. Pale yellow, with the tarsi and clypeus dark red, and the forehead and vertex nearly black. Smooth, shining and only very thinly clothed with pale hair beneath. The clypeus is small, with its sides strongly bisinuated and converging to a narrow strongly recurved rostrum, longer than it is wide, rounded at the end, and strongly and sharply carinate along the middle. Length, 13-16 mm.; breadth, 7-8 mm.

Distribution: Bombay, Belgauin (H. E. Andrewes), Bassein Fort (Oct.); Central Provinces: Nagpur, 1000 Ft. (E. A. D'abreu, Sept.); Madras.

Division: Adoretini- The labrum is produced downwards in front which is either rectangular, triangular (the apex of the triangle applied to the front edge of the mentum) but majority it is highly developed, the free lower edge being produced as a long recurved rostrum across the mouth, which it completely divides into two halves, the extremity of the rostrum interlocking with, or lying upon, the front edge of the mentum.

***Genus* Lissadoretus**- Labrum with a ribbon-like median process bisecting the mouth, rounded at the end, not serrate at the sides. Body rather parallel-sided but not long, with the upper surface shining and clothed only with minute and scanty, hardly perceptible hairs, the lower surface rather more closely hairy. Antenna 10-jointed, but the seventh joint almost invisible.

1. Lissadoretus pallidus

Pale yellow, with the tarsi and the extreme edges of the head, pronotum and elytra brown. The body smooth and shining, only clothed on its upper surface with very scanty and inconspicuous minute white setae, which are a little closer and longer upon the pygidium and lower surface.

♀: The pronotum is very broad and its front angles are slightly acute. The pygidium is less thickly clothed, with a bare median line.

Distribution: Punjab: Taru, Peshawar Distr. (T. Bainbrigge Fletcher, May),

***Genus* Adoretus**- Cast., Hist. Nat. Ins. ii, 1840, p. 142 ; Burm., Handb. Ent. iv, 1, 1844, p. 467 ; Lacord., Gen. Col. iii, 1856, p. 381.

Labrum with a ribbon-like median process bisecting the mouth, truncate at the end, serrate at the sides. Variable in form, but generally elongate and rather depressed. Clothed above and beneath with short hairs, setae or scales, which may be dense, scattered or aggregated into numerous small patches, and sometimes interspersed with a few longer erect hairs.

1 Adoretus testaceous

Geniates testaceus, Hope,* Gray's Zool. Miscell., 1831, p. 23.

Brown, with the elytra a little paler, and the antennae, femora and tibiae yellow. The head and the sides of the body beneath are rather closely clothed with decumbent grey setae, and the pronotum bears irregular patches of similar setae. The elytra are very sparingly sprinkled with very minute setae, which are more numerous at the sides. Clypeus not lobed, margin rounded (feebly sinuated in a few males). Antennae 10-jointed. Length, 11-12 mm.; breadth, 5*5 mm.

Distribution: Nepal; Bhutan: Maria Basti (Oberthiir Coll.), Pedong (Brussels Mus.).

2. **Adoretus sp**

The species in not confirmed yet and is under study.

IV. DATA ANALYSIS

The following tables and graphical representations explain the different diversity patterns as follows-

Generic diversity – As per table 1, Among 6 stations, station 1 and 4 were found to be most diverse with the occurrence of three genera, Viz. Anomala, Adoretus and Lissadoretus while at station 3 and 5, only 1 genus was found.

Generic density- The table 2 shows that Station 1 has the maximum number of beetle density (29%) with station 6 as the second densest station. Stations 2 and 3 (8% each) were the least dense places.

Generic frequency- According to table 3, genera Anomala and Adoretus were most frequent genera (83%) compared to Lissadoretus and Rhinyptia at all the 6 stations.

Generic abundance- Table 4 shows the abundance of 4 genera at 6 stations. The study shows that Genus Anomala was the most abundant genus with maximum species diversity at all the stations.

V. RESULT AND DISCUSSION

Present study shows the distribution pattern of Rutelinae across 6 different zones in the city. Among these 6 stations, station 1 which is an agricultural patch shows maximum beetle density as well as diversity. Note that the distribution areas mentioned are original description of these species, thus it indicates that during the course of evolution some of them migrated to other areas while others are probably endemic. Since Rutelinae is a family of chafers which are primarily phytophagus scarab beetles, their presence in large number at an agricultural zone is justified. The equal frequency of genera Anomala and Adoretus at 6 stations shows that they are the most represented genera across the stations and they don't particularly show any habitat preference as compared to Adoretus and Lissadoretus which here show habitat specificity. The reason behind this may be the adaptability of Anomala and Adoretus is higher than these two. Anomala is not only the most frequent genus at all stations but it is also most abundant and diverse genus with 6 identified species.

VI. CONCLUSION

The present study was performed to find out diversity of Rutelinae chafers in Pune city as a basic data generation tool,

since no other latest previous references were available. The beetle diversity work is still under process and is progressing. As per the results found during present study, Rutelinae is found in abundance even in the urban spaces despite all the industrial growth, pollution and deforestation. This family has managed to survive even in the city with whatever green cover is present. In order to have a conclusive status of Rutelinae in Pune city, an Extensive sapling at a larger area for a substantial period of time is required.

Station	Generic Diversity
1	3
2	2
3	1
4	3
5	1
6	2

TABLE 1

Stations	Generic Density (in %)
1	29
2	8
3	8
4	17
5	17
6	21

TABLE 2

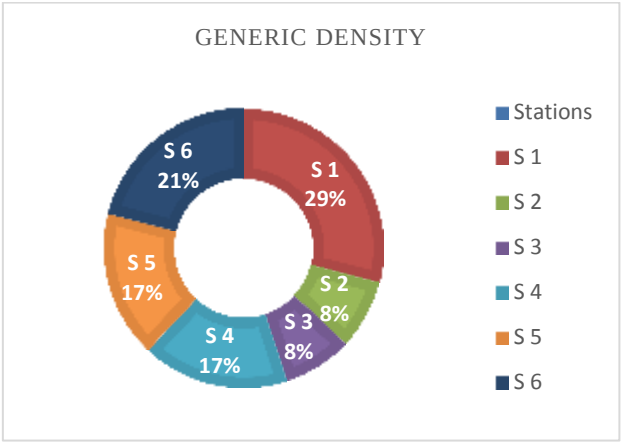


DIAGRAM 2

Genus	Generic Frequency (in %)
Anomala	83
Adoretus	83
Rhinyptia	17
Lissadoretus	17

TABLE 3

Genus	Generic Abundance (in %)
Anomala	63
Adoretus	29
Rhinyptia	4
Lissadoretus	4

TABLE 4

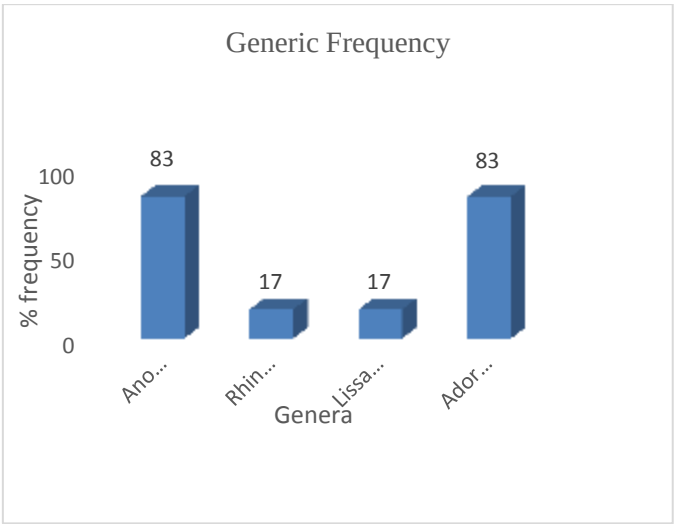
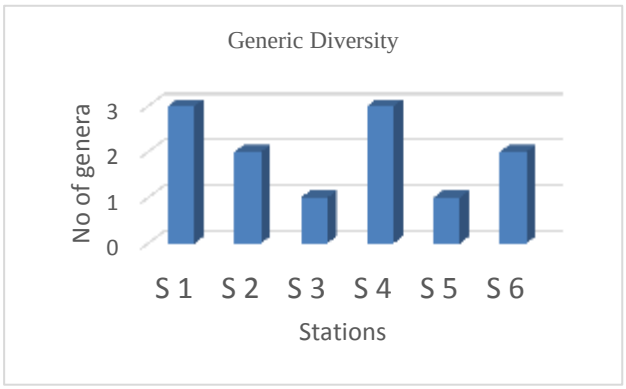


DIAGRAM 3

DIAGRAM 1



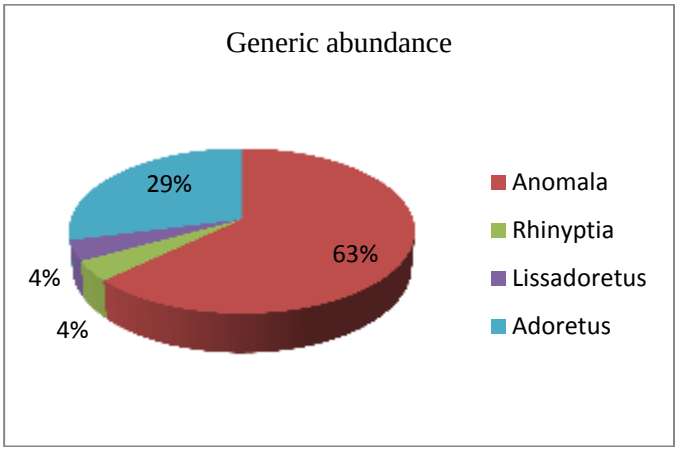


DIAGRAM 4

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IMAGES


Anomala varicolor


A. ruficapella


A. dorsalis


A. dorsalis


A. dorsalis var (b) centralis


A. leporalis


A.Andamanica


Rhinyptia indica


Lissadoretus pallidus testaceus


Adoretus


Adoretus sp

REFERENCES

[1]Sawada, H., 1991. Morphological and phylogenetical study on the larvae of Pleuristict lammelicornia in Japan. Tokyo: Tokyo Univ.Agri. Press. pp: 289.
[2]Chandra K and Gupta D 2012 Diversity and Relative Abundance of Pleurostict Scarabaeidae (Coleoptera) in Achanakmar-Amarkantak Biosphere Reserve, Central India World Journal of Zoology 7 (2): 147-154
[3]Arrow G J (1910) The Fauna of British India including Ceylon and Burma. Col. Lamell. I (Cetoniinae & Dynastinae). Taylor & Francis, London, V-XIV, 1-322.
[4]Macleay W. S. 1819. Horae Entomologicae. S. Bagster, 1-524.
[5]Burmeister H. 1832. Handbuch der entomologie, Berlin G Reimer, 1-1050.
[6]Machatschke, J. W. 1972. Scarabaeoidea: Melolonthidae, Rutelinae. Coleopterorum Catalogus Supplementa 66: 1-361.
[7]Chandra, K., 1986. Taxonomic Studies on Pleurostict Scarabaeidae (Coleoptera) of North-West India. Ph.D. thesis, Kurukshetra University, Kurukshtera, pp: 1-251

