

New Records to the Species Diversity of Family Scarabaeidae and Hybosoridae (Coleoptera: Scarabaeoidea) of Jabalpur, Madhya Pradesh (India)

¹Kailash Chandra, ²Salma Khan and ³Devanshu Gupta

¹Zoological Survey of India, New Alipore, Kolkata-700053, West Bengal, India

²Department of Bioscience, RDVV, Jabalpur, Madhya Pradesh, India

³Zoological Survey of India, Jabalpur-482002, Madhya Pradesh, India

Abstract: The study presents new records of 29 species under two families viz. Scarabaeidae and Hybosoridae of order Coleoptera from Jabalpur, Madhya Pradesh (India). The family Scarabaeidae includes 27 species belonging to 18 genera under five subfamilies while Hybosoridae represents only two species belonging to single genus under subfamily Hybosorinae. An updated checklist of 58 species of the scarab beetles belonging to 32 genera, 17 tribes, 10 subtribes, 11 subfamilies under four families of superfamily Scarabaeoidea is also provided.

Key words: Scarab Beetles · Coleoptera · Jabalpur · Madhya Pradesh · Scarabaeidae and Hybosoridae

INTRODUCTION

Scarab beetles under superfamily Scarabaeoidea, comprise a species rich group and a conspicuous component of the beetle (Coleoptera) fauna of the World. Adults of these beetles are noticeable due to their relatively large size, bright colors, often elaborate ornamentation and interesting life histories. Currently the superfamily Scarabaeoidea is divided into 12 families, 43 subfamilies, 118 tribes and 94 subtribes [1]. The family Scarabaeidae is a very large and the most diverse and widely distributed group of beetles and according to some estimates about 30,000 species of this family are known throughout the world [2]. They are well characterized with the antennae having last three antennomeres expanded into a plate like structures, front legs adapted for borrowing with large front coxae and tibia with a series of teeth and VIII tergite forms a true pygidium not concealed by VII tergite. Dung beetle is a common name applied to beetles in the subfamilies Scarabaeinae and Aphodiinae while most species in the subfamilies Melolonthinae, Dynastinae, Rutelinae and Cetoniinae feed on plant products and are agricultural pests of various commercial crops. The dung beetles as a whole performs a series of ecological functions such as nutrient cycling, soil aeration [3], seed dispersal [4, 5] and regulation of enteric parasites and dung breeding dipterans pests [6, 2].

Arrow [7-9] in the series of the Fauna of British India presented a comprehensive account of the scarab beetles of the Indian region where in 58 species were reported from Madhya Pradesh. Later Balthasar [10-12] wrote monographs on the two subfamilies viz. Scarabaeinae and Aphodiinae of the Palaearctic and Oriental region. Subsequently taxonomic research on the coleopteran diversity of Central India has been made by Chandra [13-15] and Chandra and Ahirwar [16]. Chandra [13] published an inventory of 96 species of the scarab beetles from Madhya Pradesh. Chandra [14] also reported 339 species of Coleoptera under 22 families from Madhya Pradesh. Later, concentrating on the scarab diversity of Central India, Chandra and Ahirwar [16] published a comprehensive account of the scarab beetles of Madhya Pradesh and Chhattisgarh and recorded 124 species/subspecies belonging to 45 genera under 11 subfamilies. Recently, Chandra [15] presented an account of beetle diversity of Jabalpur district and included 69 species and subspecies under 11 families. Of these beetles, 27 species of the family Scarabaeidae were included from Jabalpur.

While working on the unidentified collections present in Zoological Survey of India, Jabalpur, 29 species under two families viz. Scarabaeidae and Hybosoridae of order Coleoptera were identified and recorded for the first time from Jabalpur.

Table 1: Updated checklist of the superfamily Scarabaeoidea of Jabalpur, Madhya Pradesh (India):

ORDER: COLEOPTERA	
SUBORDER: POLYPHAGA	
(I). FAMILY: GEOTRUPIDAE	
Subfamily: BOLBOCERATINAE	
Tribe Bolboceratini	
1.	<i>Bolbohamatum marginale</i> Krikken
(II). FAMILY: TROGIDAE	
Subfamily: TROGINAE	
2.	<i>Trox</i> sp.
(III). FAMILY: HYBOSORIDAE	
Subfamily: HYBOSORINAE	
3.	<i>Hybosorus orientalis</i> Westwood*
4.	<i>Phaeochrous</i> sp.*
(IV). FAMILY: SCARABAEIDAE	
Subfamily: ORPHNINAE	
Tribe Orphnini	
5.	<i>Orphnus parvus</i> Wiedmann
Subfamily: CHIRONIINAE	
6.	<i>Chiron cylindrus</i> (Fabricius)
Subfamily: APHODIINAE	
Tribe Aphodiini	
Subtribe Aphodiina	
7.	<i>Aphodius (Pharaphodius) crenatus</i> Harold *
8.	<i>Aphodius (Calaphodius) moestus</i> Fabricius
Subfamily: SCARABAEINAE	
Tribe Gymnopleurini	
9.	<i>Gymnopleurus (Gymnopleurus) cyaneus</i> (Fabricius)*
10.	<i>Gymnopleurus (Gymnopleurus) gemmatus</i> Harold
11.	<i>Gymnopleurus (Gymnopleurus) miliaris</i> (Fabricius)
Tribe Coprini	
12.	<i>Heliocopris bucephalus</i> (Fabricius)
13.	<i>Copris (Paracopris) andrewesi</i> Waterhouse
14.	<i>Copris (Paracopris) imitans</i> Felsche *
15.	<i>Copris (Copris) repertus</i> Walker *
16.	<i>Catharsius (Catharsius) molossus</i> (Linnaeus)
17.	<i>Catharsius (Catharsius) sagax</i> (Quenstedt)
18.	<i>Catharsius (Catharsius) pithecius</i> (Fabricius)
Tribe Oniticellini	
Subtribe Drepanocerina	
19.	<i>Drepanocerus setosus</i> Wiedmann*
Subtribe Oniticellina	
20.	<i>Oniticellus (Oniticellus) cinctus</i> (Fabricius)*
21.	<i>Tiniocellus spinipes</i> (Roth)*
Tribe Onitini	
22.	<i>Onitis crassus</i> Sharp
23.	<i>Onitis philemon</i> Fabricius*
24.	<i>Onitis subopacus</i> Arrow*
25.	<i>Chironitis arrowi</i> Lanseberge
Tribe Onthophagini	
26.	<i>Caccobius (Caccophilus) ultor</i> (Sharp)*
27.	<i>Caccobius (Caccophilus) unicornis</i> (Fabricius)*
28.	<i>Onthophagus (Digitonthophagus) gazella</i> (Fabricius)
29.	<i>Onthophagus (Onthophagus) cervus</i> (Fabricius)*
30.	<i>Onthophagus (Onthophagus) dama</i> (Fabricius)*
31.	<i>Onthophagus (Onthophagus) griseosetosus</i> Arrow*
32.	<i>Onthophagus (Colobonthophagus) hindu</i> Arrow*
33.	<i>Onthophagus (Onthophagus) quadridentatus</i> (Fabricius)*
34.	<i>Onthophagus (Onthophagus) ramosus</i> (Wiedmann)
35.	<i>Onthophagus (Onthophagus) unifasciatus</i> (Schall.)*
36.	<i>Onthophagus (Proagoderus) amplexus</i> Sharp
37.	<i>Onthophagus (Onthophagus) rudis</i> Sharp
38.	<i>Phalops divisus</i> Wiedmann*

Table 1: Continued

Tribe Sisyphini	
39.	<i>Sisyphus (Sisyphus) neglectus</i> Gory*
Subfamily: MELOLONTHINAE	
Tribe Diplotaxini	
40.	<i>Apogonia proxima</i> Waterhouse*
Tribe Melolonthini	
Subtribe Schizonychina	
41.	<i>Schizonycha ruficollis</i> (Fabricius)
Subfamily: RUTELINAE	
Tribe Adoretini	
Subtribe Adoretina	
42.	<i>Adoretus bicolor</i> Brenske
43.	<i>Adoretus bimarginatus</i> Ohaus*
44.	<i>Adoretus kanarensis</i> Arrow*
45.	<i>Adoretus lobiceps</i> Arrow
46.	<i>Adoretus stoliczkae</i> Ohaus
47.	<i>Adoretus versutus</i> Harold
Subtribe Prodoretina	
48.	<i>Prodoretus indicus</i> Machatschke
Tribe Anomalini	
Subtribe Anomalina	
49.	<i>Anomala dorsalis fraterna</i> Burmeister
50.	<i>Anomala rugosa</i> Arrow*
Subfamily: CETONIINAE	
Tribe Cetoniini	
Subtribe Cetoniina	
51.	<i>Chiloloba acuta</i> G. & P.
52.	<i>Oxycetonia albopunctata</i> (Fabricius)*
53.	<i>Oxycetonia versicolor</i> (Fabricius)*
54.	<i>Protaetia (Indoprotaetia) albuguttata</i> (Vigors)
Tribe Goliathini	
Subtribe Coryphocerina	
55.	<i>Dicheros (Coryphocera) bimaculata</i> (Wiedmann)*
56.	<i>Heterorrhina elegans</i> (Fabricius)*
Tribe Gymnetini Kirby	
Subtribe Gymnetina Kirby	
57.	<i>Clinteria klugi</i> (Hope)
Subfamily: DYNASTINAE	
Tribe Pentodontini	
58.	<i>Heteronychus lioderes</i> Redtenbacher

(*New records from Jabalpur)

Chandra [15] reported 27 species of the family Scarabaeidae from Jabalpur, in accordance an updated checklist of 58 species of the scarab beetles belonging to 32 genera, 17 tribes, 10 subtribes, 11 subfamilies under four families of superfamily Scarabaeoidea is also provided (Table 1). The aim of our study was to prepare an inventory of the scarab beetles of Jabalpur district of Madhya Pradesh and to analyze and compare the diversity of these beetles with that of central India (Madhya Pradesh and Chhattisgarh) because this may be utilized in biodiversity plans and management of these beetles in future.

MATERIALS AND METHODS

Study Area: The Jabalpur district lies in the eastern half of Madhya Pradesh in the central region of India with a total geographic area of 5211 sq. km. It lies in the catchment of the longest river of central India, the Narmada, along with its tributaries, viz. Hiran, Gour, Ken and Sone. The total forest cover of the district is 1078 sq. km. which comes to around 20.69% of its geographical area [17]. The floral diversity of Jabalpur district is represented by 933 plant species belonging to 585 genera under 139 families [18] while that of faunal diversity which is quite rich and diverse, comprises about 910 species of both vertebrate and invertebrate phyla.

Specimens studied includes the unidentified collections of the scarab beetles present in, Zoological Survey of India (ZSI), Jabalpur which were collected by the scientific teams of ZSI, from different localities in different seasonal periods using light trap and handpicking method. The specimens were identified with the help of available literature [7-12,19,20] and compared with the reference collections present in ZSI, Jabalpur. Classification adopted for superfamily Scarabaeoidea is after Smith [1]. The nomenclature for the members of the subfamily Scarabaeinae is followed after Balthasar [10, 11], for Rutelinae, Cetoniinae and Dynastinae Arrow [7, 8] and for Hybosorinae Kuijten [19, 20]. Specimens were deposited in ZSI, Jabalpur. The details of material examined, with the distribution of newly recorded species in India as well as outside India are provided along with an updated checklist of the scarab beetles of the district, Jabalpur.

Observations

Systematic Account:

Order: Coleoptera Linnaeus, 1758

Suborder: Polyphaga Emery, 1886

Super family: Scarabaeoidea Latreille, 1802

(I). Family: Hybosoridae Erichson, 1847

Subfamily: Hybosorinae Erichson, 1847

1. *Hybosorus orientalis* Westwood, 1845:

1845. *Hybosorus orientalis* Westwood, *Trans. Ent. Soc. Lond.*, 6 : 159.

Material examined: Railway hostel, 30.vi.2003 (4 ex.), Coll. Subhash.

Distribution: India: Bihar, Haryana, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, Uttaranchal and West Bengal. *Elsewhere:* England, Nepal, Pakistan and U.S.A.

2. *Phaeochrous* sp:

1840. *Phaeochrous* Castelnau, *Hist. nat. des. Insectes*, 2 (1): 108.

1883. *Phaeochrous* Kuitjen, *Zool. Varh. Laiden*, 165 : 8.

Material examined: Hulki village, 16.viii.2002 (1 ex.), Coll. K. Chandra

Distribution: India: Andaman's Island, Haryana, Madhya Pradesh, Uttar Pradesh and Uttarakhand.

(II). Family: Scarabaeidae Latreille, 1802

Subfamily: Aphodiinae Leach, 1815

3. *Aphodius (Pharaphodius) crenatus* Harold, 1862:

1862. *Aphodius crenatus* Harold, *Berl. Ent. Zeit.* 5, p. 14, 1 : 142.

Material examined: Dumna road, 14.iii.2004 (1 ex.), Coll. Subhash.

Distribution: India: Andaman's Island, Haryana, Himachal Pradesh, Madhya Pradesh and Uttar Pradesh.

Subfamily: Scarabaeinae Latreille, 1802

Tribe Gymnopleurini Lacordaire, 1856

4. *Gymnopleurus (Gymnopleurus) cyaneus* (Fabricius, 1798):

1798. *Copris cyaneus* Fabricius, *Ent. Syst. Suppl.*: 34.

1931. *Gymnopleurus cyaneus* Arrow, *Faun. Brit. Ind. Lamell.* 3 : 49-50.

1963. *Gymnopleurus (Gymnopleurus) cyaneus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, I: 207.

Material examined: Railway road, 22.vi.2004 (1 ex.), Coll. Subhash.

Distribution: India: Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. *Elsewhere:* Sri Lanka.

Tribe Sisyphini Mulsant, 1842

5. *Sisyphus (Sisyphus) neglectus* Gory, 1833:

1833. *Sisyphus neglectus* Gory, *Monog. Sisyphus*, : 14.

1931. *Sisyphus neglectus*, Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae), 3 : 73.

1963. *Sisyphus (Sisyphus) neglectus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, I: 242-243.

Material examined: Panagar road, 04.v.2003 (1 ex.), Coll. Subhash.

Distribution: India: Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Orissa and Uttar Pradesh. *Elsewhere*: Pakistan.

Tribe Coprini Leach, 1815

6. *Copris (Paracopris) imitans* Felsche, 1910:

1910. *Copris imitans* Felsche, *Deutsche Ent. Zeits.* p. 347.
1931. *Copris imitans*, Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae), **3** : 124.

1963. *Copris (Paracopris) imitans*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, I: 367.

Material examined: Hulki Road, 16.viii.2002 (1 ex.), Coll. K. Chandra.

Distribution: India: Madhya Pradesh, Goa, Karnataka and Maharashtra.

7. *Copris (Copris) repertus* Walker, 1858:

1858. *Copris repertus* Walker, *Ann. Mag. Nat. Hist.*, (3) ii: 208.

1931. *Copris repertus*, Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae), **3** : 116.

1963. *Copris (Copris) repertus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, I: 351.

Material examined: Railway hostel, 22.vi.2004 (1 ex.), Coll. Subhash.

Distribution: India: Bihar, Chhattisgarh, Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Mysore, Uttar Pradesh and Tamil Nadu. *Elsewhere*: Sri Lanka and Myanmar.

Tribe Onthophagini Burmeister, 1846

8. *Phalops divisus* (Wiedmann, 1823):

1823. *Copris divisus* Wiedmann, *Zool. Mag.*, ii, I : 12.

1931. *Phalops divisus* Arrow, *Faun. Brit. India*, (Lamellicornia: Coprinae) **3** : 135.

Material examined: Railway colony, 08.vii.2004 (2 ex.), Coll. Subhash.

Distribution: India: Haryana, Himachal Pradesh, Madhya Pradesh, Uttar Pradesh and Tamil Nadu. *Elsewhere*: Sri Lanka.

9. *Caccobius (Caccophilus) ultor* (Sharp, 1875):

1875. *Caccophilus ultor* Sharp, *Col. Hefte*, XIII: 50.

1931. *Caccobius ultor* Arrow, *Faun. Brit. India*, (Lamellicornia: Coprinae) **3** : 150.

1963. *Caccobius (Caccophilus) ultor*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 135.

Material examined: University campus, 10.v.2003 (1ex.), Railway Colony, 30.vi.2004 (1 ex.), Coll. Subhash.

Distribution: India: Madhya Pradesh, Himachal Pradesh and Maharashtra.

10. *Caccobius (Caccophilus) unicornis* (Fabricius, 1798):

1798. *Copris unicornis* Fabricius, *Ent. Syst. Suppl.*, : 33.

1931. *Caccobius unicornis*, Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae), **3** : 145-146.

1963. *Caccobius (Caccophilus) unicornis*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 142-143.

Material examined: Railway hostel, 25.vi.2004 (2 ex.), Coll. Subhash.

Distribution: India: West Bengal, Haryana, Madhya Pradesh, Orissa, Uttar Pradesh and Uttarakhand. *Elsewhere*: Borneo, China, Java, Malay, Philipines and Sri Lanka

11. *Onthophagus (Onthophagus) cervus* (Fabricius, 1798):

1798. *Copris cervus* Fabricius, *Ent. Syst. Suppl.* : 31.

1931. *Onthophagus cervus*, Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae), **3** : 348-349.

1963. *Onthophagus (Onthophagus) cervus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 307.

Material examined: TFRI colony campus, 02.viii.2004 (1 ex.), Coll. Subhash.

Distribution: India: Madhya Pradesh, Maharashtra, Tamil Nadu and West Bengal. *Elsewhere*: Sri Lanka.

12. *Onthophagus (Onthophagus) dama* (Fabricius, 1798):

1798. *Copris dama* Fabricius, *Ent. Syst. Suppl.*, : 32.

1931. *Onthophagus dama*, Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae), **3** : 279-280.

1963. *Onthophagus (Onthophagus) dama*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 325-326.

Material examined: Railway colony, 18.vii.2004 (2 ex.), Coll. Subhash.

Distribution: India: Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh and Uttarakhand. *Elsewhere:* Bhutan and Sri Lanka.

13. *Onthophagus (Onthophagus) griseosetosus* Arrow, 1931:

1931. *Onthophagus griseosetosus* Arrow, *Faun. Brit. India* (Lamellicornia : Coprinae), **3** : 192.

1963. *Onthophagus (Onthophagus) griseosetosus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 374.

Material examined: Science College, 31.vii.2003 (02 ex.), Coll. Subhash.

Distribution: India: Himachal Pradesh, Madhya Pradesh, Maharashtra, Tamil Nadu and Uttarakhand.

14. *Onthophagus (Colobonthophagus) hindu* Arrow, 1931:

1931. *Onthophagus hindu* Arrow, *Faun. Brit. India*, (Lamellicornia: Coprinae), **3** : 289.

1963. *Onthophagus (Colobonthophagus) hindu*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 381-382.

Material examined: ZSI Residential colony, 27.vii.2011 (1 ex.), Coll. Rajesh Somkuwar.

Distribution: India: Madhya Pradesh, Maharashtra and South India. *Elsewhere:* Sri Lanka.

15. *Onthophagus (Onthophagus) quadridentatus* (Fabricius, 1798)

1798. *Copris quadridentatus* Fabricius, *Ent. Syst. Suppl.*, 34.

1931. *Onthophagus quadridentatus*, Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae), **3** : 304-305.

1963. *Onthophagus (Onthophagus) quadridentatus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 493-494.

Material examined: Panagar, 02.v.2003 (1 ex.); 04.v.2003 (1 ex.), Coll. Subhash; Railway colony, 23.vii.2003 (1 ex.), Coll. Subhash.

Distribution: India : Arunachal Pradesh, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. *Elsewhere:* Sri Lanka.

16. *Onthophagus (Onthophagus) unifasciatus* (Schall., 1783):

1783. *Scarabaeus unifasciatus* Schall., *Abh. Hall. Nat. Ges.* I : 240.

1931. *Onthophagus unifasciatus*, Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae), **3** : 341.

1963. *Onthophagus (Onthophagus) unifasciatus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 571.

Material examined: Railway colony, 08.vii.2004 (2 ex.), Coll. Subhash.

Distribution: India: Bihar, Jharkhand, Maharashtra, Madhya Pradesh, Tamil Nadu, Karnataka and Uttar Pradesh.

Tribe Oniticeellini Kolbe, 1905

17. *Oniticellus (Oniticellus) cinctus* (Fabricius, 1775):

1775. *Scarabaeus cinctus* Fabricius, *Syst. Ent.* : 30.

1931. *Oniticellus cinctus*, Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae) **3** : 379-380.

1963. *Oniticellus (Oniticellus) cinctus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 77.

Material examined: Railway hostel, 07.vii.2003 (1 ex.), Coll. Subhash.

Distribution: India: Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttarakhand, Uttar Pradesh and West Bengal.

18. *Tiniocellus spinipes* (Roth, 1851):

1851. *Oniticellus spinipes* Roth, *Arch., F. Nat.*, xvii, I : 128.

1900. *Tiniocellus spinipes*, Peringuey, *Trans. Phil. Soc. S. Afr.* Xii : 116.

1931. *Tiniocellus spinipes*, Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae) **3** : 378.

1963. *Tiniocellus spinipes*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 108.

Material examined: Railway hostel, 24.vi.2004 (1 ex.), 30.vi.2004 (1 ex.), Coll. Subhash.

Distribution: India: Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu and Uttarakhand. *Elsewhere:* Africa and Uganda.

19. *Drepanocerus setosus* (Wiedmann, 1823):

1823. *Copris setosa* Wiedmann, *Zool. Mag.* ii, 1 : 19.
1931. *Drepanocerus setosus*, Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae) 3 : 381-382.
1963. *Drepanocerus setosus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 68-69.
Material examined: University campus, 08.v.2004 (1 ex.); Dumna road, 28.iii.2004 (1 ex.); Railway hostel, 30.vi.2004 (1 ex.); 14.iii.2004 (1 ex.), Coll. Subhash.
Distribution: India: Chhattisgarh, Himachal Pradesh, Haryana, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttarakhand and Uttar Pradesh. *Elsewhere*: Sri Lanka.

Tribe Onitini Laporte, 1840

20. *Onitis philemon* Fabricius, 1801:

1801. *Onitis philemon* Fabricius, *Syst. Eleut.* I : 30.
1931. *Onitis philemon*, Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae), 3 : 393-394.
1963. *Onitis philemon*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 41.
Material examined: University road, 01.i.2004 (1 ex.), Coll. Subhash.
Distribution: India: Bihar, Chhattisgarh, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal. *Elsewhere*: Myanmar, Pakistan, Sri Lanka, Vietnam and Thailand.

21. *Onitis subopacus* Arrow, 1931:

1931. *Onitis subopacus* Arrow, *Faun. Brit. India*, (Lamellicornia : Coprinae), 3 : 395-396.
1963. *Onitis subopacus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera : Lamellicornia), Coprinae, II: 38-39.
Material examined: University road, 29.iii.2003 (1 ex.), Coll. Subhash.
Distribution: India: Assam, Bihar, Haryana, Himachal Pradesh, Punjab, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal.

Subfamily: Melolonthinae MacLeay, 1819
Tribe Diplotaxini Kirby, 1837

22. *Apogonia proxima* Waterhouse, 1877

1877. *Apogonia proxima* Waterhouse, *Cist. Ent.*, 2 : 233.
Material examined: Patbaba, 19.vi.2004 (1 ex.), Coll. Subhash.
Distribution: India: Andaman and Nicobar Island, Haryana, Madhya Pradesh and Uttar Pradesh.

Subfamily: Rutelinae MacLeay, 1819
Tribe Anomalini Streubel, 1839

23. *Anomala rugosa* Arrow, 1899:

1899. *Anomala rugosa* Arrow, *Trans. Ent. Soc. Lond.*, : 263.
Material examined: ZSI residential colony, 04.vii.2011 (1 ex.), Coll. Rajesh Somkuwar.
Distribution: India: Himachal Pradesh, Madhya Pradesh, Punjab, Sikkim, Uttar Pradesh and West Bengal. *Elsewhere*: Nepal.

Tribe Adoretini Burmeister, 1844

24. *Adoretus bimarginatus* Ohaus, 1914:

1914. *Adoretus bimarginatus* Ohaus, *Deutsche Ent. Zeits.*, : 480, Fig. 12.
Material examined: Railway hostel, 08.vii.2003 (1 ex.), Coll. Subhash.
Distribution: Assam, Bihar, Madhya Pradesh, Uttarakhand and West Bengal.

25. *Adoretus kanarensis* Arrow, 1917:

1917. *Adoretus kanarensis* Arrow, *Faun. Brit. India*, (Lamellicornia: Rutelinae) 2 : 337.
Material examined: ZSI Office, Vijay Nagar, 22.vi.2004 (1 ex.), Coll. Subhash.
Distribution: Maharashtra and Madhya Pradesh.

Subfamily: Cetoniinae Leach, 1819
Tribe Goliathini Griffith and Pidgeon, 1832

26. *Dicheros (Coryphocera) bimacula* (Wiedmann, 1823):

1823. *Cetonia bimacula* Wiedmann, *Zool. Mag.* ii, I : 85.
1910. *Dicheros bimacula*, Arrow, *Faun. Brit. India*, (Lamellicornia : Cetoniinae) I : 75.
Material examined: Katanga Colony, 08.viii.2004 (1 ex.), Coll. K. Chandra; University Road, 11.vii.2003 (1 ex.), Coll. Subhash.
Distribution: Madhya Pradesh and Kerala.

27. *Heterorrhina elegans* (Fabricius, 1781):

1781. *Cetonia elegans* Fabricius, *Spec. Ins.* I : 56.
 1910. *Heterorrhina elegans*, Arrow, *Faun. Brit. India*, (Lamellicornia : Cetoniinae) I : 93-94.
Material examined: ZSI office, Vijay Nagar, 04.vii.2011 (1 ex.), Coll. Rajesh Somkuwar.
Distribution: India: Bihar, Jharkhand, Karnataka, Madhya Pradesh and Tamil Nadu. *Elsewhere:* Sri Lanka.

Tribe Cetoniini Leach, 1815

28. *Oxycetonia albopunctata* (Fabricius, 1798):

1798. *Cetonia albopunctata* Fabricius, *Ent. Syst., Suppl.* : 129.
 1910. *Oxycetonia albopunctata*, Arrow, *Faun. Brit. India*, (Lamellicornia : Cetoniinae) I : 166-167.
Material examined: Railway colony, 14.ix.2004 (3 ex.); 05.ix.2004 (1 ex.); 01.x.2004 (2 ex.), Coll. Subhash.
Distribution: India: Assam, Karnataka, Madhya Pradesh, Tamil Nadu and West Bengal. *Elsewhere:* Bhutan, Mauritius, Madagascar, Pakistan and Sri Lanka.

29. *Oxycetonia versicolor* (Fabricius, 1775):

1775. *Cetonia versicolor* Fabricius, *Syst. Ent.*, : 51.
 1910. *Oxycetonia versicolor*, Arrow, *Faun. Brit. India*, (Lamellicornia : Cetoniinae) I : 164.
Material examined: Railway colony, 14.ix.2004 (2 ex.); 01.ix.2004 (1 ex.); 19.vi.2004 (1 ex.); 28.vii.2003 (1 ex.), Coll. Subhash.
Distribution: India: Assam, Madhya Pradesh, West Bengal and Uttarakhand. *Elsewhere:* Myanmar.

RESULTS AND DISCUSSION

Altogether 29 species of the scarab beetles belonging to two families viz. Scarabaeidae and Hybosoridae of superfamily Scarabaeoidea (Coleoptera) were studied from Jabalpur, Madhya Pradesh (India) and reported new to the beetle fauna of the district. Of these the family Scarabaeidae includes 27 species belonging to 18 genera under five subfamilies while Hybosoridae represents only two species belonging to single genus under subfamily Hybosorinae. Concerning the previous publication on the beetle diversity of Jabalpur [15], an updated checklist of 58 species of the scarab beetles belonging to 32 genera, 17 tribes, 10 subtribes, 11 subfamilies under four families of superfamily Scarabaeoidea is also provided (Table 1). The family Scarabaeidae (54 species) was dominating over Hybosoridae (2 species), followed by Geotrupidae and Trogidae (one species each). Of the family Scarabaeidae, the dominant subfamily Scarabaeinae includes 31 species followed by Rutelinae (9 species), Cetoniinae (7 species), Aphodiinae and Melolonthinae (2 species each) and Orphninae, Chironiinae and Dynastinae (1 species each) (Fig. 1). In terms of species diversity among genera, the most dominant genus comes out *Onthophagus* (10 species) followed by *Adoretus* (6 species), *Gymnopleurus*, *Copris*, *Catharsius* and *Onitis* (3 species each), *Aphodius*, *Caccobius*, *Anomala* and *Oxycetonia* (2 species each). Other genera are represented only by single species. Species diversity of the scarab beetles of Madhya Pradesh and Chhattisgarh is quite rich and currently includes 134 species belonging to 11 subfamilies under four families of superfamily Scarabaeoidea [16, 21-24].

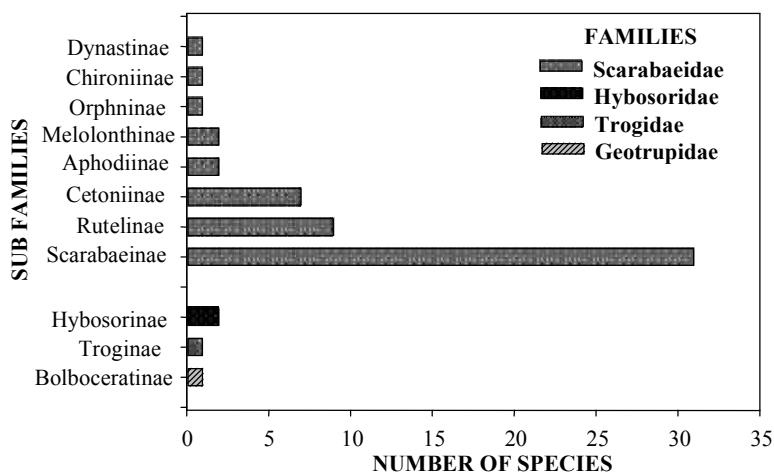


Fig. 1: Species diversity of Scarab beetles in different Subfamilies and Families of Superfamily Scarabaeoidea

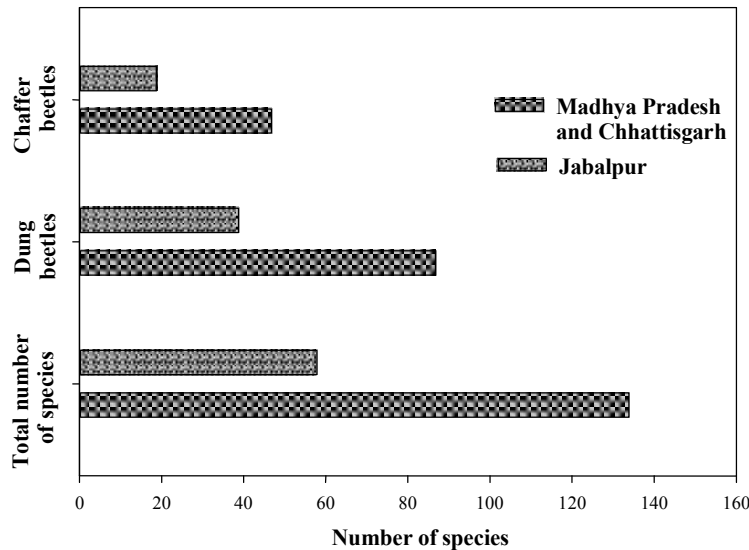


Fig. 2: Comparative diversity of scarab beetles of Jabalpur with that of Madhya Pradesh and Chhattisgarh

Of these beetles from the two states dung beetles are represented by 87 species and chaffers with 47 species while from Jabalpur dung beetles constitute 39 species and chaffers 20 species. On comparing the diversity of the scarab beetles of Jabalpur with that of Madhya Pradesh and Chhattisgarh, it was found that Jabalpur harbors comparatively variable diversity with 58 species, accounting about 44% of the total richness of these beetles for the two states (Fig. 2).

ACKNOWLEDGEMENTS

The authors are thankful to Dr. K. Venkataraman, Director, Zoological Survey of India, Kolkata for providing necessary facilities and encouragement.

REFERENCES

- Smith, A.B.T., 2006. A Review of the Family-Group Names for the Superfamily Scarabaeoidea (Coleoptera) with Corrections to Nomenclature and a Current Classification, Coleop. Soc. Mono., 5: 144-204.
- Fincher, G.T., 1981. The Potential value of dung beetles in pasture ecosystem. J. Geogr. Entomol. Soc., 16(2): 316-333.
- Mittal, I.C., 1993. Natural manuring and soil conditioning by dung beetles. Trop. Eco., 34(2): 150-159.
- Estrada, A. and R. Coates-Estrada, 1991. Howler monkeys, dung beetles (Scarabaeidae) and seed dispersal: Ecological interactions in the tropical rainforest of Los tuxlas, Mexico. J. Trop. Eco, 7: 459-474.
- Larsen, T., 2004. Dung beetle extinctions and ecological function. [http:// www.princeton.edu/kremen/trond.htm](http://www.princeton.edu/kremen/trond.htm)
- Borenmissza, G.F., 1970. Insectary studies on the control of dung breeding flies by the activity of dung beetle, *Onthophagus gazella* F. (Coleoptera: Scarabaeinae). J. Aus. Ent. Soc., 9: 31-41.
- 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.
- Arrow, G.J., 1917. The Fauna of British India including Ceylon and Burma. Col. Lamell. II (Rutelinae). Taylor & Francis, London, V-XIII, 1-387, 7 fig., 5 pls.
- Arrow, G.J., 1931. The Fauna of British India including Ceylon and Burma. Col. Lamell. III, (Coprinae). Taylor & Francis, London, XII : 1-428, 61 Fig., 19 pls., map.
- Balthasar, V., 1963. Monographie der Scarabaeidae und Aphodiidae der Palaearktischen und Orientalischen region. Prague, Verl. Tschsl. Akad Wissensch., I, 1-391, 137 figs., 24pls. : II, 627 pp: 226 Figs., 16 pls.

11. Balthasar, V., 1963. Monographie der Scarabaeidae und Aphodiidae der Palaearktischen und Orientalischen region. Prague, Verl. Tschsl. Akad.Wissensch, II, 1-627, 226 figs., 16 pls.
12. Balthasar, V., 1964. Monographie der Scarabaeidae und Aphodiidae der Palaearktischen und Orientalischen region. Prague, Verl. Tschsl. Akad. Wissensch., III, pp: 652.
13. Chandra, K., 2000. Inventory of Scarabaeid Beetles (Coleoptera) from Madhya Pradesh, India. Zoo's Print J., 15(11): 359-353.
14. Chandra, K., 2003. Insect Biodiversity in Madhya Pradesh and Chhattisgarh, Advancements in Insect Biodiversity (edited by Rajiv Gupta), Agrobios (India), 37-52 & 325-337.
15. Chandra, K., 2008. Insecta : Coleoptera, Faunal Diversity of Jabalpur District, Madhya Pradesh, pp: 159-186.
16. Chandra, K. and S.C. Ahirwar, 2007. Insecta : Coleoptera : Scarabaeidae, Fauna of Madhya Pradesh (including Chhattisgarh), State Fauna Series, 15(Part-1): 273-300.
17. State of Forest Report, 2003. Forest Survey of India (Ministry of Environment & Forests), Dehradun, pp: 1-134.
18. Oommachan, M. and J.L. Shrivastava, 1996. Flora of Jabalpur, Scientific Publishers, Jodhpur, pp: 1-354.
19. Kuijten, P.J., 1978. Revision of the Indo Australian species of the genus *Phaeochrous* Castelnau, 1840 (Coleoptera: Scarabaeidae, Hybosorinae), with notes on the African species. Zool. Verh., 165: 140, 2pis., 22 Figs.
20. Kuijten, P.J., 1983. Revision of the Genus *Hybosorus* Macleay (Coleoptera: Scarabaeidae, Hybosorinae). Zool. Verh., 201: 1-49.
21. Chandra, K. and D. Gupta, 2011a. Study of Scarabaeid Beetles (Coleoptera) of Veerangana Durgavati Wildlife Sanctuary, Damoh, Madhya Pradesh, India. Dec. Curr. Sci., 05: 272-278.
22. Chandra, K. and D. Gupta, 2011b. Two New Records of genus *Onthophagus* Latreille, 1802 (Coleoptera: Scarabaeidae) from Madhya Pradesh, India. Utt. Prad. J. Zoo., 31(2): 253-255.
23. Chandra, K. and D. Gupta, 2011c. New record of two species *Caccobius* from Madhya Pradesh (Coleoptera: Scarabaeidae). Bionotes, 13(3): 117.
24. Krikken, J., 1980. Bolboceratine scarabs of the Oriental genus *Bolbohamatum* nov. (Coleoptera, Geotrupidae). Tijd. voor Entomo. deel, 123, afl.1 pp: 1-38, figs. 1-71.