



E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2017; 5(6): 17-22
© 2017 JEZS
Received: 05-09-2017
Accepted: 06-10-2017

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First report on Scarabaeid (Coleoptera) fauna of Sahaspur, Uttarakhand

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Abstract

The study was conducted in Sahaspur, Dehradun (Uttarakhand) in the month of October 2016-March 2017. The present study incorporates Faunistic record of 16 species of scarab beetles belonging to 9 genera, 2 subfamilies (Scarabaeinae and Aphodiinae) and 1 family (Scarabaeidae) of superfamily Scarabaeoidea of order Coleoptera. All the 16 species were reported for the first time from the Sahaspur of which *Onthophagus mopsus* (Fabricius), *Onthophagus cervus* (Fabricius), *Aphodius rufipes* (Linnaeus) and *Aphodius erraticus* (Linnaeus) are new record to the Scarab fauna of Uttarakhand.

Keywords: Scarab beetles, Coleoptera, Sahaspur (Uttarakhand)

1. Introduction

Scarab beetles under superfamily Scarabaeoidea are well diversified in tropical forests and Savannas and are globally distributed insects of order Coleoptera^[1]. These Scarab beetles are well noticeable because of their relatively large size, bright colors, often elaborate ornamentation and interesting life histories. According to some estimates around 30,000 species of family Scarabaeidae of superfamily Scarabaeoidea are known throughout the world^[2]. Largely coprophagous scarab species feed on the microorganism-rich liquid component of mammalian dung and use the more fibrous material to construct brood balls for nesting^[3,4]. True dung feeding beetles are belongs to subfamily 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^[5]. They play a very important role in ecosystem, by improving soil structure and water holding capacity by incorporating organic matter back into the soil^[6], secondary seed dispersal^[7,8], biological control by reducing the number of pests^[9,2] and nutrient cycling, soil aeration^[10]. Few studies were conducted in Dehradun district of Uttarakhand, but still there are vast areas yet to be explored, so that this study focused on the species diversity of the scarab fauna in the region of Sahaspur, Dehradun, Uttarakhand.

2. Material and Methods

2.1. Study site

The present study was conducted in Sahaspur (30°23'33.76" N, 77°48'34.44° E), Dehradun, located on the North West region of India in state Uttarakhand during the month of October 2016-March 2017 (Fig.1).

2.2. Collection and Identification

A total of 16 Scarab species were collected by applying light traps and handpicking methods. Collected beetles were firstly washed with the water to remove dung from them and preserved dry pinned. The beetles were then identified with help of available literature^[11-14]. Specimens were identified up to lowest possible taxa by studying characters under Binocular Stereo Microscope (Elite). The detail of material examined and distribution of the recorded scarab beetles is provided along with the species photographs (Plate 1 & 2). Classification adopted for superfamily Scarabaeoidea is after Smith^[15].

3. Systematic Account of Species

Order: Coleoptera Linnaeus, 1758
Suborder: Polyphaga Emery, 1886

Super family: Scarabaeoidea Latreille, 1802
 Family: Scarabaeidae Latreille, 1802

3.1. Subfamily: Scarabaeinae Latreille, 1802

3.1.1. *Digitonthophagus bonasus* (Fabricius, 1775) Plate 1:

1775. *Scarabaeus bonasus* Fabricius, *Syst. Ent.*: 23.
 1931. *Onthophagus bonasus* Arrow, *Fauna Brit. India* (Coleoptera: Lamellicornia), 3: 231-232.
 1963. *Onthophagus (Digitonthophagus) bonasus* Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleopter: Lamellicornia), Coprinae, 1: 296.
 2005. *Onthophagus bonasus*, Chandra, *Fauna of Western Himalaya*, Zool. Surv. India, 2: 148.
Material examined: Uttarakhand, Sahaspur, (Jhajra), 6. x.2016 (1ex.) Coll. Shagun Mahajan.
Distribution: India: (Bihar, Karnataka, Kerala, Tamil Nadu and Uttarakhand) Nepal Pakistan, Sri Lanka, Myanmar, Thailand, Vietnam and Cambodia.

3.1.2. *Onthophagus (Onthophagus) cervus* (Fabricius, 1798)* Plate 1:

1798. *Copris cervus* Fabricius, *Ent. Syst. Suppl.*: 31.
 1931. *Onthophagus cervus*, Arrow, *Fauna Brit. India* (Coleoptera: Lamellicornia), 3: 348-349.
 1963. *Onthophagus (Onthophagus) cervus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera: Lamellicornia), Coprinae, 2: 307.
Material examined: Uttarakhand, Sahaspur (Sudhowala), 24.iii.2017, Coll. Amar Paul Singh.
Distribution: India (Madhya Pradesh, Maharashtra, Uttarakhand, Tamil Nadu and West Bengal) and Sri Lanka

3.1.3. *Onthophagus (Onthophagus) dama* (Fabricius, 1798) Plate 1:

1798. *Copris dama* Fabricius, *Ent. Syst. Suppl.*: 32.
 1931. *Onthophagus dama*, Arrow, *Faun. Brit. India*, (Coleoptera: Lamellicornia), 3: 279-280.
 1963. *Onthophagus (Onthophagus) dama*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleopter: Lamellicornia), Coprinae, II: 325-326.
Material examined: Uttarakhand, Sahaspur, (Rajawala), 16.ii.2017, Coll. Shagun Mahajan
Distribution: India (Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh and Uttarakhand), Bhutan and Sri Lanka.

3.1.4. *Onthophagus (s.str) rectecornutus* (Lansberge, 1883) Plate 1:

1883. *Onthophagus rectecornutus* Lansberge, *not Leyden Mus.* 5: 49 (female).
 1907. *Onthophagus rectecornutus*, Arrow, *Ann. Mag. Nat. Rist.*, 19 (7): 421.
 1963. *Onthophagus (Serrophorus) rectecornutus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleopter: Lamellicornia), Coprinae, 1: 499.
Material examined: Uttarakhand, Sahaspur (Jhajra), 9.iii.2017 (1 ex), Coll. Shagun Mahajan
Distribution: China, India (Assam, Bangalore, Bihar, Karnataka, Kerala, Malabar, Nelliampathy, Thekkady, Wayanad, Tamil Nadu, Nilgiri Hills, Uttarakhand and West Bengal), Sri Lanka, Sunda Islands, Thailand.

3.1.5. *Onthophagus mopsus (Fabricius, 1792) Plate 1:**

1792. *Scarabaeus mopsus* Fabricius, *Syst. Ent.*: 58.
 1931. *Onthophagus mopsus* Arrow, *Fauna Brit. India* (Coleoptera: Lamellicornia), 3: 328-329.
 1963. *Onthophagus (Onthophagus) mopsus* Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleopter: Lamellicornia), Coprinae: 441.
Material examined: Uttarakhand, Sahaspur, (Jhajra), 6.x.2016 (4 ex.) Coll. Amar Paul Singh
Distribution: India (Bihar, Jammu & Kashmir, Madhya Pradesh, Uttar Pradesh, Uttarakhand and West Bengal) and Pakistan.

3.1.6. *Onthophagus (Onthophagus) ramosellus* (Bates, 1891) Plate 1:

1891. *Onthophagus ramosellus* Bates, *Entom. Suppl.*, 24: 11.
 1931. *Onthophagus ramosellus* Arrow, *Faun. Brit. India* (Coleoptera: Lamellicornia) 3: 236.
 1963. *Onthophagus (Onthophagus) ramosellus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleopter: Lamellicornia), Coprinae, 2: 497.
 2005. *Onthophagus ramosellus*, Chandra, *Zool. Surv. India, Fauna of Western Himalaya*, 2: 148.
Material examined: Uttarakhand, Sahaspur, (Jhajra), 6.x.2016 (1 ex.) Coll. Shagun Mahajan.
Distribution: India (Bihar, Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Uttar Pradesh, Uttarakhand and West Bengal) and Pakistan.

3.1.7. *Oniticellus (Oniticellus) cinctus* (Fabricius, 1775) Plate 1:

1775. *Scarabaeus cinctus* Fabricius, *Syst. Ent.*: 30.
 1931. *Oniticellus cinctus*, Arrow, *Faun. Brit. India*, (Coleoptera: Lamellicornia) 3: 379-380.
 1963. *Oniticellus (Oniticellus) cinctus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleopter: Lamellicornia), Coprinae, 2: 77.
Material examined: Uttarakhand, Sahaspur (Sudhowala), 6.x.2016, (4 ex), Coll. Shagun Mahajan
Distribution: India (Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttarakhand, Uttar Pradesh, and West Bengal) Southern China, India, Indonesia, Malaysia, Thailand, and Vietnam.

3.1.8. *Euoniticellus pallipes* (Fabricius, 1781) Plate 1:

1781. *Scarabaeus pallipes* Fabricius, *Spec. Ins.*, 1: 33.
 1931. *Oniticellus pallipes*: Arrow, *Faun. Brit. India*, (Coleoptera: Lamellicornia), 3: 375-376,
 1963. *Oniticellus (Euoniticellus) pallipes*: Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera: Lamellicornia), Coprinae, 2: 74
Material examined: Uttarakhand, Sahaspur (Jhajra), 9.iii.2017 (2 ex), Coll. Amar Paul Singh
Distribution: India (Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Maharashtra, Rajasthan, Tamil Nadu, Uttarakhand and West Bengal) and Bangladesh.

3.1.9. *Copris (Copris) repertus* (Walker, 1858) Plate 2:

1858. *Copris repertus* Walker, *Ann. Mag. Nat. Hist.*, (3) 2: 208.
 1931. *Copris repertus*, Arrow, *Faun. Brit. India*, (Coleoptera: Lamellicornia), 3: 116.
 1963. *Copris (Copris) repertus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis.*

Region (Coleoptera: Lamellicornia), Coprinae, 1: 351.

Material examined: Uttarakhand, Sahaspur (Fulsani), 17.ii.2017 (2 ex), Coll. Shagun Mahajan

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

3.1.10. *Onitis philemon* (Fabricius, 1801) Plate 2

1801. *Onitis philemon* Fabricius, *Syst. Eleut.* 1: 30.

1931. *Onitis philemon*, Arrow, *Faun. Brit. India*, (Coleoptera: Lamellicornia), 3: 393-394.

1963. *Onitis philemon*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera: Lamellicornia), Coprinae, 2: 41.

Material examined: Uttarakhand, Sahaspur, (Jhajra), 6.x.2016 (2 ex.), Coll. Amar Paul Singh.

Distribution: India (Bihar, Chhattisgarh, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal) Myanmar, Pakistan, Sri Lanka, Vietnam and Thailand.

3.1.11. *Tiniocellus spinipes* (Roth, 1851) Plate 2

1851. *Oniticellus spinipes* Roth, *Arch., F. Nat.*, (17) 1: 128.

1900. *Tiniocellus spinipes*, Peringuey, *Trans. Phil. Soc. S. Afr.* 12: 116.

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

1963. *Tiniocellus spinipes*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera: Lamellicornia), Coprinae, 2: 108.

Material examined: Uttarakhand, Sahaspur (Nanda Ki Chowki), 4.xi.2016 (1 ex), Coll. Amar Paul Singh.

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

3.1.12. *Catharsius* (s.str.) *molossus* (Linnaeus, 1758) Plate 2

1758. *Catharsius molossus* Linnaeus, *Syst. Nat. Ed.* 10: 347

1931. *Catharsius molossus*, Arrow, *Faun. Brit. India*, (Coleoptera: Lamellicornia), 3: 94.

1963. *Catharsius molossus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera: Lamellicornia), Coprinae, 1: 307-309.

Material examined: Uttarakhand, Sahaspur (Nanda Ki Chowki), 24.iii.2017 (1 ex), Shagun Mahajan.

Distribution: India (Assam; Andaman Island; Bihar; Karnataka; Kerala: Wayanad, Nelliampathy, Thekkady, Odisha, Sikkim, Uttarakhand, West Bengal), Afghanistan, Cambodia, China, Laos, Malaysia, Nepal, Sri Lanka, Sunda Islands, Taiwan, Thailand, Vietnam.

3.1.13. *Tibiodrepanus setosus* (Wiedemann, 1823) Plate 2

1823. *Copris setosa* Wiedemann, *Zool. Mag.* (2) 1: 19.

1931. *Drepanocerus setosus*, Arrow, *Faun. Brit. India*, (Coleoptera: Lamellicornia) 3: 381-382.

1963. *Drepanocerus setosus*, Balthasar, *Mon. der Scarabaeidae und Aphodiidae der Palaeark. und Orientalis. Region* (Coleoptera: Lamellicornia), Coprinae, 2: 68-69

2009. *Tibiodrepanus setosus* Haroldius, 4: 1-30.

Material examined: Uttarakhand, Sahaspur (Jhajra), 9.iii.2017 (2 ex), Coll. Amar Paul Singh

Distribution: India (Kerala: Nilambur, Nelliampathy, Thekkady, Wayanad, Madhya Pradesh, Maharashtra,

Uttarakhand), Sri Lanka.

3.2. Subfamily: Aphodiinae Leach, 1815

3.2.1. *Aphodius* (*Pharaphodius*) *crenatus* (Harold, 1862) Plate 2

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

Material examined: Uttarakhand, Sahaspur (Chharba), 17.ii.2017 (1 ex), Coll. Shagun Mahajan

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

3.2.2. *Aphodius rufipes** (Linnaeus, 1758) Plate 2:

1758. *Aphodius rufipes*, Linnaeus, *Syst. Nat. Ed.* 10

Material examined: Uttarakhand, Sahaspur (Nanda Ki Chowki), 4.xi.2016 (2 ex),

24.iii.2017 (4 ex), Coll. Shagun Mahajan.

Distribution: India (Uttarakhand, Himachal Pradesh and Uttar Pradesh),

3.2.3. *Aphodius erraticus** (Linnaeus, 1758) Plate 2

1758. *Aphodius erraticus*, Linnaeus, *Syst. Nat. Ed.* 10

Material examined: Uttarakhand, Sahaspur (Fulsani), 17.ii.2017 (1 ex), Coll. Amar Paul Singh.

Distribution: India (Uttarakhand), Afghanistan, Austria, Belarus, Belgium, Canada, Denmark, Estonia, Finland, France, Germany, Greece, Guatemala, Ireland, Italy, Latvia, Luxembourg, Mongolia, Morocco, Netherlands, Norway, Poland, Russia, Slovakia, Spain, Sweden, Switzerland, Tunisia, Turkey, USA, United Kingdom, Uzbekistan

4. Results and Discussion

Altogether 16 species of the scarab beetles belonging to two subfamilies viz. Scarabaeinae and Aphodiinae of family Scarabaeidae and superfamily Scarabaeoidea (Coleoptera) were studied from Sahaspur, Uttarakhand (India). The subfamily Scarabaeinae (13 species) was dominating over Aphodiinae (3 species).

The first comprehensive account on the scarabaeid beetles of the Indian region were published in three volumes of Fauna of British India by Arrow^[11-13] where in 72 species were reported from Uttarakhand. Later Mittal^[16] published an annotated list of the scarab fauna of Western Uttar Pradesh and recorded 151 species of scarabaeid beetles belonging to 41 genera and 12 subfamilies. Subsequently taxonomic research on the coleopteran diversity of Central India has been made by Mittal^[17] who gave the diversity and conservation status of 136 species of Laparostict Scarabaeidae belonging to 26 genera and 8 subfamilies from North India. Later Chatterjee^[18] reported 44 species belonging to 16 genera and 3 subfamilies from Uttarakhand. Recently Chandra *et al.*^[19] published updated checklist of the scarab beetles of Uttarakhand comprising 167 species belonging to 52 genera, 21 tribes, 9 subfamilies and 3 families of superfamily Scarabaeoidea.

By combining almost all the previously published information^[11-13, 16-19], it is concluded that all the species are reported for the first time from the Sahaspur of which **Onthophagus mopsus* (Fabricius), **Onthophagus cervus* (Fabricius), **Aphodius rufipes* (Linnaeus) and **Aphodius erraticus* (Linnaeus) are new record to the Scarab fauna of Uttarakhand. (*) represents the species added new to the scarab fauna of Uttarakhand. Species diversity of the scarab beetles of Uttarakhand is quite rich. With the contribution of four new species to the fauna of Uttarakhand, the current data includes 171 species belonging to 9 subfamilies and 3 families of superfamily Scarabaeoidea.

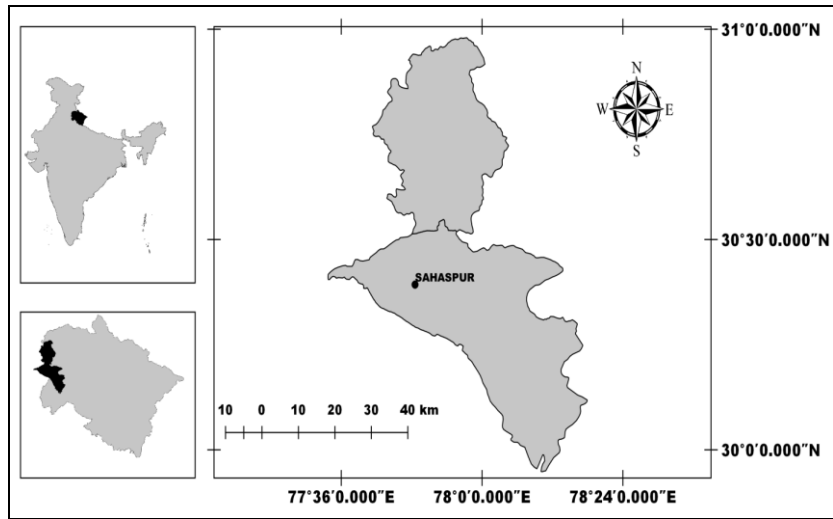


Fig 1: Location of Sahaspur in Dehradun district Uttarakhand

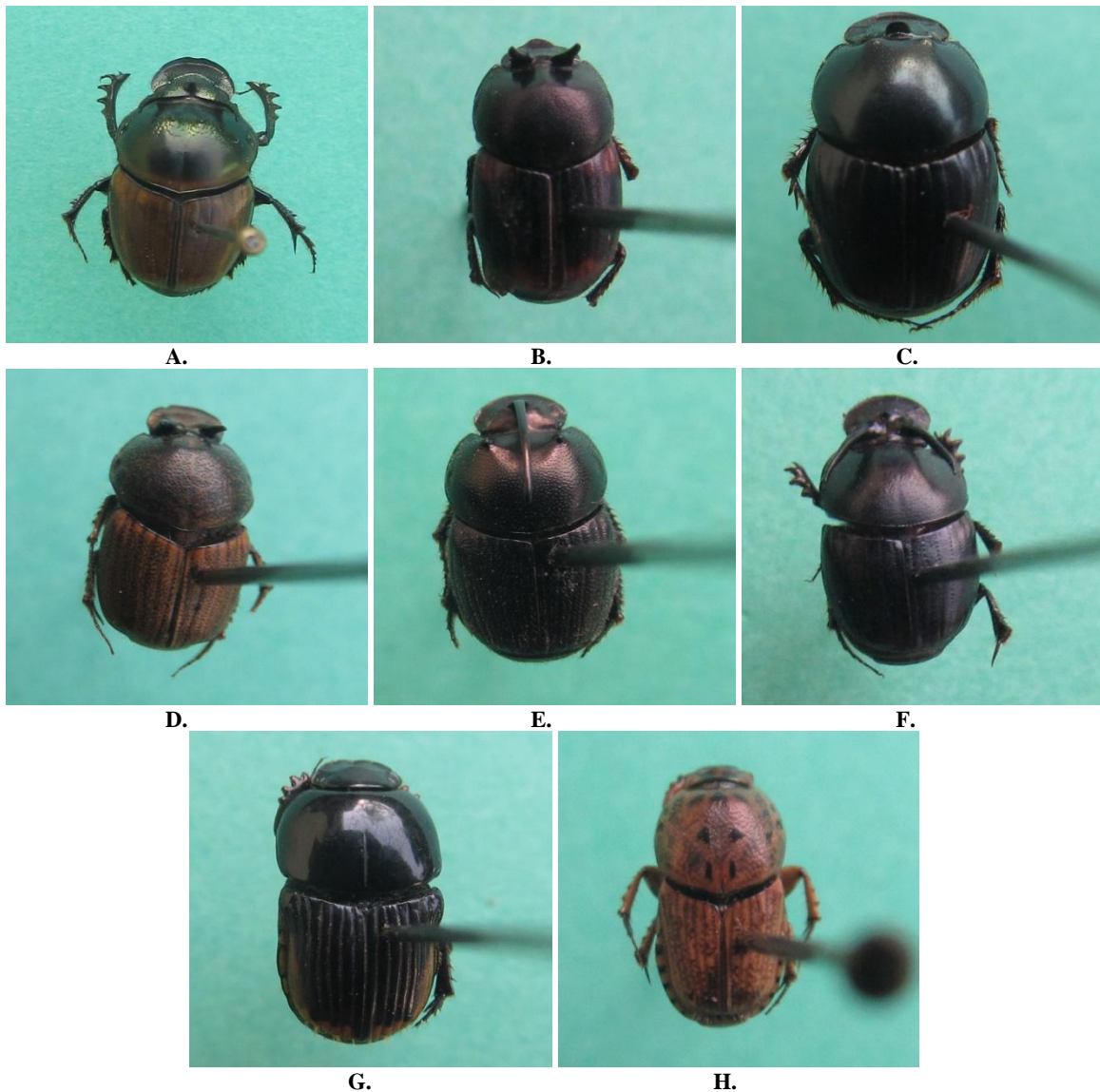


Plate 1: Scarabaeinae beetles of Sahaspur, Dehradun, Uttarakhand **A:** *Digitonthophagus bonasus* **B:** *Onthophagus (Onthophagus) cervus** **C:** *Onthophagus (Onthophagus) dama* **D:** *Onthophagus (s.str) rectecornutus* **E:** *Onthophagus (Onthophagus) mopsus** **F:** *Onthophagus (Onthophagus) ramosellus* **G:** *Oniticellus (Oniticellus) cinctus* **H:** *Euoniticellus pallipes*.

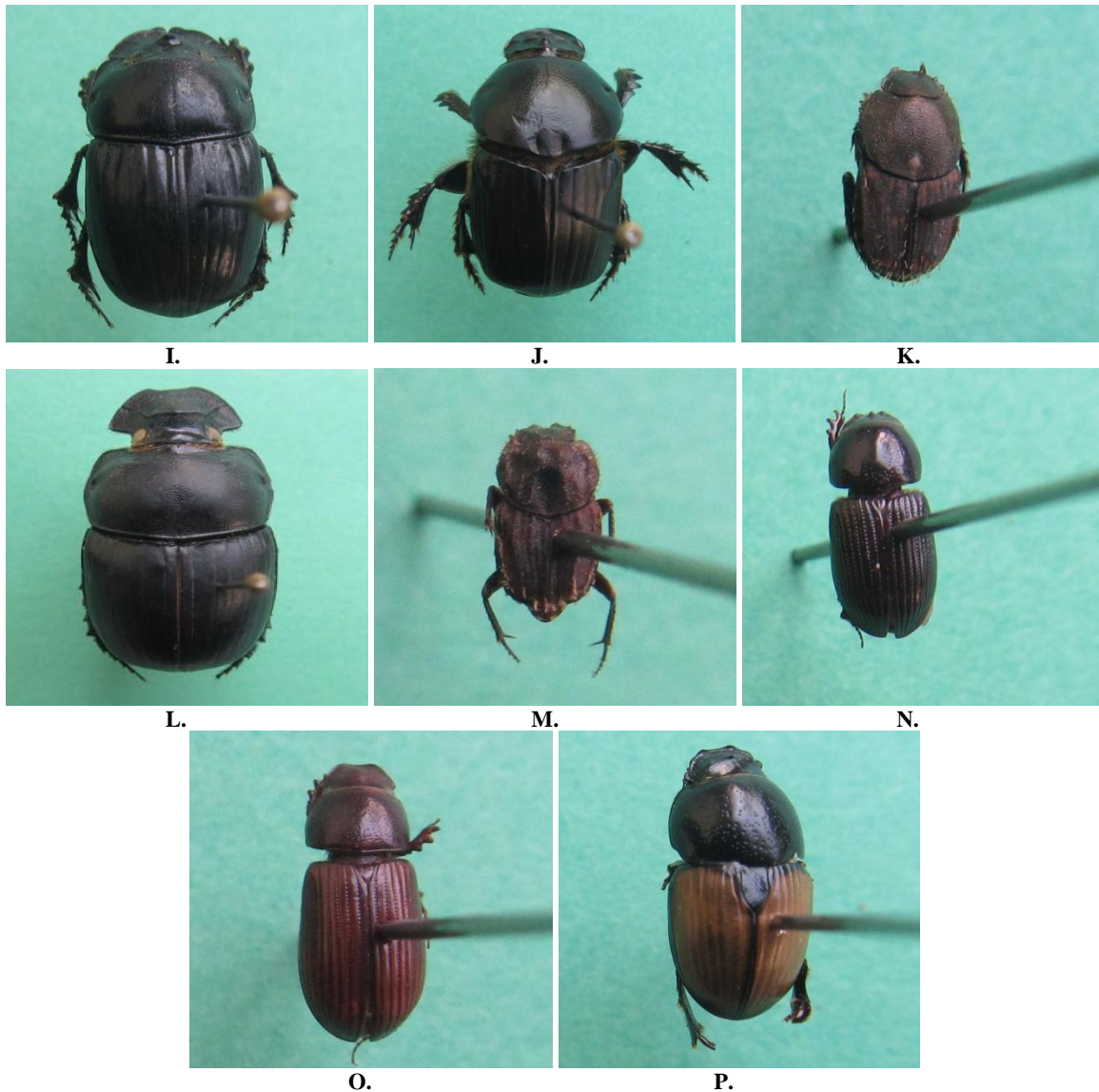


Plate 2: Scarabaeinae (I-M) and Aphodinae (N-P) beetles of Sahaspur, Dehradun, Uttarakhand, **I:** *Copris (Copris) repertus* **J:** *Onitis philemon* **K:** *Tiniocellus spinipes* **L:** *Catharsius (s.str.) molossus* **M:** *Tibiodrepanus setosus* **N:** *Aphodius (Pharaphodius) crenatus* **O:** *Aphodius rufipes** **P:** *Aphodius erraticus**

5. Conclusion

The present study concluded the faunal account of a small collection of the scarab beetles of Sahaspur, Uttarakhand comprising 16 species belonging to 9 genera, 2 subfamilies and 1 family of superfamily Scarabaeoidea. These species are recorded for the first time from Sahaspur, Uttarakhand while four species viz. **Onthophagus mopsus* (Fabricius), **Onthophagus cervus* (Fabricius), **Aphodius rufipes* (Linnaeus) and **Aphodius erraticus* (Linnaeus) are new record to the fauna of Uttarakhand.

6. Acknowledgements

The authors are thankful to Director, Wildlife Institute of India, Dehradun & Principal Dr. V.P. Sharma, Alpine Institute of Management and Technology Dehradun for providing necessary facilities and encouragement and are also like to gratefully and sincerely thanks to Devanshu Gupta for identification of the species and to the local communities of the Sahaspur, Uttarakhand for their cooperation in the field work.

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