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A first report of dung beetle *Garreta smaragdifer* (Walker, 1858) 
attending the faecal matter of Northern Plain Gray Langur 
*Semnopithecus entellus* (Dufresne, 1997) with range extension and 
a checklist of the genus *Garreta* Janssen, 1940

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Author contributions: ASK formulated the study, identified the beetle, dissected genetalia, taken photos, prepared map, written MS. MJP written the identification part of the Hanuman Langur, identified the Langur and helped in compilation, taken photo of Langur.

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INTRODUCTION

The genus Garreta Janssens, 1940, is widely distributed in Afrotropical and Oriental regions (Davis & Deschodt 2018) and is known by 25 extant species and two subspecies (Morretto & Génier 2015; Schoolmeesters 2017; Davis & Deschodt 2018; Pokorny & Zidek 2018; Zidek 2018) from the world including 8 from India (Mittal 2011; Chandra & Gupta 2014). The Asian species of this genus have been revised by Pokorny & Zidek (2016) and the African species by Pokorny & Zidek (2018). In their revision, they clearly state that describing species in this genus based on the colours is not valid. The colour changes in this group are due to the temperature induced effect, they further state that the species distributed in the warmer regions are greenish-bluish in temperate regions and coppery in intermediate climatic conditions. The species in this genus look similar and to delineate the species, recently in Afrotropical species, the micro-sculpture of the exoskeleton was used as an important character for differentiation by Moretto & Génier (2015)

RESULTS AND DISCUSSION

Taxonomic account

Family Scarabaeidae Latreille, 1802
Subfamily Scarabaeinae Latreille, 1802
Tribe Gymnopleurini Lacordaire, 1856
Genus Garreta Janssen, 1940
1803. Gymnopleurus Illiger (ex parte), Mag. Ins., II: 199.
1897. Paragymnopleurus Shipp (ex parte), Entom., XXX: 166.
Type species: Ateuchus azureus Fabricius, 1801 (= Garreta azureus (Fabricius, 1801)), Natural History Museum, London, UK (BMNH).

Garreta smaragdifer (Walker, 1858)
(Image 1B–D)
Type locality: Sri Lanka?

Distributon: India (Chhattisgarh, Madhya Pradesh, Maharashtra, Sri Lanka).

Gautala-Autramghat Wildlife Sanctuary, Maharashtra, India lies in the Satmala and Ajantha hill ranges. During our field survey tour of the sanctuary, we came across many G. smaragdifer adults, busy rolling in fresh primate faecal matter of the Northern Plain.
Gray Langur *Semnopithecus entellus* (Dufresne, 1997). Large troops of the langur were seen hopping on the *Hardwickia binata* Roxb. trees present in the Patnadevi part of the sanctuary and around the Bhaskaracharya Forest Guest house during the day time. Near the guest house it was observed that the fresh dung of the langur was rolled and carried by the large number of *G. smaragdifer*, who were busy in rolling and fighting for the dung in the day time. The langur was identified by the mammal expert and the second author. Some of the beetles were collected and brought to the laboratory for further study and to our surprise it was identified as *G. smaragdifer*, a new record for Maharashtra whose range extended from central India to Maharashtra. The aim of this paper is to provide a first report of the Dung Beetle *G. smaragdifer* attending the faecal matter of a primate species from India and also its range extension from Maharashtra.

First instance, on 12 August 2021, we observed a large troop of langurs near the Kedarkund area (20.309N & 74.967E; 447 m) very close to the water falls, about 4 km from the Bhaskaracharya Forest Rest House (Figure 1). The entire forest floor was covered with the shiny bluish-green dung beetles, either rolling or devouring the faecal matters of the langur (Image 1). As many as 80 beetles were counted during the survey. The next day, a similar emergence of dung beetles was noticed all along within the campus of the Bhaskaracharya Forest Rest House (20.318N & 74.975E; 468 m), where a small roost of about 15 langurs was seen. A total of more than 100 beetles were encountered during the period. All were actively rolling the very meagre faecal matters underneath the tree. Some of them were fighting for the dung balls. This is a common practice where male dung beetles fight for the dung pad with other males. Both the days were exceptionally wet and the weather was slightly overcast with a light drizzle.

Various reports suggest that a dung ball is rolled away from the dung for brood construction by a single beetle, or by a pair and buried in the soil (Prasse 1957). An egg is laid at its base, and is covered with dung in the chamber making a brood. This brood is then coated with a mixture of soil and dung to prevent fungal attack (Scholtz et al. 2009). The *Garreta* brood is generally oval in shape. We also noticed slightly oval shaped brood balls all along the locality.

The other primate species observed during the survey was the Rhesus Macaque *Macaca mulatta*.
Zimmermann, 1780, which are found in small numbers at the locality. Major herbivorous animals observed from the Gautala-Autramghat Sanctuary were Nilgai *Boselaphus tragocamelus* (Pallas, 1766), Indian Gazelle *Gazella bennettii* (Sykes, 1831), Sambar *Rusa unicolor* (Kerr, 1792), Spotted Deer *Axis axis* (Erxleben, 1777), and Wild Boar *Sus scrofa* Linnaeus, 1758. Carnivorous animals like Leopard *Panthera pardus* (Linnaeus, 1758), Tiger *Panthera tigris* (Linnaeus, 1758), and Jungle Cat *Felis chaus* Schreber, 1777 were also found during the survey. It was observed in the field that faecal matters of these animals were not attended to by *G. smaragdifer*.

Most scarabs prefer to feed on herbivore faecal matter, which are largely undigested plant matter, rather than carnivore faecal matters, which hold very little nutritional value for insects (Hadley 2021). According to Al-Houty & Musalam (1997) the faecal matter of herbivorous mammals was more preferred than the carnivores. There are many studies on the dung beetles attending on the dungs of elephants (Sabu et al. 2006), Gaur (*Boselaphus* & Sabu 2007), cattle species (Tonelli et al. 2021) from India. There are reports of dung beetles attending on the scats of carnivorous animals too (Al-Houty & Musalam 1997). Even though studies were reported on the faecal matters of primates from other countries (Estrada & Coates-Estrada 1991) so far there were none from India. Hence, the present report forms the first instance of dung beetles on the dungs of primate species from India and also reporting the beetle species *G. smaragdifer* for the first time from Maharashtra State.

The extant species of the genus *Garreta* Janson, 1940 (modified from Moretto & Génier 2015 and Zídek 2018).

   Type Locality: Wildlife College, South Africa; SANC (South Africa, Gauteng, Pretoria, South African National Collection of Insects).
   Distribution: Southern Africa.

2. *Garreta azureus* (Fabricius, 1801)
   Type Locality: Guinea [Ghana]; ZMUC (Zoological Museum of Copenhagen University, Denmark).
   Distribution: Africa.

   Type Locality: N Zérékoré, se. Guinea; NMPC (National Museum (Natural History), Prague, Czech Republic).
   Distribution: Guinea.

4. *Garreta caffer* (Fahraeus, 1857)
   Type Locality: Caffraria; NHRS (Naturhistoriska Riksmuseet, Stockholm, Sweden).
   Distribution: Angola, South Africa.

5. *Garreta crenulatus* (Kolbe, 1895)
   Type Locality: N of Lake Albert (Uganda?); MNHB (Museum für Naturkunde Leibniz-Institut, Berlin, Germany).
   Distribution: Republic Democratic Congo.

6. *Garreta dejani* (Castelnau, 1840)
   Distribution: India (Chhattisgarh, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu, Uttarakhand), Nepal, Pakistan.

7. *Garreta diffinis* (Waterhouse, 1890)
   Type Locality: Senegambia; BMNH (Natural History Museum, London, UK).
   Distribution: Gabon, Gambia, Senegal, sw. DRC (Kuili=Kwilu River).

8. *Garreta fastiditus* (Harold, 1867)
   Type Locality: Cape of Good Hope MNHN (Muséum National d’Histoire Naturelle, Paris, France).
   Distribution: Zimbabwe, Mozambique, South Africa.

9. *Garreta gilleti* (Garreta, 1914)
   Type Locality: Saigon, Cochinchine; MNHN (Muséum National d’Histoire Naturelle, Paris, France).
   Distribution: India (Uttar Pradesh) Thailand, Vietnam.
10. *Garreta laetus* (Hope, 1842)  
Type Locality: Liberia: enirons de cap Palmas [=Cape Palmas, Liberia]; OXUM (Oxford University Museum of Natural History, UK).  

11. *Garreta laetus laetus* (Hope, 1842)  
Type Locality: Liberia: enirons de cap Palmas [=Cape Palmas, Liberia]; OXUM (Oxford University Museum of Natural History, UK).  
Distribution: Cape Palmas.

12. *Garreta laetus olivaceus* (Quedenfeldt, 1884)  
Type Locality: Malange [Angola]; (MNHN) (Muséum National d’Histoire Naturelle, Paris, France).  
Distribution: Angola, Congo, Malawi, Mozambique, Republic Democratic Congo, Tanzania, and Zimbabwe.

13. *Garreta lugens* (Fairmaire, 1891)  
Type Locality: Somalia; NHMW (Naturhistorisches Museum, Vienna, Austria).  

14. *Garreta malleolus* Kolbe, 1895  
Type Locality: Tanganyika. Lac Victoria [=East of Lake Tanganyika]; MNHB (Museum für Naturkunde Leibniz-Institut, Berlin, Germany).  
Distribution: Republic Democratic Congo, Ruanda, Mozambique, Uganda, Urundi, and Zimbabwe.

15. *Garreta matabelensis* Janssens, 1938  
Type Locality: Matabele, Zimbabwe; ISNB (Institut Royal des Sciences Naturelles, Brussels, Belgium).  
Distribution: Zimbabwe.

16. *Garreta mombelgi* (Boucomont, 1929)  
Type Locality: Sichuan, Yunnan, China; MNHN (Muséum National d’Histoire Naturelle, Paris, France).  
Distribution: China.

17. *Garreta morosus* (Fairmaire, 1886)  
Type Locality: Sichuan, Yunnan, China; MNHN (Muséum National d’Histoire Naturelle, Paris, France).  
Distribution: China.

18. *Garreta mundus* (Wiedemann, 1819)  
Type Locality: the type destroyed.  
Distribution: India (Bihar, Chhattisgarh, Himachal Pradesh, Kashmir, Madhya Pradesh, Punjab, Uttarakhand), Pakistan, southwestern China.

19. *Garreta namalugens* Davis & Deschodt, 2018  
Distribution: Southern Africa.

20. *Garreta nitens* (Olivier, 1789)  
Type Locality: Senegal; MNHN (Muséum National d’Histoire Naturelle, Paris, France).  

21. *Garreta opacus* (Redtenbacher, 1848)  
Type Locality: Punjab during British India? type lost; NHMW (Naturhistorisches Museum, Vienna, Austria).  
Distribution: India: (Himachal Pradesh, Jammu &
Kashmir, Uttarakhand) and Nepal.

22. *Garreta ruficornis* (Motschulsky, 1854)
   Type Locality: Not known.
   Distribution: India (Assam, Himachal Pradesh, Punjab, Uttarakhand), Afghanistan, China, Myanmar, and Thailand.

23. *Garreta rutilans* (Castelnau, 1840)

   Type Locality: Sennaar, Sudan; MNHN (Muséum National d’Histoire Naturelle, Paris, France).
   Distribution: Botswana, eastern South Africa, Sudan, and Zimbabwe.

24. *Garreta smaragdifer* (Walker, 1858)
   Type Locality: Not known; BMNH (Natural History Museum, London, UK).
   Distribution: India (Chhattisgarh, Madhya Pradesh, Maharashtra (reported in this study), southern India) and Sri Lanka.
25. **Garreta sylvestris** Mittal, 2011


Type Locality: Haryana; INPC (National Pusa Collections, New Delhi, India).

Distribution: India (Haryana).

Remark: Endemic to India.

26. **Garreta unicolor** (Fahraeus, 1857)


Type Locality: Caffraria; NHRS (Naturhistoriska Riksmuseet, Stockholm, Sweden).

Distribution: Mozambique, South Africa, and Zimbabwe.

27. **Garreta wahlbergi** (Fahraeus, 1857)


Type Locality: Caffraria; NHRS (Naturhistoriska Riksmuseet, Stockholm, Sweden).

Distribution: Botswana, Mozambique, South Africa, Swaziland, and Zimbabwe.

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