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Research Article

SPECIES LIST WITH PICTORIAL KEY FOR DUNG BEETLES (COLEOPTERA: SCARABAEIDAE: SCARABAEINAE) OF NELLIAMPATHI IN SOUTH WESTERN GHATS, INDIA

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A B S T R A C T

Scarabaeinae dung beetles are globally distributed group of insects that are scavengers, primarily feeding on animal excrement, but may also feed on carrion, and decomposing fruits. Through their feeding behavior, they perform important ecosystem services. Dung beetle communities respond rapidly to habitat disturbance, specifically tropical forest disturbance, hence they are recognized as ideal ecological indicators to study effects of habitat disturbance on biodiversity. Western Ghats in India is one of the biodiversity hotspots of the world. However, its forests face tremendous population pressure due to agricultural expansion, infrastructure development and non-timber forest product harvest. This has contributed to loss of biodiversity and forest cover in the Western Ghats.There is limited information on ecologically important insects such as dung beetles of South Western Ghats. In the present study, dung baited pitfall traps were used to collect dung beetles across a forest-agriculture habitat ecotonein Nelliampathiin South Western Ghats. Thirty four species, belonging to 11 genera and seven tribes were collected from Nelliampathi. Three first reports for South India and nine endemics to Western Ghats were recorded. A species list with pictorial key for dung beetles of Nelliampathi in South Western Ghats is provided. Such a species list with pictorial key will provide baseline information and enable rapid identification of dung beetles of the region in future studies.

INTRODUCTION

Scarabaeinae dung beetles are globally distributed group of insects that are scavengers, primarily feeding on animal excrement, but may also feed on carrion, and decomposing fruits (Halffter and Mathews, 1966). Through their feeding behavior, they perform important ecosystem services such as nutrient recycling, biological pest control and secondary seed dispersal (HanskiandCambefort, 1991; Nichols *et al*., 2008). Dung beetle communities respond rapidly to habitat disturbance, specifically tropical forest disturbance, hence they are recognized as ideal ecological indicators to study effects of habitat disturbance on biodiversity (Davis *et al*., 2001; Gardner *et al*., 2008; Nichols *et al*., 2007).

Western Ghats in India is one of the biodiversity hotspots of the world. However, its forests face tremendous population pressure. Over the last century, agricultural expansion, infrastructure development and non-timber forest product harvest has contributed to loss of biodiversity and forest cover in Western Ghats (Jha*et al*., 2000; Kumar, 1993; Menon and Bawa, 1997; Shahabuddin and Prasad, 2004).

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Information on dung beetle biodiversity of South Western Ghats is limited. Few studies that has documented the dung beetle biodiversity of South Western Ghats are Arrow (1931),Paulian,(1980, 1984), Biswas and Chatterjee (1986), Biswas and Mulay (2001), Mathew (2004), Schoolmeesters and Thomas (2006), Latha *et al*., (2011), Sabu *et al.,* (2011), Mathews (2013), Sathiandran *et al*., (2015). In the present studya species list with pictorial key for dung beetles of Nelliampathiin South Western Ghats is compiled. Such a species list with pictorial key will provide baseline information and rapid identification of dung beetles of the region in future studies.

MATERIALS AND METHOD

Study Site

Nelliampathi is located on the "edge" of Palghat gap in South Western Ghats (Pearson and Ghorpade, 1989). The collection site, Kaikatty in Nelliampathi is located at 10^0 31'N longitude and 76^0 40'E latitude, at an elevation of 960msl (Fig. 1). Though extensive in area, Nelliampathi forests presents a fragmented landscape interspersed by large number of plantations, dams, and roads. It is an ecologically high sensitive area forming a corridor for the movement of long ranging species such as *Pantheratigris* Linnaeus, 1758 (tiger), *Pantherapardus* Linnaeus, 1758 (leopard), *Bosgaurus* Smith, 1827 (wild gaur), and is also a crucial migratory route for *Elephasmaximus* Linnaeus, 1758 (elephant) (Sukumar and Easa, 2006).

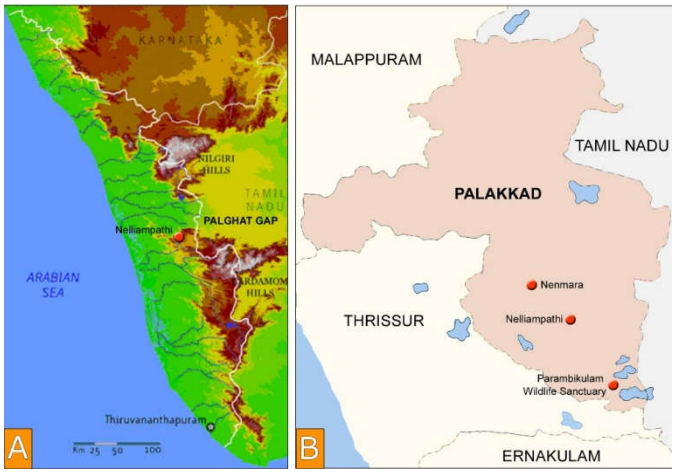


Fig 1 A. Map showing Western Ghats; B. Map howing study region Nelliampathi.

The vegetation in the forest habitat is characterized by west coast semi-evergreen forest consisting of a mixture of evergreen and deciduous trees (Kerala Forests and Wildlife Department, 2004). Dung beetles were collected across a forest- agriculture habitat ecotone in Nelliampathi. The study sites consisted of a 971 hectare reserve forest, 372 hectare agriculture habitat of banana and orange plantations and a well-defined ecotone characterized by scattered trees and less undergrowth that separates the two habitats (Fig. 2). Traps were placed in the reserve forest, ecotone and in the portion of the agriculture habitat with bananaplantation.

Fig. 2 Dung beetle species collected from Nelliampathi during the 2007-08 study period that are first reports from South India,A. *Onthophagus deflexicollis*, B. *O. manipurensis*, C. *Tibiodrepanocerus sinicus* and endemic to Western Ghats, D. *Caccobius gallinus*, E.*Liatongus indicus*, F. *Ochicanthon mussardi*, G. *Onthophagus amphicoma*, H. *O. andrewesi*, I. *O. bronzeus*, J. *O. vladimiri*, K. *Paracopris davisoni*, L. *Sisyphus araneolus*

Sampling

Dung beetles were collected using dung baited pit fall traps in the year 2007-08. Three collections were made during the study period (monsoon, presummer, summer). The collected beetles were preserved in 70% alcohol and brought to the laboratory of St. Joseph's College, Devagiri, Kozhikode. The beetles were identified to species levels using taxonomic keys available in Arrow (1931) and Balthasar (1963a, b) and also by verifying with type specimens available in the Coleoptera collections of St. Joseph's College, Devagiri, Kozhikode. Photographs were taken using Nikon D50 digital camera attached to a trinocular stereo zoom microscope (Labomed ASZ-99TR). All species are listed with their valid names, authority, and the year of description. The specimens are all deposited in the coleopteran collection of St. Joseph's College, Devagiri, Kozhikode.

RESULTS

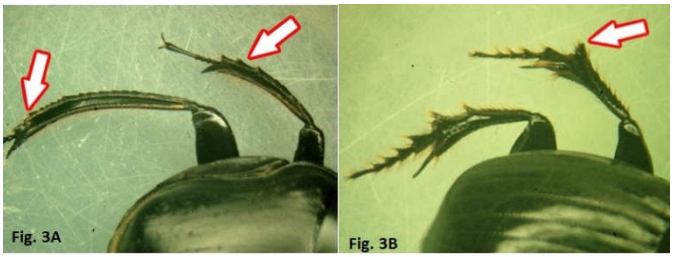
Thirty four species, belonging to11 genera and seven tribes were collected from Nelliampathi. The genera were *Caccobius*, *Catharsius*, *Copris*, *Liatongus*, *Paracopris*, *Paragymnopleurus*, *Ochicanthon*, *Onitis*, *Onthophagus*, *Sisyphus* and *Tibiodrepanus.* The seven tribes were Canthonini, Coprini, Gymnopleurini, Onitini, Onthophagini, Oniticelliniand Sisyphini (Table 1).

Three first reports (#) for the South Indian region were recorded from Nelliampathi, they are *Onthophagusdeflexicollis*, *O.manipurensis* and *Tibiodrepanussinicus*. Nine species endemic (*) to the Western Ghats were collected from Nelliampathi, they are *Caccobiusgallinus*, *Liatongusindicus, Ochicanthonmussardi, Onthophagusamphicoma, O. andrewesi, O. bronzeus, O. Vladimiri, Paracoprisdavisoni* and *Sisyphus araneolus.*

Key to the tribes and subtribes of subfamily Scarabaeinaeof Nelliampathi in South Western Ghats

1 Middle and hind tibiae elongate, slender, not or very little widened towards the apex (Fig. 3A) …….. 2

Middle and hind tibia short, widened towards the apex and triangular (Fig. 3B) …….. 4



2Middle coxa not widely separated, strongly oblique (Fig.4A) ……..**Gymnopleurini**

Middle coxa widely seperated, parallel or only little converging (Fig.4B)……. 3

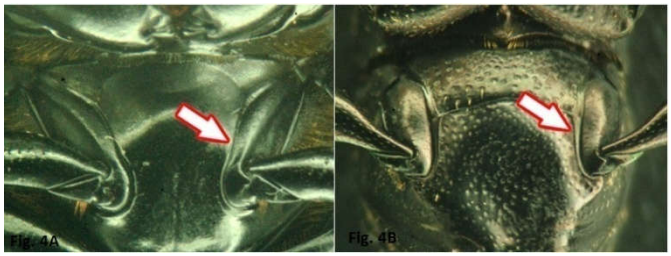
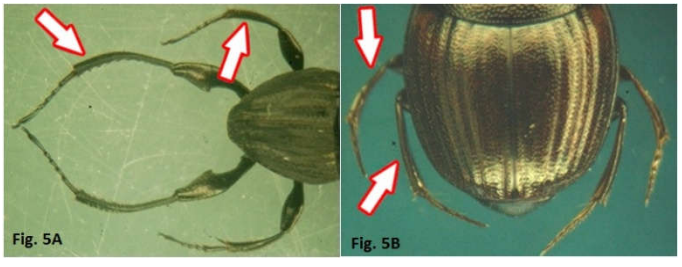


Table 1 Dung beetle species collected from a semi-evergreen forest (SEG), ecotone (ECO) and agriculture habitat (AGR) of Nelliampathi in South Western Ghats for the 2007-08 study period with distribution records, species endemic to Western Ghats (*), first report from South India (#).

Species	Habitat	Distribution
Caccobius(*Caccophilus*)*gallinus** Arrow, 1907	ECO, AGR	India (Kerala: Nelliampathi, Wayanad; Tamil Nadu: Nilgiri Hills)
Caccobius(*Caccophilus*)*meridionalis*Boucomont, 1914	AGR	India (Karnataka; Kerala: Erumaiyoor, Mahe, Nelliampathi, Ranipuram, Shendurney, Silentvalley, Thekkady, Wayanad; Gujarat; Maharashtra; Tamil Nadu: AnaimalaiHills, Nilgiri Hills), Sri Lanka
Caccobius (Caccophilus) ultor Sharp, 1875	AGR	India (Haryana:Kanneri; Karnataka: Budipadaga; Kerala: Nelliampathi, Ranipuram; Maharashtra: Bombay, Khandesh; Punjab, Rajasthan, UttarPradesh).
Catharsius(s.str.)*molossus*Linnaéus, 1758	SEG, ECO, AGR	Afghanistan, Cambodia, China, India (Andaman; Arunachal Pradesh; Assam; Bihar; Gujarat; Hariyana; Karnataka; Kerala: Kinavellore, Nelliampathi, Thekkady, Wayanad; Meghalaya; Mumbai; Orissa; Rajasthan; Sikkim; Tamil Nadu; Uttaranchal; W. Bengal), Laos, Malaysia, Nepal, Sri Lanka, Sunda Island, Taiwan, Thailand, Vietnam (Annam)
Copris (s.str.) *repertus* Walker, 1858	SEG, ECO, AGR	China, India (Arunachal Pradesh, Bihar; Chattisgarh; Gujarath, Karnataka; Kerala: Nelliampathi, Palghat, Ranipuram, Shendurney, Silent valley, Taliparamba, Thekkady, Wayanad); Madhya Pradesh; Maharashtra: Mumbai; Pondicherry, Rajasthan, Tamil Nadu: Anaimalai Hills, Nilgiri Hills; Uttar Pradesh), Sri Lanka, Thailand
Liatongus (s.str.) *indicus** Arrow, 1908	AGR	India (Kerala: Nelliampathi, Wayanad; Tamil Nadu: Anamalai Hills, Nilgiri Hills).
Ochicanthonmussardi* *Cuccodoro, 2011*	ECO	India (Kerala: Cardamom Hills, Nelliampathi Hills)
Onitissubopacus Arrow, 1931	AGR	Afghanistan, China, India (Assam; Bihar; Kashmir; Kerala: Nelliampathi, Wayanad; Madhya Pradesh; Tamil Nadu: Anamalai Hills; Uttaranchal; W. Bengal), Myanmar, Nepal, Sri Lanka, Sunda Islands, Thailand, Vietnam.
Onthophagus (s.str.) *amphicoma**Boucomont, 1914	SEG, ECO, AGR	India (Kerala: Mahe, Malabar, Nelliampathi, Travancore; Tamil Nadu: Nilgiri Hills).
Onthophagus(s.str.)*andrewesi** Arrow, 1931	SEG, ECO, AGR	India (Karnataka: Kanara; Kerala: Nelliampathi, Wayanad; Tamil Nadu: Anamalai Hills, Nilgiri Hills).
Onthophagus (s.str.) *bronzeus** Arrow, 1907	SEG, ECO, AGR	India (Karnataka; Kerala: Nelliampathi, Wayanad; Tamil Nadu: Nilgiri Hills).
Onthophagus (s. str.) *castetsi*Lansberge, 1867	SEG, ECO	India (Kerala: Nelliampathi, Travancore, Trivandrum, Wayanad; Tamil Nadu: Kodaikanal (Shembaganur), Madura, Palni Hills; Uttar Pradesh).
Onthophagus (*Micronthophagus*) *cavia* Boucomont, 1914	SEG, ECO	India (Bombay; Karnataka: Nandidroog; Kerala : Nelliampathi; Tamil Nadu: Conoor, Nilgiri Hills).
Onthophagus (s.str.) *centricornis* Fabricius, 1798	SEG	Afghanistan, India (Karnataka; Kerala: Nelliampathi, Wayanad; Maharashtra;TamilNadu: Nilgiri Hills), Sri Lanka.
Onthophagus(s.str.) *deflexicollis*#Lansberge, 1883	ECO	Burma, India (Assam; ArunachalPradesh; Bengal; Kerala: Nelliampathi; Uttaranchal; Sikkim), Indonesia (Sumatra), Malay-Peninsula, Myanmar, Tonkin
Onthophagus (s. str.) *ensifer* Boucomont, 1914	SEG, ECO, AGR	India (ArunachalPradesh; Gujarat; Kerala: Nelliampathi, Ranipuram, Thekkady, Wayanad; Tamil Nadu: Madhura, Nilgiri Hills).
Onthophagus (s.str.) *fasciatus* Boucomont, 1914	ECO, AGR	India (Karnataka; Kerala: Nelliampathi, Ranipuram, Thekkady, Wayanad; MadhyaPradesh; Mumbai; Uttaranchal; W. Bengal; Tamil Nadu: AnaimalaiHills, Madhura, Nilgiri Hills).
Onthophagus (s.str.) *favrei*Boucomont, 1914	SEG, ECO, AGR	India (Karnataka; Kerala: Nelliampathi, Wayanad; Tamil Nadu: Coimbatore, Nilgiri Hills), Sri Lanka.
Onthophagus(s.str.) *furcillifer*Bates, 1891	SEG, ECO, AGR	India (Assam; Kashmir; Kerala: Ranipuram, Thekkady, Wayanad; Punjab; Uttaranchal).
Onthophagus (s.str.) *insignicollis* Frey, 1954	SEG, ECO, AGR	India (Bihar; Kerala: Nelliampathi, Wayanad).
Onthophagus (s.str.) *laevis* Harold, 1880	SEG, ECO, AGR	Borneo, China, India (Kerala: Nelliampathi, Wayanad; Sikkim; Uttaranchal, W. Bengal), Indonesia (Java; Sumatra), Myanmar, Thailand.
Onthophagus (*Digitonthophagus*)*manipurensis*# Arrow, 1907	SEG, ECO, AGR	Burma; India (Arunachal Pradesh; Assam; Kerala: Nelliampathi; Manipur).
Onthophagus(s.str.) *pacificus*Lansberge, 1885	SEG, ECO, AGR	China, Bangladesh, Borneo, India (Assam; Karnataka; Kerala: Wayanad, Nelliampathi; Tamil Nadu: Nilgiri Hills; Uttaranchal; W. Bengal), Indonesia (Java; Sumatra), Myanmar, Malaysia, Sunda Islands, Thailand, Laos, Vietnam.
Onthophagus (s.str.) *porcus*Arrow, 1931	AGR	India (Arunachal Pradesh; Kerala: Nelliampathi, Wayanad; W. Bengal).
*Onthophagus (Serrophorous)rectecornutus*Lansberge, 1883	AGR	China, India (Assam; Bihar; Karnataka; Kerala: Malabar, Nelliampathi; Tamil Nadu: Nilgiri Hills; W. Bengal), Sri Lanka, Sunda Islands, Thailand.
Onthophagus (s.str.) *turbatus* Walker, 1858	SEG, ECO, AGR	India (Karnataka; Kerala: Mahe, Malabar, Nelliampathi; Maharashtra; Puducherry; Tamil Nadu: Nilgiri Hills), Sri Lanka.
Onthophagus (s.str.) *vladimiri* *Frey, 1957	SEG, ECO	India (Kerala: Nelliampathi, Wayanad; Tamil Nadu: Anamalai Hills).
Paracopriscribratus Gillet, 1927	SEG, ECO, AGR	India (Gujarat: Karnataka; Kerala: Nelliampathi, Ranipuram, Shendurney, Thekkady; Surat; Tamil Nadu: AnaimalaiHills, KalyanaPandal).
*Paracoprisdavisoni** Waterhouse, 1891	ECO, AGR	India (Karnataka; Kerala: Nelliampathi, Peerumade, Ranipuram, Thekkady, Travancore, Wayanad; Mumbai; Tamil Nadu: Nilgiri Hills, Palni Hills).
*Paracoprissignatus*Walker, 1858	ECO	India (Karnataka; Kerala: Mahe, Malabar, Thekkady, Travancore Sendurney, Wayanad; Maharashtra; Tamil Nadu: Coimbatore) Laos, Sri Lanka, Vietnam (Annam).
Paragymnopleurussinuatus Olivier, 1789	SEG	India (Arunachal Pradesh; Karnataka; Kerala: Nelliampathi, Nilambur, Palghat, Ranipuram, Shendurney; Maharashtra: Kanara, S. Bombay; Sikkim; W. Bengal), Myanmar, Nepal.
Sisyphus (S. str.) araneolus* Arrow, 1927	SEG, ECO	India (Kerala: Nelliampathi; Tamil Nadu: Nilgiri Hills).
Tibiodrepanussetosus Wiedemann, 1823	SEG, ECO, AGR	India (Kerala: Nelliampathi, Wayanad; Tamil Nadu: Anamalai Hills, Nilgiri Hills).
Tibiodrepanussinicus# Harold, 1868	AGR	Burma, India (Central and Northern India; Kerala: Nelliampathi), Laos, North Vietnam, Southern China.

3 Middle and hind legs remarkably long and slender and the hind tibia more or less strongly curved (Fig.5A)…… …… **Sysiphini**

Middle and hind legs not remarkably long, hind tibia not strongly curved (Fig.5B) ……**Canthonini**



4 Second segment of the labial palpi shorter than the first, third well developed

(Fig.6A)……..**Coprini**

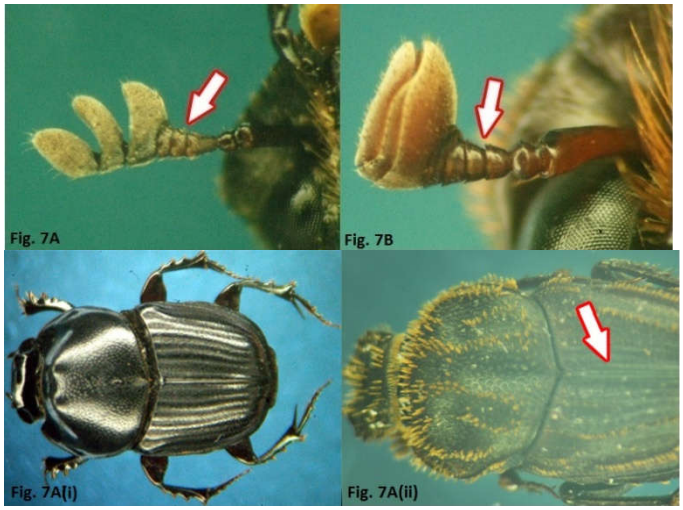
Second segment of the labial palpi longer than the first, third very rudimentary or absent (Fig. 6B)……..……..5

5 Antenna 8 segmented (Fig.7A)..... .....**Oniticellini**

Upper surface smooth or with fine hairs (Fig.7Ai).....**Oniticellina**

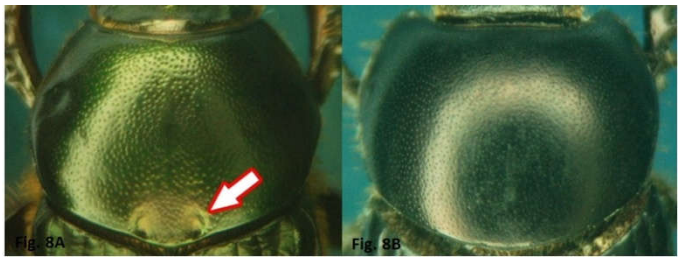
Upper surface with coarse erect hairs (Fig.7Aii).....**Drepanocerina**

Antenna 9 segmented (Fig.7B) 6



6 Pronotum with two basal impression in the middle (Fig.8A).....**Onitini**

Pronotum without two basal impression in the middle (Fig. 8B).....**Onthophagini**



Key to the genera of subfamily scarabaeinae of Nelliampathi in South Western Ghats

Gymnopleurini

Clypeus with two teeth (Fig.9A).....**Paragymnopleurus Shipp**

Sisyphini

Body round with dispropotionately large legs, clothed above with short, erect, hooked setae(Fig.9B).....**Sisyphus Latereilli**

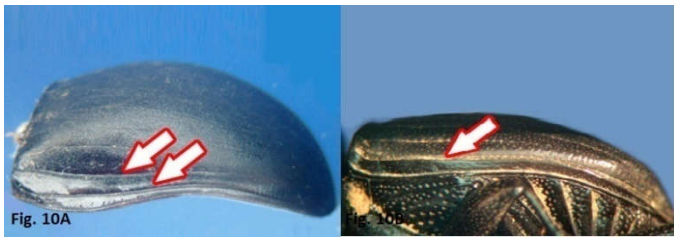
Canthonini

Elytra with six dorsal striae, seventh stria bordering the edge of elytra (Fig.9C) .....**Ochicanthon Vaz-de-Mello**

Coprini

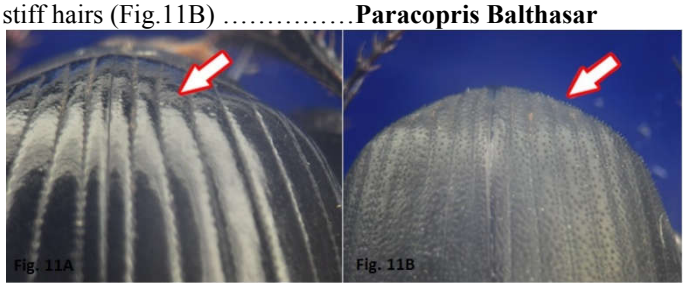
1Elytra with two lateral carina (Fig.10A) .....**CatharsiusHope**

Elytra with one lateral carina (Fig.10B)..... 2



2 Punctures at the apex and sides of the elytra without hairs (Fig.11A).....**Copris Geoffroy**

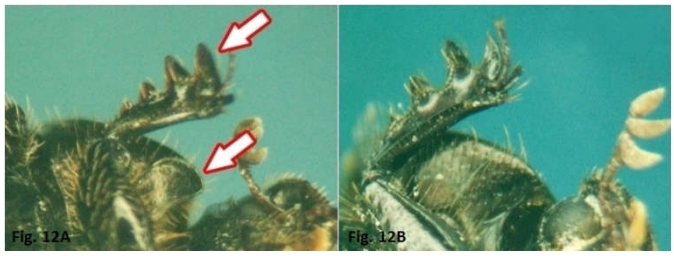
2' Punctures at the apex and sides of the elytra bearing short stiff hairs (Fig.11B) .....**Paracopris Balthasar**



Onthophagini

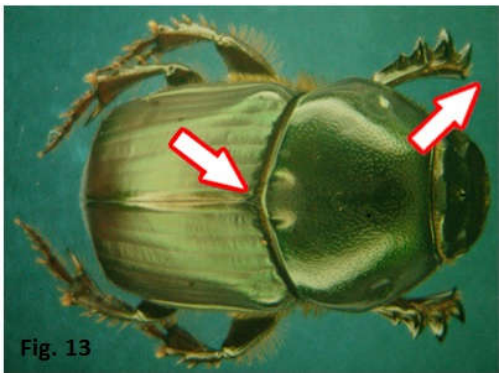
1 Terminal margin of the front tibia at right anles to the inner margin and anterior angles of trhe prothorax hollowed beneath (Fig.12A).....**Caccobius Thomson**

Either one or none of the above charatcters present (Fig.12B).....**Onthophagus Latreille**



Onitini

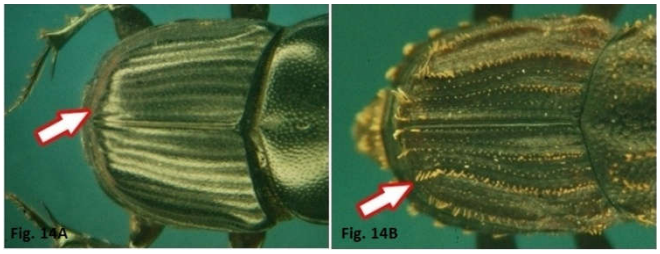
Scutellum very minute, front tarsi absent (Fig 13).....**Onitis Fabricius**



Oniticellini

1 Elytra not fringed with hairs before the hind margin (Fig 14 A).....**Liatongus Reitter**

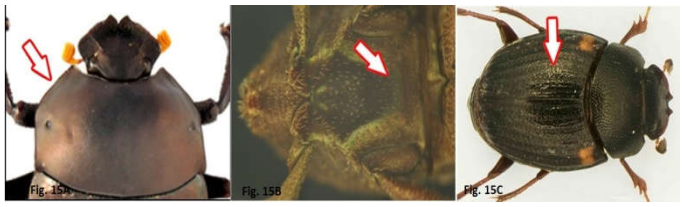
Elytra fringed with hairs before the hind margin (Fig 14B).....**Tibiodrepanus Krikken**



Key to the species of subfamily scarabaeinae of Nelliampathi in South Western Ghats

Paragymnopleurus
Pronotum strongly angulate at the sides (Fig.15A)…… ***P.sinuatus*** **Olivier, 1789**
Sisyphus
Metasternum feebly punctured in front (Fig.15B)……..***S. araneolus*** **Arrow, 1927**

Ochicanthon
Elytral strias narrow with chains of oval depressions joined by straight sulci (Fig.15C)……***O. mussardi*** **Cuccodoro, 2011**



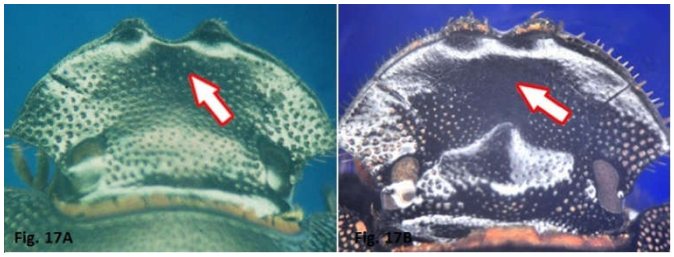
Catharsius
Head with small smooth area adjoining each eye (Fig 16A) ……***C. molossus*** **(Linnaeus, 1758)**

Copris
Pronotum with sharply defined anterior declivity (Fig 16B)……***C. repertus*** **Walker, 1858**

Paracopris

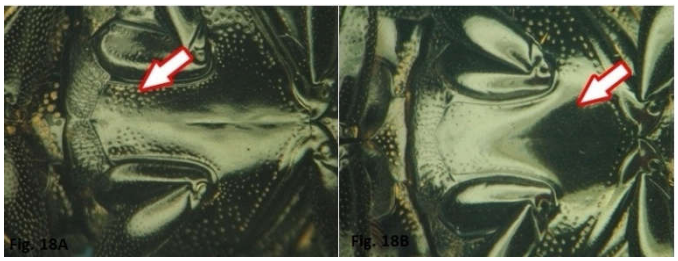
1Clypeus strongly punctured (Fig 17A)……***P. cribratus*** **Gillet, 1927**

Clypeus rather smooth (Fig 17B)……..……2



2 Metasternal shield punctured in front (Fig 18A)……..***P. davisoni*** **Waterhouse, 1891**

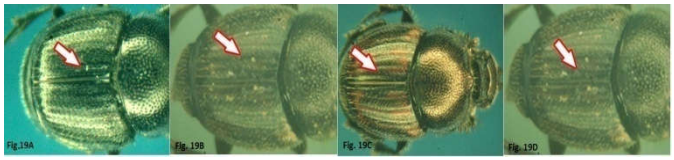
Metasternal shield not punctured in front (Fig 18B) ……..….***P. signatus*****Boucomont, 1858**



3 Elytra very shining (Fig 19A)……***C. gallinus*** Arrow, 1907

Elytra not shining (Fig 19B)…… ……..…4

4 Elytra variegated (Fig 19C) ….....……...*C. meridionalis,* Boucomont, 1914
Elytra entirely black (Fig 19D)……..…***C. ultor*** **Sharp, 1875**

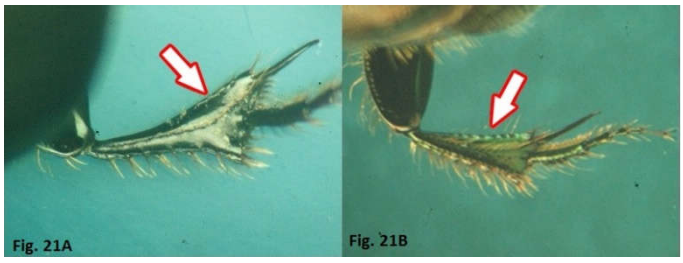


Onthophagus
1 Eyes large separated by distinctly less than three times their length (Fig. 20A) ……..***O. cavia*** **Boucomont, 1914**

Eyes small separated by at least three times their length (Fig. 20B)……..…….2

2 Hind tibia extremely short, triangular, as broad at the end as metatarsus is long (Fig. 21A)……3

Hind tibia not extremely short, triangular, not as broad at the end as metatarsus is long (Fig 21B)…….5



3 Pronotum grooved (Fig. 22A)……..…..***O. laevis*** Harold, 1880

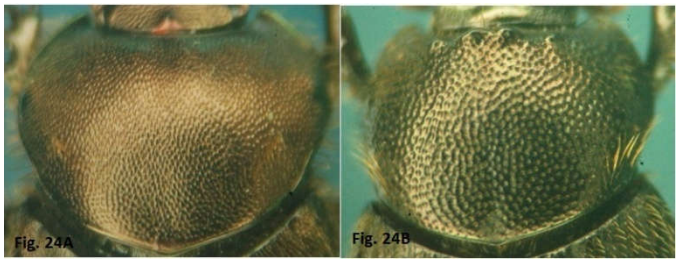
Pronotum not grooved (Fig 22B)……..…4

4 Pronotum with 4 tubercles (Fig. 23A) …….*O. insignicollis*Frey, 1954

Pronotum without 4 tubercles (Fig 23B)…….*O. pacificus*Lansberge, 1885

5 Pronotum wholly or partly granular or rugose (Fig 24A)…….6

Pronotum punctured without granules, asperities, or rugosity (Fig 24B)……..9



6 Pronotum entirely granular or rugose without distinct punctures (Fig 25A) ……. *O. bronzeus* Arrow, 1907

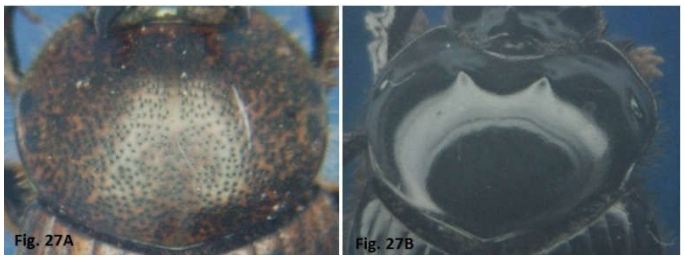
Pronotum partly granular or rugose with some punctures or smooth areas(Fig 25B)…….7

7Front angles of pronotum not produced, very blunt (Fig 26A)..…….. *O. castetsi* Lansberge, 1867

Front angles of pronotum more or less produced (Fig 26B)……8

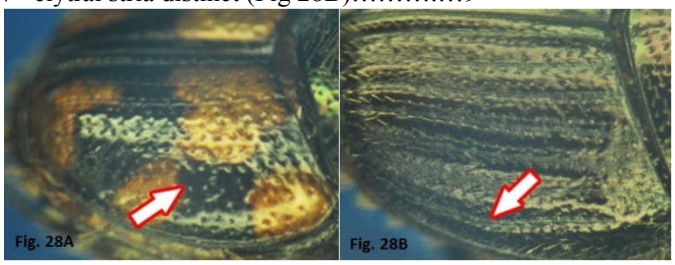
8Pronotum light brown (Fig 27A)……...***O.*** *rectecornutus* Lansberge, 1883

Pronotum black (Fig 27B)…….*O. manipurensis* Arrow, 1907



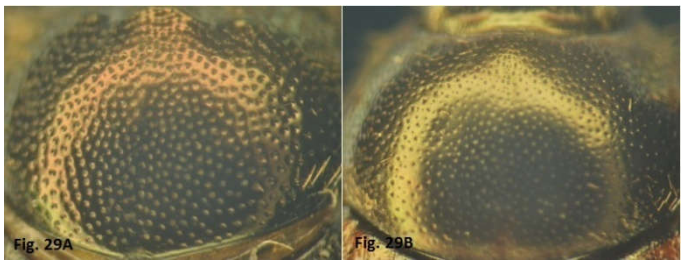
97th elytral stria indistinct (Fig 28A)…….. ***O.*** *amphicoma* Boucomont, 1914

7th elytral stria distinct (Fig 28B)……..…9



10Punctures of the pronotum, large, close, umbilicate (Fig 29A) ……*O. furcillifer* Bates, 1891

Punctures of the pronotum, not large close umbilicate (Fig 29B)……..…..10

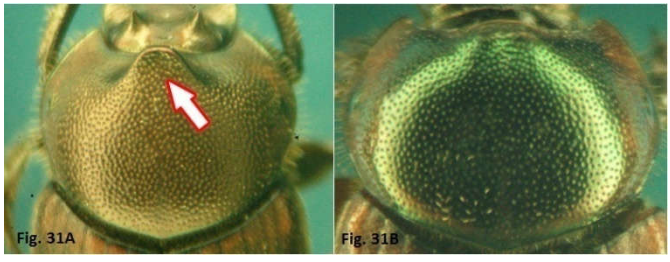


11Pronotum pale at the sides (Fig 30A)……...12

Pronotum uniformly colored (Fig 30B)……13

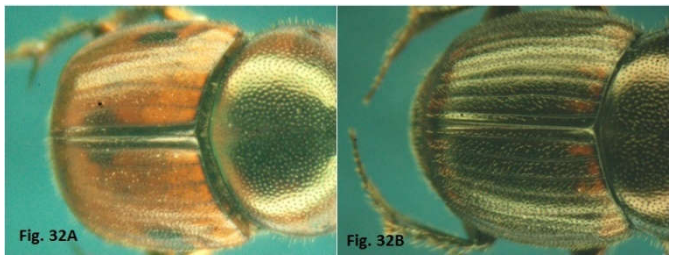
12Pronotum with an elongated process (Fig 31 A)…….***O.*** *vladimiri* Frey, 1957

Pronotum without an elongated process (Fig 31B)..……..12

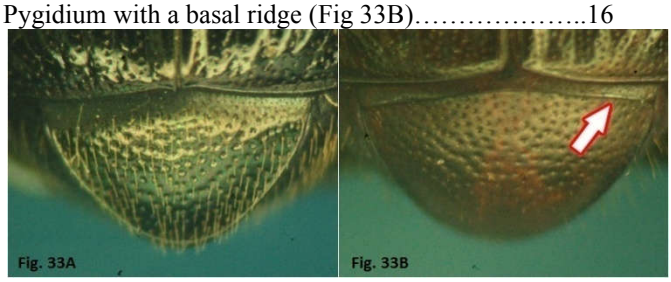


13Base, apex and sides of the elytra pale (Fig 32A) …….*O. fasciatus* Boucomont, 1914

Base, apex and sides of the elytra not entirely pale (Fig 32B)…….....*O. favrei* Boucomont, 1914

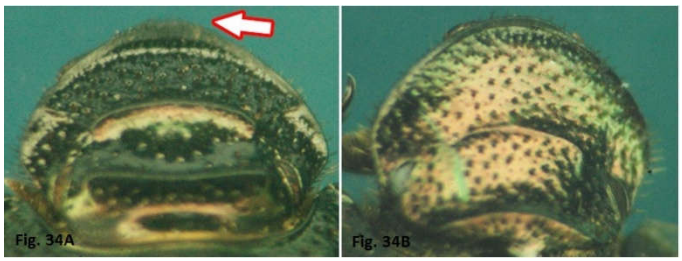


14Pygidium without a basal ridge (Fig 33A)……..……15
Pygidium with a basal ridge (Fig 33B)……..16



15Clypeus produce in front (Fig 34A)……...*O. andrewesi* Arrow, 1931

Clypeus not produced in front (Fig 34B)……*O. porcus* Arrow, 1931

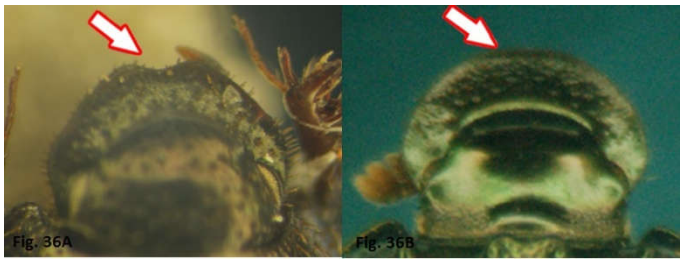


16Head horned or ridged (Fig 35A)…….*O. turbatus* Walker, 1858

Head not horned or ridged (Fig 35B) ……..*O. deflexicollis* Lansberge, 1883

17Clypeus notched or lobed(Fig 36A)……***O.*** *centricornis* Frey, 1798

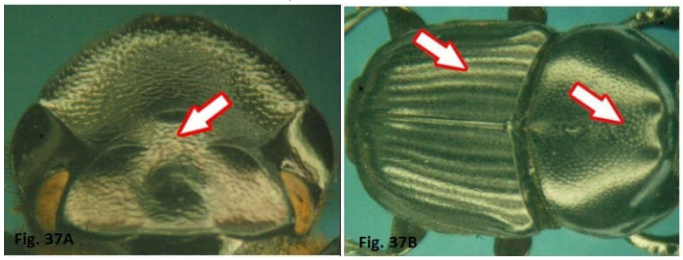
Clypeus not notched or lobed(Fig 36B)……..***O. ensifer*** Boucomont, 1914



Onitis
Clypeo-frontal carina broadly interrupted (Fig 37A)……*O. subopacus* Arrow, 1908

Liatongus

Pronotum well punctured, elytral intervals convex (Fig 37B) ……*L. indicus* Arrow, 1931



Tibiodrepanus
Male with single pronotal horm (Fig 38A)……..…*T. setosus* Wiedemann, 1823

Male with two pronotal horn (Fig 38B)……..……..*T. sinicus* Harold, 1868

DISCUSSION

Comparison of dung beetles collected in the present study with collections of Arrow (1931), Balthasar (1963, 1974), Paulian (1980, 1983) and the checklist of dungbeetles of the moist western slope of the South Western Ghats (Sabu *et al.,* 2011) revealed that several species belonging to genus Ochicanthon and Panelus which were earlier well represented in the Nelliampathi region was not recorded in the present study. Genus Ochicanthon was represented by only *Ochicanthonmussardi* in the present study while earlier collections had reported the presence of *O. gauricola* (Latha *et al*., 2011), *O. laetus* (Arrow, 1931) and *O. nitidus* (Paulian, 1980). Genus Panelus was not recorded in the present study but earlier, *Panelusmussardi* (Paulian, 1980) and *P. keralai* (Paulian, 1980) were recorded. The absence of the above mentioned species in the collection could be due to habitat degradation in the region which could possibly result in species loss (Sabu *et al.,* 2011) and affect the dung beetle fauna of the region.

CONCLUSION

This study gains significance in the context of present deterioration of forests in the Western Ghats region due to anthropogenic pressures. Documenting the biodiversity of such threatened habitats is important as adequate information on biodiversity of a region is essential for planning conservation strategy for a region.

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