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Cover: The breathtakingly beautiful Silver Jubilee cover of JoTT is done in color pencils and ink by the 13-year old darling, Elakshi Mahika Molur.





## INTRODUCTION

The taxonomy of most of the aquatic beetles has been thoroughly studied worldwide, and to date more than 13,000 species are described under this group (Short 2018). The Oriental region harbours about 3,580 species of aquatic beetles (Jäch & Balke 2008). According to Ghosh & Nilsson (2012), there are over 250 dytiscid species found in India, and the same catalogue records 48 species from Maharashtra. It was essential to revisit the aquatic beetle fauna of Maharashtra as the previous work was done 40–45 years before (Vazirani 1967, 1968, 1969, 1970a,b, 1971, 1977a,b, 1984). A recent literature-based checklist of aquatic beetles from Maharashtra reports 57 species of beetles under the families Dytiscidae Leach, 1815; Gyrinidae Latreille, 1810; Noteridae Thomson, 1860, and Hydrophilidae Latreille, 1802 (Sharma & Bano 2012). A series of papers by Vazirani (1967, 1968, 1969, 1970a,b, 1971, 1977a,b, 1984) included past as well as new records, and also added new species of water beetles, a majority of which belong to Dytiscidae. Tonapi & Ozarkar (1969a,b) in their studies on aquatic beetles from the Pune region included water beetle species with brief descriptions and short notes on their ecology. Data on the family Haliplidae Aube, 1936 from Maharashtra is available (Sheth et al. 2016). Additionally, Sheth et al. (2018) revised the dytiscid genus *Copelatus* Erichson, 1832 with the discovery of three new species. Further, a recent study presented a record of 15 species of water beetles from Pune (Deb et al. 2023). The taxonomic keys and descriptions are available for many, if not all, species of Indian Dytiscidae, and Noteridae (e.g., Vazirani 1967, 1968, 1969, 1970a,b, 1971, 1977a,b, 1984; Pederzani 1995; Miller & Wewalka 2010), Gyrinidae, and Haliplidae (Vazirani 1984); however, some of these keys need revision. Also, compiled literature and keys for the Indian Hydrophilidae, another large group of aquatic beetles, are not readily available.

Here, for the first time, we are providing digital images of 59 species of aquatic beetles, collected from western Maharashtra. These exclude a total of 12 species as detailed information is already available for 10 species under the genera *Eretes* Laporte, 1833, *Copelatus* Erichson, 1832, and *Haliplus* Latreille 1802 (Sheth & Ghatge 2014; Sheth et al. 2016, 2018). Additionally, due to a lack of intact specimens, two species, namely *Microdytes svensoni* K.B. Miller & Wewalka, 2010 and *M. boukali* Wewalka, 1997 were also omitted. Keys provided by Vazirani (cited earlier) are updated and modified wherever necessary. The earlier and latest literature (Balfour-Browne 1946; Vazirani 1967,

1968, 1969, 1970a,b, 1971, 1977a,b, 1984; Biström & Silfverberg 1981; Biström 1982, 1983, 1986, 1988, 1996; Brancucci 1983; Nilsson et al. 1989; Hansen 1991; Schödl 1992, 1993; Pederzani 1995; Wewalka 1979, 1997; Miller 2002; Biström & Nilsson 2003; Brancucci 2003; Komarek 2003; Balke et al. 2004; Miller et al. 2006; Miller & Wewalka 2010; Bouchard et al. 2011; Nilsson 2011; Ghosh & Nilsson 2012; Miller & Bergsten 2012; Hendrich & Brancucci 2013; Short & Fikáček 2013; Bilton 2015; Biström & Bergsten 2015; Nilsson 2015; Hajek & Brancucci 2015; Nasserzadeh & Komarek 2017; Villastrigo et al. 2017) was followed for identification and nomenclature. In the previous Indian literature, line drawings were also poorly produced or lacking. Hence, taxonomically important structures of aquatic beetles are illustrated also with line drawings, wherever necessary. Latest names of species are used. To restrict the size of this paper earlier synonymies and species distributions outside Maharashtra are not presented, as these are already available in the familywise catalogues (cited earlier). For the same purpose keys to families, subfamilies, and genera are not given.

## MATERIALS AND METHODS

### Study area

For the present work, we focused on freshwater habitats in the northern Western Ghats (hereafter referred to as NWG) of Maharashtra State (locality and habitat details are according to Sheth et al. 2019). NWG are one of eight parts of the Deccan plateau formed due to volcanic eruptions (Image 1A). Based on the geology and geography, there exists an altitudinal gradient in NWG. The altitude in NWG (Image 1B) ranges 600–1,375 m with the highest at Kalasubai peak (1,650 m) in Maharashtra State. The escarpments (900–1,375 m) act as barriers for summer winds because of which the Ghats receive orographic rain. During the southwest monsoon (June–October) the Ghats receive maximum rainfall followed by the dry period for the rest of the year. The rainfall ranges from 3,500–6,500 mm and decreases northwards and eastwards (Image 1C). The heat waves and cold waves are experienced in NWG. Temperature reaches as high as 42 °C to as low as 4 °C. The eastern side of the Ghats have lower temperature ranges as opposed to the western side. The annual mean temperature (Image 1D) in the Western Ghats proper is somewhat lower as 18–24 °C (Mani 1974).



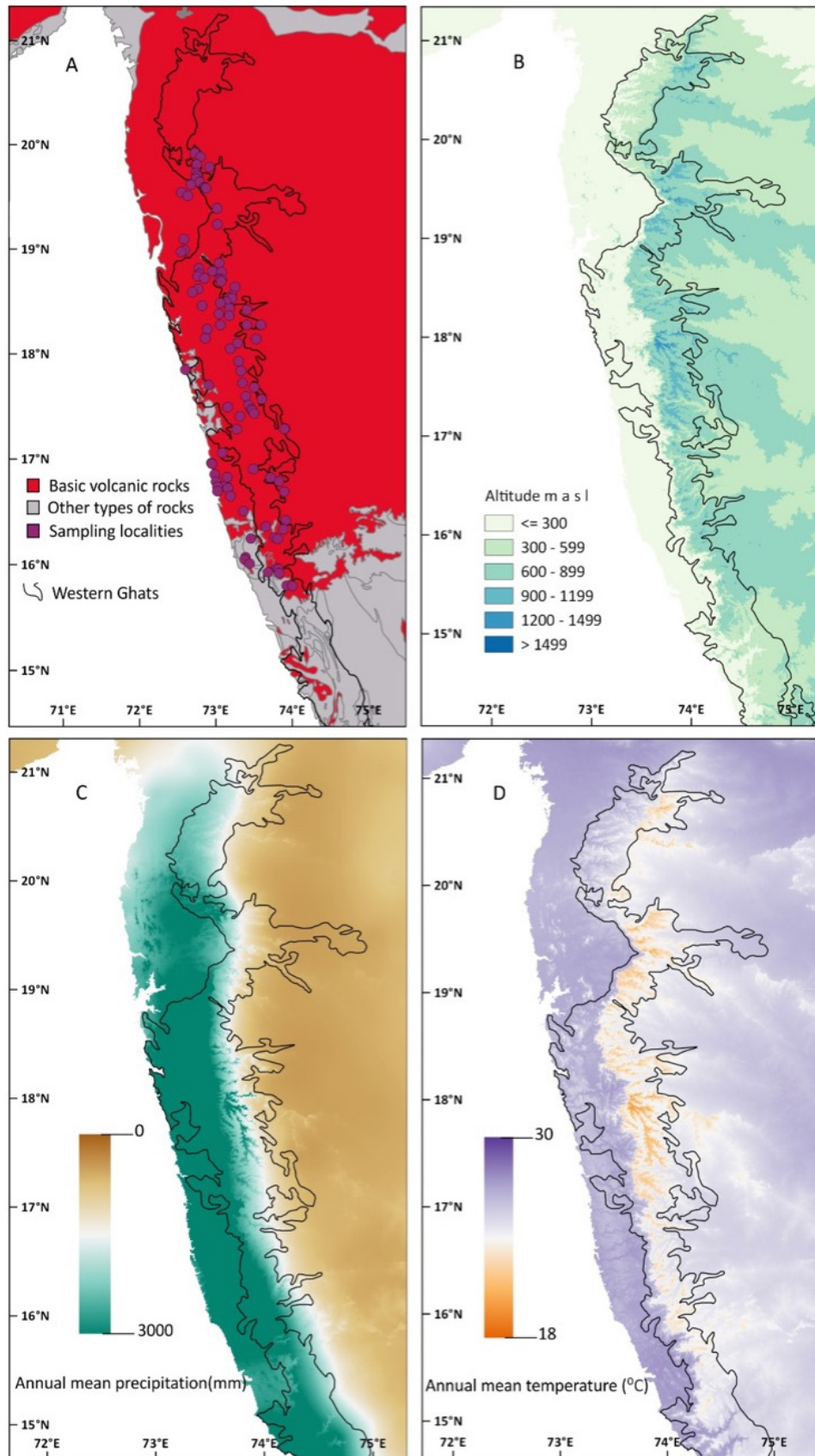


Image 1. A—Types of rocks and sampling localities in northern Western Ghats | B—Altitudinal gradient in NWG | C—Gradient of precipitation in NWG | D—Gradient of temperature in NWG.

## Methods

Specimen collection, identification, and preparation of illustrations follows Sheth & Ghate 2014 and Sheth et al. 2019 (please refer to the reference list provided as a supplementary file Sheth et al. 2019 as a comparative literature). All these references for the identification of specimens are provided with keys for respective taxa in the present paper. The checklist is prepared from our surveys. The specimens are deposited in the Hemant Vasant Ghate collection (HVGC) at Modern College, Pune. The specimens will be subsequently deposited in the Zoological Survey of India, Akurdi, Pune.

## RESULTS

### Checklist of aquatic beetles of NWG

[\*new record to Maharashtra; #already published in Sheth & Ghate 2014, Sheth et al. 2016 and Sheth et al. 2018]

#### Family Dytiscidae Leach, 1815

##### Subfamily: Hydroporinae Aubé, 1836

##### Tribe: Hyphydrini Gistel, 1848

###### 1. *Hyphydrus lyratus flavicans* Régimbart, 1892

Material examined and distribution: Seven males and 10 females from Pune and Nashik.

###### 2. *Hyphydrus intermixtus* (Walker, 1858)

Material examined and distribution: 45 males and 40 females were studied from Pune, Satara, Ahmednagar, Nashik, Raigad, and Kolhapur.

###### 3. *Hyphydrus renardi* Severin, 1890

Material examined and distribution: 30 males and 30 females were studied from Pune, Satara, Ahmednagar, Thane, Nashik, Kolhapur, and Ratnagiri.

###### 4. *Microdytes sabitae* Vazirani, 1968

Material examined and distribution: 24 males and 23 females were studied from Pune, Satara, and Ahmednagar.

###### 5. *Microdytes whitingi* K.B. Miller & Wewalka, 2010

Material examined and distribution: three females and one male from Pune.

##### Tribe: Hydrovatini Sharp, 1880

###### 6. *Hydrovatus cardoni* Severin, 1890

Material examined and distribution: seven males and eight females were studied from Kolhapur and Ratnagiri.

###### 7. *Hydrovatus rufoniger rufoniger*\* (Clark, 1963)

Material examined and distribution: one male and one female from Ratnagiri.

###### 8. *Hydrovatus acuminatus* Motschulsky, 1859

Material examined and distribution: three males and two females studied from Nashik, Pune, Sangli, and Sindhudurg.

##### Tribe: Bidessini Sharp, 1880

###### 9. *Clyeodytes hemani* Vazirani, 1968 (Image 4C, 5C)

Material examined and distribution: 20 males and 30 females from Satara.

###### 10. *Hydroglyphus flammulatus* (Sharp, 1882)

Material examined and distribution: 60 males and 65 females were examined from Pune, Satara, Thane, Nashik, Kolhapur, and Sindhudurg.

###### 11. *Hydroglyphus inconstans* (Régimbart, 1892)

Material examined and distribution: More than 100 males and females were examined from Pune, Satara, Thane, Raigad, Nashik, and Ratnagiri.

###### 12. *Yola indica* Biström, 1983 (Image 4F, 5F)

Material examined and distribution: five males and five females from Pune, Ahmednagar, Sangli, and Kolhapur.

###### 13. *Peschetius quadricostatus* (Aubé, 1838) (Image 6A, 7Aa, 7Ab)

Material examined and distribution: 50 males and 50 females were studied from Pune, Thane, Raigad Nashik, Ratnagiri, and Sindhudurg.

###### 14. *Peschetius toxophorus* Guignot, 1942 (Image 6A, 7Aa, 7Ab)

Material examined and distribution: 50 males and 50 females were studied from Pune, Satara, and Nashik.

##### Tribe: Hygrotini Portevin, 1929

###### 15. *Hygrotus* (s.str.) *musicus* (Klug, 1834) (Image 6C, 7C)

Material examined and distribution: two males and two females from Pune.

###### 16. *Hygrotus nilghiricus* Régimbart, 1903 (Image 6D, 7D)

Material examined and distribution: Five males and eight females from Pune.

##### Subfamily: Laccophilinae Gistel, 1856

##### Tribe: Laccophilini Gistel, 1856

###### 17. *Laccophilus ceylonicus* Zimmermann, 1919

Material examined and distribution: 18 males and 23 females from Pune and Satara.

###### 18. *Laccophilus flexuosus* Aubé, 1838

Material examined and distribution: more than 100 males and females studied from Pune, Satara, Thane, Nashik, Kolhapur, and Ratnagiri.

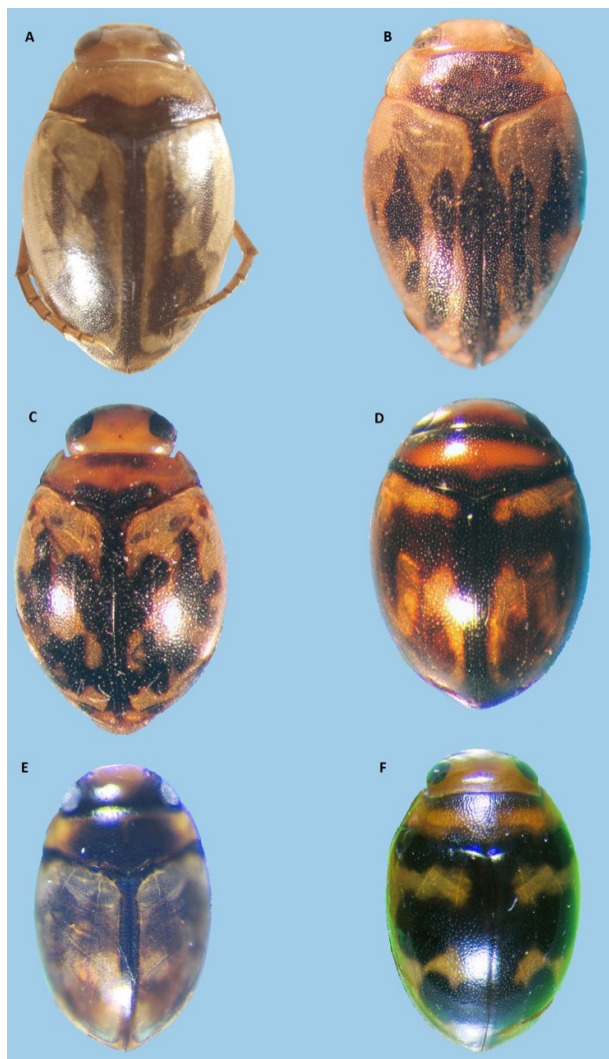


Image 2. Dorsal habitus: A—*H. flavicans* | B—*H. intermixtus* | C—*H. re-nardi* | D—*M. sabitae* | E—*M. whitingi* | F—*H. cardoni*. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

**19. *Laccophilus inefficiens* (Walker, 1859)**

Material examined and distribution: more than 150 males and females were studied from Kolhapur, Pune, Satara, Ahmednagar, Nashik, Thane, and Sindhudurg.

**20. *Laccophilus parvulus parvulus* Aubé, 1838**

Material examined and distribution: 15 males and 18 females were studied from Pune, Satara, Ratnagiri, and Sindhudurg.

**21. *Laccophilus parvulus obtusus* Sharp, 1882**

Material examined and distribution: 10 males and eight females from Pune, Nashik, Thane, Ratnagiri, and Sindhudurg.

**Subfamily: Colymbetinae Erichson, 1837**

**Tribe: Colymbetini Erichson, 1837**

**22. *Rhantus taprobanicus* Sharp, 1890 (Image 9D, 10D)**

Material examined and distribution: eight males and eight females were studied from Raigad, Satara, Pune, Ahmednagar, Kolhapur, and Nashik.

**Subfamily: Copelatinae Branden, 1885**

**Tribe: Copelatini Branden, 1885**

**23. *Copelatus schuhi*<sup>#</sup> Hendrich & Balke, 1998**

Material examined and distribution: two males and six females from Pune and Ratnagiri.

**24. *Copelatus deccanensis*<sup>#</sup> Sheth, Ghate & Hájek, 2018**

Material examined and distribution: two males and six females from Nashik, Ahmednagar, and Pune.

**25. *Copelatus bezdeki*<sup>#</sup> Sheth, Ghate & Hájek, 2018**

Material examined and distribution: one male and four females were studied from Kolhapur, Satara, and Pune.

**26. *Copelatus indicus*<sup>#</sup> Sharp, 1882**

Material examined and distribution: one male and one female were studied from Satara.

**27. *Copelatus scherer*<sup>#</sup> Wewalka, 1981**

Material examined and distribution: one male was studied from Satara.

**28. *Copelatus mysorensis*<sup>#</sup> Vazirani, 1970**

Material examined and distribution: three males and five females were studied from Pune.

**29. *Copelatus cryptarchoides*<sup>#</sup> Régimbart, 1899**

Material examined and distribution: one male and one female from Pune.

**30. *Lacconectus lambai* Vazirani, 1977**

Material examined and distribution: 20 males and 23 females were studied from Satara.

**31. *Lacconectus andrewesi* Guignot, 1952**

Material examined and distribution: six females and four males from Pune.

**Subfamily: Dytiscinae Leach, 1815**

**Tribe: Eretini Crotch, 1873**

**32. *Eretes griseus*<sup>#</sup> (Fabricius, 1781)**

Material examined and distribution: 10 males and 10 females from Nashik, Pune, Kolhapur, and Sindhudurg.

**Tribe: Aciliini Thomson, 1867**

**33. *Sandracottus festivus* (Illiger, 1801)**

Material examined and distribution: eight males and seven females were studied from Satara, Pune, and



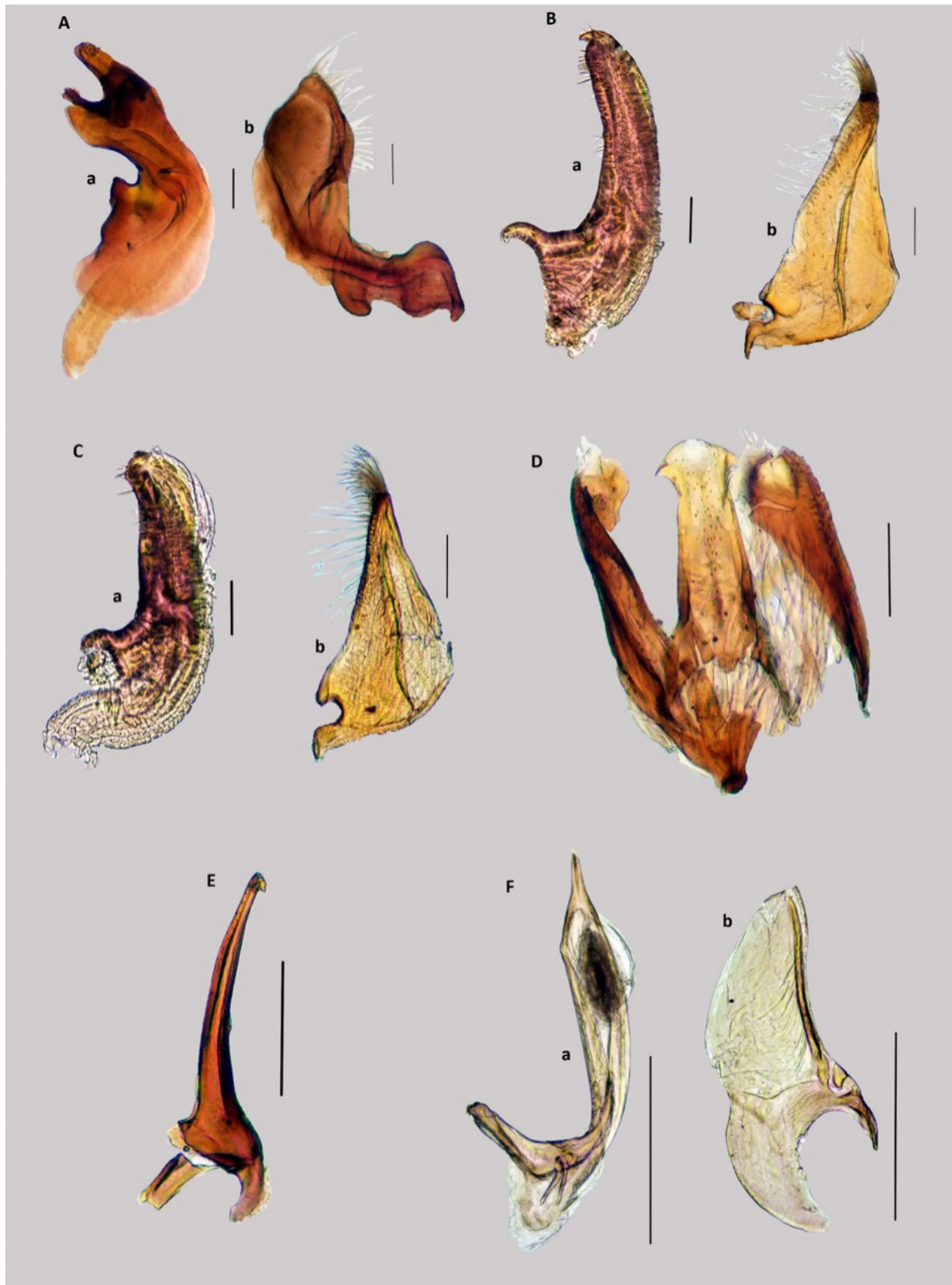


Image 3. Lateral view of male genitalia (a: aedeagus, b: paramere): A—*H. flavicans* | B—*H. intermixtus* | C—*H. renardi* | D—*M. sabitae* (dorsal view) | E—*M. whitingi*. Scale for A–E: 100  $\mu$ m | F—*H. cardoni* (500  $\mu$ m). © S.D. Sheth, A.D. Padhye & H.V. Ghate.

Ahmednagar.

**34. *Sandracottus dejeanii* (Aubé, 1838)**

Material examined and distribution: seven males and nine females were studied from Raigad and Pune.

**Tribe: Hydaticini Sharp, 1880**

**35. *Hydaticus incertus* Régimbart, 1888**

Material examined and distribution: 25 males and 26 females were studied from Pune, Nashik, and Kolhapur.

**36. *Hydaticus luczonicus* Aubé, 1838**

Material examined and distribution: 40 males and 47 females were studied from Pune, Ahmednagar, Nashik, and Satara.

**37. *Hydaticus vittatus vittatus* (Fabricius, 1775)**

Material examined and distribution: 30 males and 30 females were examined from Kolhapur, Pune, Satara, Ahmednagar, and Nashik.

**38. *Hydaticus satoi satoi* Wewalka, 1975**

Material examined and distribution: 15 males and 15 females from Raigad, Pune, Satara, Ahmednagar, Nashik, and Sindhudurg.

**Subfamily: Cybistrinae**

**Tribe: Cybistrini Sharp, 1880**

**39. *Cybister sugillatus* Erichson, 1834**

Material examined and distribution: three males and four females studied from Pune, Satara, Raigad, and Sindhudurg.

**40. *Cybister cardoni* Severin, 1890**

Material examined and distribution: one male and one female from Ratnagiri.

**41. *Cybister tripunctatus lateralis* (Fabricius, 1798)**

Material examined and distribution: two males and four females were studied from Pune, Nashik, Raigad, and Ratnagiri.

**42. *Cybister confusus* Sharp, 1882**

Material examined and distribution: two males and four females from Pune, Raigad, and Ratnagiri.

**43. *Cybister cognatus* Sharp, 1882**

Material examined and distribution: three males and three females from Pune and Nashik.

**Family: Gyrinidae Latreille, 1810**

**Subfamily: Gyrininae Latreille, 1810**

**Tribe: Enhydrini Régimbart, 1882**

**44. *Dineutus indicus* Aubé, 1838**

Material examined and distribution: 50 males and 52 females were studied from Raigad, Pune, Satara, Ahmednagar, Nashik, and Sindhudurg.

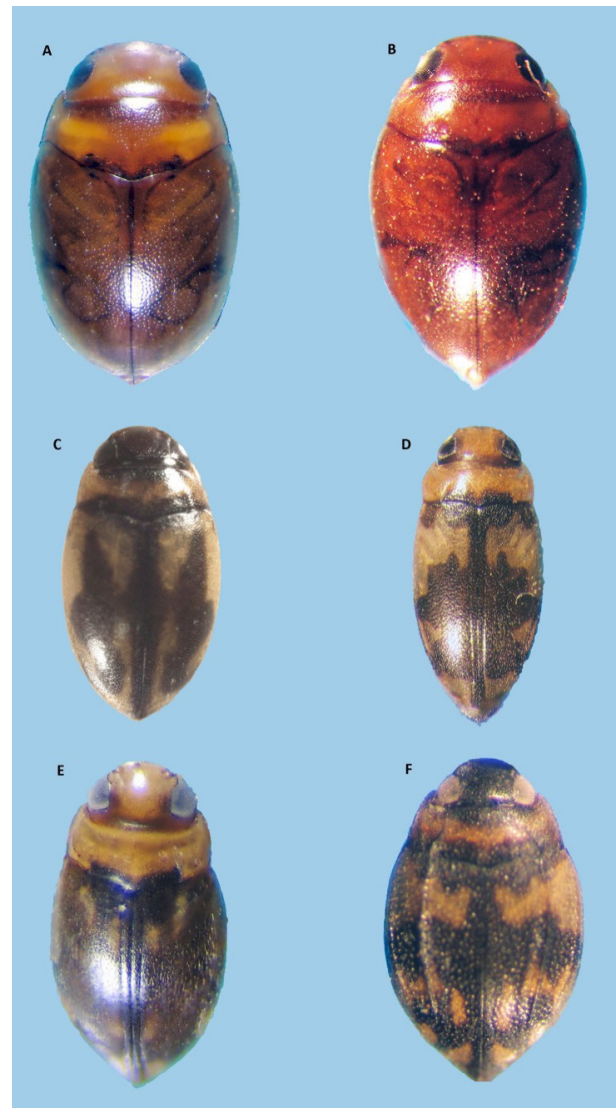


Image 4. Dorsal habitus: A—*H. rufoniger rufoniger* | B—*H. acuminatus* | C—*C. hemani* | D—*H. flammulatus* | E—*H. inconstans* | F—*Y. indica*  
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**45. *Dineutus unidentatus* Aubé, 1838**

Material examined and distribution: one male and two females from Nashik.

**Tribe: Orectochilini Régimbart, 1882**

**46. *Patrus productus* (Régimbart, 1883)**

Material examined and distribution: two males and two females from Ratnagiri.

**47. *Patrus discifer* (Walker, 1859)**

Material examined and distribution: 10 males and 12 females were examined from Pune, Kolhapur, and Ratnagiri.

**48. *Patrus cf haemorrhous* (Régimbart 1891)**

Material examined and distribution: one female

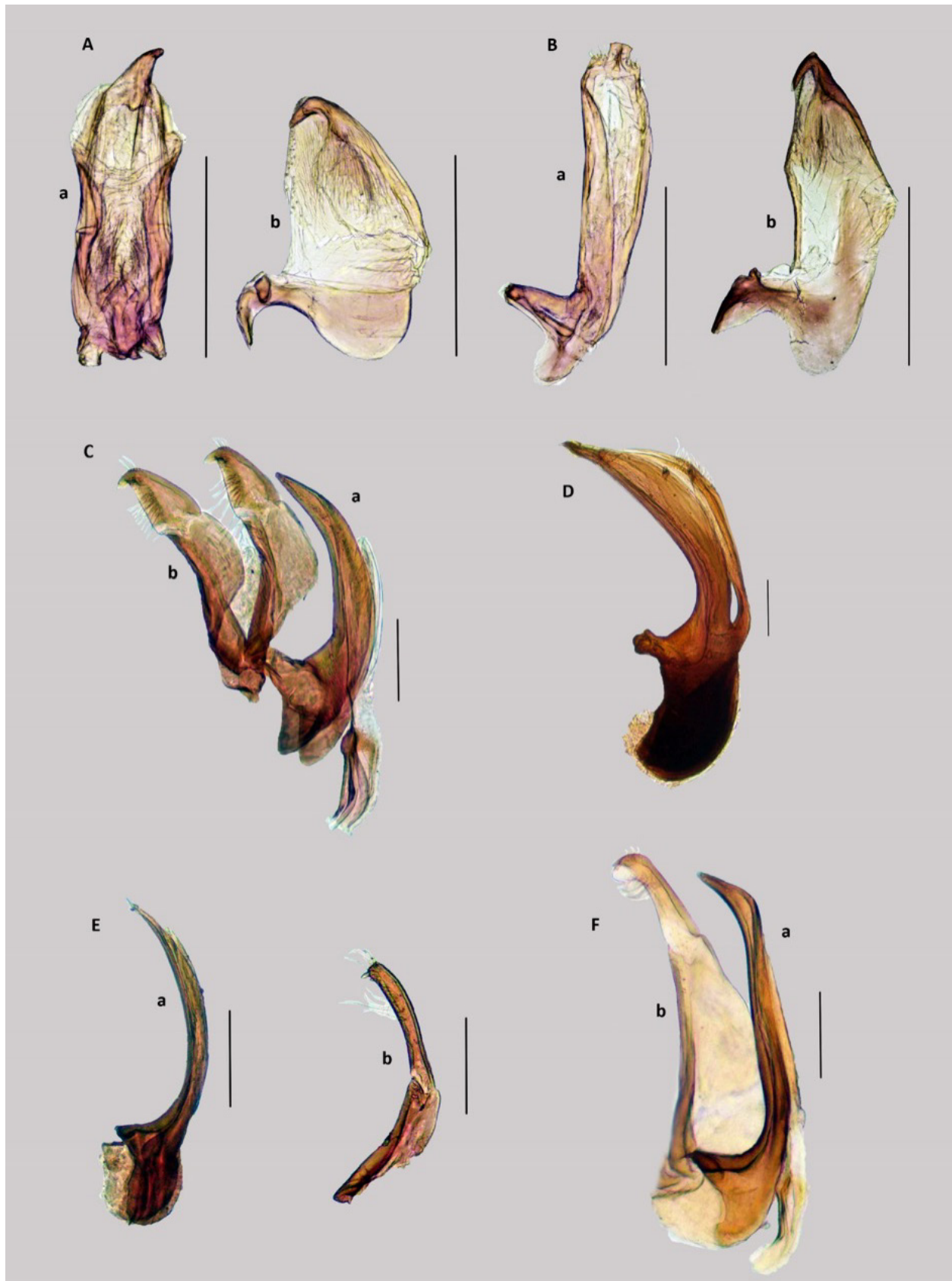


Image 5. Lateral view of male genitalia (a: aedeagus, b: paramere): A—*H. rufoniger rufoniger* (dorsal view) | B—*H. acuminatus* | C—*C. hemani* | D—*H. flammulatus* | E—*H. inconstans* | F—*Y. indica*. Scale for A–B: 500  $\mu$ m | scale for C–F: 100  $\mu$ m.



from Pune.

**49. *Patrus assimilis* (Ochs 1957)**

Material examined: 10 males and 10 females from Ratnagiri and Sindhudurg.

**50. *Patrus limbatus* (Régimbart, 1883)**

Material examined: One male and one female from Pune

**Family: Noteridae Thomson, 1860**

**Subfamily: Noterinae Thomson, 1860**

**Tribe: Noterini Thomson, 1860**

**51. *Canthydrus laetabilis* (Walker, 1858)**

Material examined and distribution: 12 males and 14 females were studied from Pune.

**52. *Canthydrus luctuosus* (Aubé, 1838)**

Material examined and distribution: 20 males and 20 females were studied from Pune, Nashik, and Kolhapur.

**Tribe: Neohydrocoptini Zalat, Saleh, Angus & Kaschef, 2000**

**53. *Neohydrocoptus bivittis*\* Motschulsky 1859**

Material examined and distribution: two males and three females from Ratnagiri (collected by SVP & MRK).

**54. *Neohydrocoptus* sp. 2**

Material examined and distribution: one male and two females from Ratnagiri (collected by SVP & MRK) and one specimen from Pune.

**Family: Haliplidae Aube, 1936**

**Subfamily: Haliplinae, Tribe: Haliplini**

**55. *Haliphus arrowi*# Guignot, 1936**

Material examined and distribution: 22 males and 15 females from Pune and Satara.

**56. *Haliphus angustifrons*# Régimbart, 1892**

Material examined and distribution: one male from Pune.

**Family: Hydrophilidae Latreille, 1802**

**Subfamily: Hydrophilinae Latreille, 1802**

**57. *Sternolophus inconspicuus* (Nietner, 1856)**

Material examined and distribution: five males and three females were studied from Pune district.

**58. *Sternolophus rufipes* (Fabricius, 1792)**

Material examined and distribution: five males and 10 females were studied from Pune, Nashik, Ratnagiri, and Sindhudurg.

**59. *Hydrobiomorpha spinicollis* (Eschscholtz, 1822) (Image 20C, 21C)**

Material examined and distribution: three females and two males from Pune and Kolhapur.

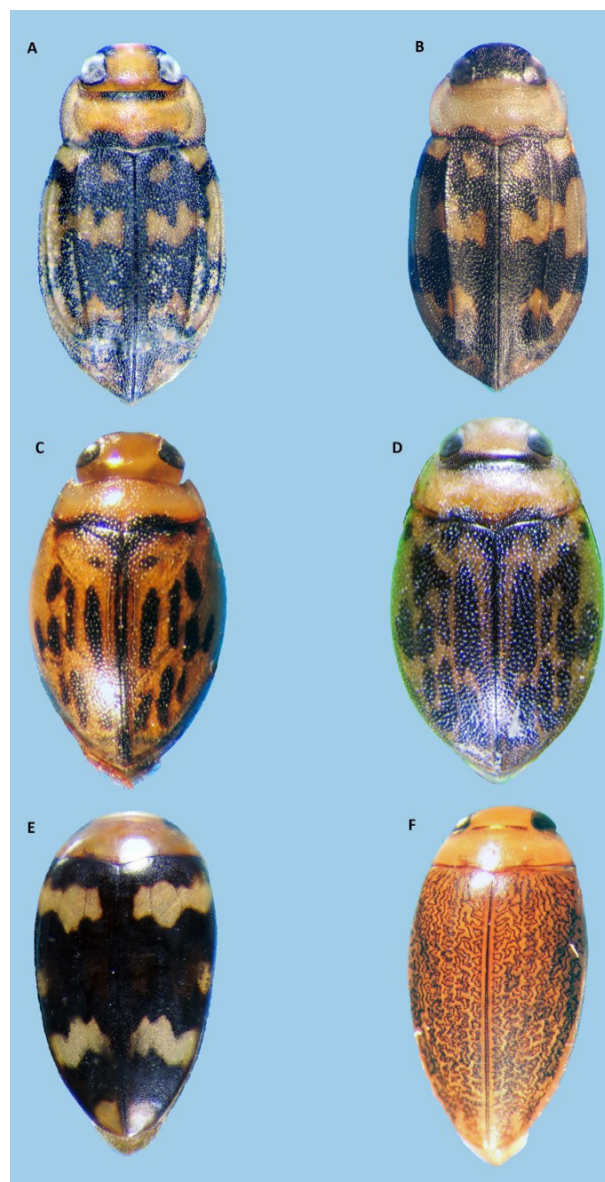


Image 6. Dorsal habitus: A—*P. quadricostatus* | B—*P. toxophorus* | C—*H. musicus* | D—*H. nilghiricus* | E—*L. ceylonicus* | F—*L. flexuosus*. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

**60. *Hydrophilus olivaceous* Fabricius, 1781 (Image 20D, 21D)**

Material examined and distribution: Three males and six females from Nashik, Pune, Raigad, and Goa.

**61. *Berosus pulchellus* MacLeay, 1825**

Material examined and distribution: 11 females and six males from Pune, Nashik, Raigad, and Sindhudurg.

**62. *Berosus chinensis* Knisch, 1922**

Material examined and distribution: two females and two males from Pune.

**63. *Berosus indicus* (Motschulsky, 1861)**

Material examined and distribution: eight females

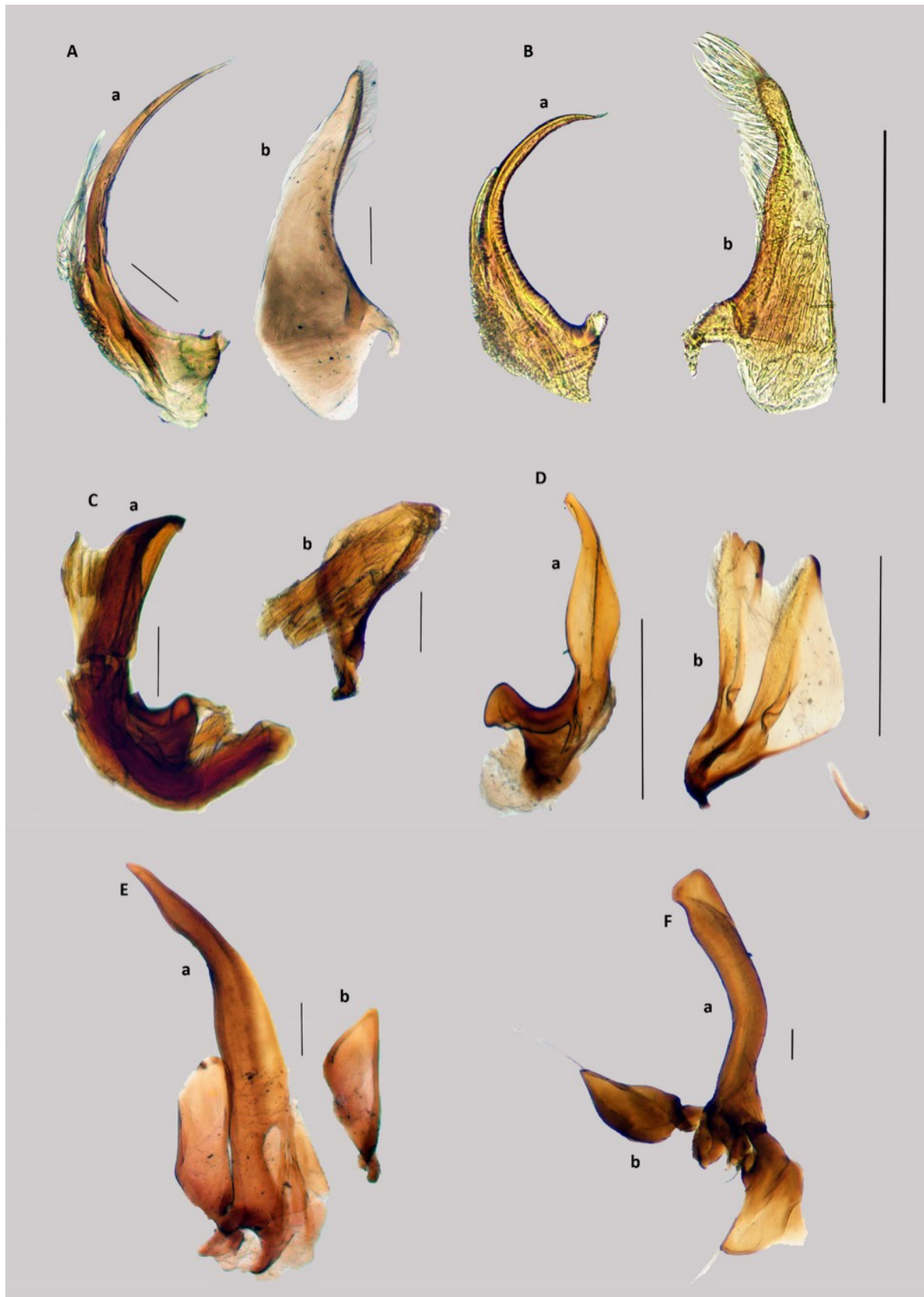


Image 7. Lateral view of male genitalia (a: aedeagus, b: paramere): A—*P. quadricostatus* | B—*P. toxophorus* | C—*H. musicus* | D—*H. nilghiricus*. (Scale for A–D: 500 µm) | E—*L. ceylonicus* | F—*L. flexuosus*. (Scale for E and F: 100 µm).



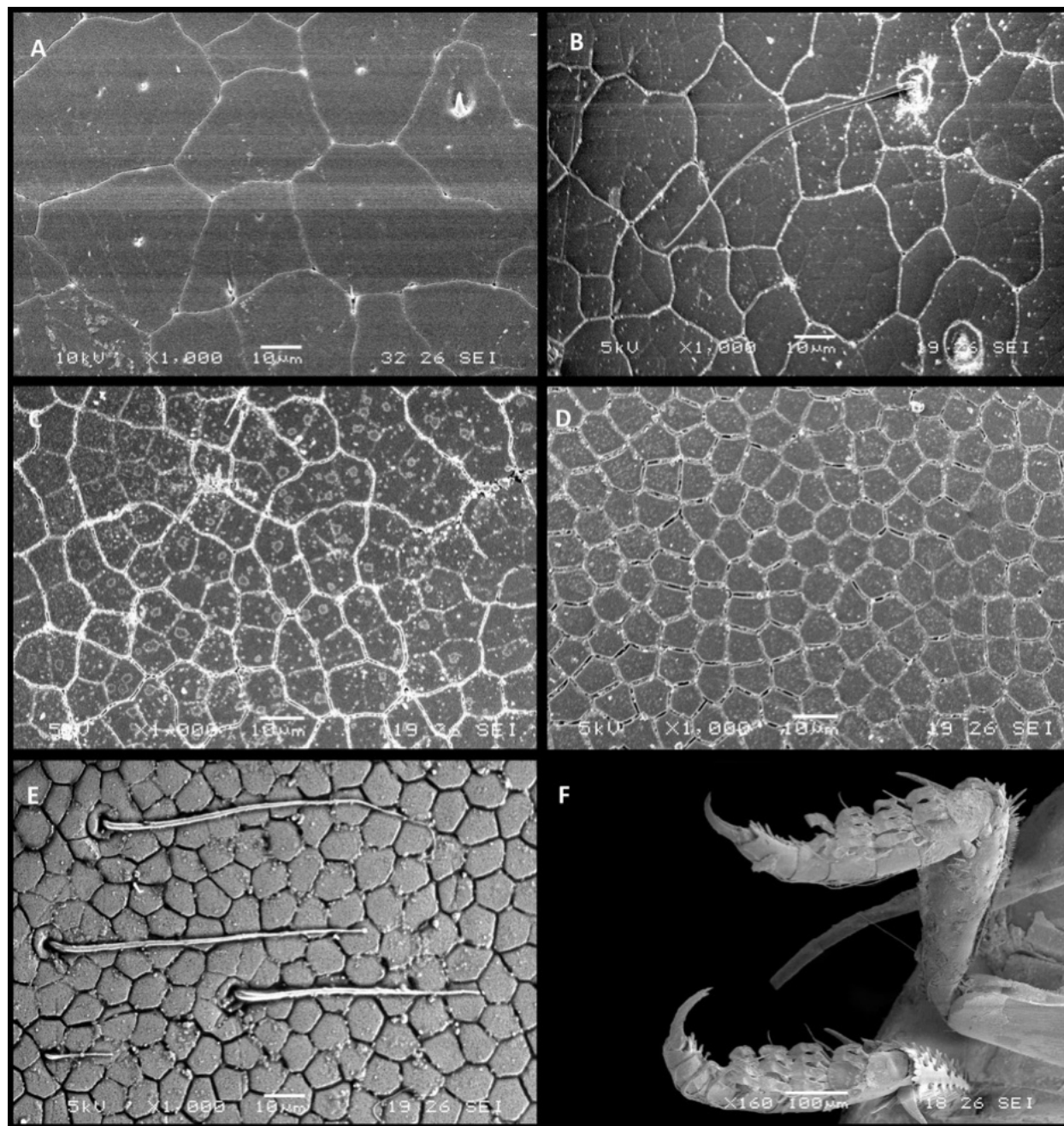


Image 8. Elytral microsculpture: A—*L. ceylonicus* | B—*L. flexuosus* | C—*L. inefficiens* | D—*L. parvulus* | E—*L. obtusus* | F—Adhesive setae on *Lacophilus* male pro and meso tarsi.

and eight males from Pune, Nashik, Satara, and Sindhudurg.

**64. *Berosus indiges* Schödl, 1992**

Material examined and distribution: two males and two females from Nashik.

**65. *Regimbartia attenuata* (Fabricius, 1801)**  
(Image 22E, 24E)

Material examined and distribution: two males and four females from Pune, Satara, Kolhapur, Ratnagiri, and

Sindhudurg.

**66. *Allocotocerus* sp1** (Image 22F, 24F)

Material examined and distribution: seven males and eight females from Kolhapur, Ratnagiri, and Sindhudurg districts.

**67. *Amphiops* sp1** (Image 25A, 25B)

Material examined and distribution: three females and two males from Pune, Ratnagiri, and Sindhudurg.

Remarks: Size: 3.5–4 mm



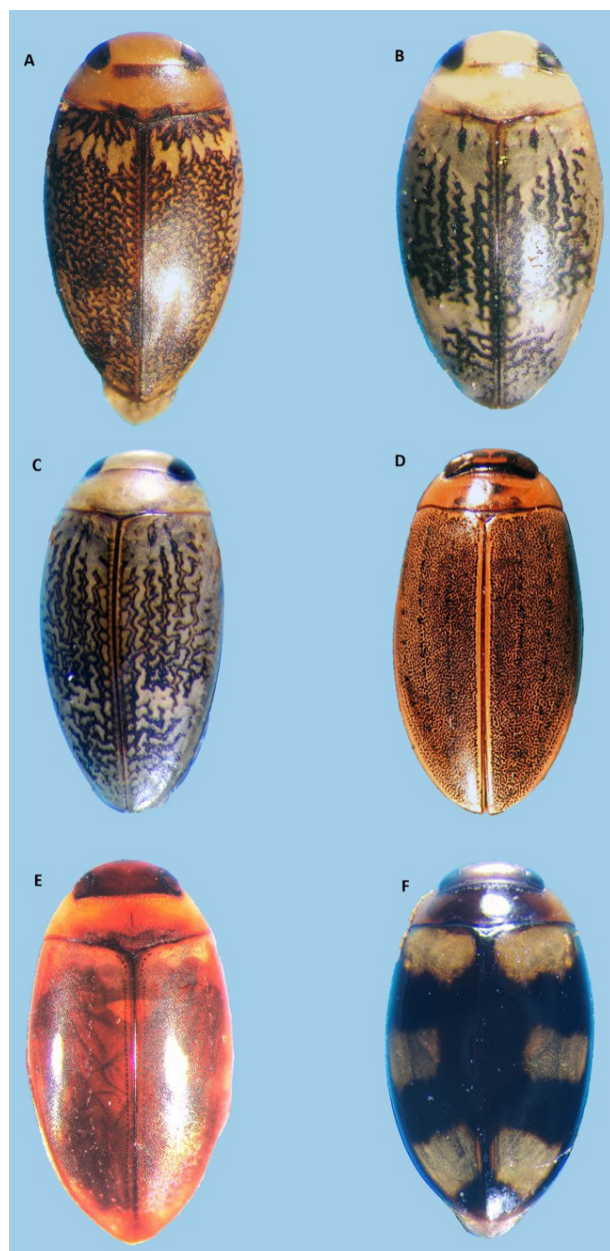


Image 9. Dorsal habitus: A—*L. inefficiens* | B—*L. parvulus* | C—*L. obtusus* | D—*R. taprobanicus* | E—*L. lambai* | F—*L. andrewesi*. © S.D. Sheth, A.D. Padhye & H.V. Ghathe.

**68. *Helochaeres* sp1** (Image 25C, 25D)

Material examined and distribution: two females and four males from Nashik, Pune, Ratnagiri, and Sindhudurg.

Remarks: Size: 5.3–5.6 mm

**69. *Helochaeres* sp2** (Image 25E, 25F)

Material examined and distribution: three females and two males from Nashik and Ratnagiri.

Remarks: Size: 4.5–4.8 mm.



Image 10. Lateral view of male genitalia (a: aedeagus, b: paramere): A—*L. inefficiens* | B—*L. parvulus* | C—*L. obtusus* | D—*R. taprobanicus* | E—*L. lambai* | F—*L. andrewesi*. (Scale for A–C: 100 µm | scale for D, E, and F: 500 µm.). © S.D. Sheth, A.D. Padhye & H.V. Ghathe.

## ILLUSTRATED TAXONOMIC KEYS TO THE AQUATIC BEETLES OF NWG

### Family Dytiscidae

#### Subfamily: Hydroporinae Aubé, 1836

#### Genus *Hyphydrus* Illiger, 1802

Biström (1982) was followed for generic as well as species level identification.

Illustrations and additions to the keys to *Hyphydrus* species:

1. Pronotum with distinct black marking at posterior margin (Figure 1A); in male last abdominal segment with tubercles; second abdominal segment of male with spine like process (Figure 1B); in female each elytron with longitudinal depression; size large, 4–5mm (Image 2A); male genitalia (Image 3A)...***H. l. flavicans* Régimbart, 1892**

- Pronotum with distinct black markings at anterior and posterior margins; in male last abdominal segment

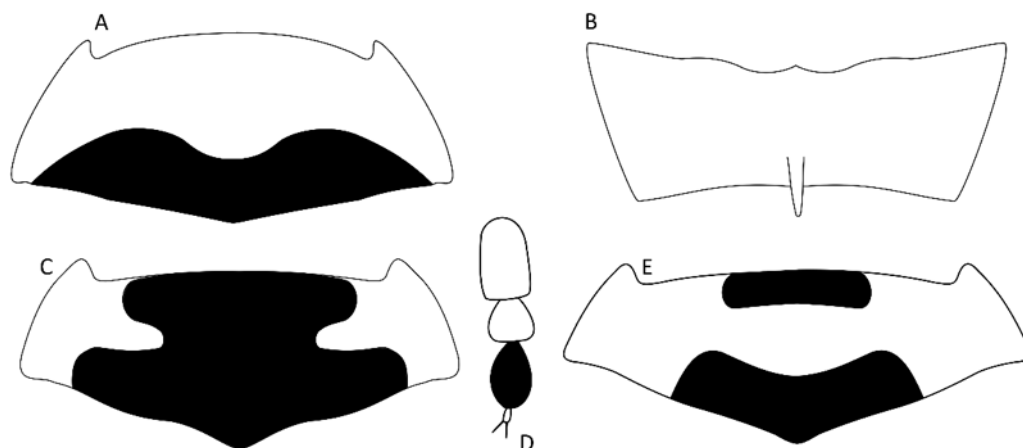


Figure 1. Pronotal maculation A—*H. flavicans* | B—Second abdominal segment of male *H. flavicans* | C—*H. intermixtus* | D—Pro and meso tarsi of *H. intermixtus* | E—*H. renardi*. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

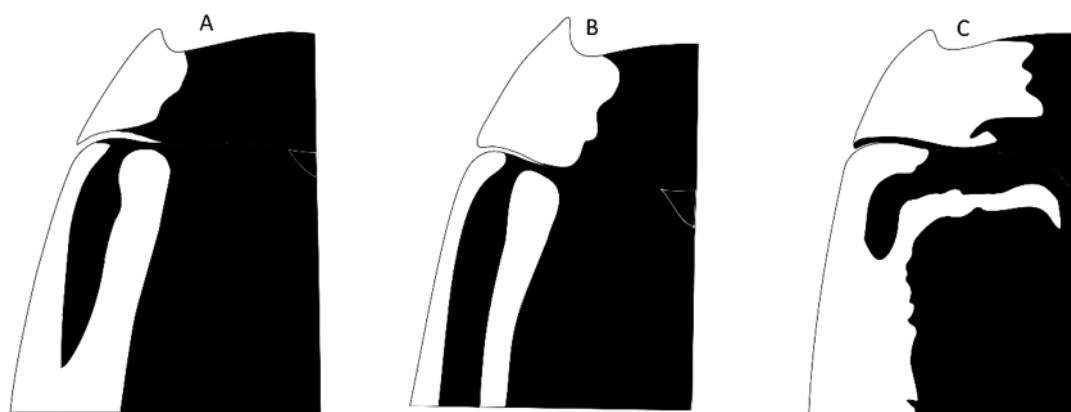


Figure 2. Pronotal and elytral maculation: A—*H. vittatus* | B—*H. satoi* | C—*H. luczonicus*. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

without tubercles; male without spine like process on second abdominal segment; female without longitudinal depression per elytron; size small, 3–4 mm...2

2. Pronotum with anterior and posterior black markings connected on disc (Figure 1C); elytra less shiny; pro and mesotarsi with last segment dark (Figure 1D); size 3.5–4mm (Image 2B); median lobe of male genitalia with a hook like apical process in lateral view (Image 3B)...*H. intermixtus* (Walker, 1858)

- Pronotum with anterior and posterior black markings separate (Figure 1E); elytra shiny; last segment of pro and mesotarsi not darkened; size 3–4mm (Image 2C); median lobe of male genitalia without a hook like apical process in lateral view (Image 3C)...*H. renardi* Severin, 1890.

#### Genus *Microdytes* J. Balfour-Browne, 1946

Species were identified using the descriptions and keys provided by Wewalka (1997) and Miller & Wewalka

(2010).

Illustrations and keys to *Microdytes* species (Image 3D, 3E):

1. Body globular oval, size 2 mm (Image 2D); dorsal-ventral sides with coarse punctures...*M. sabitae* Vazirani, 1968

- Body oblong oval, size 1.5 mm (Image 2E); dorso-ventrally flat, punctures on dorsal-ventral sides obsolete...*M. whitingi* K.B. Miller & Wewalka, 2010

#### Genus *Hydrovatus* Motschulsky, 1853

The species were identified using keys by Biström (1996).

Illustrations and keys to *Hydrovatus* species (Image 3F, 5A, and 5B):

1. Elytron black with pale yellow transverse fasciae, sutural region black; size 3 mm (Image 2F)...*H. cardoni* Severin, 1890

- Elytron concolourous...2

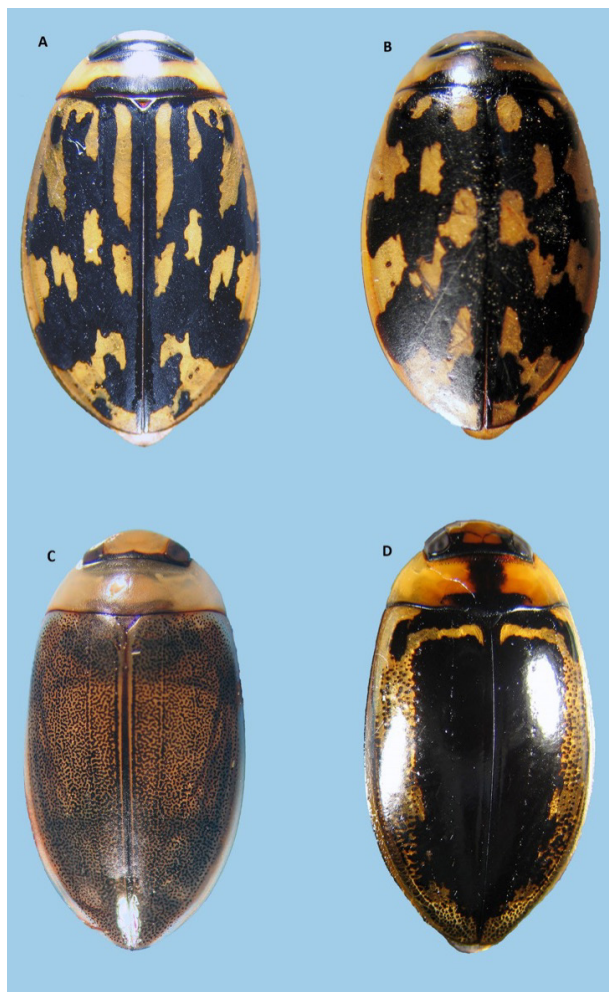


Image 11. Dorsal habitus: A—*S. festivus* | B—*S. dejeanii* | C—*H. incertus* | D—*H. luczonicus*. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

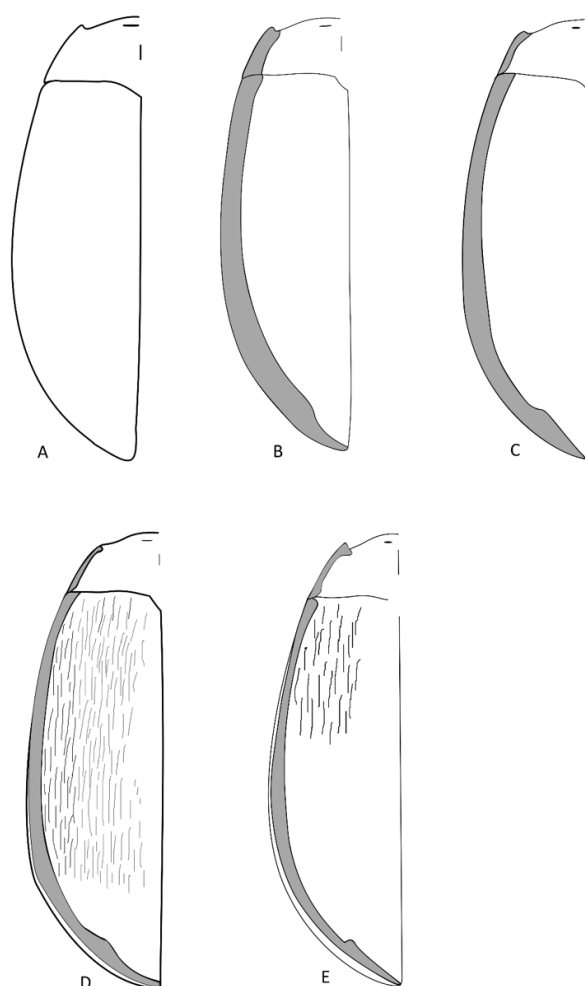


Figure 3. Elytral sexual sculpture: A—*C. sugillatus* | B—*C. cardoni* | C—*C. tripunctatus lateralis* | D—*C. confusus* | E—*C. cognatus*. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

2. Size 3.5 mm (Image 4A) ...*H. rufoniger rufoniger* (Clark, 1963)

- Size 2.5 mm (Image 4B)...*H. acuminatus* Motschulsky, 1859

#### Genus *Hydroglyphus* Motschulsky, 1853

The species were identified using keys by Vazirani (1968).

Illustrations and keys to *Hydroglyphus* species:

1. Pronotal plicae do not continue on elytra; size 2.5 mm (Image 4D); median lobe of male genitalia abruptly narrows to apex (Image 5D)...*H. flammulatus* (Sharp, 1882)

- Pronotal plicae continue on elytra; size 1.5 mm (Image 4E); median lobe of male genitalia gradually narrows to apex (Image 5E)...*H. inconstans* (Régimbart, 1892)

#### Genus *Hygrotus* Stephens, 1828

Illustrations and keys to *Hygrotus* species

1. Median lobe of male genitalia broad from base to apex (Image 7 Ca,b); body Size 3 mm (Image 6C)...

*Hygrotus musicus* (Klug, 1834)

- Median lobe of male genitalia broad at base, bulges in middle, narrows towards apex (Image 7Da,b); body Size 4.5 mm (Image 6D)...*Hygrotus nilghiricus* Régimbart, 1903

Remarks: Villastrigo et al. (2017) proposed a new classification of tribe Hygrotini based on molecular phylogeny. The former genus *Herophydrus* was synonymized with a subgenus *Hygrotus* s. str. and the genus *Hyphoporus* was given a new status of a subgenus under the genus *Hygrotus* (Villastrigo et al. 2017).



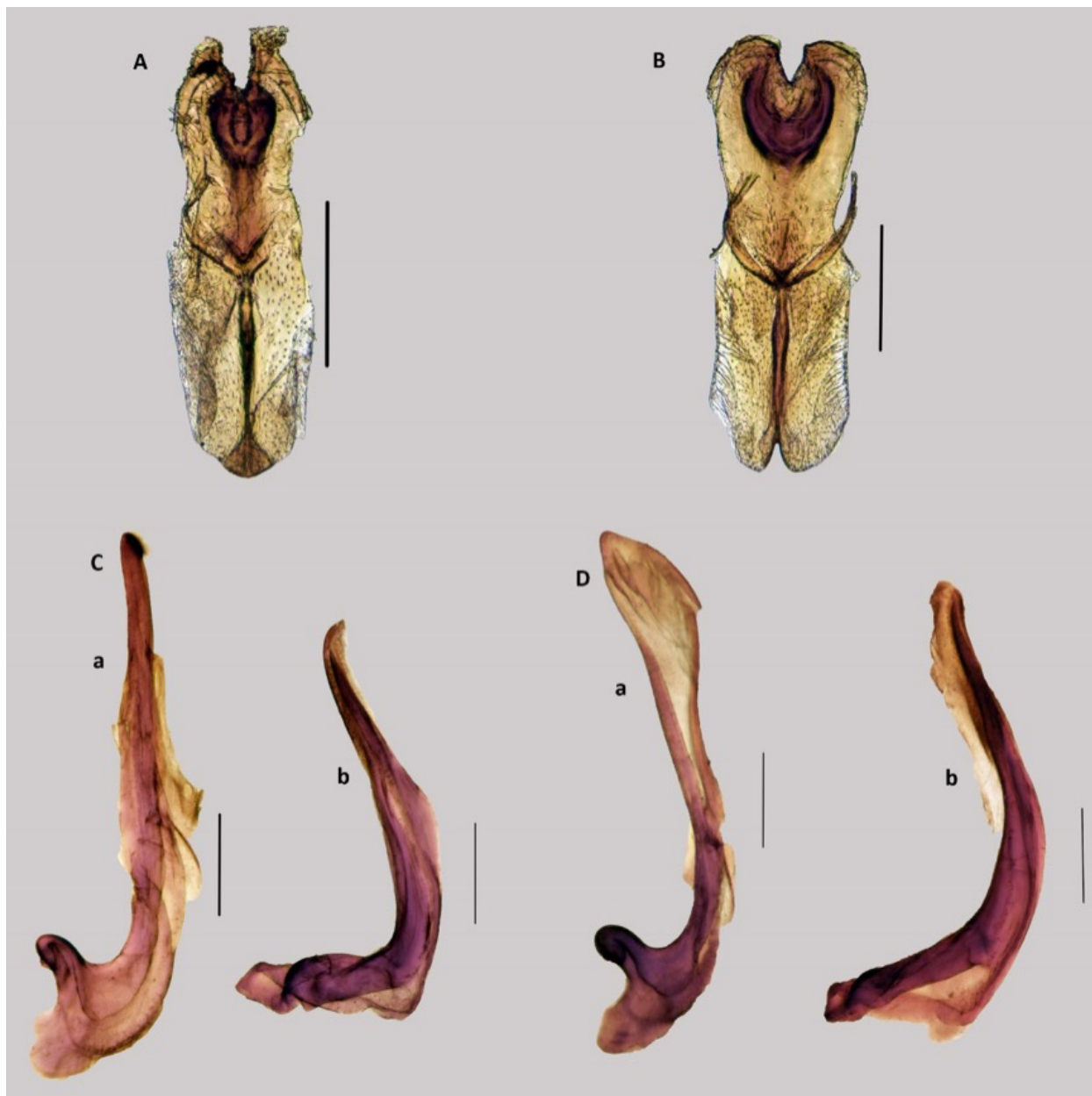


Image 12. Lateral view of male genitalia (a: aedeagus, b: paramere): A—*S. festivus* | B—*S. dejeanii* | C—*H. incertus* | D—*H. luczonicus*. Scale 500  $\mu\text{m}$ . © S.D. Sheth, A.D. Padhye & H.V. Ghatge.

#### Subfamily: Laccophilinae Gistel, 1856

##### Genus *Laccophilus* Leach, 1815

The generic identification is based on keys provided by Pederzani (1995) and Brancucci (1983), and species level identification is based on Brancucci (1983) and Vazirani (1968).

Illustrations and additions to the keys to *Laccophilus* species:

1. Elytra dark brown or black with 3 yellow fasciae and a median yellow spot per elytron (fasciae: 1<sup>st</sup>—sub-basal fascia well separated from base, 2<sup>nd</sup>—post median

and 3<sup>rd</sup>—apical) elytral microsculpture (Image 8A); size 4 mm (Image 6E); male genitalia (Image 7E)...*L. ceylonicus* Zimmermann, 1919

- Elytra with black lines or irrotations; overall pale yellow to reddish yellow dorsally...2

2. Ventrally concolourous; size 3.5–4.5 mm...3

- Ventrally without uniform colouration (metacoxal plates and some abdominal segments darker); smaller species (size 3 mm)...4

3. Each elytron with several irregular and thin black lines, uniformly distributed except most lateral region,

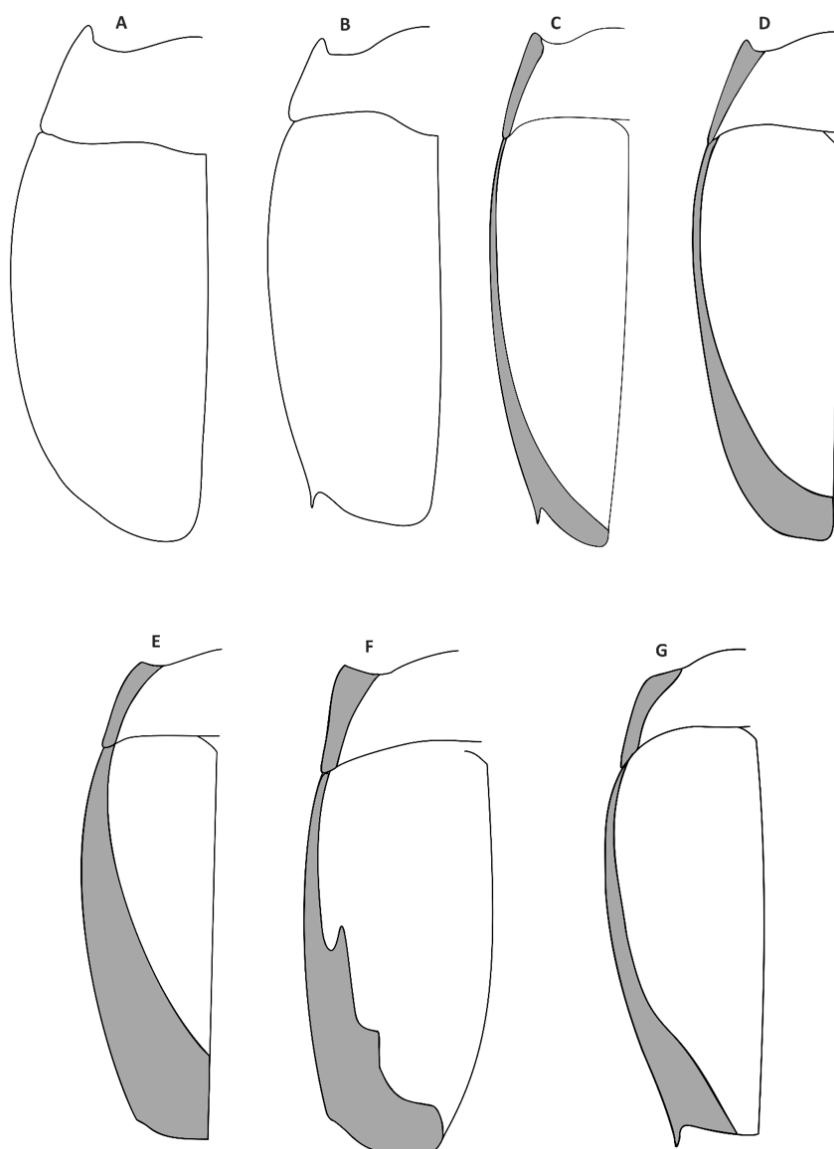


Figure 4. Pattern of hydrofuge pubescence on elytra and epiplural spine of *Dineutus* and *Patrus* species (not to the scale): A—*D. indicus* | B—*D. unidentatus* | C—*P. productus* | D—*P. limbatus* | E—*P. discifer* | F—lateral *P. cf. haemorrhous* | G—*P. assimilis*. © S.D. Sheth, A.D. Padhye & H.V. Ghatge.

elytral microsculpture consists of irregular hexagons within which place small hexagons (Image 8B); anterior and posterior margins of pronotum with thin black band medially; size 4–4.5 mm (Image 6F); median lobe of male genitalia broad from base to apex (Image 7F)...*L. flexuosus* Aubé, 1838

- Each elytron with several irregular and thick black lines connected at many points forming irrotations, these lines become thinner or obsolete in sub-basal region and in apical half, appear as fasciae, elytral microsculpture consists of small hexagons (Image 8C); anterior and posterior margins of pronotum with thick black band medially; size 3.5mm (Image 9A); median lobe of male

genitalia broad at base narrowly tapers towards apex, angled near base (Image 10A)...*L. inefficiens* (Walker, 1859)

4. Each elytron with 5–6 double, solid parallel lines (on disc) interrupted largely at base and in apical half (Image 9B), elytral microsculpture consists of small hexagons (Image 8D); median lobe of male genitalia broad at apex (Image 10B)...*L. parvulus parvulus* Aubé, 1838

- Each elytron with 5–6 double, parallel lines (on disc) less interrupted at base and in apical half (Image 9C), elytral microsculpture consists of small hexagons (Image 8E); median lobe of male genitalia distinctly narrow at

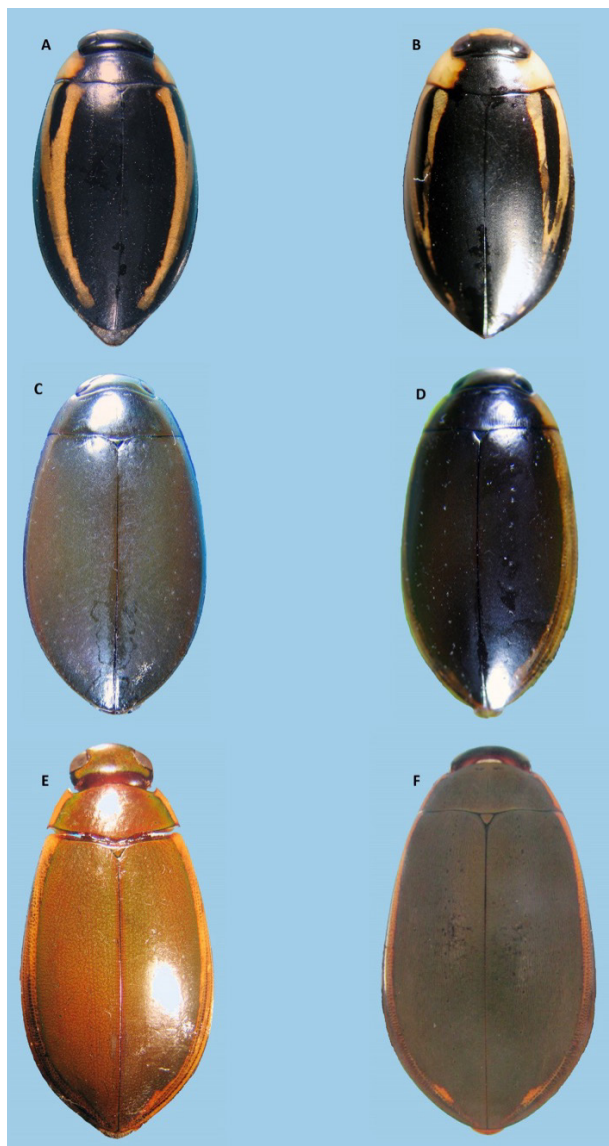


Image 13. Dorsal habitus: A—*H. vittatus* | B—*H. satoi* | C—*C. sugillatus* | D—*C. cardoni* | E—*C. tripunctatus lateralis* | F—*C. confusus*. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

apex (Image 10C)...*L. parvulus obtusus* Sharp, 1882

Remarks: Pro and meso tarsi of male bear adhesive setae arranged in four rows (Image 8F).

#### Subfamily: Copelatinae Branden, 1885

##### Genus *Lacconectus* Motschulsky, 1855

Species were identified using keys and description provided by Vazirani (1970a, 1977a) and Brancucci (2003).

Illustrations and additions to the keys to *Lacconectus* species:

1. Body elongate oval, elytra uniformly yellowish-brown, with narrow faint basal streak, but without yellow

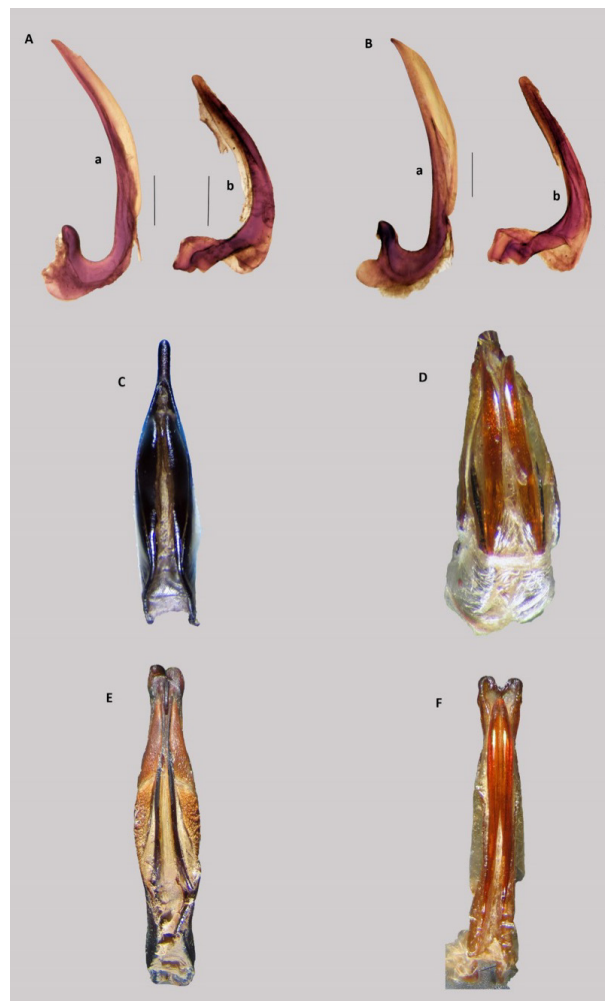


Image 14. Lateral view of male genitalia (a: aedeagus, b: paramere): A—*H. vittatus* (500 µm) | B—*H. satoi* (500 µm) | C—*C. sugillatus* (4 mm) | D—*C. cardoni* (3.5 mm) | E—*C. tripunctatus lateralis* (5.1 mm) | F—*C. confusus* (7 mm). © S.D. Sheth, A.D. Padhye & H.V. Ghate.

fasciae per elytron; size 5–5.5 mm (Image 9E); apex of median lobe broadly pointed (Image 10Ea), apical lobes on parameres almost uniformly broad (Image 10Eb) ...*L. lambai* Vazirani, 1977

- Body oblong oval, elytra dark brown to black with 3 broad yellow fasciae; size 5 mm (Image 9F); apex of median lobe narrow (Image 10Fa), apical lobes on parameres narrow at base while broad at apex (Image 10Fb) ..*L. andrewesi* Guignot, 1952

Remarks: *Lacconectus andrewesi* was found in the same habitat along with *Laccophilus ceylonicus*, which has similar elytral pattern as that of *L. andrewesi*.

#### Subfamily: Dytiscinae Leach, 1815

##### Genus *Sandracottus* Sharp, 1882

Illustrations and additions Keys to the *Sandracottus*



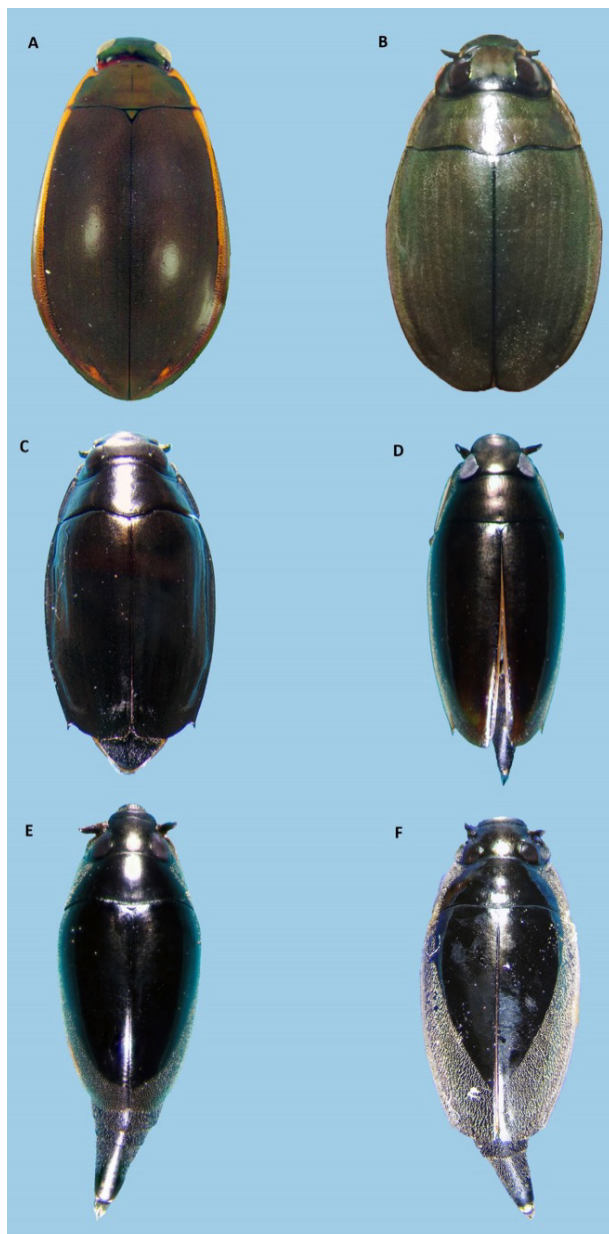


Image 15. Dorsal habitus: A—*C. cognatus* | B—*D. indicus* | C—*D. unidentatus* | D—*P. productus* | E—*P. limbatus* | F—*P. discifer*. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

species:

1. Head with black mark not continuous; pronotal anterior and posterior median black bands connected by a thin black line; two yellow stripes parallel to suture initiate just after the elytral base terminate in basal half; size 14–15mm (Image 11A); tip of median lobe continuous in dorsal view of male genitalia (Image 12A)...*S. festivus* (Illiger, 1801)

- Head with black mark continuous; pronotal anterior and posterior median black bands connected by a thick

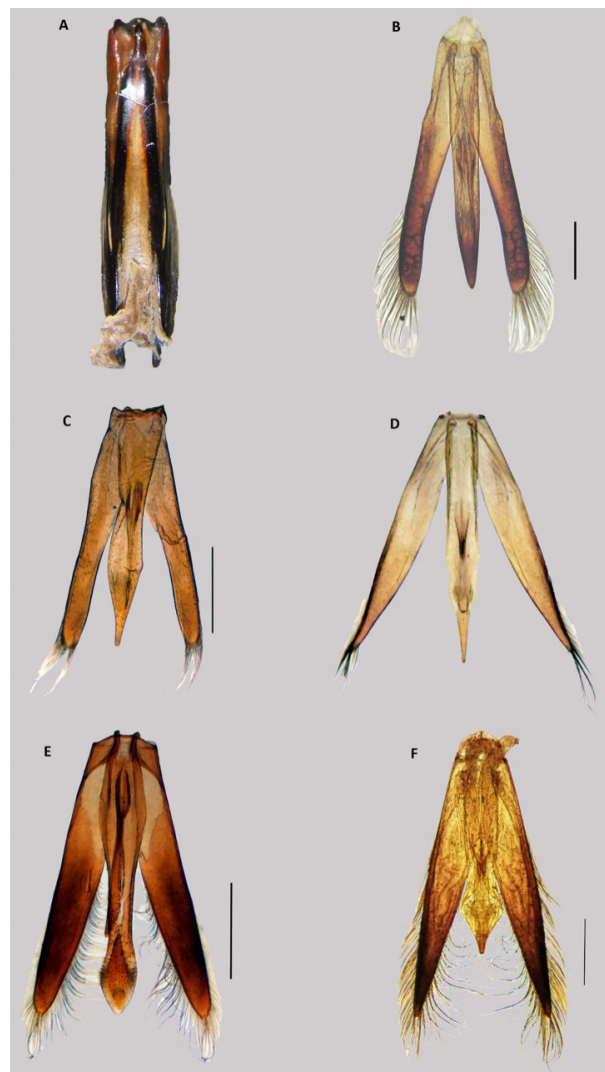


Image 16. Dorsal view of male genitalia: A—*C. cognatus* | B—*D. indicus* | C—*D. unidentatus* | D—*P. productus* | E—*P. limbatus* | F—*P. discifer*. Scale 500 µm. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

black band; two yellow large spots instead of yellow stripes present just after the elytral base; size 11–13 mm (Image 11B); tip of median lobe bifurcated in dorsal view of male genitalia (Image 12B)...*S. dejeanii* (Aubé, 1838)

#### Genus *Hydaticus* Leach, 1817

According to Ghosh & Nilsson (2012) in India all nine species belong to *H. (Prodaticus)* Sharp, 1882, out of which four are known from Maharashtra. However, Miller et al. (2009) and Pederzani (1995) consider *Hydaticus* and *Prodaticus* as two separate genera.

Illustrations and additions to the keys to the *Hydaticus* species:

1. Smaller species, size 10 mm (Image 11C); elytra yellow with confluent black spots; pronotum on

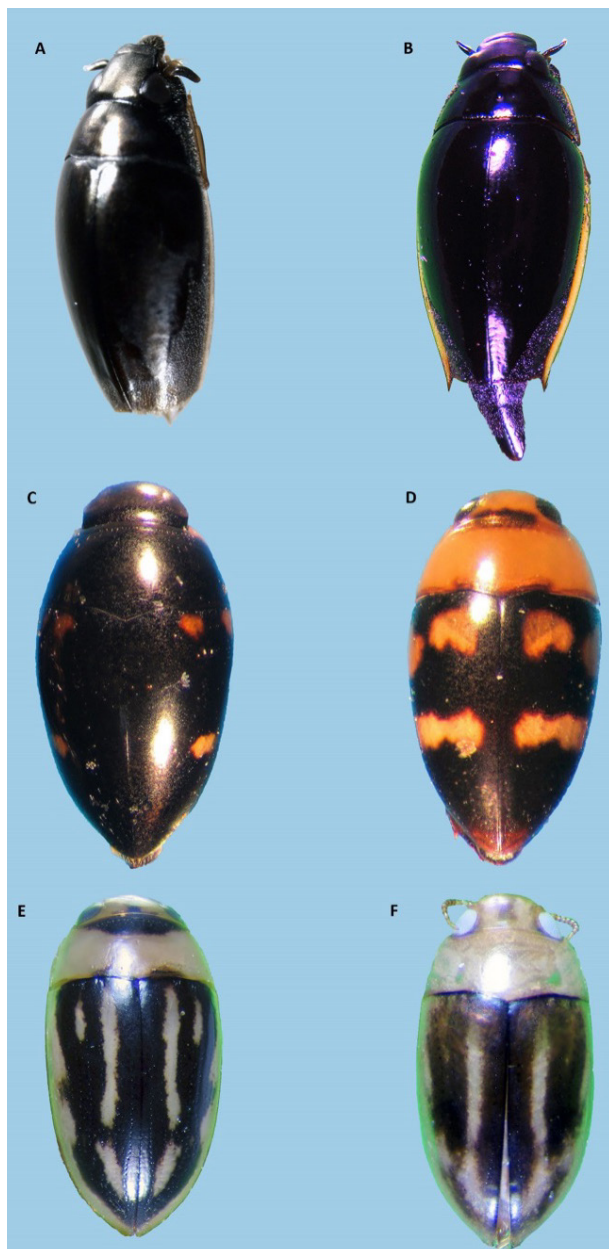


Image 17. Dorsal habitus: A—*P. cf. haemorrhous* (female) | B—*P. assimilis* | C—*C. luctuosus* | D—*C. laetabilis* | E—*N. bivittatus* | F—*Neohydrocoptus* sp. 2. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

disc (anterior and posterior margins) with faint, well separated black bands; short tuft of setae present at apex of median lobe of male genitalia (Image 12 Ca,b)...*H. incertus* Régimbart, 1888

- Larger species, size more than 10 mm; elytra black with lateral yellow patterns; pronotal disc black, lateral margins yellow; short tuft of hair absent at apex of median lobe of male genitalia...2

2. Two lateral yellow vittae present on elytra; male

mesotarsomeres with two rows of adhesive cups...3

- Elytral yellow vittae replaced by large yellow band (nearly half the width of elytron) posteriorly extends up to the tip, a transverse, narrow yellow band connected to lateral yellow band extend towards suture sub-basally; male mesotarsomeres with four rows of adhesive cups; form broadly oval, large as 13 mm (Image 11D); pronotal lateral yellow band extends largely on disc, leaving narrow, median black region (Figure 2C); male genitalia (Image 12Da,b)...*H. luczonicus* Aubé, 1838

3. Form oval, narrow (Image 13A); lateral vittae broad, join each other well before reaching mid of elytron, terminate just before apex; pronotal yellow band not extending beyond elytral humeral vitta (Figure 2A); size 12.5 mm; median lobe of male genitalia narrowly explanate from base to apex (Image 14Aa,b)...*H. vittatus vittatus* (Fabricius, 1775)

- Form oval, broad (Image 13B); lateral vittae narrow, join each other beyond mid of elytron, terminate well before apex; pronotal yellow band extending beyond elytral humeral vitta (Figure 2B); size 12.8–13.0 mm; median lobe of male genitalia broadly explanate from base to apex (Image 14Ba,b)...*H. satoi satoi* Wewalka, 1975

#### Genus *Cybister* Curtis, 1827

According to Miller et al. (2007) there are four subgenera under the genus as *Cybister* (*Megadytoides*) Brinck, *Cybister* (*Melanectes*) Brinck, *Cybister* (*Cybister*) Curtis and *Cybister* (*Neocybister*) Miller, Bergsten and Whiting. This classification was based 47 adult and larval characters, and molecular work on Cytochrome oxidase I (COI), Cytochrome oxidase I (COII), Histone 3 (H3) and wingless genes (Miller et al. 2007). Our specimens belong to *C. (Melanectes)* Brinck and *C. (Cybister)* Curtis. The generic identification is based on keys provided by Pederzani (1995) and Miller et al. (2007), and species identification is based on Vazirani (1968).

Illustrations and additions to the keys to the *Cybister* species:

1. Pronotum with red lateral margins; elytra without lateral yellow bands or stripes (Image 13C); ventrally uniformly dark brown; only 3<sup>rd</sup> and 4<sup>th</sup> abdominal sternites with lateral pale yellow spots; mesotarsi of male without sexual pubescence; median lobe of male genitalia without bifurcated apex, widest at the middle in ventral view (Image 14C); female with second rudimentary claw; female without sexual sculpture on elytra (Figure 3A)...*C. (Melanectes) sugillatus* Erichson, 1834

- Both pronotum and elytra with lateral yellow bands



Image 18. Lateral view of male genitalia: A—*P. assimilis* (500  $\mu$ m) | B—*C. luctuosus* | C—*C. laetabilis* | D—*N. bivittis* | E—*Neohydrocoptus* sp. 2. Scale 100  $\mu$ m. © S.D. Sheth, A.D. Padhye & H.V. Ghate.



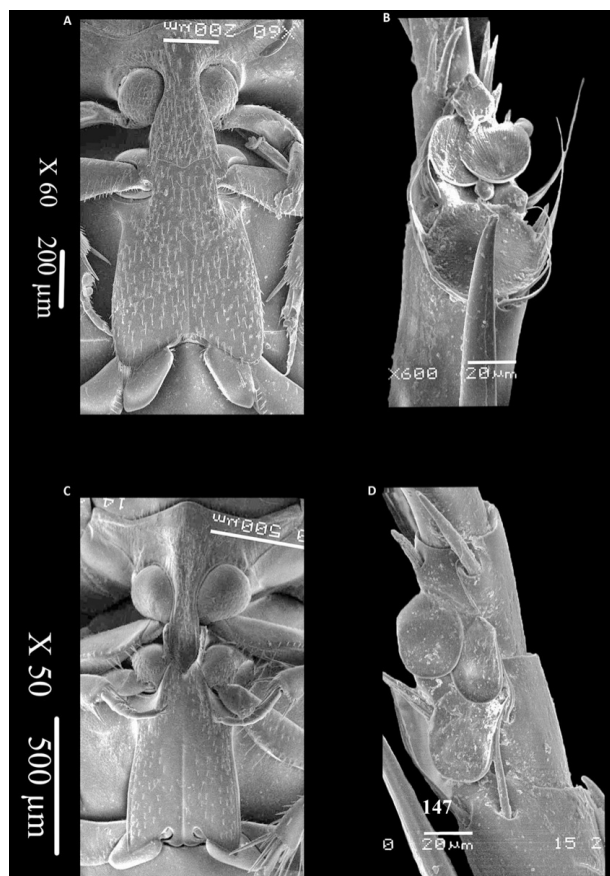


Image 19 Noterid platform: A—*Canthydrus*, C—*Neohydrocoptus* | Male adhesive setae B—*Canthydrus*, D—*Neohydrocoptus*. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

or stripes; 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> abdominal sternites bear yellow spots laterally; mesotarsi of male with sexual pubescence; median lobe of male genitalia with or without bifurcated apex in ventral view; female without second metatarsal claw; females with or without sexual sculpture on elytra...2

2. Total Size less than 25 mm (Image 13D); apex of median lobe of male genitalia not bifurcated anteriorly in ventral view (Image 14D), female without sexual sculpture on elytra (Figure 3B)...*C. cardoni* Severin, 1890

- Size 25 or more than 25 mm...3

3. Size 25 mm (Image 13E); elytral band wider than that on pronotum, extend on elytral epipleura, reach at elytral apex; ventrally largely brown with metaventrite and metacoxal plates yellow laterally; apex of median lobe male genitalia bifurcated (Image 14E); female without sexual sculpture on elytra (Figure 3C)...*C. (cybister) tripunctatus lateralis* (Fabricius, 1798)

- Size more than 25 mm; female with sexual sculpture on elytra...4

4. Elytral yellow band gradually narrows towards

apex leaving lateral-most area brown; female with secondary sexual sculpture prominent (Figure 3D), in the form of short striae, cover entire elytra except region near suture and apex (1/5<sup>th</sup> of elytral size); male with both first and second mesotarsomeres completely covered with sexual hairs; size 36 mm (Image 13F); apex of median lobe of male genitalia bifurcated (Image 14F)...*C. (cybister) confusus* Sharp, 1882

- Elytral yellow band as wide as pronotal band, narrows in basal half; female elytral sculpture in the form of short, deep, sparsely placed striae, present in basal half only, leaving posterior half shiny (Figure 3E); male with only first mesotarsomere completely covered with sexual hairs while second mesotarsomere incompletely covered; size 32–34 mm (Image 15A); apex of median lobe of male genitalia (Image 16A)...*C. (cybister) cognatus* Sharp, 1882

**Family: Gyrinidae Latreille, 1810**

**Subfamily: Gyrininae Latreille, 1810**

**Genus *Dineutus* MacLeay, 1825**

1. For identification of Gyrinidae, work by Miller & Bergsten (2012), and Vazirani (1984) was used. Vazirani (1984) followed the classification of the family Gyrinidae in three subfamilies viz, Orectochilinae, Enhydrinae, and Gyrininae. However, Miller & Bergsten (2012) re-classified the family in three subfamilies Spanglerogyrinae, Heterogyrinae, and Gyrininae based on 42 morphological characters and molecular work on 12S rRNA, cytochrome c oxidase I and II, elongation factor 1 alpha and histone III. The tribe Enhydrini is now included under the subfamily Gyrininae (Miller & Bergsten 2012).

Illustrations and additions to the keys to *Dineutus* species:

Larger species, size 12–15 mm (Image 15B); elytral dorsal striae weakly impressed, elytral apical margin not denticulate, elytral epipleura not produced into spine (Figure 4A); median lobe and parameres equal in size;; parameres subparallel and with smoothed apex (Image 16B)...*D. indicus* Aubé, 1838

- Smaller species, size 6–7 mm (Image 15C); elytral dorsal striae shallow but distinctly impressed, elytral apical margin denticulate, elytral epipleura produced into spine (Figure 4B); median lobe and parameres subequal in size, parameres subparallel in apical region, apex rounded (Image 16C)...*D. unidentatus* Aubé, 1838

Remarks- The individuals were found in groups on the water surface at the edge of large water body as well as in open water. When disturbed, the beetles go under water, move fast to escape from the view and reappear

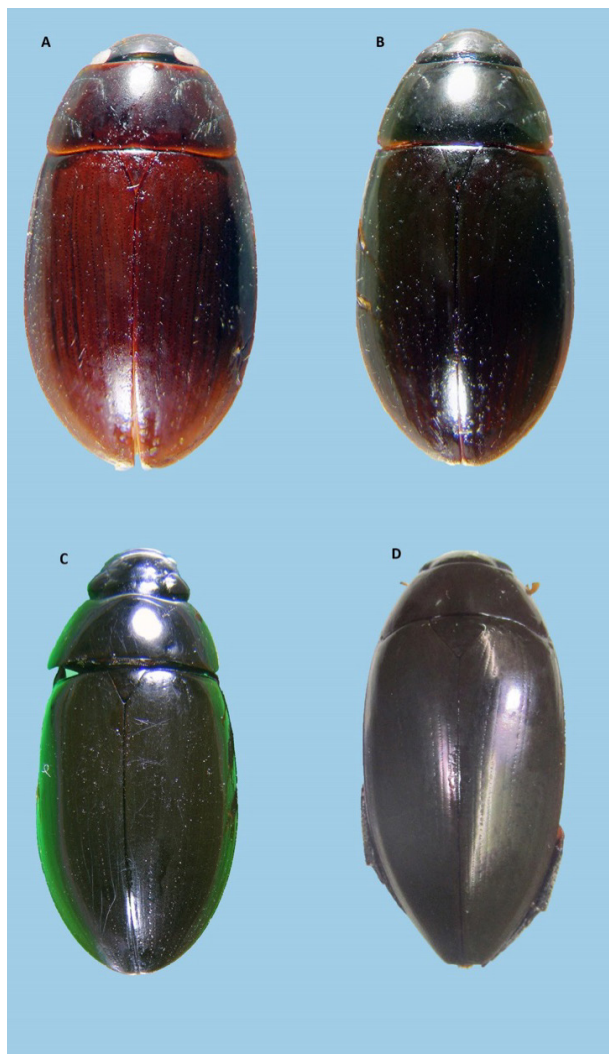


Image 20. Dorsal habitus: A—*S. inconspicuus* | B—*S. rufipes* | C—*H. spinicollis* | D—*H. cf. olivaceous*. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

on the surface.

### Genus *Patrus* Aubé, 1838

Miller & Bergsten (2012) raised the subgenus *Patrus* to genus rank; it was formerly under the *Orectochilus* Dejean, 1833. Vazirani (1984) classified 43 Indian species of *Patrus* species into six groups.

Illustrations and additions to the keys to *Patrus* species:

1. Labrum 3–4 times broader than long...2
  - Labrum less than 3 times broader than long...4
2. Epipleura produced into spine (Figure 4C); median lobe as equal as parameres in size, median lobe broad at base while largely tapers towards apex (Image 16D); total size 4–5 mm (Image 15D)...*P. productus* (Régimbart,

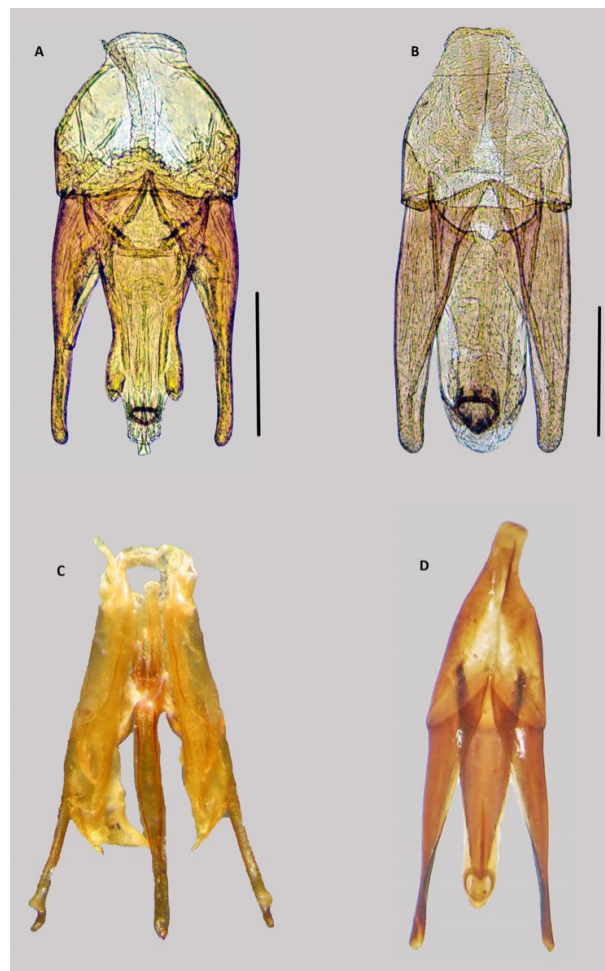


Image 21. Male genitalia (a: median lobe | b: paramere): A—*S. inconspicuus* | B—*S. rufipes* | C—*H. spinicollis* | D—*H. cf. olivaceous*. Scale for A and B: 500 µm. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

### 1883)

- Epipleura not produced into spine...3

3. Smaller species, size 4–5 mm (Image 15E, Figure 4D); median lobe as equal as parameres in size, apex blunt (Image 16E)...*P. limbatus* (Régimbart, 1883)

- Larger species, size 7 mm (Image 15F, Figure 4E); median lobe  $\frac{2}{3}$ <sup>rd</sup> the size of parameres, apex narrow, bifid at tip (Image 16F)...*P. discifer* (Walker 1859)

4. Epipleura not produced into spine; inner margin of lateral pubescence on elytra with 3 lobes (Figure 4F); size 5mm (Image 17A)...*P. cf. haemorrhous* (Régimbart 1891)

- Epipleura produced into spine; inner margin of lateral pubescence on elytra without 3 lobes (Figure 4G); size 7–7.25 mm (Image 17B); median lobe shorter than parameres, broadly pointed at apex (Image 18A)...*P. assimilis* (Ochs 1957)





Image 22. Dorsal habitus: A—*B. pulchellus* | B—*B. chinensis* | C—*B. indicus* | D—*B. indiges* | E—*R. attenuata* | F—*Allocotocerus* sp. 1. © S.D. Sheth, A.D. Padhye & H.V. Ghathe.

#### Family: Noteridae Thomson, 1860

#### Subfamily: Noterinae Thomson, 1860

#### Genus *Canthydrus* Sharp, 1882

Miller (2009) provided systematics of world Noteridae Thomson, 1860. Miller (2009) and Vazirani (1968) was followed for genus level and species level identification, respectively.

Illustrations and additions to the keys to *Canthydrus* species:

1. Head and pronotum largely yellow with medial short black streak at posterior margin; size 2.5 mm (Image 17D); male genitalia (Image 18C)...*C. laetabilis* (Walker, 1858)

- Head black, pale anteromedially; pronotum largely black with corners yellow; size 3 mm (Image 17C); male genitalia (Image 18B)...*C. luctuosus* (Aubé, 1838)

Remarks: Scanning electron micrographs revealed noterid platform of *Canthydrus* species is more or less uniformly covered with dense setae (Image 19A).

#### Genus *Neohydrocoptus* Satô, 1972

Previously the genus *Neohydrocoptus* was a subgenus under the genus *Hydrocoptus* Motschulsky (1853) but, later it was raised to genus level by Nilsson et al. (1989) (Nilsson 2011). Vazirani (1968) reported *N. subvittulus* and *N. bivittis* species from India under the genus *Hydrocoptus* Motschulsky (1853). Keys provided by Miller (2009) were followed for generic identification.

Illustrations and additions to the keys to *Neohydrocoptus* species:

1. Head with prominent black streak posteriorly; pronotum anteromedially with broad black mark, posteriorly with a narrow band; size 3.5 mm (Image

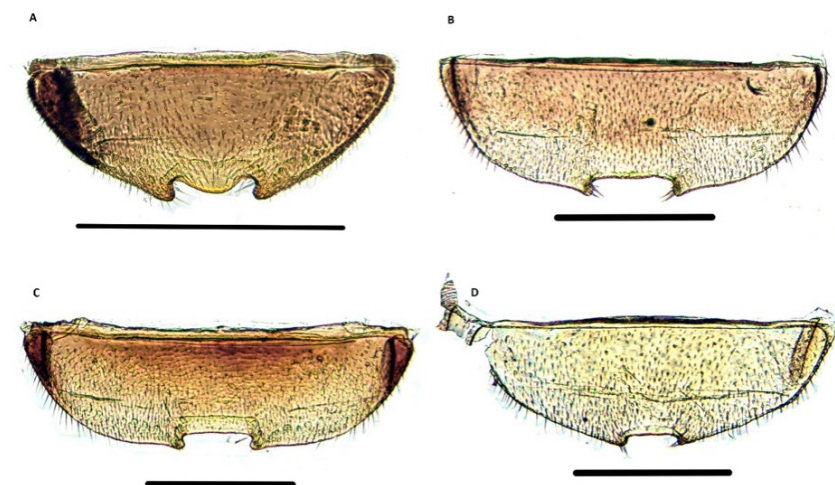


Image 23. Last abdominal ventrite of male: A—*B. pulchellus* | B—*B. indiges* | C—*B. indicus* | D—*B. chinensis*. Scale: 500 µm. © S.D. Sheth, A.D. Padhye & H.V. Ghathe.



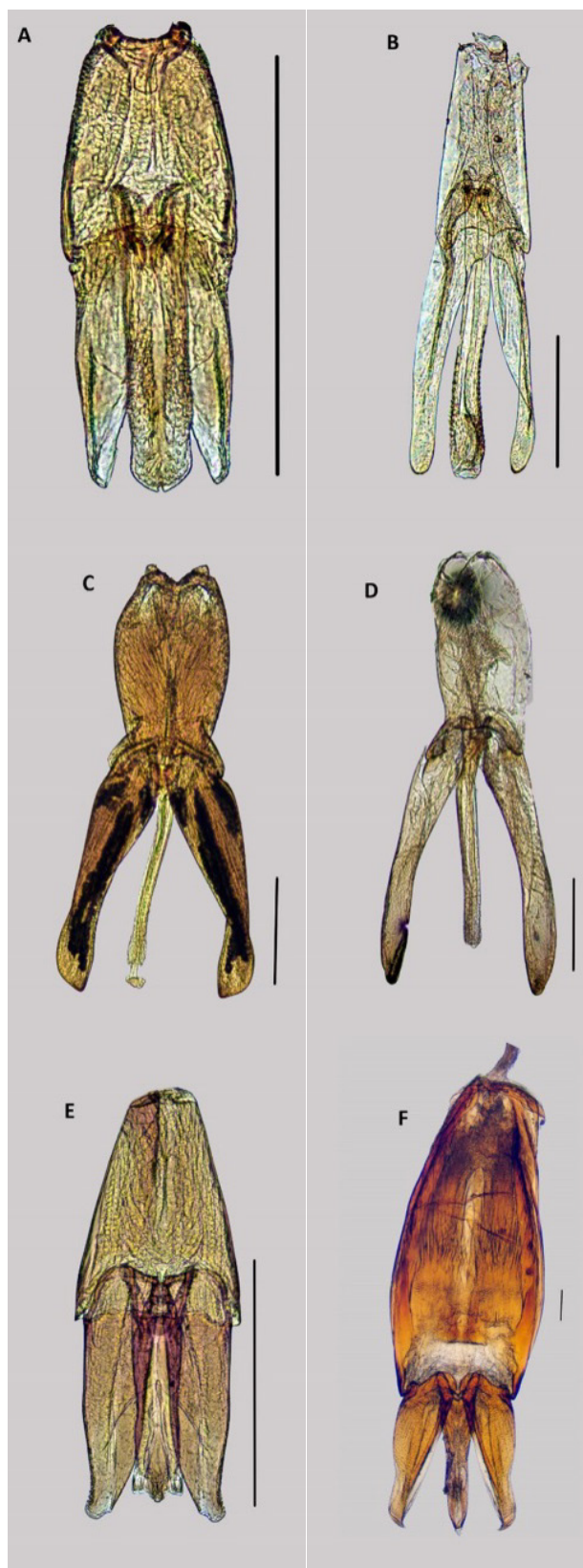


Image 24. Dorsal view of male genitalia: A—*B. pulchellus* | B—*B. chinensis* | C—*B. indicus* | D—*B. indiges* | E—*R. attenuata* | F—*Allocotocerus* sp. 1 (Scale 100 μm). Scale for A–E: 500 μm. © S.D. Sheth, A.D. Padhye & H.V. Ghate.

17E); median lobe of male genitalia anteriorly spatulate, large paramere narrowly triangular, bear numerous setae from base to apex (Image 18D)...*N. bivittis*\* **Motschulsky 1859**

- Head without prominent black streak; pronotum anteromedially without broad black mark, posteriorly with little narrow band; size 2 mm (Image 17F); median lobe of male genitalia slightly bulging subapically, large paramere broadly pointed, bear hardly any setae (Image 18E)... ***Neohydrocoptus* sp2**

Remarks: Scanning electron micrographs revealed noterid platform of *Neohydrocoptus* species is covered with sparse and short setae (Image 19C). Adhesive structure of male Indian *Neohydrocoptus* species (Image 19D) differs than that of male *Canthydrus* species (Image 19B).

#### Family Hydrophilidae Latreille, 1802

##### Subfamily Hydrophilinae Latreille, 1802

##### Genus *Sternolophus* Solier 1834

Komarek (2003) was followed for generic identification. Nasserzadeh & Komarek (2017) was followed to identify species.

Illustrated keys to *Sternolophus* species:

1. Metaventral spine short, not extending on the abdominal ventrite; size 9 mm (Image 20A); lobules of median lobe of male genitalia large (Image 21A)...*S. inconspicuus* (**Nietner, 1856**)

- Metaventral spine long, extends on the abdominal ventrite; size 10 mm (Image 20B); lobules of median lobe of male genitalia small (Image 21B)...*S. rufipes* (**Fabricius, 1792**)

##### Genus *Berosus* Leach 1817

Illustrated keys to *Berosus* species: Schödl (1992; 1993) was referred for identification.

1. Size small, 2.5–3.0 mm (Image 22A); last abdominal sternite of male with medial bulge (Image 23A); male genitalia (Image 24A)...*B. pulchellus* **MacLeay, 1825**

- Size large, 4.5–6.5 mm; last abdominal sternite of male without median bulge...2

2. Elytral intervals 2–5 with irregular punctures...*B. chinensis* **Knisch, 1922** (Image 22B, 23D, 24B)

- Elytral intervals 2–5 without irregular punctures...3  
3. Bulge present in front of metaventral projection; last abdominal ventrite of male without median bulge (Image 23C); parameres of male genitalia broad (Image 24C); habitus (Image 22C)... *B. indicus* (**Motschulsky, 1861**)

- Bulge absent in front of metaventral projection, last abdominal ventrite of male without median bulge

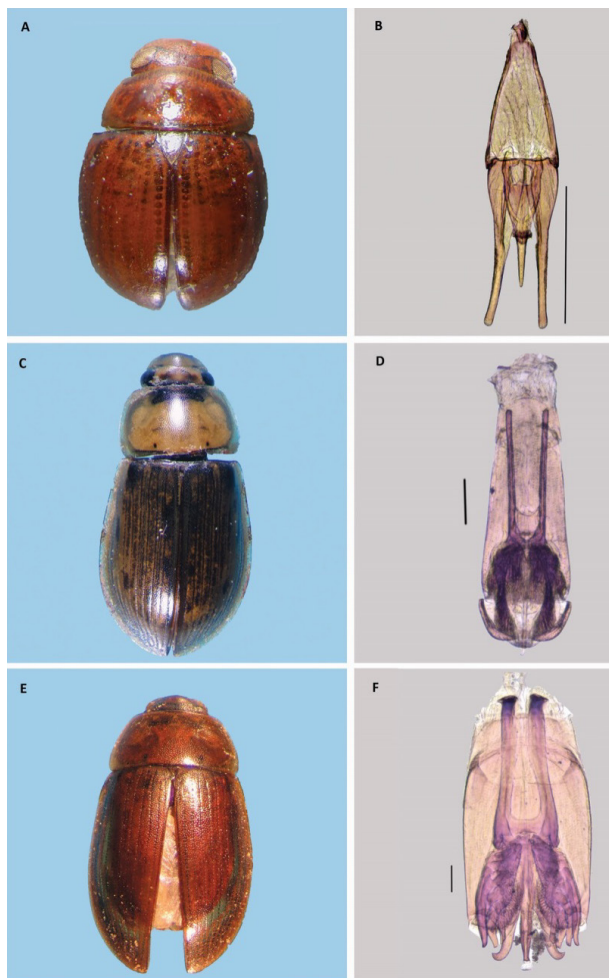


Image 25. Dorsal habitus (A, C, E): A—*Amhiops* sp. 1 | C—*Helochares* sp. 1 | E—*Helochares* sp. 2. Male genitalia (B, D, F): B—*Amhiops* sp. 1 (500  $\mu$ m) | D—*Helochares* sp. 1 (100  $\mu$ m) | F—*Helochares* sp. 2 (100  $\mu$ m). © S.D. Sheth, A.D. Padhye & H.V. Ghate.

(Image 23B); parameres of male genitalia slender (Image 24D); habitus (Image 22D)...***B. indiges* Schödl, 1992**

## DISCUSSION

The present study was initiated to revive the work carried out during the 1970s by Vazirani, Tonapi & Ozarkar (1969a,b) on aquatic beetles in Maharashtra after a gap of 40 years. Although there are a few other short reports on species from Maharashtra, most of these earlier works provide only line drawings of a few species. However, good quality photos of many of Indian species are still not available. In fact, this may be the first attempt from India to provide well-curated digital images of several species of aquatic beetles in one place. Not only that, many checklists and other short reports

still use old nomenclature (as discussed below). Some recent checklists are probably based only on published literature and are incomplete, inaccurate and, hence, misleading.

The checklist of aquatic beetles of Maharashtra (Sharma & Bano 2012) missed some previously reported species from this region such as *Cybister sugillatus* Erichson, 1834, *Clypeodytes hemani* Vazirani, 1968, and *Microdytes whitingi* Miller & Wewalka, 2010. Among these are the species for which the type locality (e.g., *C. hemani* and *M. whitingi*) is Maharashtra (Vazirani 1967; Miller & Wewalka 2010), respectively. The checklist still includes 52 species, even though there are these omissions. We have collected 68 species from different types of water bodies in western Maharashtra with descriptions of new species (Sheth et al. 2018). Further, *Hydrovatus rufoniger rufoniger* was recorded earlier from Bihar in the eastern part of India (Vazirani 1970b). The present work extends its range westward in India. Similarly, *Neohydrocoptus bivittis* is recorded for the first time from the Konkan region, westward to the northern Western Ghats of Maharashtra. This suggests that the water beetle fauna of Maharashtra has perhaps been underestimated and intensive surveys may reveal a few more known species or even new species (Sheth et al. 2019).

Secondly, updated nomenclature (mentioned below) is not followed in the latest checklist (Sharma & Bano 2012). For example, the genus *Guignotus* Houlbert, 1934, still used by Sharma & Bano (2012), was synonymised with the genus *Hydroglyphus* Motschulsky, 1853 (Biström & Silverberg 1981). Miller et al. (2006) also shifted the genus *Peschetius* from the tribe Hydroporini to the tribe Bidessini. Likewise, Miller & Bergsten (2012) published valid subfamily-group, tribe-group and genus-group names under the family Gyrinidae. They raised the former subgenus *Patrus* to the genus level. Vazirani (1984) followed the classification of the family Gyrinidae in three subfamilies, namely- Orectochilinae [genera *Orectochilus s.str* and *Orectochilus (Patrus)*], Enhydrinae (genus *Dineutus*), and Gyrininae (genera *Gyrinus*, *Aulogyrinus* and *Metagyrinus*). Miller & Bergsten (2012) included all the above-mentioned genera under the single subfamily Gyrininae Latreille, 1810, with three tribes, based on a detailed study of morphology and DNA sequences for the phylogenetic analysis.

During the course of our surveys, we also collected specimens of additional hydrophilid genera *Laccobius* Erichson, 1837 and *Enochrus* Thomson, 1859 other than those presented here. These species have much size variation; females appear similar for many species

within these genera and revised keys for species-level identification are scanty. Therefore, we could identify most specimens to the genus level only. Due to this uncertainty, these genera were not included in this chapter. However, the work on their species-level identification is in progress.

Within the period of 5–6 years, we have collected diverse species of beetles adapted to freshwater ecosystems. However, this includes submerged species and water surface dwellers only. We further intend to work on other water associated beetles and also survey other type of inland waters, namely saline ecosystems.

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