Aquatic Coleoptera from Pakistan: faunistic and zoogeographical contribution (Coleoptera: Gyrinidae: Dytiscidae: Hydrophilidae)

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ABSTRACT

Records of 19 species and one subspecies of water beetles of four families: Gyrinidae (two species), Dytiscidae (seven species), Hydrophilidae (10 species), and Spercheidae (one subspecies) from Pakistan are listed, based on collected material. Four genera and 10 species are recorded from Pakistan for the first time. The newly recorded genera are: Patrus, Helochares, Sternolophus and Coelostoma. The newly recorded species are: Dineutus spinosus (Fabricius, 1781), Patrus haemorrhous (Régimbart, 1891), Copelatus freudei Guignot, 1955, Copelatus sp1, Copelatus sp2, Enochrus ater (Kuwert, 1888), Helochares anchoralis Sharp, 1890, Sternolophus rufulpes (Fabricius, 1792), Paracymus aeneus (Germar, 1824) and Coelostoma stultum (Walker, 1858). Zoogeographic affinities of the recorded species are discussed. According to their current distribution, the 18 species known from Pakistan can be classified into five zoogeographical categories.

Introduction

Zoogeographically, the major part of Pakistan is in the Palaearctic Region (Hindu Kush, Karakorum, western Himalayas, Sulaiman Range, North Pakistan sandy desert and western Indus Valley) whilst the rest of the area is in the Oriental Region (Indus River Delta, eastern Indus Valley desert, Thar desert, Rann of Kutch in southern Punjab and eastern Himalaya) and traces of the Afrotropical Region from southern Iran to extreme southwestern Baluchistan. The Hindu Kush, Karakorum and Himalayas are a major biogeographic boundary between the subtropical and tropical flora and fauna of the Indian subcontinent and the temperate-climate Palaearctic Region (Rafi et al. 2010). Pakistan lies in the temperate zone. The climate is generally arid, characterised by hot summers and cool or cold winters, and wide variations between extremes of temperature at given locations. There is little rainfall. These generalisations should not, however, obscure the distinct differences existing amongst particular locations (Blood 1994).
The distribution of aquatic Coleoptera is not well explored in Pakistan. Many scattered, but limited, studies have been carried out in the past. The aim of this paper is to document the newly recorded genera and species of aquatic beetles from Pakistan.

Material and methods

Specimens were collected using a small aquatic dip net with a triangular frame, various small metal kitchen sieves and a light trap. All specimens are deposited in the M.C. Darilmaz Collection (University of Aksaray, Turkey).

The nomenclature used is as follows: for Gyrinidae by Miller and Bergsten (2012); for Dytiscidae by Nilsson (2013); for Hydrophilidae and Spercheidae by Short and Fikáček (2013) and Hansen (2004).

Materials were collected for this study from the following localities (Figure 1):

PA1: Pakistan: Khyber Pakhtunkhwa, Pabbi City, Taru Jabba Village, near narrow canal; light trap; 34.0100°N, 71.7244°E, 305 m, 14.VII.2011.

Figure 1. Map of collecting localities, modified from the original © NordNordWest, downloaded from http://upload.wikimedia.org/wikipedia/commons/thumb/6/66/Pakistan_location_map.svg/2365px-Pakistan_location_map.svg.png. The map is published herein under the terms of the licence for its previous versions: the Creative Commons Attribution-Share Alike 3.0 Unported licence (http://creativecommons.org/licenses/by-sa/3.0/deed.en).
PA2: Pakistan: Sanghar, Khipro, shallow pools; light trap; 25.8227°N, 69.3764°E, 15 m, 10.X.2009.
PA3: Pakistan: Sindh, Karachi, Banaras Colony, small river; 34.1224°N, 72.4611°E, 332 m, 18.VIII.2008.
PA4: Pakistan: Sindh, Tharparkar district, Nagarparkar Town; 24.3588°N, 70.7512°E, 56 m, 20.VI.2009.
PA5: Pakistan: Khyber Pakhtunkhwa; 34.9208°N, 72.6987°E, 1942 m, 25.VI.2011.
PA6: Pakistan: Sindh, Matiari, Taj Muhammed Village, puddle; 25.6315°N, 68.6805°E, 24 m, 27.IX.2009.
PA7: Pakistan: Sindh, Tharparkar District, Mithi, near the police station; light trap; 24.7333°N, 69.8000°E, 36 m, 16.I.2011.
PA8: Pakistan: Sindh, Thatta district, Haleji Lake; 24.8254°N, 67.7791°E, 20 m, 12.VIII.2010.

Results

The following symbols are used in the text:
*: New record at the species level;
**: New record at the genus level.

Family GYRINIDAE Latreille

So far only one species *Dineutus indicus* (Aubé) has been recorded from Pakistan (Mazzoldi 2003).

Subfamily GYRININAE Latreille

Tribe ENHYDRINI Régimbart

Genus *Dineutus* MacLeay

Amongst the numerous species groups and subgenera of *Dineutus* MacLeay, 1825, Subgenus *Spinosodineutes* comprises 15 spp. in the African, Oriental and Australasian regions (Brinck 1981). This subgenus is characterised by the epipleural (postero-lateral) angle of the elytra being produced into a distinct spine. In the Indomalayan Region this subgenus is represented by two species, *Dineutus unidentatus* Aubé and *D. spinosus* (Fabricius). The two species are easily distinguished by the yellow margin of the elytra of *D. unidentatus*, whilst *D. spinosus* is evenly dark and bronzed (Balke et al. 2004). In this study, *D. spinosus* is the first representative of the subgenus from Pakistan.

* *Dineutus (Spinosodineutes) spinosus* (Fabricius)

Material examined
1 ex. PA4.

Distribution
Palaearctic Region: India (Sikkim, Darjeeling, Uttar Pradesh). Oriental Region (Mazzoldi 2003).
Tribe ORECTOCHILINI Régimbart

** Genus *Patrus* Aubé

This genus occurs from Iran east to southern China and Japan, and south to New Guinea. It does not appear to occur in Australia. There is the unusual occurrence of a single species in central Africa [*Patrus africanus* (Ochs)]. Elevation of this subgenus of *Orectochilus* to genus rank results in about 200 valid species names associated with this genus, though it has not been comprehensively revised (Miller and Bergsten 2012).

Until now, no species of this genus was known from Pakistan (Mazzoldi 2003). In this study, *Patrus haemorrhous* is the first representative from Pakistan.

* *Patrus haemorrhous* (Régimbart)

**Material examined**

1 ex. PA8

**Distribution**

An Indian species, so far the species has been recorded from Bihar, Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu and West Bengal (Vazirani 1984).

Family *Dytiscidae* Leach

Subfamily *Dytiscinae* Leach

Tribe *Hydaticini* Sharp

Genus *Hydaticus* Leach

So far, five species have been recorded from Pakistan: *Hydaticus fabricii fabricii* (W.S. Macleay); *Hydaticus histrio* Clark, 1864; *Hydaticus pictus* (Sharp); *Hydaticus vittatus vittatus* (Fabricius); *Hydaticus ricinus* Wewalka, 1979 (Ghosh and Nilsson 2012). The latter species is recorded here also for Pakistan.

However, *Hydaticus leander* (Rossi) was recorded from Pakistan by Darilmaz and Ahmed (2009). Afterwards, the first author rechecked this specimen and concluded the specimen belongs to *Hydaticus ponticus* Sharp.

*Hydaticus (Prodaticus) ricinus* Wewalka

**Material examined**

2 ex. PA1; 1 ex. PA6

**Distribution**

Oriental Region: India (Assam, Tamil Nadu), Bhutan, Myanmar, Nepal (Danda Pakhar), Sri Lanka (Polonnaruwa); China (Tibet), Laos, Thailand, Vietnam. Palaearctic Region: Afghanistan, Pakistan, Nepal (Wewalka 1979; Ghosh and Nilsson 2012).
Tribe **ERETINI** Crotch  
Genus **Eretes** Laporte

The genus *Eretes* was revised by Miller (2002). Four species are recognised in the genus; two of them *Eretes griseus* (Fabricius) and *Eretes sticticus* (Linnaeus) were recorded from Pakistan (Miller 2002). *E. griseus* is recorded here also for Pakistan.

**Eretes griseus** (Fabricius)

*Material examined*
14 ex. PA1; 6 ex. PA2

*Distribution*
This species occurs from Indonesia, the extreme northern tip of Australia (Darwin) and Guam to Japan and the Philippines to the Sichuan province of China and Vladivostok, Russia throughout southern Asia and Africa, including Madagascar, and north to southern Europe (Miller 2002).

Subfamily **HYDROPORINAE** Erichson  
Tribe **BIDESSINI** Sharp  
Genus **Hydroglyphus** Motschulsky

Up to the present, five species of the genus *Hydroglyphus* have been recorded from Pakistan: *Hydroglyphus angularis* (Klug); *H. geminus* (Fabricius); *H. pendjabensis* (Guignot); *H. signatellus* (Klug); *H.flammulatus* (Sharp) (Ghosh and Nilsson 2012). The latter two species are recorded here also for Pakistan.

**Hydroglyphus signatellus** (Klug)

*Material examined*
1 ex. PA3

*Distribution*
Palaearctic Region: Afghanistan, Algeria, Arab Emirates, Armenia, Azerbaijan, Bosnia Herzegovina, Croatia, Cyprus, Egypt, France, Georgia, Greece, India (West Bengal), Iran, Iraq, Israel, Italy, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Libya, Morocco, Oman, Pakistan, Russia (South European), Saudi Arabia, Spain, Syria, Tunis, Yugoslavia, Tajikistan, Turkey, Turkmenistan, Uzbekistan, Yemen. Afrotropical Region: Ethiopia, Kenya, Senegal, Sudan (Bistrom 1986; Ghosh and Nilsson 2012; Nilsson and Hájek 2013).

**Hydroglyphus flammulatus** (Sharp)

*Material examined*
1 ex. PA1; 1 ex. PA7
Distribution
Oriental Region: India (Andhra Pradesh, Assam, Bihar, Delhi, Gujarat, Himachal Pradesh, Jharkhand, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, West Bengal); Bangladesh, Myanmar, Sri Lanka; Cambodia, China, Indonesia, Taiwan, Thailand, Vietnam.

Palaearctic Region: India (Uttar Pradesh), Iran, Japan, Nepal, Pakistan (Ghosh and Nilsson 2012; Nilsson and Hájek 2013).

Subfamily COPELATINAE Van den Branden
Tribe COPELATINI Van den Branden
Genus Copelatus Erichson

So far, only one species has been recorded from Pakistan: Copelatus feae Régimbart (Ghosh and Nilsson 2012). In this study, three different species were recognised, however, as two species are represented only by single females; only one species (male) is identified to the species level.

* Copelatus freudei Guignot

Material examined
1 ex. PA6

Notes
Single male with broken apex of median lobe. However, based on habitus and shape of remaining part of median lobe, the specimen can be, with little hesitation, assigned to C. freudei, described from northern India (Bengal) and subsequently recorded also from Bhutan (Wewalka 1975) (Jiří Hájek, personal communication).

* Copelatus sp1

Material examined
1 ex. PA 1

Notes
A specimen similar to C. sociennus J. Balfour-Browne in habitus; however, single females of Copelatus cannot be reliably identified (Jiří Hájek, personal communication).

* Copelatus sp2

Material examined
1 ex. PA 5

Notes
Single female of the Copelatus erichsonii group cannot be identified as any known species from the area (Jiří Hájek, personal communication).
So far, only one species has been recorded from Pakistan: *Enochrus esuriens* (Walker) (Hansen 1999, 2004). The species is recorded here also for Pakistan. Also, in this study, *E. ater* is the second representative of the genus from Pakistan.

*Enochrus (Methydrus) esuriens* (Walker)

**Material examined**
10 ex. PA1; 1 ex. PA6

**Distribution**
Oriental Region: Bangladesh, China (Fujian, Guangdong, Hainan, Jiangxi), India, Indonesia (Borneo, Java, Sumatra, Sunda), Malaysia (Peninsula), Nicobar Is., Philippines, Sri Lanka, Thailand, Vietnam. Palaeartic Region: Bhutan, China (Hubei, Jiangsu), Iraq, Japan, Nepal, Pakistan, Saudi Arabia, South Korea. Australian Region: Australia, Fiji, New Caledonia, New Guinea, Solomon Is., Vanuatu (Hansen 1999, 2004).

* *Enochrus (Lumetus) ater* (Kuwert)

**Material examined**
2 ex. PA3

**Distribution**
Palaeartic Region: Algeria, Austria, Bosnia-Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Iran, Iraq, Israel, Italy, Jordan, Kazakhstan, Lebanon, Romania, Saudi Arabia, Spain, Syria, Tajikistan, Turkey, Turkmenistan, Uzbekistan, Yugoslavia. Afrotropical Region: Oman, Saudi Arabia (Hansen 1999, 2004).

Subfamily ACIDOCERINAE Zaitzev

**Genus Helochares** Mulsant

Until now, no species of this genus was known from Pakistan (Hansen 1999, 2004). In this study, this genus of the Hydrophilidae is first represented in Pakistan.

* Helochares (Hydrobaticus) anchoralis* Sharp

**Material examined**
1 ex. PA4.
**Distribution**

Oriental Region: Bangladesh, Cambodia, China (Fujian, Hainan, Yunnan), India, Indonesia (Sumatra), Laos, Philippines, Sri Lanka, Taiwan, Thailand. Palaearctic Region: China, Japan (Hansen 1999, 2004).

Subfamily **HYDROPHILINAE** Latreille  
Tribe **BEROSINI** Mulsant  
Genus **Berosus** Leach

Until now, five species have been recorded from Pakistan: *Berosus nigriceps* (Fabricius); *B. chinensis* Knisch; *B. fairmairei* Zaitzev; *B. indicus* (Motschulsky); *B. indiges* Schödl (Hansen 1999, 2004). *B. indicus* and *B. nigriceps* are recorded here also for Pakistan.

*Berosus (Enoplurus) indicus* (Motschulsky)

**Material examined**

14 ex. PA1; 8 ex. PA2.

**Distribution**

Oriental Region: Bangladesh, India (Bihar, Goa, Karnataka, Kerala, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal), Nepal, Sri Lanka. Palaearctic Region: Pakistan (Hansen 1999, 2004).

*Berosus (s. str.) nigriceps* (Fabricius)

**Material examined**

10 ex. PA1; 2 ex. PA2; 6 ex. PA4

**Distribution**

Oriental Region: Bangladesh, India (Delhi, Madhya Pradesh, Rajasthan, Tamil Nadu, Uttar Pradesh), Nepal, Sri Lanka. Afrotropical Region: Angola, Benin, Botswana, Cape Verde Is., Chad, Djibouti, Ethiopia, Gambia, Ghana, Guinea Bissau, Ivory Coast, Kenya, Mali, Mauritania, Namibia, Niger, Nigeria, Oman, Saudi Arabia, Senegal, South Africa, Sudan, Tanzania, Yemen, Zaire, Zimbabwe. Palaearctic Region: Iran, Irak, Pakistan, Saudi Arabia (Hansen 1999, 2004).

Genus **Regimbartia** Zaitzev

Only one species has been recorded from Pakistan: *Regimbartia attenuata* (Fabricius) (Hansen 1999, 2004). The species is recorded here also for Pakistan.
Regimbartia attenuata (Fabricius)

Material examined
2 ex. PA1

Distribution
Oriental: Burma, Cambodia, China (Fujian, Guangdong, Yunnan), India, Indonesia (Java, Sumatra, Sumbawa, Sunda), Malaysia, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam. Australian Region: Australia (New South Wales, Northern Territory, Queensland, South Australia, Western Australia), New Guinea. Palaearctic Region: Afghanistan, China (Jiangsu), Japan, Kurdistan, Pakistan, South Korea. Afrotropical Region: Oman, Yemen (Hansen 1999, 2004).

Tribe HYDROPHILINI Latreille
** Genus Sternolophus Solier

There are nine described species of Sternolophus distributed primarily in the Old World tropics, although some extend into the southern and extreme eastern Palaearctic Region. Until now, no species of this genus was known from Pakistan (Hansen 1999, 2004).

* Sternolophus (s. str.) rufipes (Fabricius)

Material examined
11 ex. PA1; 3 ex. PA3; 2 ex. PA5.

Distribution
Oriental Region: China (Fujian, Guangdong, Hunan, Yunnan, Zhajiang), India (Tamil Nadu), Indonesia (Java, Sumatra), Philippines, Sri Lanka, Taiwan, Thailand, Vietnam. Palaearctic Region: China (Beijing, Jiangsu, Tibet), India (Kashmir), Japan, South Korea (Hansen 1999, 2004).

Genus Hydrophilus Geoffroy

So far, one species has been recorded from Pakistan: Hydrophilus senegalensis (Percheron) (Hansen 1999, 2004; Darilmaz and Ahmed 2009). The species is recorded here also for Pakistan.

Hydrophilus (s. str.) senegalensis (Percheron)

Material examined
2 ex. PA2.
**Tribe LACCOBIINI** Bertrand
**Genus Paracymus** Thomson

So far, one species has been recorded from Pakistan: *Paracymus vulgatus* Wooldridge, 1977 (Wooldridge 1977). In this study *P. aeneus* is the second representative of the genus from Pakistan.

*Paracymus aeneus* (Germar)

**Material examined**
2 ex. PA3.

**Distribution**
Afrotropical Region: Angola, Cameroon, Ethiopia, Kenya, Mauritania, Mozambique, Namibia, Niger, Saudi Arabia, Senegal, Somalia, South Africa, Sudan, Tanzania, Uganda, Yemen, Zaire. Palaeartic Region: Algeria, Egypt, Pakistan. Oriental Region: India (Maharashtra, Uttar Pradesh) (Hansen 1999, 2004).

**Subfamily SPHAERIDIINAE** Latreille
**Tribe COELOSTOMATINI** Heyden

**Genus Coelostoma** Brullé

Up to now, 104 species have been described from Afrotropical, Palaeartic and Oriental regions. Until now, no species of this genus was known from Pakistan (Hansen 1999, 2004; Short and Hebauer 2006).

*Coelostoma (Holocoelostoma) stultum* (Walker)

**Material examined**
2 ex. PA1.

**Distribution**
Oriental Region: Andaman Is., Burma, India (Assam), Indonesia (Bornea, Java, Sumatra, Sumbawa), Malaysia (Peninsula), Nicobar Is., Philippines, Sri Lanka, Taiwan, Thailand, Vietnam. Palaeartic Region: Afghanistan, China, Japan, Nepal, South Korea. Afrotropical Region: Mascarene Is., Oman, Saudi Arabia (South) (Hansen 1999, 2004).
Family **SPERCHEIDAE** Erichson

The family Spercheidae is a homogeneous group of beetles composed of only one genus, *Spercheus* Kugelann. Recent papers mention that this family has 18 species, most of them from the Ethiopian and Oriental zoogeographic regions (Hansen 1991; Hebauer 1997; Darilmaz and Kiyak 2011).

Until now, only a single Oriental subspecies, *Spercheus belli belli*, has been recorded in Pakistan (Hebauer 1997). The species is recorded here also for Pakistan.

*Spercheus belli belli* Champion

**Material examined**
1 ex. PA1.

**Distribution**
Palaearctic Region: Pakistan. Oriental Region: Bangladesh, India (Bihar, Uttar Pradesh) (Hansen 1999, 2004).

**Discussion**
The present survey of water beetles from Pakistan reveals 19 species and one subspecies of the families Gyrinidae, Dytiscidae, Hydrophilidae and Spercheidae. Two specimens of *Copelatus* have not yet been identified to the species level. In this study, four genera and 10 species are recorded from Pakistan for the first time: Gyrinidae (one genus and two species), Dytiscidae (three species) and Hydrophilidae (three genera and five species). They are *Patrus* Aubé, *Helochares* Mulsant, *Sternolophus* Solier, *Coelostoma* Brullé, *Dineutus spinosus* (Fabricius), *Patrus haemorrhous* (Régimbart), *Copelatus freudei* Guignot, *Copelatus sp1*, *Copelatus sp2*, *Enochrus ater* (Kuwert), *Helochares anchoralis* Sharp, *Sternolophus rufipes* (Fabricius), *Paracyxus aeneus* (Germar), and *Coelostoma stultum* (Walker).

According to their current distribution, the 18 species here discussed from Pakistan can be classified into five zoogeographical categories (Table 1). Pakistan lies in the transition zone between both Oriental to Palaearctic and Oriental to Afrotropical faunas.

Our findings, which are introduced by Hájek (2006), support two hypotheses:

1. A relatively high number of chiefly Oriental species in Pakistan (*D. spinosus, P. haemorrhous, H. ricinus, H. flammulatus, C. freudei, H. anchoralis, B. indicus, S. rufipes, S. belli belli*) indicates a continuous distribution of fauna typical of the Oriental region.

2. *B. nigriceps, H. senegalensis* and *C. stultum* occur in the Afrotropical as well as in the Oriental region. The occurrence of these species in Pakistan supports a hypothesis of a former continuous distribution of some taxa in the ‘Old World tropics’ from sub-Saharan Africa through the Arabian Peninsula, Southern Iran and Pakistan to India and Southeast Asia.
Animals other than the aquatic Coleoptera have a similar distribution and thus support these hypotheses. These results appear to support the hypothesis advanced by Pearson and Ghorpade (1989) that the tiger beetle fauna on the subcontinent is largely the result of numerous independent contributions from the Afrotropical, the Palaearctic and the Oriental faunas. In addition, our results show similarity to those of Rafi et al. (2010) and Zia et al. (2011).

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Disclosure statement

No potential conflict of interest was reported by the authors.

Geolocation information

Point (Dineutus spinosus): 24.3588°N, 70.7512°E; Point (Patrus haemorrhous): 24.8254°N, 67.7791°E; Point (Hydaticus ricinus): 34.0100°N, 71.7244°E; Point (Eretes griseus): 34.0100°N, 71.7244°E; Point (Hydroglyphus signatellus): 34.1224°N, 72.4611°E; Point (Hydroglyphus flammulatus): 34.0100°N, 71.7244°E; Point (Copelatus freudei): 24.3588°N, 70.7512°E; Point (Enochrus esuriens): 34.0100°N, 71.7244°E; Point (Enochrus ater): 24.3588°N, 70.7512°E; Point (Helochares anchoralis): 24.3588°N, 70.7512°E; Point (Berosus indicus): 34.0100°N, 71.7244°E; Point (Berosus nigriceps): 34.0100°N, 71.7244°E; Point (Regimbartia attenuata): 34.0100°N, 71.7244°E; Point (Sternolophus ruflipes): 34.0100°N, 71.7244°E; Point (Coelostoma stultum): 24.3588°N, 70.7512°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensis): 34.0100°N, 71.7244°E; Point (Paracymus aeneus): 34.0100°N, 71.7244°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensis): 34.0100°N, 71.7244°E; Point (Paracymus aeneus): 24.3588°N, 70.7512°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensis): 34.0100°N, 71.7244°E; Point (Paracymus aeneus): 24.3588°N, 70.7512°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensis): 34.0100°N, 71.7244°E; Point (Paracymus aeneus): 24.3588°N, 70.7512°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensis): 34.0100°N, 71.7244°E; Point (Paracymus aeneus): 24.3588°N, 70.7512°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensis): 34.0100°N, 71.7244°E; Point (Paracymus aeneus): 24.3588°N, 70.7512°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensis): 34.0100°N, 71.7244°E; Point (Paracymus aeneus): 24.3588°N, 70.7512°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensis): 34.0100°N, 71.7244°E; Point (Paracymus aeneus): 24.3588°N, 70.7512°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensis): 34.0100°N, 71.7244°E; Point (Paracymus aeneus): 24.3588°N, 70.7512°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensis): 34.0100°N, 71.7244°E; Point (Paracymus aeneus): 24.3588°N, 70.7512°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensis): 34.0100°N, 71.7244°E; Point (Paracymus aeneus): 24.3588°N, 70.7512°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensis): 34.0100°N, 71.7244°E; Point (Paracymus aeneus): 24.3588°N, 70.7512°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E; Point (Spercheus belli belli): 24.3588°N, 70.7512°E; Point (Hydrophilus senegalensi

| Species                        | Palaeo-Oriental | Afrotropical | Oriental | Palaearctic | Australian |
|-------------------------------|-----------------|--------------|----------|-------------|------------|
| Dineutus spinosus             | ●               |              |          |             | ●          |
| Patrus haemorrhous            | ●               |              |          |             | ●          |
| Hydaticus ricinus             | ●               |              |          |             | ●          |
| Eretes griseus                | ●               | ●            | ●        | ●           | ●          |
| Hydroglyphus signatellus      | ●               | ●            | ●        | ●           | ●          |
| Hydroglyphus flammulatus      | ●               | ●            | ●        | ●           | ●          |
| Copelatus freudei             | ●               | ●            | ●        | ●           | ●          |
| Enochrus esuriens             | ●               | ●            | ●        | ●           | ●          |
| Enochrus ater                 | ●               | ●            | ●        | ●           | ●          |
| Helocharas anchoralis         | ●               | ●            | ●        | ●           | ●          |
| Berosus indicus               | ●               | ●            | ●        | ●           | ●          |
| Berosus nigriceps             | ●               | ●            | ●        | ●           | ●          |
| Regimbartia attenuata         | ●               | ●            | ●        | ●           | ●          |
| Sternolophus ruflipes         | ●               | ●            | ●        | ●           | ●          |
| Hydrophilus senegalis         | ●               | ●            | ●        | ●           | ●          |
| Paracymus aeneus              | ●               | ●            | ●        | ●           | ●          |
| Coelostoma stultum            | ●               | ●            | ●        | ●           | ●          |
| Spercheus belli belli         | ●               | ●            | ●        | ●           | ●          |

Table 1. List of species and their zoogeographical regions.
72.6987°E; Point (Hydrophilus senegalensis): 25.8227°N, 69.3764°E; Point (Paracyamus aeneus): 34.1224°N, 72.4611°E; Point (Coelostoma stultum): 34.0100°N, 71.7244°E

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