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Two Aquatic Beetles Reported (Haliplidae: Coleoptera) from Azerbaijan, Iran

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Abstract: There are many studies on aquatic insects in the world but they didn't work a lot in Iran. Haliplidae is a family of aquatic insects (Coleoptera: Adephaga) that didn't study before a lot. This family of insects is not too popular, so finding it is not very easy. In 2000-2008, the water beetle fauna from 2 sampling sites was studied on this family. In this study, two aquatic beetle species belongs to 2 genera (*Peltodytes* Regimbart, 1878 and *Haliplus* Latreille, 1802) had been reported from East Azerbaijan and Ardabil Provinces of North-West Iran. All specimens were collected between 2000 and 2008. One species (*Haliplus heydeni* Wehncke, 1875) has been recorded for the first time from Iran.

Key words: Coleoptera · Aquatic Beetle · East Azerbaijan · Ardabil · Iran

INTRODUCTION

Aquatic Coleoptera constitute an important part of the macrozoobenthos of freshwater habitats. Small and temporary water bodies have more species than large and permanent ones [1]. Aquatic beetles have their greatest abundance and diversity in temperate regions [2]. These insects are not selective in their choice of water bodies and occur in a wide variety of habitats [3], although many species may prefer certain types of water bodies [4]. Many of them, especially dytiscids and many hydrophilids, are generally found in habitats of small shallow water bodies or on the margin of rivers and marshes and they occupy the zone of emergent vegetation, mats of plant debris, or flooded terrestrial vegetation along the shoreline [5]. The aquatic beetle fauna of Iran is partly known. Hosseinie [6-10] studied the aquatic beetle fauna of Fars, Guilan, Mazandaran and Khuzestan Provinces. Ostovan *et al*. [11] studied the diversity, abundance and biology of aquatic insects, including aquatic beetles, in Ardabil and Fars Provinces. Cox *et al*. [12] studied water beetles of the families Dytiscidae, Hydrophilidae, Gyrinidae and Haliplidae in Amir-Kolayeh and the part of Anzali. Zahiri [13] studied beetles of Haliplidae and Noteridae from the Fars and Khuzestan Provinces. Johary [14] studied the beetles of the genus *Enochrus* from the aquatic coleopteran collection of Shiraz University. Atamehr [15, 16] reported 51 species belonging to 40 genera and 14 families from Tabriz Province. Aquatic beetles (Coleoptera: Adephaga) from East Azerbaijan Province were studied to obtain valuable documentation of their occurrence in the different types of springs there. Twenty-four species were detected, among which 11 were found for the first time in Iran. A further aim of this study was to consider the obtained faunistic results from the ecological aspect. Vafaii [17] reported 24 species belonging to 13 genera and 5 families in Markazi Province of Central Iran. The ecological significance of the new records is briefly discussed.

MATERIALS AND METHODS

In 2000-2008, the water beetle fauna from 2 sampling sites was studied. East Azerbaijan and Ardabil Province (were the sampling was done). East Azerbaijan is located in North-West Iran between 36°45' and 39°26' East and 45°05' and 48°22' north and covers an area of approximately 47,830 km²; it has a population of around four million people. Generally speaking, East Azerbaijan enjoys a cool, dry climate, being in the main a mountainous region. But the gentle breezes off the Caspian Sea have some influence on the climate of the low-lying areas. Temperatures run up to 8.9 °C in Tabriz and 20 °C in Maraqeh, in the winter dropping to -10-15 °C at least (depending on how cold the overall year is). The ideal seasons to visit this province are in the spring and summer months.

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Table 1: List of sampling sites in East Azerbaijan and Ardabil Provinces

No.	Sampling site	Coordinates	Province	Habitat
1	Varkesh river (14 km NW of Tabriz)	46° 10' E 38°20' N	East Azerbaijan	River
2	Balikloo river (5 km Sw of Ardabil)	48° 15' E 38°10' N	Ardabil	River

Fig. 1: Map of the study area indicating the location of the study sites. 1) Varkesh river; 2) Balikloo river

Ardebil Province is a strip stretching from 36°50′on the North latitude and 47° on the East longitude (referenced from the Greenwich meridian) to 39°40′ North and 49° East. Ardebil's eastern border, separating it from the Caspian Sea and preventing moisture from entering the region. Diverse mounts, high latitude, proximity to Caspian Sea, facing Mediterranean air flows and Siberian cold air masses play an important role in weather quality. Based on the acquired local data and geographic/climatic information, four distinct climatic regions were identifiable and are as follows: the Plains, the Foothills, the Very Cold Mountains and the Cold Mountains. These regions might also be categorized by altitude, topography, climatic conditions, vegetation or type of produce. The mean maximum temperature during the hot period of the year reaches 33-37° C creating a sultry weather. The absolute maximum temperature is 38-40° C.

For collecting aquatic beetles, sweeping the water with a metal sieve or net was the main method; in some cases, a drag-type net or light trap was used. All captured samples were separated with forceps. Sorting was performed wet or dry in a flat white tray. The beetles were preserved in 95% alcohol, which was subsequently replaced by a mixture of 75% alcohol and 5% glycerin after 24 hours.

Slide-mounted specimens and material preserved in fluid are stored in collections of the Department of Entomology of Ardabil Azad University.

A list of localities is given in Table 1. The ‘List of species” gives the sampling locations for each species. The date of sampling and total number of individuals and synonyms are also noted. All specimens were collected by the author. Species new for Iran are marked with an asterisk.

RESULTS AND DISCUSSION

Two aquatic beetle species belongs to 2 genera [18, 19] had been reported from East Azerbaijan and Ardabil Provinces of North-West Iran. All specimens were collected between 2000 and 2008. One species [20] has been recorded for the first time from Iran. Here are the lists of species:

- Family Haliplidae Kirby, 1837
- Genus *Peltodytes* Régimbart, 1879
- *Peltodytes caesus* (Duftschmid 1805:284)
- Figs. 2-8; Tab. 1
- Material: East Azerbaijan, Varkesh River 04.06.2001 1? 1?.
- Vondel (1992) provides a detailed description of this species, plus a discussion of its synonymys and distribution.
- Synonymy:
- *Peltodytes caesus* (Duftschmid 1805:284)
- *Dytiscus curculinus* Muller 1776:73
- *Dytiscus caesus* Duftschmid 1805:284
- *Haliplus quadrimaculatus* Drapiez 1820:349
- *Cnemidotus caesus* (Duftschmid 1805:284), by Aube 1836:38
- *Cnemidotus impressus* Panzer 1794:7, by Seidlitz 1887:35
- *Cnemidotus caesus* var. *levantinus* Sahlberg 1902:17
- *Peltodytes curculinus* (Muller 1776:73), by Zimmermann 1920:299
- *Peltodytes impressus* (Panzer 1794:7), by Zimmermann 1920:299
- *Peltodytes quadrimaculatus* (Drapiez 1820:349), by Zimmermann 1920:299
- *Peltodytes caesus* var. *levantinus* (Sahlberg 1902:17), by Zimmermann 1920:299
- *Cnemidotes delhermi* Mazeret 1923:67
- *Peltodytes caesus* subsp. *levantinus* (Sahlberg 1902:17), by Gueorguiev 1958:44
- *Dytiscus impressus* Panzer 1794:7, nec. Fabricius 1787, mis-identified. *Dytiscus impressus* Fabricius = *Haliplus ruficollis* (DeGeer 1774), designated by Holmen 1987:133.

Type Specimens: Syntypes probably in the Oberosterreichisches Landsmuseum, Linz, Austria. Type locality: Austria.

Description: Length 3.5-4.0 mm. Body wide, rather squarish and parallel-sided. Dorsal side yellowish with black punctures along the posterior margin or pronotum and on elytra. and with a dark common spot and often some minor spots on the elytra (Fig. 7). Ventral side and legs yellowish or reddish. Pronotum with a coarsely punctured impression along the posterior margin. Elytral punctures very strong anteriorly, particularly the first punctures or the inner rows which are almost pit-shaped. Presternal apophysis with a median depression apically and with slightly raised sides. Metasternal apophysis with a median pit and some lateral depressions. Each hind coxal plate with a blunt denticle posteriorly.

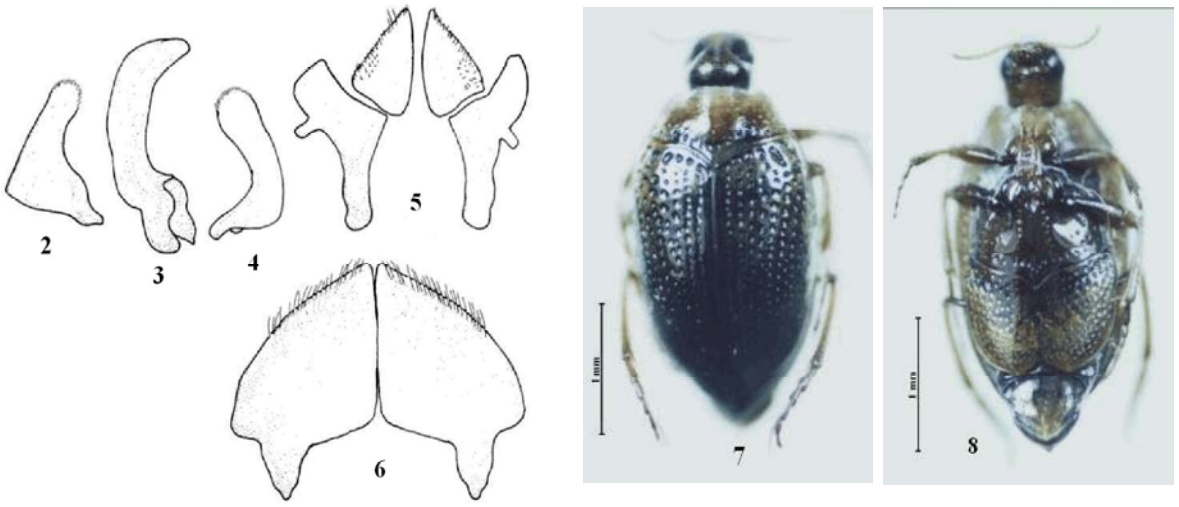

Fig. 2-8: *Peltodytes caesus*; 2-4: Male genital sclerites; 2: left paramere; 3: penis; 4: right paramere; 5-6: Female genital sclerites; 5: gonocoxae and tergal halves IX; 6: gonocoxosternites (Holmen, 1987); 7: dorsal view; 8: ventral view [Photo: A. Atamehr].

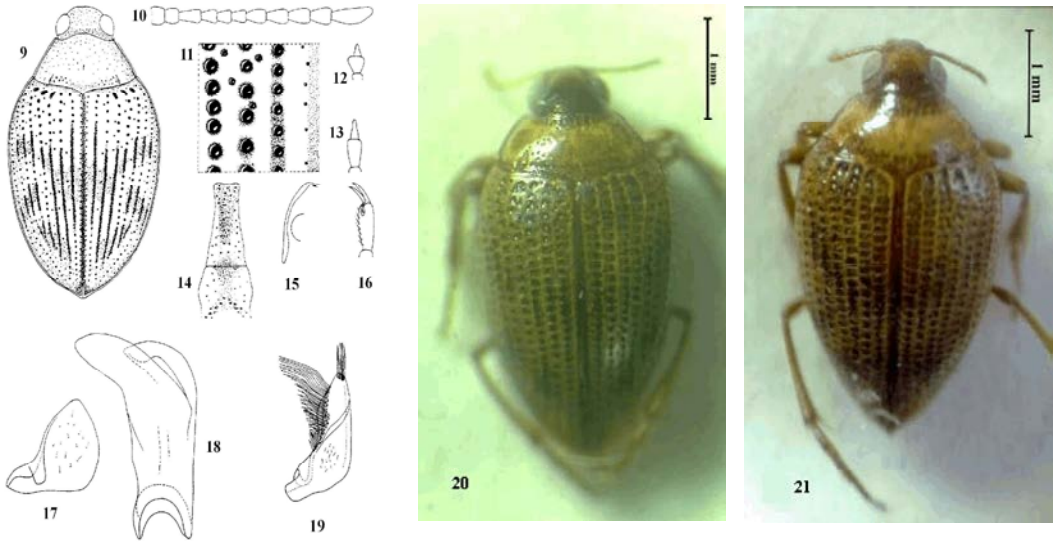

Fig. 9-21: *Haliplus heydeni*; Fig. 9-19: *Haliplus heydeni* male; 9: Habitus; 10: antenna; 11: punctures near elytral base and suture; 12: labial palpus; 13: maxillar palpus; 14: prosternal and metasternal process; 15: prosternal process in lateral view; 16: claws of forelegs; 17: left paramere; 18: penis; 19: right paramere (Vondel, 1992); 20-21: 20: male; 21: female [Photo: A. Atamehr].

Male: front claws simple. of subequal length; penis stout with a blunt apex; parameres with an apical membraneous part, bordered with short hairs; genital sclerites vide (Figs 2-4).

Female: Gonocoxosternites large, triangular, with short struts; gonocoxae small, triangular; tergal halves IX wide, weakly sclerotized; genital sclerites vide (Figs 5, 6).

Mainly, in stagnant, eutrophic bodies of water with rich vegetation. The larva and probably also the adult, feeds on filamentous algae. Eggs are laid in the spring on the surface of submerged vegetation. Full-grown larvae occur later in the summer, as well as teneral adults, so the larva probably does not hibernate. The larva was first described by Schiedte [21] and the pupa by Bertrand [22]. In Fennoscandia the adult probably hibernates out of the water [23].

Distribution: Europe from southern England and Scandanavia east to the Ukraine, south to north Africa and the mideast from Morocco to Iran.

- Genus *Haliplus* Latreille, 1802
- * *Haliplus heydeni* Wehncke, 1875
- Fig. 9-21; Tab. 1
- Material: Ardabil, Balikloo River 24.10.2003 2♀ 1♂.
- Type species *Haliplus multipunctatus* Fabricius, 1787 Syns.
- *Haliplus foveostriatus* Thomson 1884
- *Haliplus transverses* Thomson 1870
- *Haliplus pedemontanus* Fiori 1904
- *Haliplus multipunctatus* Wehncke 1875
- Haliplus romanus Fiori, 1904

Description: Length 2.2-2.8 mm, width 1.2-1.6 mm. Body shortly oval, usually widest in front of the middle and tapering strongly behind the middle (Fig. 20, 21).

Head yellow-brown to rust-coloured with brown to almost black vertex, sparsely and finely to densely punctured. Distance between eyes about 2.0× width of one eye. Antennae yellow-brown (Fig. 10). Palpi yellow-brown (Figs. 12, 13).

Pronotum yellow to yellow-red. Plicae opposite fourth elytral puncture rows short, mostly curved, ¼× length of pronotum, slightly impressed between plicae. Weakly and sparsely punctured, between plicae more strongly and densely punctured. Lateral sides margined, straight to slightly convex (Fig. 9).

Elytra yellow to yellow-red, dark interrupted lines on primary puncture rows often confluent, base and suture narrowly darkened. Completely margined. Primary puncture rows fairly strong and moderately dense to fairly sparse, about 35-40 punctures in first row, basal punctures of third to fifth row groove-like or at least widened. Secondary punctures fairly strong, dense along suture, sparse on intervals. All punctures darkened (Figs. 9, 11).

Ventral side yellow to yellow-red, legs yellow-brown to brown, darkened towards coxae, elytral epipleura yellow with uncoloured punctures. Prosternal process narrowed near coxae, channelled in anterior ?, anterior edge not margined, moderately strongly punctured (Figs. 14-15). Metasternal process usually strongly impressed in the middle, rarely almost flat, strongly punctured (Fig. 14). Metacoxal plates reaching to fifth sternite, moderately strongly punctured, near suture weakly punctured. Fifth and sixth sternite with transverse puncture row, last sternite sparsely punctured, on apex more densely punctured. No setiferous striole on dorsal face of hind tibia, longer tibial spur of hind legs about 4/5× length of first tarsal segment.

Males: First three tarsal segments of fore-and midlegs widened and provided with sucker hairs. Claws of forelegs equal in length (Fig. 16). Penis and parameres as in Figs. 17-19.

Females: Elytra usually without micropunctation, rarely a small area on apex micropunctured. The elytra of the female are also at the back of glossy. The animals live in clean, stagnant and slowly flowing waters [24].

Similar Species: This species is often confused with H. ruficollis, with which it is often living in the same locality. Males have a different aedaegus and equal claws on forelegs. Females are usually not micropunctured. In most cases the enlarged basal elytral punctures are useful to distinguish H. heydeni from H. ruficollis and other related species. [25].

Distribution: The species is in Europe, Asia Minor, Western Siberia and Turkestan disseminated. It is widely distributed in Central Europe and often to very often. Most of Europe north to Britain, Scandinavia and the northern parts of the USSR east to Siberia, south to Spain, Italy and the Balkans, Turkey, Transcaucasia and Kazakhstan [26].

Species richness and abundance of aquatic beetles sampled from the study area are influenced by other factors such as permanence, depth and flow of the water. Consequently, the highest species richness and abundance refer to shallow permanent streams. A comparative study conducted by Williams *et al*. [27] on river, stream, ditch and pond biodiversity indicated that elevation, permanence, depth and flow were the main environmental variables explaining invertebrate assemblage composition.

The World Catalogue of the beetle family Haliplidae was published in June 24, 2005. Since then new information became available and numerous omissions and errors were detected. This first up-date includes new taxa and other taxonomic acts published until December 31, 2006 [28].

Freshwater ecosystems in Azerbaijan are subject to profound changes as a result of anthropogenic disturbances, due mainly to the increase of human populations and the degradation of natural resources. The protection of these habitats is fundamental for the conservation of their biodiversity. Due to structural alteration and contamination, rivers have already lost a great part of their biological diversity. Our study added one newly recorded species, H. *heydeni*. In freshwater habitats of East Azerbaijan and Ardabil Provinces, 2 aquatic beetle species (Coleoptera: Haliplidae) belonging to 2 genera were recorded at 2 sites. Of these, the species *Haliplus heydeni* Wehncke, 1875-30 (Fig. 9-21) is recorded from Ardabil Province and Iran for the first time. The species *Peltodytes caesus* (Duftschmid, 1805)-31 (Fig. 2-8) is recorded from East Azerbaijan Province for the first time.

The total number of specimens of aquatic beetles of the family Haliplidae (Coleoptera: Adephaga) collected in freshwater habitats of East Azerbaijan and Ardabil Provinces amounts to 5. In decreasing order, they are as follows (% of total abundance is given in parentheses): *Haliplus heydeni* (60%) and *Peltodytes caesus* (40%).

Further studies aiming to improve our knowledge on Iranian water beetles should focus on collecting in little known areas, revision of the still unstudied material from additional families and filling the large gaps in our knowledge regarding the diversity of water beetles in some specific habitats.

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