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***HYDATICUS SATOI DHOFARENSIS* N. SSP. FROM OMAN**

(Insecta Coleoptera Dytiscidae)

Riassunto

[*Hydaticus satoi dhofarensis* n. ssp. dell'Oman]

Si descrive una razza geografica di *Hydaticus satoi* Wewalka, 1975, cui si attribuisce lo status di sottospecie e la denominazione di *Hydaticus satoi dhofarensis* n. ssp. Numerosi esemplari del nuovo taxon sono stati raccolti nella regione di Dhofar (Oman) dal Dr. Marco Dellacasa del Museo di Storia naturale e del Territorio dell'Università di Pisa. Alcuni esemplari della medesima provenienza erano stati segnalati in passato (BRANCUCCI, 1980) come *Hydaticus satoi* Wewalka, così identificati per le caratteristiche dell'edeago. La disponibilità di materiale più abbondante ha consentito di evidenziare alcuni costanti caratteri distintivi, come le dimensioni maggiori, il corpo più largo e dilatato dopo la metà e il disegno giallo elitrale limitato per lo più ad un'unica, sottile fascia laterale. La costanza di questi caratteri e la notevole distanza che separa la popolazione del Dhofar dal rimanente areale di *H.satoi*, assente da Iran e Pakistan meridionale, suggeriscono trattarsi di una forma endemica, evolutasi a causa dell'isolamento geografico. La sottospecie è confrontata con la forma tipica e con alcune specie vicine.

Abstract

Hydaticus satoi dhofarensis n. ssp. is described from the Dhofar region, Oman, and compared with the nominal form and some allied species.

Key words: *Hydaticus satoi dhofarensis*, Dhofar, Oman, Dytiscidae.

Introduction

Dr. Marco Dellacasa, of the Natural History Museum, Pisa University, kindly submitted a collection of 35 water beetles sampled during a trip to Oman, Dhofar region, in October 2002.

The Dhofar region is subdivided into 9 provinces (wilayats). Its climate is dramatically different to the rest of Oman due to the effects of the monsoon rains (khareef) which arrive during the summer months, creating humidity and moderate temperatures of around 30^o C. As a consequence, the area becomes lush and green, with waterfalls and rivers feeding the surrounding pastures. The mountain ridge, which receives the most rain, stretches for 400 km from east to west. During

the khareef, springs gush forth and provide plentiful water supplies for much of the rest of the year. The fresh greenery is ideal for cattle grazing, and livestock rearing is an important occupation in the area¹.

Climate supports the survival of plants and animals forming an unique ecosystem, a relict of the time when Arabia was not so arid and desert as it is today. The unique ecosystem and the high number of endemisms justify the great naturalistic interest of the Dhofar region.

The small collection of water beetles received for identification comprises 4 specimens of Gyrinidae, 28 Dytiscidae and 3 Hydrophilidae. The most abundant species is a distinctive, possibly endemic *Hydaticus* Leach, 1817, dealt with here below; the others are widely distributed species. BRANCUCCI (1980) reported 4 exx. of *Hydaticus satoi* Wewalka, 1975 from Oman, Dhofar region, October 1979, leg. Larsen, and noticed their reduced yellow elytral pattern. The assignment to *Hydaticus satoi* was due to the shape of penis. Since more specimens were made available for study by Dellacasa's collection, it became possible to outline a few constant differences between the type form of *Hydaticus satoi* and the taxon from Dhofar. No doubts the latter is close to the former and possibly derives from an original stock of that species, cut off by withering climate. Actually *Hydaticus satoi* is not reported from both southern Pakistan and Iran, so there is a wide gap of arid countries between the distribution area of *Hydaticus satoi* f. typ. (India and eastward) and the Dhofar region of Oman. Whether the endemic taxon is a geographical race of *H. satoi* or has developed into a different species, it is an open question. However a reasonable assumption is to assign it subspecific status.

Hydaticus satoi dhofarensis n. ssp.

Type material

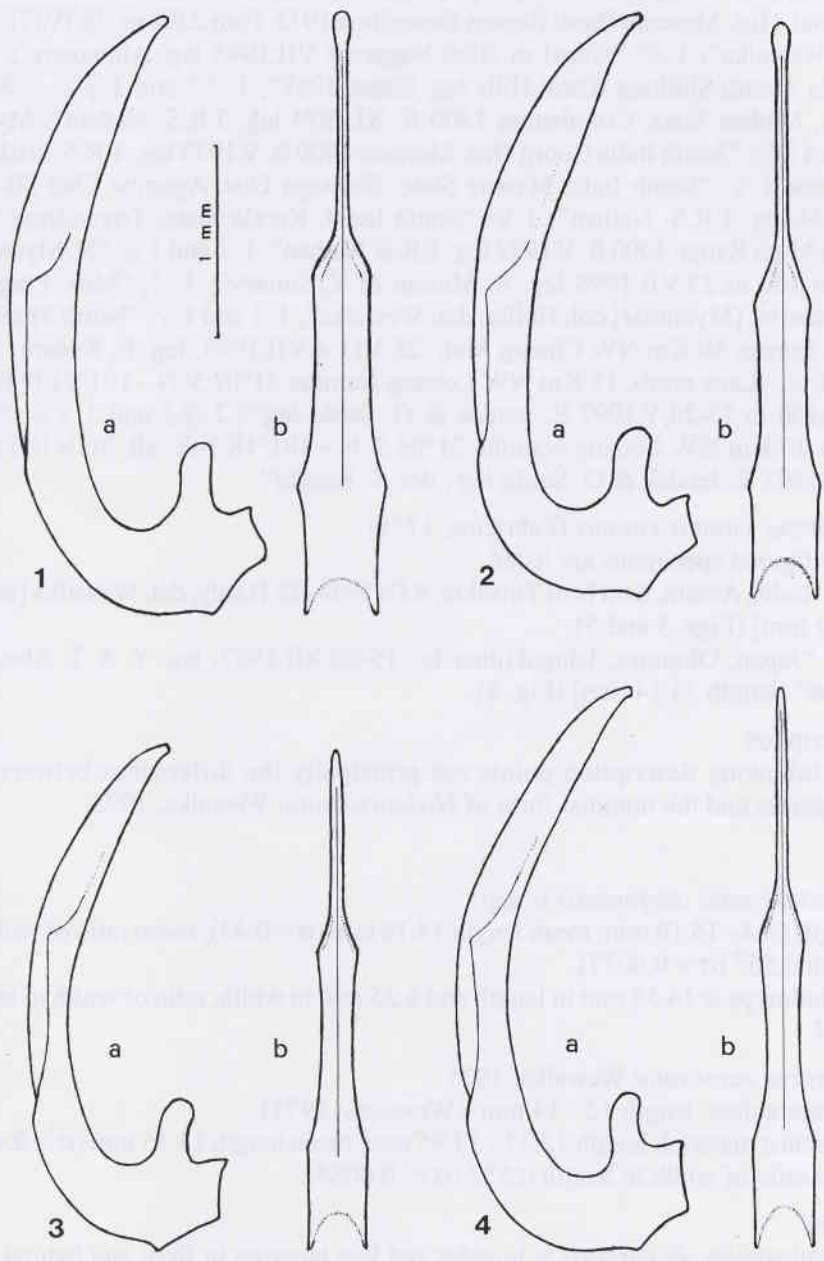
Hydaticus satoi dhofarensis n. ssp. (23 exx.)

6 ♂♂ and 8 ♀♀: "Ain Sanahawq, 17°08,64' N - 54°10,85' E, m 130, 5.IX.2002"; 4 ♂♂ and 2 ♀♀: "Wadi Hinna, 17°03,20' N - 54°36,56' E, m 350, 10.IX.2002"; 1 ♀: "Wadi Darbat, base cascata [below waterfall], Hg light, 11.IX.2002"; 1 ♂ and 1 ♀: "Jabal Samhan, E of Hyoor, 17°07,88' N - 54°43,99' E, m 1350, 14.IX.2002". Holotype: a male specimen labelled "Ain Sanahawq, 17°08,64' N - 54°10,85' E, m 130, 5.IX.2002" deposited in the Natural History Museum of Pisa (Museo di Storia naturale e del Territorio dell'Università di Pisa). The remaining 22 specimens are paratypes. They are deposited in the Natural History Museum of Pisa, in author's collection, in coll. Saverio Rocchi (Florence) and coll. Günther Wewalka (Vienna).

Reference material

Hydaticus satoi satoi Wewalka, 1975 (30 exx.)

¹ This paragraph was downloaded from an official site of Dhofar government on the web.



Figs. 1-4 - Median lobe of the aedeagus (a: side view, b: dorsal view): 1. *Hydaticus satoi dhofarensis* n. ssp. [Oman]; 2. *Hydaticus satoi satoi* Wewalka [Myanmar]; 3. *Hydaticus vittatus vittatus* (Fabricius) [India, Assam]; 4. *Hydaticus vittatus vittatus* (Fabricius) [Japan, Okinawa].

1 ♂: "Bhutan, Dorjee Kandu, Dorjula 3100 m, 2.IX.1976. det. M.Brancucci"; 2 ♂: "Nat. Hist. Museum Basel Bhutan Expedition 1972, Paro 2300 m. 28.IV.[?].1972 det. Wewalka"; 1 ♂: "Nepal m 2000 Nagarcot VII.1995 leg. Ammosov"; 1 ♂: "India Assam Shillong Khasi Hills leg. Sircar 1968"; 3 ♂♂ and 3 ♀♀: ♂ South India, Madras State, Coimbatore 1400 ft. XI.1974 leg. T.R.S. Nathan"; Mysore State 4 ♀♀: "South India Coorg Dist. Mercara 4000 ft. V.1973 leg. T.R.S. Nathan"; 1 ♂ and 1 ♀: "South India Mysore State, Shimoga Dist. Agumbe Chat 2000 ft. V.1974 leg. T.R.S. Nathan"; 1 ♀: "South India, Kerala State, Trivandrum Dist. Poon Mudi Range 3000 ft. V.1972 leg. T.R.S. Nathan"; 1 ♂ and 1 ♀: "N. Myanmar, Putao 500 m 23.VII.1998 leg. S. Murzin & V. Siniaev"; 1 ♂: "Mus. Pragense Tenasserim [Myanmar] col. Helfer, det. Wewalka"; 1 ♂ and 1 ♀: "North Thailand, Mae Taman, 50 Km NW Chiang Mai, 25.VI - 4.VII.1998, leg. E. Kuèera"; 1 ♂ and 1 ♀: "Laos north, 15 Km NW Louang Namtha 21°07.5' N - 101°21.0' E, alt. 750±100 m 13-24.V.1997 E. Jendek & O. Šauša leg."; 2 ♂♂ and 3 ♀♀: "Laos north 20 Km NW Louang Namtha 21°09.2' N - 101°18.7' E alt. 900±100 m 5-11.V.1997 E. Jendek & O. Šauša leg., det. S. Rocchi".

Hydaticus vittatus vittatus (Fabricius, 1775)

Only figured specimens are listed.

1 ♂: "India, Assam, 6 mi N of Tinsukia, 9.IV.1944 DE Hardy, det. Wewalka [length 12.53 mm] (Figs. 3 and 5);

1 ♂: "Japan, Okinawa, Ishigakijima Is., 15-20.XII.1987, leg. Y. & T. Abe, det. T.Abe" [length 13.14 mm] (Fig. 4).

Description

The following description points out principally the differences between the subspecies and the nominal form of *Hydaticus satoi* Wewalka, 1975.

Size

Hydaticus satoi dhofarensis n. ssp.

Length 13.4 - 15.10 mm; mean length 14.19 mm ($\sigma = 0.43$); mean ratio of width to length 0.567 ($\sigma = 0.0077$).

The holotype is 14.55 mm in length and 8.25 mm in width, ratio of width to length 0.567.

Hydaticus satoi satoi Wewalka, 1975

Literature data: length 12 - 14 mm (WEWALKA, 1975).

Reference material: length 12.37 - 13.95 mm, mean length 13.35 mm ($\sigma = 0.462$); mean ratio of width to length 0.552 ($\sigma = 0.0084$).

Shape

The subspecies *dhofarensis* is broader and less tapering in front and behind than the nominal form. It is broadest behind the middle. The ratio of width to length is higher in *dhofarensis* (broader body), usually higher than 0.56, and is lower than 0.56 in the nominal form, as a rule.

More details on size and shape are given in the following table.

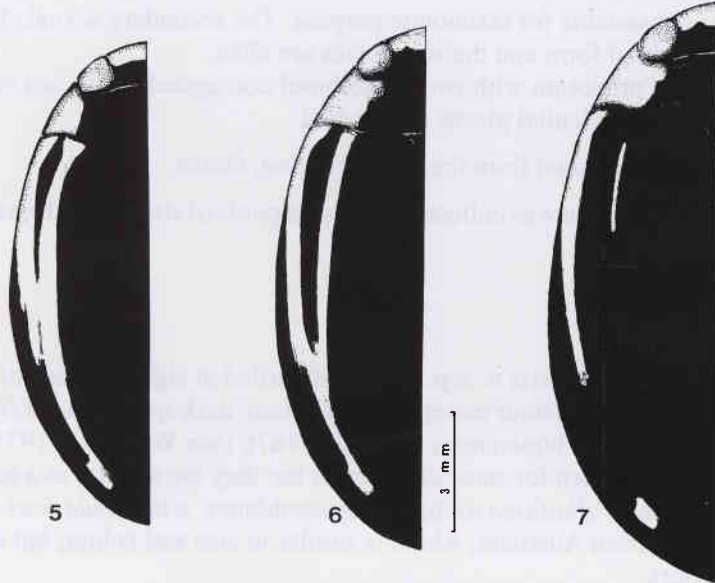
taxon	nr. exx.	body length (mm)				ratio of width to length			
		min.	max	mean	standard deviat.	min.	max	mean	standard deviat.
<i>satoi</i> f.typ. ♂	15	12.37	13.8	13.16	.49	.538	.565	.551	.0082
<i>satoi</i> f.typ. ♀	15	12.9	13.95	13.53	.32	.539	.567	.553	.0084
<i>satoi</i> f. typ. (all)	30	12.37	13.95	13.35	.45	.538	.567	.552	.0084
<i>s. dhofarensis</i> ♂	11	13.4	14.55	13.99	.40	.553	.583	.566	.0086
<i>s. dhofarensis</i> ♀	12	13.65	15.10	14.38	.36	.560	.577	.569	.0064
<i>s. dhofarensis</i> (all)	23	13.4	15.10	14.19	.43	.553	.583	.567	.0077

Table 1. Body length and ratio of width to length measured in 30 exx. of *Hydaticus satoi satoi* and 23 exx. of *Hydaticus satoi dhofarensis* n. ssp.

The table gives the results of measurements and some statistical arrangements. A self explaining representation of the differences in length and ratio of width to length between *satoi* f. typ. and ssp. *dhofarensis* is shown in fig. 8. In spite of a moderate overlapping, the two subspecies form different sets of points.

Colour pattern

Upper side black with yellow pattern. Head yellow in front and black behind, as in



Figs. 5-7 - Colour pattern of the dorsal side: 5. *Hydaticus vittatus vittatus* (Fabricius) [India, Assam]; 6. *Hydaticus satoi satoi* Wewalka [Myanmar]; 7. *Hydaticus satoi dhofarensis* n. ssp. [Oman].

most species of the *vittatus* group. Pronotum widely yellow at sides and black at the middle. The border line between black and yellow is slightly angulate at the middle (Fig. 7) as in the type form (Fig. 6).

The yellow bands of elytra are narrower and shorter than in *H. satoi satoi*. The outer band attains the margin at base and is submarginal behind, extending short beyond the middle of the elytral length as a rule, except for a few specimens, in which the outer band approaches the preapical yellow spot. The outer band is very narrow in melanic specimens, but never missing. The inner (discal) band is either absent or reduced to a short and narrow sub-basal stripe, not connected to the outer band. Preapical yellow spots always detectable, also in melanic specimens. Underside dark brown with yellow prosternal process; anterior legs and mesofemurs yellow; intermediate tibiae and tarsi light brown, posterior legs dark brown; setose fields of metatarsi with long black setae, paler at apex; palpi and basal half of antennae yellow.

Puncturation

The dorsal surface is covered by a dense and minute puncturation with interspersed larger punctures, principally at the base of elytra. The submarginal rows of punctures of pronotum and the elytral rows as well as the sculpture of the underside do not present differential characters.

Sexual characters

Male. The median lobes of the aedeagus in *satoi* f. typ. and ssp. *dhofarensis* are alike (Figs. 1 and 2). A few minor differences can be observed in some specimens, but they are not suitable for taxonomic purpose. The secondary sexual characters of both the nominal form and the subspecies are alike.

Female. Disc of pronotum with two latero-basal corrugated fields, not extending to the yellow areas. Genital pieces not studied.

Distribution. Only known from the Dhofar region, Oman.

Biology. The new taxon was collected from side pools of streams and springs, and at light.

Discussion

Hydaticus satoi dhofarensis n. ssp. can be identified at sight because of its size, the body shape and the colour pattern. As for colour, dark specimens of *Hydaticus vittatus* and *Hydaticus bipunctatus* Wehncke, 1876 (see WEWALKA, 1975: figs. 6 and 11) can be mistaken for *satoi dhofarensis* but they are smaller as a rule. Dark specimens of *satoi dhofarensis* have a resemblance with *Hydaticus daemeli* Wehncke, 1876 from Australia, which is similar in size and colour, but differs in other characters.

The subspecies and the nominal form are closely related to other taxa of the *vittatus* group with a similar aedeagus, principally *Hydaticus vittatus* (Fabricius), *Hydaticus*

major Régimbart, 1899 and *Hydaticus arabicus* Guignot, 1951. The closest species is *Hydaticus vittatus* (Fabricius), but its median lobe of the aedeagus is narrower in lateral view and pointed at apex in dorsal view (Figs. 3 and 4), while it is widened apically in *satoi*.

H. vittatus and *H. major* were revised by WEWALKA (1975). *Hydaticus arabicus* Guignot, described on two males from Hadramaut (GUIGNOT, 1951), was revised and figured by BRANCUCCI (1981).

This species is geographically close to *H. satoi dhofarensis* and is similar in size. The principal differences lie in the colour pattern of elytra and the narrower penis of *arabicus*, in side view².

The remaining members of the *vittatus* group and the Afro-Malagasy *Hydaticus bivittatus* Laporte de Castelnau, 1835 have a fairly different shape of the aedeagus and cannot be confused with *satoi*.

Water beetles found in association with *Hydaticus satoi dhofarensis* n. ssp.

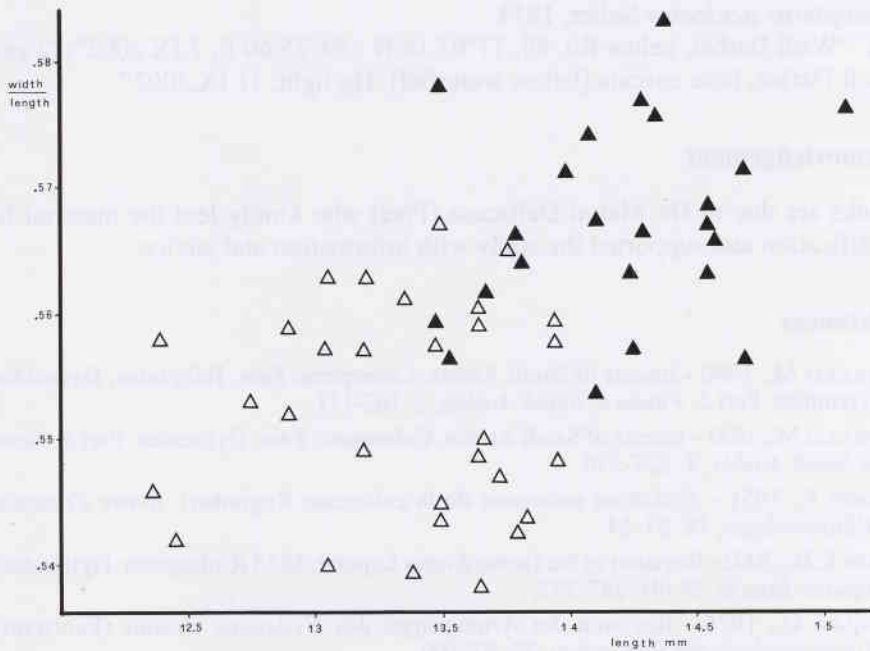


Fig. 8 - Length and ratio of width to length of *H. satoi satoi* (white triangles) and *H. satoi dhofarensis* (black triangles).

² The median lobe of the aedeagus in *H. satoi* and its allied is about 3 mm long, however according to the scale-bar by BRANCUCCI (1981), the penis of *H. arabicus* is approximately half as long as in other species.

Fam. Gyrinidae

Dineutus aereus Klug, 1834

2 exx. "Wadi Hinna, 17°03,20' N - 54°36,56' E, m 350, 10.IX.2002"; 1 ex. "Wadi Darbat, below Rd. 49, 17°03,16 N - 54°25,60 E, 7.IX.2002"; 1 ex. "Wadi Darbat, base cascata [below waterfall], Hg light, 11.IX.2002".

Fam. Dytiscidae

Hyphydrus pictus Klug, 1834

1 ex. "Ain Sanahawq, 17°08,64 N - 54°10,85' E, m 130, 5.IX.2002"; 1 ex. "Wadi Hinna, 17°03,20' N - 54°36,56' E, m 350, 10.IX.2002".

Hydroglyphus [= *Guignotus*] *major* (Sharp, 1882)

1 ex. "Jabal Samhan, E of Hiyor, 17°07,88' N - 54°43,99' E, m 1350, 14.IX.2002".

Eretes sticticus (Linnaeus, 1767) sensu MILLER (2002)

1 ex. "Al Mughsayi envir., 16°53,01 N - 53°46,47 E, 6.IX.2002".

Cybister tripunctatus africanus Laporte de Castelnau, 1835

1 ex. "Wadi Hinna, 17°03,20' N - 54°36,56' E, m 350, 10.IX.2002".

Fam. Hydrophilidae

Temnopterus aculeatus Solier, 1834

1 ex. "Wadi Darbat, below Rd. 49, 17°03,16 N - 54°25,60 E, 7.IX.2002"; 2 exx. "Wadi Darbat, base cascata [below waterfall], Hg light, 11.IX.2002".

Acknowledgement

Thanks are due to Dr. Marco Dellacasa (Pisa) who kindly lent the material for identification and supported the study with information and advice.

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