

## A new *Isobactrus* species (Acari: Halacaridae) from southern Iran

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(with 11 figures)

### Abstract

A new species, *Isobactrus scutatus* sp. n., is described. This is the first record of a halacarid mite from southern Iran. The male of *I. scutatus* can be distinguished from other males because of its enlarged genital plate. *Isobactrus scutatus* is characterized by a combination of character states typically found in species of the tropical Indo-Pacific but not in those living in the Black Sea, Mediterranean and northern Atlantic.

**Key words:** Acari, Halacaroidea, *Isobactrus scutatus* sp. n., description, Gulf of Oman, Southern Iran.

### Introduction

The algivorous genus *Isobactrus* Newell, 1947 is restricted to the upper and middle area of a more or less regularly emerged shoreline, often it is found in areas influenced by brackish or even fresh water. The genus is spread world-wide, at present there are 28 valid and one species inquirenda. Analyses of morphological characters (Abé 2001, Bartsch 2010) revealed lineages, each restricted in its distribution to either the northern hemisphere, the tropics (between about 25° north and south latitude) or the southern hemisphere. Unfortunately the number of species known is still small and there are large geographical areas without any records of the genus *Isobactrus*. The *Isobactrus* species described in the present paper is the first record of this genus from the north-western part of the Indian Ocean.

### Material and methods

The halacarid mite was taken in the course of a collection trip by H. Smit, V. Pešić and A. Saboori in the southern part of Iran (Pešić *et al.* 2012), a trip meant to study the distribution of epigeal and hypogean Hydrachnidia (water mites).

The halacarid mite was cleared in lactic acid and mounted in glycerine jelly. The holotype is deposited in the Zoological Museum, University of Hamburg.

Drawings were done using a drawing tube. The legs, their segments and claws, and the epimeral plates are numbered I to IV, similarly the pairs of dorsal and ventral setae of the idiosoma are numbered from the anterior to the posterior.

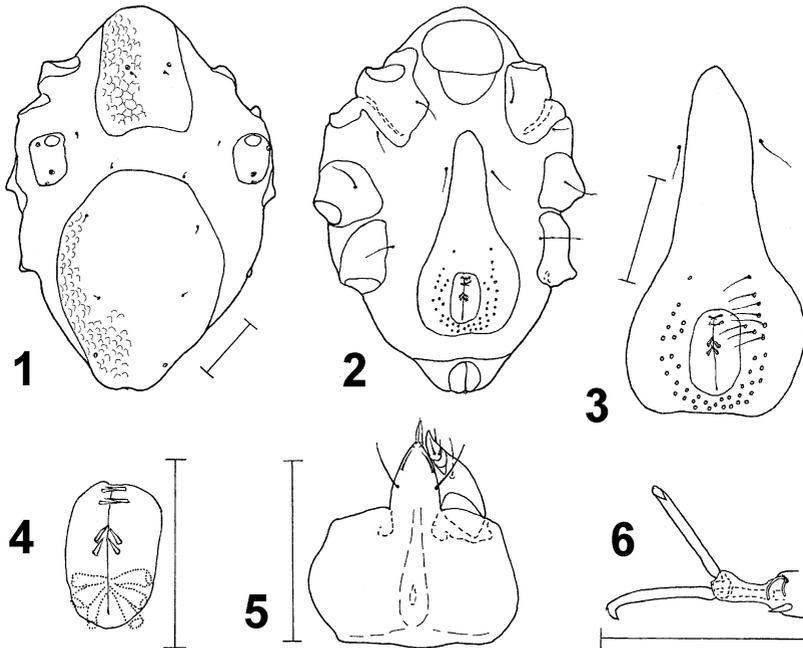
## Systematics

### *Isobactrus scutatus* sp. n.

COLLECTING DATA. – H o l o t y p e male, ZMH, Iran, Hormozgan Province, harbour of Bandar-e-Jask, 25°38.931 N, 57°46.432 E, littoral, 15 July 2011; coll. H. Smit.

ETYMOLOGY. – The name is derived from scutum (Latin), a shield, because the species is characterized by an enlarged, shield-like genital plate.

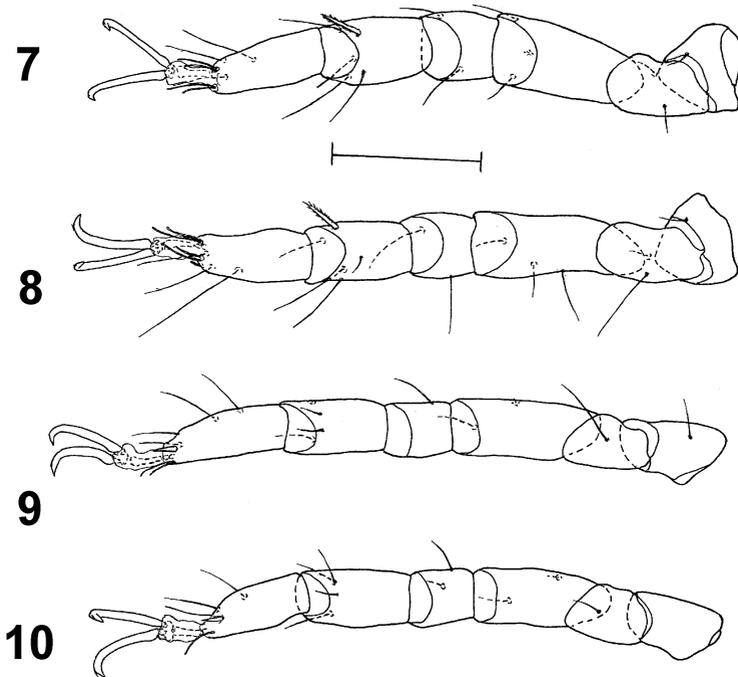
DIAGNOSIS. – Length of male idiosoma 294  $\mu$ m. Dorsum with the four plates anterior and posterior dorsal plate and pair of ocular plates. Third pair of dorsal setae in striated integument immediately anterior to posterior dorsal plate. Pair of epimeral plates II small, fused with epimeral plates I. Epimeral plates III and IV separated. Genital plate anteriorly linguiform enlarged and extending antierad beyond level of third pair of ventral setae. Anus in sub-terminal position and surrounded by anal plate. Basifemora III and IV with single seta each. Tibiae I and II with one bipectinate seta. Claws with minute apical tooth, else smooth.



**Figs 1-5.** *Isobactrus scutatus* sp. n., male. **1.** idiosoma, dorsal; **2.** idiosoma, ventral; **3.** genital plate, ventral; **4.** genital opening; **5.** gnathosoma, ventral; **6.** tip of tarsus III, ventral (dorsal setae excluded). Scale = 50  $\mu$ m.

DESCRIPTION. – Length of idiosoma 294  $\mu\text{m}$ , width 205  $\mu\text{m}$ . Posterior dorsal plates with a squamose-foveate ornamentation, distinct in marginal parts but faint in median part (Fig. 1). Length of anterior dorsal plate 92  $\mu\text{m}$ , width 75  $\mu\text{m}$ ; frontal margin of anterior dorsal plate arched, posterior margin slightly concave. First pair of gland pores level with insertion of leg I. Pair of ocular plates rhomboid in outline, bearing a cornea, two gland pores and a canaliculus. Length of ocular plates 40  $\mu\text{m}$ , width 32  $\mu\text{m}$ . Length of posterior dorsal plate 167  $\mu\text{m}$ , width 130  $\mu\text{m}$ ; anterior margin truncate. A pair of gland pores near end of idiosoma. All dorsal setae short and similar-sized. First pair of dorsal setae on anterior dorsal plate slightly posteromedial and immediately adjacent to gland pores, second pair in striated integument lateral to ocular plates, third pair immediately anterior to margin of posterior dorsal plate, fourth and fifth pair of setae on posterior dorsal plate about level with insertions of legs III and IV, respectively.

Surface of ventral plates without marked ornamentation. Camerostomal plate present, not fused with pair of epimeral plates I (Fig. 2). Pair of epimeral plates II small, fused with epimeral plates I. Epimeral plates III and IV separated. Genital plate anteriorly linguiform prolonged, length of plate 160  $\mu\text{m}$ , width 85  $\mu\text{m}$ . Length of genital opening 40  $\mu\text{m}$ , width 25  $\mu\text{m}$ . Each genital sclerite with four subgenital setae. Three pairs of internal genital acetabula



**Figs 6-14.** *Isobactrus scutatus* sp. n., male. **7.** leg I, ventral; **8.** leg II, ventral; **9.** leg III, ventral; **10.** leg IV, ventral. (Scale = 50  $\mu\text{m}$ ).

almost equal in length, posterior pair of acetabula slightly more narrow (Fig. 4). Genital opening surrounded by 45 slender and smooth perigenital setae (Fig. 3), one pair somewhat outlying but all setae within genital plate. Anal plate, with anus, and posterior dorsal plate fused. Anus in subterminal position. First pair of ventral setae on epimeral plates I, second pair in striated integument immediately adjacent to posterior margin of epimeral plates II. Third pair of ventral setae adjacent to anterior part of genital plate. Epimeral plate III with a ventral but no dorsal seta. Following pair of ventral setae in striated integument adjacent to epimeral plates IV.

Gnathosoma slightly wider than long, length 57  $\mu\text{m}$ , width 58  $\mu\text{m}$ . Rostrum with two pairs of maxillary setae (Fig. 5); one pair of minute rostral setae seen in ventral aspect of gnathosoma. Length of rostrum 26  $\mu\text{m}$ , width 14  $\mu\text{m}$ . Palps four-segmented. Second palpal segment with one dorsal seta, fourth segment with three setae in basal part; no setae on first and third palpal segment.

Legs almost equal in length (Figs 7-10) and all shorter than idiosoma. Telfemora I and II slightly longer than telfemora III and IV. Tibiae I to IV almost equal in length; tibiae I and II shorter than the legs' telfemora. Leg chaetotaxy from trochanter to tarsus (famulus and parambulacral setae excluded): leg I, 1, 2, 3, 2, 5, 4; leg II, 1, 2, 3, 2, 5, 4; leg III, 1, 1, 2, 1, 4, 4; leg IV, 0, 1, 2, 2, 4, 3. Both tarsus I and II with short 3  $\mu\text{m}$ -long solenidion in dorsolateral position and a pair of doubled, eupathid parambulacral setae; in each pair dorsal seta about 12  $\mu\text{m}$  long, ventral seta 8-9  $\mu\text{m}$  long. Tarsus III with flattened, wide lateral parambulacral seta and doubled, eupathid medial setae (Fig. 6); ventral seta of doublet only slightly shorter than dorsal seta. Tarsus IV with flattened and wide lateral parambulacral seta and eupathid medial seta. Distance between two dorsal setae on tarsus III less than height of that segment, distance between paired fossary setae and apical dorsal seta slightly more than that between dorsal setae. Major part of carpit a solid rod, interrupted only in its basal part. Central sclerite present. Claws slender, with minute tine at their apex, else smooth.

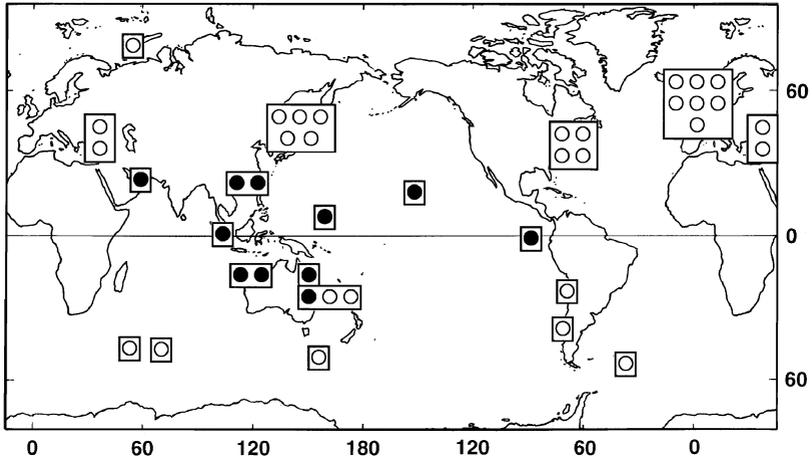
REMARKS. – A single specimen is available for study and an anomaly in a single specimen or an unusual range in the species' morphological variability can never be excluded. The mite was dead (washed out of its original habitat and decaying?) before it was preserved and such a state can influence the interpretation of a structure, e.g. absence or presence of a seta. At present there are no published records of anomalies in *Isobactrus* and in the more than thousand adults studied by the author small differences in the chaetotaxy have been found but no marked difference in the size of plates. Accordingly, *Isobactrus scutatus* sp. n. has the rank of a new species.

The male of *I. scutatus* sp. n. is easily separated from the males of other *Isobactrus* species because of its elongate, linguiform genital plate; in the other species the anterior margin of the plate is arched or almost truncate and it does not even extend to the level of the third pair of ventral setae. The shape of the genital plate of the female of this species is not known. Morphological differences between females and males are generally restricted to the genital region and, though rarely, to the shape of the fossary setae. Beside the shape of the genital plate there are additional characters which separate *I. scutatus* sp. n. from other species.

A parsimony analysis, based on 36 morphological characters, showed a correlation between phylogenetic lineages, the geographical areas inhabited and present-day latitudes (Bartsch 2010). The character state combination of *I. scutatus* sp. n. is summarized in Table 1. The most marked difference between northern hemisphere species, from between about 30° and 75° N (northern Atlantic, Mediterranean, Black Sea, and northern Pacific) and *I. scutatus* sp. n. is the absence versus presence (in *I. scutatus* sp. n.) of an anal plate and the ventral versus subterminal (in *I. scutatus* sp. n.) position of the anus. *I. scutatus* sp. n. is not related to any of the 15 northern hemisphere species.

**Table 1.** Morphological characters of *Isobactrus scutatus* sp. n. In parentheses the corresponding character state number according to Bartsch (2010: table 2).

1. Idiosoma with four dorsal plates (2).
2. Third pair of dorsal idiosomatic setae in striated integument anterior to posterior dorsal plate (0).
3. With five pairs of dorsal idiosomatic setae (1).
4. All dorsal idiosomatic setae similar in size (0).
5. With four pairs of gland pores (1).
6. Epimeral plates I large, without wedge of striated integument, plates II small, camerostomal plate not conspicuously enlarged (2).
7. Epimeral plates II and III widely separated by membranous integument (0).
8. Epimeral plates III and IV distinct, adjacent, anterior pair of setae situated on epimeral plate III, second pair of setae in margin of epimeral plate IV (0).
9. Dorsal (lateral) seta of epimeral plate III lacking (0).
10. With two pairs of ventral setae on or adjacent to epimeral plates III and IV (0).
11. Anal plate and posterior dorsal plate fused (0).
12. Anus in subterminal position (1).
13. Data lacking.
14. Data lacking.
15. Male with pair of outlying perigenital setae situated on genital plate (1).
16. In male all perigenital setae situated on genital plate (0).
17. Male with internal genital acetabula (0).
18. Basifemur III with one seta (0).
19. Basifemur IV with one seta (1).
20. Telofemur I with three setae (1).
21. Telofemur II with three setae (1).
22. Telofemur III with two setae (1).
23. Telofemur IV with two setae (1).
24. Genu I with two setae (0).
25. Genu II with two setae (0).
26. Genu III with one setae (0).
27. Genu IV with two setae (1).
28. Tibia III with four setae (0).
29. Tibia IV with four setae (0).
30. Tibia I with one bipectinate ventral seta (1).
31. Tibia II with one bipectinate ventral seta (1).
32. No bipectinate ventral seta on tibia III (0).
33. No bipectinate ventral seta on tibia IV (0).
34. Tarsus III with four dorsal setae (1).
35. Medial parambulacral seta on tarsus III doubled, shorter seta about half the length of longer seta (1).
36. Tarsi III and IV with similar-sized, almost smooth apical fossary setae (0).



**Fig. 11.** Geographical distribution of the character states: presence (○) or absence (●) of a dorsal seta on epimeral plate III and three (○) or two (●) setae on genera I and II. Excluded from the map is a record of the northern Atlantic *Isobactrus uniscutatus* (Viets) from Victoria, southeastern Australia; according to Bartsch & Gwyther (2004), the species is non-indigenous in Australia.

*Isobactrus scutatus* sp. n. shares several character states with the seven Indo-Pacific species which have been found between about 25° north and south, character states which are neither present in northern nor in southern hemisphere species (Fig. 11). Unfortunately there are at present no records of *Isobactrus* from the tropical southern Atlantic. Of *I. australiensis* Bartsch, 2003, *I. luxtoni* Bartsch, 1992, *I. pacificus* Bartsch, 1989, *I. ponapensis* Abé, 1996, and *I. similis* Bartsch, 2005 males are known. These males have a short, more or less circular genital plate. *Isobactrus asper* Bartsch, 1977 and *I. obesus* Bartsch, 1992 are known only by their females. *Isobactrus asper* is characterized by the enlarged anterior epimeral plates which include the third pair of ventral setae and *I. obesus* by a very wide posterior dorsal plate and a long camerostomal plate that extends posteriorly beyond the third pair of ventral setae, but does not include this pair of setae.

The six species known from the temperate and polar southern hemisphere have either an enlarged camerostomal plate or an anterior ventral shield by fusion of epimeral plates I and camerostomal plate, both plate and shield include the third pair of ventral setae, in *I. scutatus* sp. n. the camerostomal plate is small, not fused with the epimeral plates I and II, the third pair of ventral setae is in the striated integument lateral to the genital plate.

### Acknowledgement

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## Zusammenfassung

Eine neue Art, *Isobactrus scutatus* n. sp., wird beschrieben. Dies ist der erste Fund der Gattung von der Südküste des Iran. Durch die beim Männchen stark verlängerte Genitalplatte unterscheidet sich die Art von den bisher Beschriebenen. *I. scutatus* sp. n. weist eine Kombination von Merkmalen auf, die bei Arten aus dem tropischen indo-pazifischen Raum vorkommt, nicht aber bei Arten des Schwarzen Meeres, Mittelmeeres und Nordatlantiks.

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