

A new *Spariolenus* species from caves in Oman — the first representative of the Heteropodinae in the Arabian peninsula (Araneae: Sparassidae)

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Summary

A new species of *Spariolenus* is described from Oman, *S. secundus* sp. n. Type material (♀) was recorded only in one cave system (Al Fallah Cave). The new species is closely related to *S. tigris* Simon known from India and Pakistan. Morphological details of *Spariolenus* spp. and zoogeographical aspects are discussed in comparison with other members of the Heteropodinae and other Sparassidae.

Introduction

The spider family Sparassidae Bertkau, 1872 has recently attracted taxonomic interest (e.g. Davies, 1994; Jäger, 1998). The subfamily Heteropodinae Thorell, 1873 was diagnosed by Jäger (1998). It comprises at present eight genera (Jäger, 2002). Most of them are originally distributed in Asia and Australia (*Bhutaniella* Jäger, 2000, *Heteropoda* Latreille, 1804, *Pandercetes* L. Koch, 1875, *Pseudopoda* Jäger, 2000, *Sinopoda* Jäger, 1999, *Spariolenus* Simon, 1880 and *Yiinthei* Davies, 1994). Only *Barylestis* Simon, 1910 is distributed in tropical Africa (Jäger, 2002; Jäger & Kunz, 2005). One species, *Heteropoda venatoria* (Linnaeus, 1767), has a cosmopolitan distribution. Hitherto, the only representatives of the Sparassidae known from the Arabian peninsula are those which are adapted to arid or semi-arid conditions, i.e. species of *Cebrennus* Simon, 1880, *Cerbalus* Simon, 1897, *Eusparassus* Simon, 1903 and *Olios* Walckenaer, 1837. All these genera belong to subfamilies other than Heteropodinae.

The genus *Spariolenus* Simon, 1880 comprises small to large spiders with a leg span of up to about 15 cm. It contains at present five nominal species (Platnick, 2005): the type species *S. tigris* Simon, 1880 (Pakistan and India), three species of which the congenerity is uncertain — *S. megalopsis* Thorell, 1891 (India: Nicobar Islands), *S. taeniatus* Thorell, 1890 (Indonesia: Nias) and *S. taprobanicus* (Walckenaer, 1837) (Sri Lanka) — and *S. minusculus* (Reimoser, 1934) (India), which was recently transferred to this genus by Jäger (2002). The congenerity of the latter species needs to be confirmed by means of conspecific males. Almost nothing is known about the biology of *Spariolenus* species.

Material and methods

Specimens were kept in 70% ethanol and examined and illustrated with a Leica MZ 16 stereomicroscope with drawing mirror. The style of description follows Jäger & Vedel (2005). Spination is listed as prolateral,

dorsal, retrolateral and ventral (only if present); for the palp femur, patella, tibia and tarsus are considered. The listing of spination and number of palpal claw teeth in square brackets indicates data from paratypes if different, and round brackets refer to asymmetric individual variation. Measurements and data of the holotype are given first, followed by those of paratypes in square brackets. Some measurements could not be taken from one paratype (PJ 1596) as the prosoma was smashed. All measurements are in mm. Abbreviations used: ALE=anterior lateral eyes, AME=anterior median eyes, PJ=number of Sparassidae examined by Peter Jäger, PLE=posterior lateral eyes, PME=posterior median eyes, I–IV=leg I–IV; MNHN=Muséum National d'Histoire Naturelle, Paris (Christine Rollard), NHMW=Naturhistorisches Museum Wien (J. Gruber), ONHM=Oman Natural History Museum, Muscat (S.R. Al Moosani), SMF=Forschungsinstitut Senckenberg Frankfurt (P. Jäger), ZMB=Zoologisches Museum Berlin (J. Dunlop).

Taxonomy

Genus *Spariolenus* Simon, 1880

Type species: Spariolenus tigris Simon, 1880. Designated by Simon (1897).

Diagnosis: See Jäger (2002: 58).

Spariolenus secundus sp. n. (Figs. 1–11, 16–17)

Spariolenus sp.: Jäger, 2004: figs. 47–49, 57.

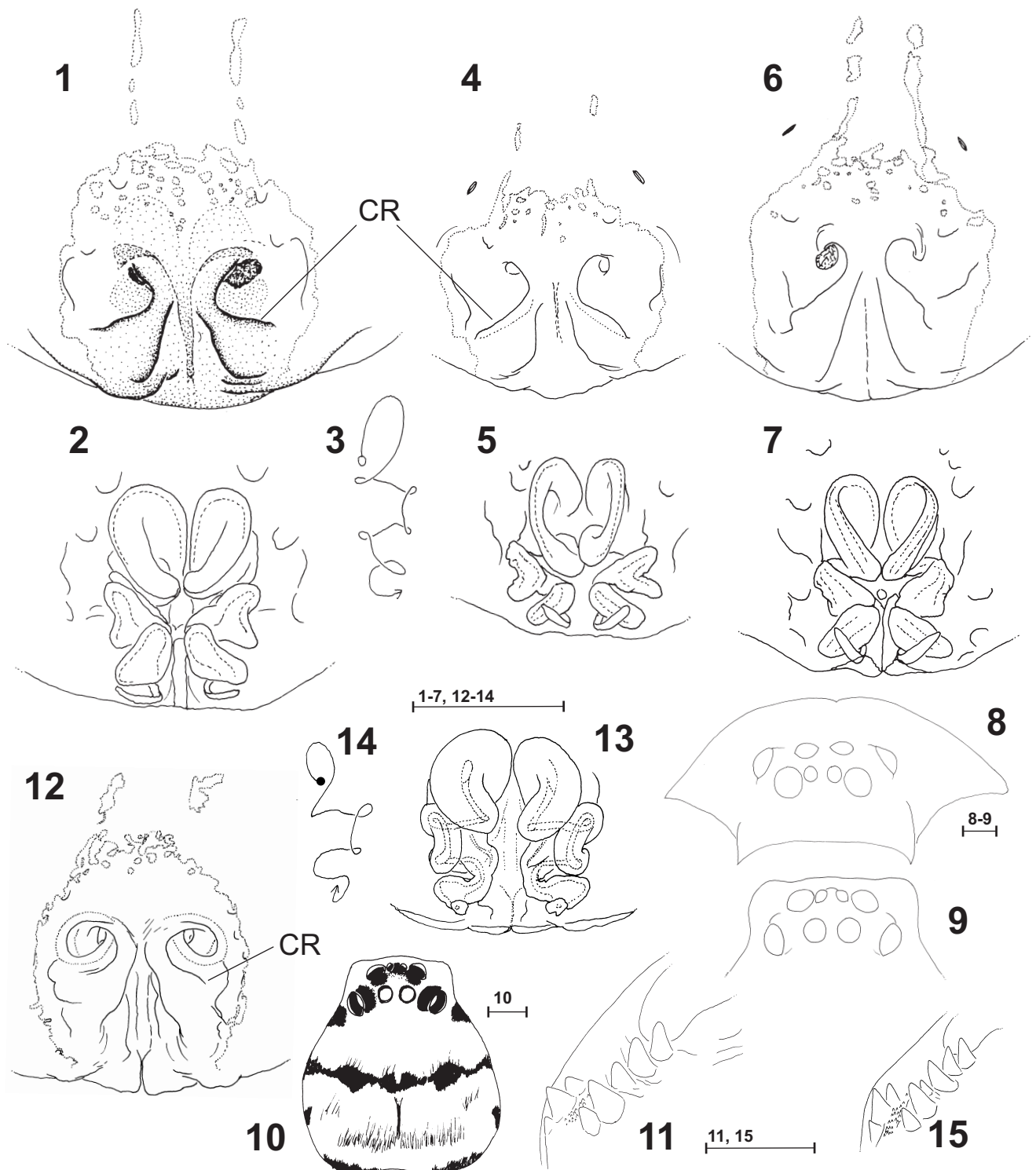
Type material: Holotype ♀ (PJ 1470): Oman, Al Hota Cave, GPS 53 77 46, 25 55 112 (23°06'14"N, 57°21'58"E), 1152 m a.s.l., September 2000, leg. Siegfried Huber (SMF). Paratypes: 1♀ (PJ 1968, SMF) and 1 juvenile (PJ 1970, ONHM), Oman, Al Hota Cave, 23°06'14"N, 57°21'58"E, 27 September 2000, leg. S. Polak; 1♀ (PJ 1596), Oman, Hoti cave system, Fallah cave, entrance hall, caught by hand, GPS 53 62 88, 25 52 322 (23°04'45"N, 57°21'10"E), 606 m a.s.l., 21–27 January 2001, leg. Sattmann, Seemann, Finkes, Fischer (NHMW).

Other material examined: OMAN: 2 juvs (PJ 2004–2005), Jebal Akhdar, E. of Al Hamra, Al Fallah cave, entrance hall, leg. Sattmann, Speleoman, November 2001, No. 89 (NHMW); 1 juv. (PJ 1865), Jebal Akhdar, E. of Al Hamra, Wadi Fallah, Al Ghubrat, surroundings of spring, leg. Sattmann, Speleoman, 18 November 2001, No. 12 (NHMW); 8 juvs (PJ 1866, 2005–2013), Jebal Akhdar, E. of Al Hamra, Hoti cave, entrance, Wadi Huta, site of roping-down, 16 November 2002, leg. Sattmann, II/01 (NHMW); 2 juvs (PJ 1597–1598), Hoti cave system, Fallah cave, entrance hall, caught by hand, GPS 53 62 88, 25 52 322 (23°04'45"N, 57°21'10"E), 606 m a.s.l., 21–27 January 2001, leg. Sattmann, Seemann, Finkes, Fischer (NHMW); 1 juv. (exuviae; PJ 2014), Hoti cave system, Fallah cave, main lake surroundings, 21–30 January 2001, leg. Sattmann, Seemann, Finkes, Fischer (NHMW); 1 juv. (PJ 2015), W. of Nizwa, close to Al Hamra, Al Hota Cave, GPS

23°06'14"N, 57°21'58"E, September 2000, leg. Siegfried Huber (SMF); 1 subad. ♂ (PJ 1969), 1 juv. (PJ 1971), Al Hota Cave, 23°06'14"N, 57°21'58"E, 27 September 2000, leg. S. Polak (SMF); 1 subad. ♂ (PJ 1471), Al Hota Cave, GPS 53 77 46, 25 55 112

(23°06'14"N, 57°51'58"E), 1152 m a.s.l., September 2000, leg. Siegfried Huber (SMF).

Comparative material examined: Spariolenus tigris: Holotype ♀ (PJ 687), with label: Clubionidae — *Spariolenus tigris* E. S., 1576, Calcutta (thev) (MNHN);



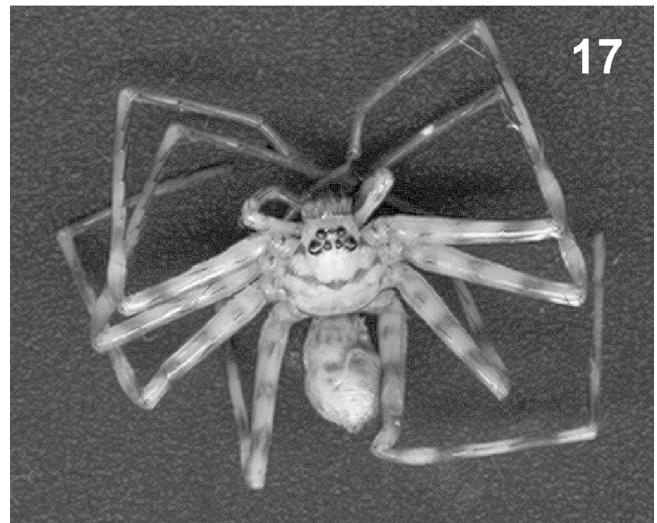
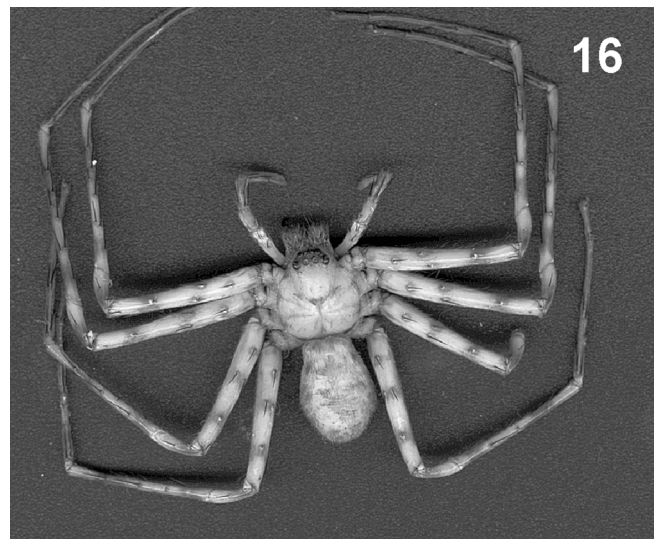
Figs. 1–15: **1–11** *Spariolenus secundus* sp. n. **1, 4, 6** Epigyne, ventral view; **2, 5, 7** Vulva, dorsal view; **3** Schematic course of internal duct system; **8** Dorsal shield of prosoma, frontal view; **9** Eye arrangement, dorsal view; **10** Dorsal shield of prosoma, dorsal view, showing colour pattern including transverse band; **11** Left chelicera, ventral view (1–3, 8–9, 11: ♀ holotype, PJ 1470; 4–5: ♀ paratype, PJ 1596; 6–7: ♀ paratype, PJ 1968; 10: immature, PJ 1597). **12–15** *Spariolenus tigris* Simon, 1880, ♀ holotype, PJ 687. **12** Epigyne, ventral view; **13** Vulva, dorsal view; **14** Schematic course of internal duct system; **15** Left chelicera, ventral view. Scale lines=1.0 mm. Abbreviation: CR=central rim of epigyne.

1 subadult ♀ (PJ 688), same data as holotype (MNHN); 2♂ (PJ 867, 868), with label: Collection Reimoser, *Spariolenus tigris* Sim., Calcutta, Gravely (NHMW). Note: Platnick (2005) indicates that the distribution range of *S. tigris* includes Malaysia. Neither in Sethi & Tikader (1988) nor in any other publication is Malaysia or a part of it listed for this species. Instead the latter authors list Malacca (=Melaka; town and state of Malaysia) as part of the distribution range for the genus *Spariolenus*. As no specimen nor literature reference listing Malaysia as a locality for *S. tigris* is known to the author a confusion of the range of genus and type species by Platnick (2005) cannot be excluded. '*Rhitymna*' *saccata* Järvi, 1914: Holotype ♀ (PJ 863), with label: East Africa, 8 May 1897, leg. Reimer, 85.98. Reimer (ZMB 31224). '*Olios*' *malagassus* Strand, 1907: Holotype ♂ (PJ 744), with label: Madagascar: Nossibé, A. Stumpff 1881 (SMF 4692). '*Rhitymna*' *hildebrandti* Järvi, 1914: 2♀ syntypes (PJ 865–866), with label: *Isopeda*, NW Madagascar, Hildebrandt (ZMB 3718). '*Olios*' *nossibeensis* Strand, 1907: Holotype ♂ (PJ 730), with label: Madagaskar, A. Stumpff 18 December 1885 (SMF 4694).

Etymology: The new species is the second species which can unambiguously be placed in the genus *Spariolenus* (Latin: *secundus*=the second); adjective.

Diagnosis: Closely related to *Spariolenus tigris* from India. Females of the new species can be recognised by the following differences: central epigynal rims extend laterally beyond the copulatory opening (not extending beyond the copulatory opening in *S. tigris*; cf. Figs. 1, 12); first coil of the internal duct system narrow and close together (wide and separated at least in the posterior part in *S. tigris*; cf. Figs. 5, 13); anterior bands of the epigynal field long and narrow (shorter and slightly broader in *S. tigris*); posterior margin of epigyne without median slit or with slit only slightly indicated (with distinct slit in *S. tigris*; cf. Figs. 1, 12).

Description: Female: Prosoma length 11.5 [9.5–10.4], width 9.7 [8.9], anterior width 5.2 [4.5–4.6], height of dorsal shield 2.6 [2.2]. Opisthosoma length 12.1 [8.7–9.1], width 8.5 [6.3–6.9]. Eye diameters: AME 0.49 [0.35], ALE 0.92 [0.80], PME 0.73 [0.65], PLE 1.01 [0.96]; eye interdistances: AME-AME 0.31 [0.21], AME-ALE 0.06 [0.04], PME-PME 0.34 [0.27], PME-PLE 0.70 [0.47], AME-PME 0.59 [0.43], ALE-PLE 0.73 [0.49]; clypeus height at AME 1.62 [1.39], at ALE 1.26 [1.01]. Leg formula: 2143. Spination: palpus 131, 101[101(2)], 2121, 1014; femur I 323, II 32[3]3, III 323, IV 322[1]; patella 101[I 001, II–III 101, IV 100]; tibia I 333 10 [303 10, 323 10], II 333 10 [313 10, 535 10], III 3338 [3238, 33(2)38], IV 3336 [3136, 3236(8)]; metatarsus I–II 1014, III 2024 [2014], IV 3036. Leg measurements: palp 20.1 (5.9, 2.9, 4.7, –, 6.6) [15.7 (4.6, 2.2, 3.7, –, 5.2)], I 65.4 (17.7, 6.3, 20.1, 17.3, 4.0) [52.5 (14.3, 5.1, 16.5, 13.4, 3.2)], II 69.7 (19.5, 6.6, 21.4, 18.2, 4.0) [54.8 (15.5, 5.0, 17.2, 13.9, 3.2)], III 58.8 (16.8, 6.1, 17.2, 15.1, 3.6) [47.9 (13.6, 4.6, 14.6, 12.2, 2.9)], IV 62.0 (17.6, 5.7, 17.7, 17.4, 3.6) [50.6 (14.1, 4.8, 14.7, 14.0, 3.0)]. Chelicerae with 3 anterior teeth [2 teeth on one chelicera in one paratype, PJ 1596] and 5 posterior teeth (Fig. 11). Palpal



Figs. 16–17: *Spariolenus secundus* sp. n., habitus, dorsal aspect, showing leg-body proportions and colour pattern including leg annulations. **16** ♀ holotype, PJ 1470; **17** immature, PJ 1597.

claw with 8 [7, 9] teeth. Coloration: generally yellowish brown with brown pattern. Chelicerae and base of labium and gnathocoxae red-brown. Prosoma with transverse band in front of fovea, more distinct in juveniles (Fig. 10), and few patches at margin. Head region darker. Distal segments of appendages darker (reddish brown). Femora to tibiae annulated, basal parts of femora only with single spine patches. Opisthosoma with irregular pattern dorsally and laterally. Sternum, ventral surfaces of coxae, femora and opisthosoma without pattern.

Male: Unknown (only subadult males collected so far).

Distribution: Known only from the type locality.

Biology: So far, specimens of the new species have been caught only inside a cave system. Outside the caves an unidentified species of the genus *Eusparassus* was found, a typical inhabitant of arid environments. Phenological data for *Spariolenus secundus* sp. n. are limited to the results from three expeditions: adult females were recorded in January and September, subadult males in September, and juveniles in January, September and November.

Discussion

The record of *Spariolenus secundus* sp. n. from the Arabian peninsula is interesting in several respects. It is the first natural occurrence of a representative of the Heteropodinae in this region. The new species is closely related to *Spariolenus tigris*, the type species, according to the very similar female genital organs and other characters which will be discussed below.

Taxonomy: The Heteropodinae are characterised by a combination of somatic characters: a denticle field between the cheliceral teeth with most of the denticles close to the three anterior teeth: the female palpal claw with long and curved teeth; two recurved eye rows with $AME < ALE$; all three elements of the trilobate membrane well developed (Jäger, 1998, 2001b). In *Spariolenus* all these characters except the characteristically toothed female palpal claw are present. The secondary claw teeth are not elongated as in other Heteropodinae and the primary tooth extends beyond the secondary teeth (Jäger, 2004: figs. 47–49), whereas most other Heteropodinae show the reverse state (primary tooth shorter than secondary teeth). Thorough examination of ontogenetically earlier stages of *Spariolenus secundus* sp. n. revealed that the teeth are here longer (as they are in two *Sinopoda* spp., whose adult stages also had shorter palpal claw teeth), the primary tooth remained prominent and, moreover, the angle at which the teeth arise from the claw is different from that in all other Heteropodinae so far included and resembles that in *Berlandia* Lessert, 1921, a genus known only from Tanzania. From these results Jäger (2004) assumed that *Spariolenus* belongs to a phylogenetic lineage within the Heteropodinae different from typical representatives such as *Heteropoda*, *Sinopoda* or *Pseudopoda*.

Another character complex with an unusual state for Heteropodinae in the species described here is the cheliceral dentition. Usually three promarginal and four retromarginal teeth are present. As a few species have five or six retromarginal teeth (Jäger, 1998), this character is not included as diagnostic in the list above. However, the new *Spariolenus* species has five retromarginal teeth, and the type species (*S. tigris*) four to seven, a character state which is also present in *Berlandia* spp. (six teeth) and an undescribed genus from Madagascar and East Africa (five to seven teeth).

A close relationship of *Spariolenus* with *Berlandia* is also supported by the ventral spination of the tibiae of the walking legs. The presence of more (10) than six ventral spines — the usual state in Heteropodinae — is shared with representatives of *Berlandia* (19–20 spines).

Ecology and zoogeography: Members of the Heteropodinae are known as inhabitants of humid habitats, e.g. among leaf litter and on or under tree bark in forests or in rock crevices and cavities under stones, but they are also known as cave-dwellers (Fage, 1924; Jäger, 2001a, 2005). The distribution range of the subfamily was shown by Jäger (2001b: fig. 62). It represents an Afroasian disjunction and is generally restricted to humid forests in subtropical and tropical regions. The Al

Fallah cave system includes permanent lakes which provide the “breathing cave” with fresh and humid air (Hanna & Al-Belushi, 1996). In this arid region the humid conditions, to which representatives of the Heteropodinae in general are adapted, are found by *Spariolenus secundus* sp. n. only in the cave system. True troglomorphic features such as reduced eyes are lacking, although the coloration is paler than in other Heteropodinae. The phenological data are inadequate to allow statements on whether the species is seasonally independent or influenced by different external conditions in different seasons.

Concerning the isolated occurrence of the new species in Oman, it cannot be stated whether a former wider range of *Spariolenus* under more suitable conditions such as the presence of forests could be an explanation, which would identify it as a relictual endemic, or whether a population has drifted from India to Oman. A similar case is represented by *Heteropoda variegata* (Simon, 1874) from the eastern Mediterranean (Greece to Israel), which is also restricted to “dark, humid places” like caves or cellars (Levy, 1989; Jäger, unpublished records). In the latter case close relatives are found only in SE Asia (Jäger, unpublished) and thus a secondary drift of this species, as assumed by Jäger (2001b), is more likely.

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