

## A redescription of *Voraptus affinis* Lessert, 1925 (Araneae: Pisauridae), with comments on the placement of the genus

### Переописание *Voraptus affinis* Lessert, 1925 (Araneae: Pisauridae) и замечания о таксономической принадлежности рода

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КЛЮЧЕВЫЕ СЛОВА: Африка, афротропический, Aranei, *Charminus*, *Cispus*, Miturgidae, *Parapostenus*, перенос рода.

ABSTRACT. A redescription is presented of the poorly known South African spider, *Voraptus affinis* Lessert, 1925, based on the female holotype specimen. Evaluation of its somatic and epigynal morphology indicates that the genus is currently misplaced in Miturgidae, and *Voraptus* Simon, 1898 is hereby transferred back to Pisauridae, wherein it was traditionally placed. A relationship to the Afrotropical genera *Cispus* Simon, 1898 and *Charminus* Thorell, 1899 is proposed.

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РЕЗЮМЕ. Переописан малоизвестный вид из ЮАР, *Voraptus affinis* Lessert, 1925, на основе голо-типа (самки). Анализ соматической морфологии и формы эпигины показал, что род необоснованно рассматривается в семействе Miturgidae, и поэтому мы перемещаем род *Voraptus* Simon, 1898 обратно в Pisauridae. Предполагается родство рода *Voraptus* с афротропическими родами *Cispus* Simon, 1898 и *Charminus* Thorell, 1899.

### Introduction

Miturgidae is a currently a small spider family, with 29 genera and 141 species distributed on all of the continents, although it was far richer historically. More than 40 genera described in the family or its junior synonym Zoridae have been transferred to other families or synonymized with other genera [WSC, 2022]. The bulk of the generic and species richness is distributed in Australasia, and only four genera have been recorded from the Afrotropical Region: *Palicanus* Thorell, 1897, *Parapostenus* Lessert, 1923 and *Syrisca* Simon, 1886 (all originally described in the dionychan

Clubionidae), and *Voraptus* Simon, 1898, originally described in the trionychan Pisauridae. Considering the unstable taxonomy of Miturgidae, it is not surprising that three of these genera (*Palicanus*, *Parapostenus* and *Voraptus*) may be ambiguously placed in the family [Ramírez, 2014], and require revision to revisit their phylogenetic position.

*Voraptus* is a small and poorly known genus, represented by five Afrotropical species and a single species from Indonesia, *V. orientalis* Hogg, 1919, which is probably misplaced. Only the type species, *V. tenellus* (Simon, 1893) from the Seychelles, has ever been re-described, and the affinities of the genus are complicated by a lack of illustrations of the male palp of any of the three species whose males have been described, *V. tenellus*, *V. aeriis* Simon, 1898 from the Congo, and *V. exilipes* (Lucas, 1858) from Gabon [WSC, 2022]. As the genus has never been revised, the broader phylogenetic relationships of some of the species are unclear, and they may be misplaced [Dippenaar-Schoeman, Jocqué, 1997].

Despite *Voraptus* being described in Pisauridae [Simon, 1898a] and placed therein subsequently (e.g. Roewer [1955]; Bonnet [1959]), Lehtinen [1967] transferred it to Zoridae, suggesting it was “closely related to the two-clawed dionychan genus *Thasyraea*”. However, *Thasyraea* L. Koch, 1878 has also never been revised, and its two species have never been re-described, making this suggested relationship puzzling. Dippenaar-Schoeman & Jocqué [1997] questioned the validity of the placement in Zoridae, and retained *Voraptus* in Pisauridae, although it has subsequently been placed in Miturgidae, which is now a senior synonym of Zoridae [Ramírez, 2014].

In this paper, *V. affinis* is re-described from the type specimen, compared with congeners and an undescribed representative of *Parapostenus*, and the phylogenetic placement of the genus is reconsidered.

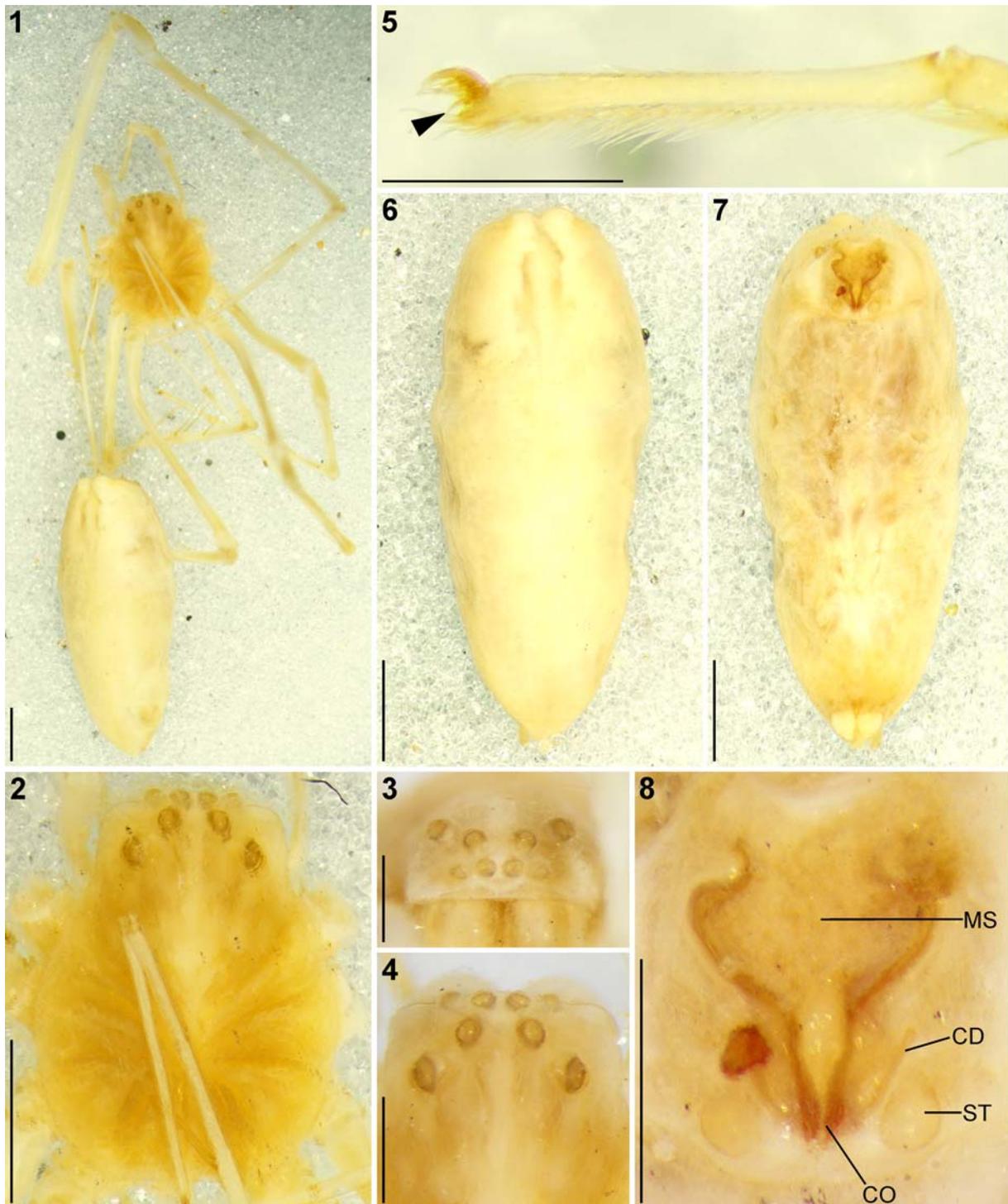


Fig. 1. Microscope images of the holotype female of *Voraptus affinis* from Durban, South Africa. A — various separated body parts; B — carapace, dorsal; C — eye region, anterior; D — same, dorsal; E — tarsus III, arrow indicating third claw; F — abdomen, dorsal; G — same, ventral; H — epigyne, ventral. Scale bars — 1.0 mm (A, B, F, G), 0.5 mm (C–E, H). Abbreviations: CO — copulatory opening, CD — copulatory duct, MA — median atrium, ST — spermatheca.

Рис. 1. Голотип самка *Voraptus affinis* из Дурбана, ЮАР. А — разные части тела; В — карапакс, сверху; С — глазное поле, спереди; D — тоже, сверху; E — лапка III, стрелка указывает третий коготок; F — брюшко, сверху; G — тоже, снизу; H — эпигина, снизу. Масштаб 1,0 мм (A, B, F, G), 0,5 мм (C–E, H). Сокращения: CO — копулятивные отверстия, CD — копулятивный канал, MA — срединная ямка, ST — сперматека.

## Material and Methods

The holotype specimen of *Voraptus affinis* was loaned from the KwaZulu-Natal Museum, Pietermaritzburg, South Africa (NMSA). For comparison, female and male specimens of an undescribed species of *Parapostenus* from Hogsback, South Africa (32°32.644'S, 26°56.751'E, leg. R. Booysen & A. Marais, 14.III.2020), were also examined under a Jeol JSM-IT200 scanning electron microscope. Specimens were studied in 70% ethanol under a Nikon SMZ800 stereomicroscope, and digital images were taken using a coupled Nikon DS-L3 camera system. Depending on the somatic or copulatory organs structures photographed, a series of between 6 and 25 photos were taken and stacked using CombineZM software [Bercovici *et al.*, 2009]. All measurements are given in millimetres and were taken using an ocular micrometer on the aforementioned microscope. Leg measurements are presented in sequence from the femur to the tarsus, with the total in parenthesis.

The following abbreviations are used in the redescription of *V. affinis*: AER — anterior eye row; AL — abdomen length; ALE — anterior lateral eye(s); AME — anterior median eye(s); AW — abdomen width; CH — clypeus height; CL — carapace length; CW — carapace width; FL — fovea length; MOQ — median ocular quadrangle: AW — anterior width, PW — posterior width, L — length; PER — posterior eye row; PERW — posterior eye row width; PLE — posterior lateral eye(s); PME — posterior median eye(s); SL — sternum length; SW — sternum width; TL — total length. Leg spination follows the format of Bosselaers & Jocqué [2000], with spine positions indicated using the following abbreviations: do — dorsal; pl — prolateral; plv — prolateral ventral; rl — retrolateral; rlv — retrolateral ventral; vt — ventral terminal.

## Taxonomy

Pisauridae Simon, 1890

*Voraptus* Simon, 1898

Type species: *Dendrolycosa tenella* Simon, 1893 from the Seychelles.

*Voraptus affinis* Lessert, 1925

Fig. 1.

*Voraptus affinis* Lessert, 1925: 332, fig. 5A, B (♀).

*Voraptus affinis* Roewer, 1955: 406, fig. 170b (♀).

TYPE MATERIAL. Holotype ♀: SOUTH AFRICA: KwaZulu-Natal Province: Durban, Umbilo, 29°53'S, 30°58'E, 70 m, leg. L. Bevis, NMSA 27834 — examined.

DIAGNOSIS. *Voraptus affinis* shares with the type species, *V. tenella*, a chalice-shaped epigynal atrium, but can be distinguished by the shape of the anterior fossae, which are curved inward then anteriorly, forming an S-shape in *V. affinis* (Fig. 1H), but bent and directed anteriolaterally in the type species [Benoit, 1978: fig. 3B; Saaristo, 2010: fig. 41.2].

DESCRIPTION. *Female* (holotype). Measurements: CL 2.40, CW 1.87, AL 5.40, AW 2.15, TL 7.20, FL 0.45, SL 1.15, SW 0.98, CH 0.14, AME 0.10, ALE 0.08, PME 0.13, PLE 0.13, AME–AME 0.08, AME–ALE 0.06, ALE–ALE 0.40, PME–PME 0.27, PME–PLE 0.23, PLE–PLE 0.69, PERW 0.86, MOQAW 0.27, MOQPW 0.44, MOQL 0.21.

Length of leg segments: I 5.15, 1.20, 5.25, 4.95, missing (?); II 4.30, 1.05, 4.00, 4.10, 1.75 (15.20); III 3.25, 0.85, 2.20, 2.60, 1.00 (9.90); IV 4.40, 0.95, 3.65, 4.20, 1.55 (14.75). Palp: 1.35, 0.60, 0.70, 1.10 (3.75).

Habitus of female as in Fig. 1A, body parts separated, leg I separated from carapace; colouration and markings faded. Carapace orange-brown, paler along midline, with radiating striae from fovea; shape oval, eye region narrowed, with lateral margins almost square (Fig. 1B); anterior eye row slightly procurved in anterior view, AME larger than ALE (Fig. 1C); posterior eye row strongly recurved in dorsal view, eyes subequal in size, larger than anterior eyes, placed on slight tubercles (Fig. 1D). Chelicerae not protruding, sparsely covered with short white setae on anterior surface; 3 teeth on promargin and retromargin; endites and labium orange-brown; sternum oval, slightly longer than broad. Legs long, many spines broken off; ventral spines on tibiae and metatarsi approximately 1/3 segment length; tarsi with three claws (Fig. 1E). Leg spination: femora: I pl 1 do 2 rl 2, II pl 1 do 3 rl 2, III pl 1 do 2 rl 1, IV pl 1 do 2 rl 1; patellae: spineless; tibiae: I pl 2 do 1 rl 1 plv 4 rlv 4, II pl 2 rl 2 plv 3 rlv 3, III pl 2 do 1 rl 1 plv 2 rlv 2, IV pl 2 do 1 rl 2 plv 2 rlv 2; metatarsi: I pl 3 rl 3 plv 3 rlv 3, II pl 3 rl 2 plv 3 rlv 3, III pl 3 rl 3 plv 3 rlv 3 vt 1, IV pl 3 rl 3 plv 3 rlv 3 vt 1. Palpal spination: femora: pl 1 do 1; patellae: spineless; tibiae: pl 1 plv 1; tarsi: pl 1 rl 1 plv 1 rlv 2. Abdomen cylindrical, almost four times longer than broad, creamy-grey dorsally (Fig. 1F) and ventrally (Fig. 1G), without distinct markings. Epigyne longer than broad, with chalice-shaped median atrium, with anterior fossae S-shaped, curving inward then anteriorly; copulatory openings situated at posterior narrowing of septum, with slender copulatory ducts directed anteriolaterally, entering posterolateral teardrop-shaped spermathecae along their anterior margin (Fig. 1H).

*Male*. Unknown.

REMARK. The original description [Lessert, 1925] indicates that the carapace and abdomen are yellow in colour and the abdomen has a dark anterior marking that gradually tapers towards the posterior. The carapace and abdomen are covered in short spaced white hairs. Unfortunately, the type specimen is faded and no markings are evident anymore.

DISTRIBUTION. Only known from the type locality.

## Discussion

The genus *Voraptus* is very poorly known taxonomically, and is in urgent need of revision to appreciate its true diversity and more accurately assess its phylogenetic placement. The present paper presents only the second redescription of one of its six species. Not surprisingly, this lack of knowledge has contributed to the genus not being included in any phylogenetic studies of Pisauridae and related groups (e.g. Sierwald [1997]; Wheeler *et al.* [2017]). *Voraptus* species all tend to be small compared to most other pisaurids, with total body lengths based on original and redescriptions ranging between 5.5 mm for males to a maximum 10.6 mm for females, both for *V. tenellus* (Table). As most of the species have at least some illustrations published of them, a brief discussion of the available evidence is warranted.

The eye region of *V. tenellus* [Benoit, 1978: fig. 3A] and *V. extensus* [Lessert, 1916: figs 23, 25], and

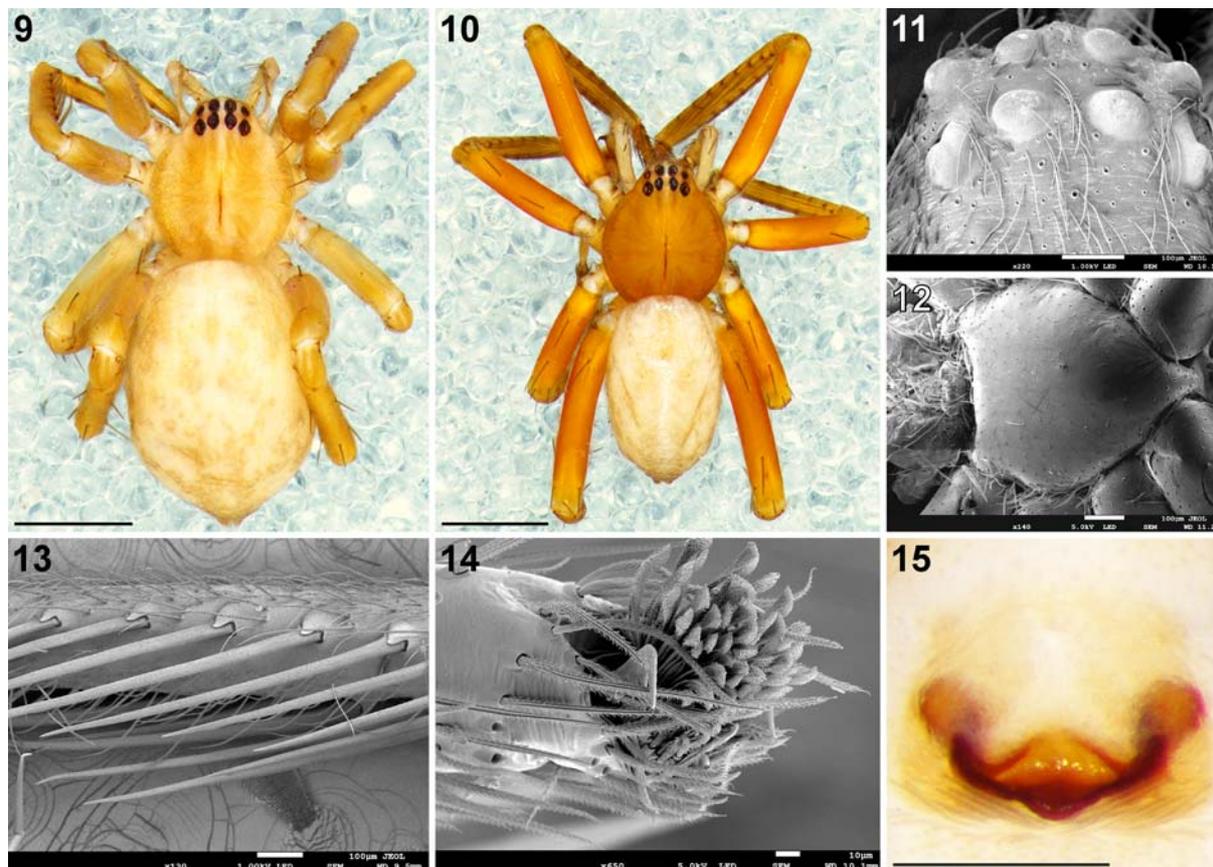


Fig. 2. Digital microscope images (A, B, G) and scanning electron micrographs (C–F) of the female (A, C–E, G) and male (B, F) of *Parapostenus* sp. from Hogsback, South Africa: A, B — dorsal habitus; C — eye region, dorsal; D — sternum; E — tibia I, paired ventral spines with locking mechanism; F — tarsus IV, claws and claw tufts; G — epigyne, ventral. Scale bars — 1.0 mm (A, B), 0.25 mm (G).

Рис. 2. Цифровые (A, B, G) и растровые фотографии (C–F) самок (A, C–E, G) и самца (B, F) *Parapostenus* sp. из Hogsback, ЮАР: A, B — габитус, сверху; C — глазное поле, сверху; D — sternum; E — голень I, парные вентральные шипы с запирающим механизмом; F — лапка IV, коготки и коготковые подушечки; G — эпигина, снизу. Масштаб 1,0 мм (A, B), 0,25 мм (G).

dorsal habitus and eye region of *V. exilipes* [Lucas, 1858: fig. 1, 1a] and *V. affinis* [Lessert, 1925: fig. 5A; Fig. 1A–D], are consistent those of many genera of Pisauridae. The eye arrangement particularly suggests a close affinity to the related genera *Cispius* Simon, 1898 and *Charminus* Thorell, 1899, from which it can be distinguished by the slightly procurved AER in anterior view (Fig. 1C), while those of the other two genera are slightly recurved in anterior view [Blandin, 1978: figs 4, 5]. The PER of *Voraptus* species is strongly recurved, with the eyes separated by a distance almost double each of their diameters, and with the posterior margin of the PME in front of the anterior margin of the PLE. In comparison, the PER of *Parapostenus* (as an example of Afrotropical Miturgidae) is only slightly recurved, with the eyes separated by a distance smaller than the PME diameter, and the eyes are least partly overlapping in the transverse plane (Fig. 2A–C).

Although the sternum of *V. affinis* is not figured here, it is oval in shape and slightly longer than broad, while in *Parapostenus* the sternum is shield-shaped, very broad anteriorly with a narrow extension between

the posterior coxae, and as broad as long (Fig. 2D). Similar to *Cispius* and *Charminus*, which have relatively slender abdomens usually at least twice longer than broad [Blandin, 1978], *V. affinis* has a very slender abdomen almost four times longer than broad (Fig. 1F, G), while the abdomen of *Parapostenus* is oval and approximately 1.5 times longer than broad (Fig. 2A, B).

Leg morphology is also particularly informative. In *Voraptus*, *Cispius* and *Charminus* the legs are long and slender [Blandin, 1978; Fig. 1A], the ventral leg spines are very slender and widely separated from each other, and the tarsi have 3 claws and lack claw tufts (Fig. 1E), the latter being particularly important characters applicable to Pisauridae [Dippenaar-Schoeman, Jocqué, 1997; Jocqué, Dippenaar-Schoeman, 2006]. In contrast, Miturgidae often have many pairs of closely positioned strong ventral spines on the anterior legs (e.g. Fig. 2E) and are two-clawed dionychan spiders that sometimes possess (Fig. 2F) or lack claw tufts [Dippenaar-Schoeman, Jocqué, 1997; Raven, Stumkat, 2003; Jocqué, Dippenaar-Schoeman, 2006; Ramírez, 2014].

Table. Body lengths of *Voraptus* species in millimetres, based on original descriptions and redescrptions. Таблица. Длина тела пауков рода *Voraptus* в миллиметрах по данным первоописаний либо переописаний.

Species	Females	Males	References
<i>Voraptus aerius</i> Simon, 1898	Unknown	6.7	Simon [1898b]
<i>Voraptus affinis</i> Lessert, 1925	7.2	Unknown	Lessert [1925]
<i>Voraptus exilipes</i> (Lucas, 1858)	Unknown	6.0	Lucas [1858]
<i>Voraptus extensus</i> Lessert, 1916	6.5	Unknown	Lessert [1916]
<i>Voraptus orientalis</i> Hogg, 1919	10.5	Unknown	Hogg [1919]
<i>Voraptus tenellus</i> (Simon, 1893)	10.6	5.5	Simon [1893]; Benoit [1978]

Lastly, the epigynes of *Voraptus* (Fig. 1H), *Cispius*, *Charminus* and other pisaurids almost always have a distinct subtriangular atrium medially (e.g. Blandin [1978]; Sierwald [1997]), while those of Miturgidae form a plate with (e.g. Raven, Stumkat, [2003]) or without (Fig. 2G) a median atrium.

Based on all of the aforementioned evidence, the transfer of *Voraptus* back to Pisauridae is proposed here, where it would be considered a member of the subfamily Pisaurinae based on the relationships proposed by Sierwald [1997].

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