

***XYSTICUS BREVIDENTATUS* (THOMISIDAE): FURTHER RECORDS AND FIRST DESCRIPTION OF THE FEMALE**

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ABSTRACT. The male of *Xysticus brevidentatus* Wunderlich 1995 was originally described from Dubrovnik in Croatia, but females have remained unknown. During a revision of museum material in Vienna further specimens including both males and associated females from Albania, Italy and Yugoslavia were discovered. The morphology of the male pedipalp allows the placement of *X. brevidentatus* in the *cristatus* group which contains, among others, *X. cristatus* (Clerck 1757), *X. audax* (Schrank 1803), *X. macedonicus* Šilhavý 1944 and *X. pseudocristatus* Azarkina & Logunov 2001. Detailed analyses of the females showed that the shape of the female epigyne and vulva is consistent with the general scheme of the *cristatus* group and that the specimens can, due to a number of distinctive characters, be regarded as the females of *X. brevidentatus*.

Keywords: Araneae, Thomisidae, *Xysticus*, taxonomy, Balkans, *cristatus* group

The thomisid fauna of the Balkans was reviewed by Šilhavý (1944) who provided not only a species list, but also descriptions of two new *Xysticus* species, namely *X. macedonicus* Šilhavý 1944 from Macedonia and *X. tenebrosus* Šilhavý 1944 (and subspecies) from Herzegovina and Macedonia. Both species were described only from males; females remained unknown. More recently, another new species, *X. brevidentatus* Wunderlich 1995, was reported from Dubrovnik, but again the female remained unknown. In their studies of the *cristatus* group within *Xysticus* both Azarkina & Logunov (2001) and Jantscher (2001a) dealt with the problem of separating the closely related and very similar species *X. cristatus* (Clerck 1757) and *X. audax* (Schrank 1803) and both included in their analyses a third *cristatus* group species. Azarkina & Logunov (2001) mainly focused on the eastern Eurasian region and described *X. pseudocristatus* while Jantscher (2001a), who reviewed central European specimens, redescribed *X. macedonicus* including the previously unknown female.

During a revision of material lodged in the Vienna museum further *cristatus* group specimens comprising males from Castelnuovo (now called Herceg Novi, Yugoslavia), Aspromonte (Calabria, Italy) and northern Albania as well as possibly associated females from northern Albania, were discovered. The males

from the latter locality, which unequivocally belong to *X. brevidentatus*, were probably collected syntopically with female *Xysticus*. These specimens may well represent the unknown *X. brevidentatus* females since they can be distinguished from all other members of the *cristatus* group. The affiliation of these female specimens to the Balkan species *X. tenebrosus* can be excluded since *X. tenebrosus* does not belong to the *cristatus* group but rather to the genus "*Psammitis*" as proposed by Jantscher (2002) and thus the predicted shape of the *X. tenebrosus* epigyne is supposed to look completely different. The present paper is a redescription of *X. brevidentatus* including a detailed study on the probable *X. brevidentatus* females and includes a discussion of possible relationships based on shared characters.

METHODS

Alcohol preserved material was loaned from Senckenberg Museum in Frankfurt (SMF; the holotype of *X. brevidentatus*) and the Naturhistorisches Museum in Vienna (NHMW; all other material). The specimens were studied using a Wild M8 binocular while an Olympus BH-2 microscope was used for higher magnification. A camera lucida attachment was used for the drawings (hairs generally omitted). All measurements are given

in millimeters. The leg spination is presented for each leg separately, starting with the number of spines on the dorsal—prolateral—ventral—retrolateral side of each segment (Fe–Mt). The spines are usually arranged in rows or double rows (ventral sides of Ti and Mt), the latter case being indicated by a “+”. Occasionally spines are less robustly developed than usual. These are marked by an additional “w” (for weak) next to the relevant number of spines.

Abbreviations.—ALE/AME = ratio of distance AME–ALE/diameter of one AME; AME = anterior median eyes; ALE = anterior lateral eyes; AME/AME = ratio of distance between AME/diameter of one AME; BL = body length; Fe = femur; LI–IV = legs I–IV; LTA = lateral tegular apophysis; Mt = metatarsus; LTA = lateral tegular apophysis; Pa = patella; PE = posterior eyes; PL = prosoma length; PME = anterior median eyes; PLE = posterior lateral eyes; PW = prosoma width; PE/AME = ratio of distance between PME–PLE/diameter of one AME; Ti = tibia.

For more information on color pattern/spination and genital structures refer to Jantscher (2001b).

REMARKS

A comparison of the genital morphology with other members of the *cristatus* group reveals that for both sexes of *X. brevidentatus* the most similar sets of characters are found in *X. macedonicus*. This species also occurs in the Balkans (e.g. Deltshev 1990) but spreads as far north as Bavaria (Muster 2000). In the present paper *X. macedonicus* is regarded as the probable sister group due to shared characters in the genital morphology.

For the males, shared characters can be found not only in the lateral tegular apophysis (LTA) but also in the shape of the embolus. The LTA is broad and expansive in both species, although there are unique features here in *X. brevidentatus*, e.g. the crest-shaped bulge (Fig. 2, c) on the lower edge, the second distinct tip or the gentle, less sclerotized structure within the curvature of the “shovel”. This less sclerotized structure is quite similar in general appearance in both *X. brevidentatus* and *X. macedonicus*. The distal part of the embolus is, in comparison with *X. cristatus* or *X. audax*, enormously enlarged, but while it is broad and short in *X. macedonicus* (e.g.

Jantscher 2001a, figs. 5, 6, 11) it is extremely long in *X. brevidentatus*. Although it must be mentioned here that the single specimen from Calabria (NHMW) is somewhat different as both the embolus and tutaculum (pocket-like sheath on the retrolateral side of the cymbium protecting the distal part of the embolus, see Fig. 2, t) are unusually short.

The similarities between *X. brevidentatus* and *X. nubilus* Simon 1875 (see e.g. Simon 1932, fig. 1213) mentioned by Wunderlich (1995) appear to be only superficial and due rather to the rotation of the axis of the median tegular apophysis towards the basal region of the bulb than to the lateral tooth. Moreover the lateral tegular apophysis of *X. nubilus* is simple in structure and the tiny tooth beneath the base of the median tegular apophysis is lacking completely in *X. nubilus*. Instead a sclerotised ridge is present.

Females show, as is typical within the *cristatus* group, a broad range of variability in their genitalia and like all *cristatus* group females (e.g. Azarkina & Logunov 2001; Jantscher 2001a) are difficult to separate from each other. The main reason for this variability is obviously the membranous structure of the genital duct, which is in the proximal part enormously widened (sack-like structure) and then towards the receptacula contracts again and forms distinct bulges and twists. For this reason the angle at which the vulva is examined plays a crucial role in accurate identification. The vulva must be placed evenly and not viewed at a different angle. The broad range of epigynal/vulvar variation becomes obvious in comparison of Figs. 6–17.

However, with regard to other *cristatus* group females, we find the greatest character correlation between females of *X. brevidentatus* and *X. macedonicus*. The epigynes of both species are very similar and are barely separable, which is reminiscent of the problem with the epigynes of *X. cristatus* and *X. audax* (e.g. Azarkina & Logunov 2001; Jantscher 2001a). A specific character shared between them is the presence of elongate lateral plates (Fig. 6, sp) on each side of the median septum (Fig. 6, ms). But again, the vulvar structure of *X. brevidentatus* and *X. macedonicus* is different. Here special attention must be paid to the duct region which connects the receptacula and the membranous part of the base of the grooves. This region is characteristically

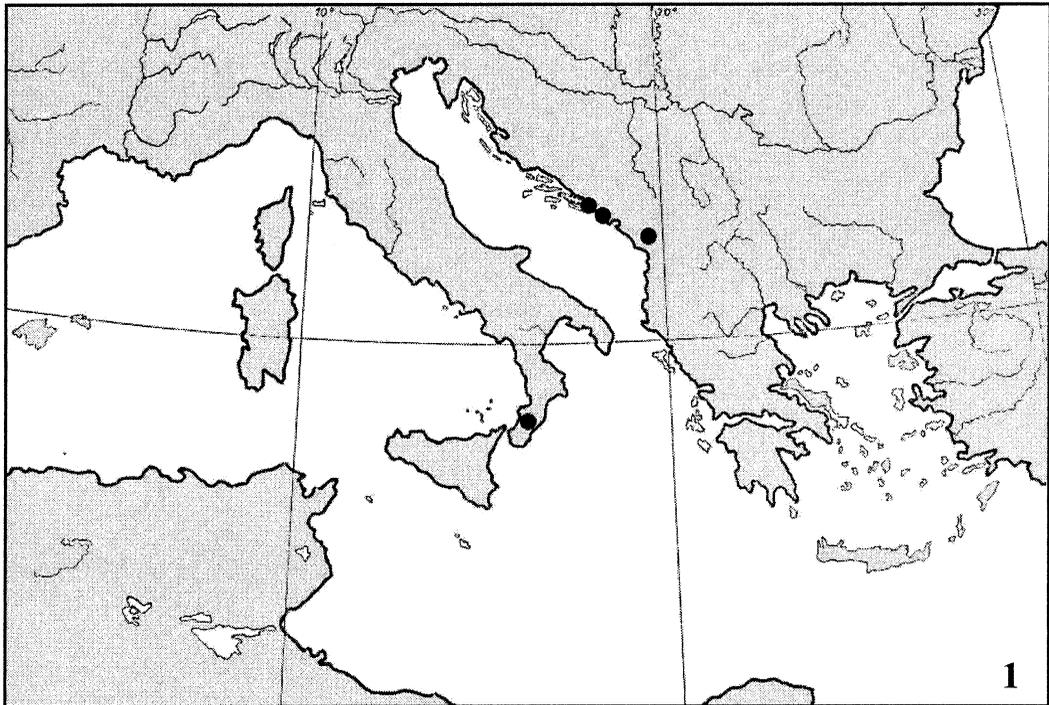


Figure 1.—Known distribution of *Xysticus brevidentatus*.

twisted in *X. brevidentatus* but takes a more simple and more gentle course in *X. macedonicus*. Again *X. nubilis* females (see e.g. Simon 1932, fig. 1236) differ strikingly from the shape of the *X. brevidentatus* epigyne. The broad range of intraspecific variation of the genital morphology is comparable to that observed in *X. cristatus* or *X. audax* (e.g. Jantscher 2001a) and is demonstrated in Figs. 6–17.

Xysticus brevidentatus was only known from the type locality in Croatia and, based on the NHMW material, is now also reported from northern Albania, Yugoslavia and Italy. Unfortunately we lack any information on its ecological requirements as there are no hints on the museum labels nor in the original description. More material and data are desirable for an insight into the ecology and zoogeography of this species.

Xysticus C.L. Koch 1835
“*cristatus* group”

Xysticus brevidentatus Wunderlich 1995
(Figs. 1–17)

Xysticus brevidentatus Wunderlich, 1995:754, figs. 20–22.

Type.—Holotype male, Dubrovnik, Former Yugoslavia (now Croatia) (SMF 5546).

Other material examined.—2 ♂, 8 ♀, northern Albania, Penther leg. (NHMW); 1 epigyne [without body], Castelnuovo [now Herceg Novi; Montenegro, Yugoslavia] (NHMW); 1 ♂, Italy, Aspromonte, (Calabr.), Paganetti-Humler, 2006 (NHMW).

Diagnosis.—*Xysticus brevidentatus* can be separated from similar species of the *cristatus* group by the highly specific and complex structure of the lateral tegular apophysis, which not only bears a distinct, crest-like bulge (Fig. 2, c) on its prolateral edge but also shows a second strongly sclerotized, marginally serrated extension. In comparison to other *cristatus* group species the embolus is distinctly enlarged and massive.

The general appearance of the female epigyne is nearly identical to *X. macedonicus* (e.g. Jantscher 2001a, figs. 19, 20, 21). It also shows elongate side plates (Fig. 6, sp) beneath the median septum (Fig. 6, ms) but can be separated from *X. macedonicus* by the vulvar structure. Before reaching the receptacula, the genital duct (planar, dorsal view), is twisted in

X. brevidentatus but takes a more straight course first and then gently turns around towards the receptacula in *X. macedonicus*.

Description.—*Male*: measurements ($n = 3$): BL: 4.0–4.7; PL: 2.1–2.4; PW: 2.1–2.3; AME/AME: 4.7–5.1; PE/AME: 5.2–5.3; ALE/AME: 2.6–3.1.

Color and structure: Prosoma dorsally dark to middle brown with a distinct white marking, more or less forming a “U” shape (rein-shaped marking—see Jantscher 2001b). It is anteriorly rather narrow but reaches the yellow-cream colored eye-field. The median field, i.e. the area enclosed by the U-shape is middle brown and medially divided by a white, longitudinal line. The anterior eyes and PLE are embedded in a light, white stripe. The lateral areas of the tergum are dark middle brown and show only a slight pattern. Clypeus frontally set with 7 spines. Clypeal margin centrally somewhat elongated to form a small, triangular prong between the chelicerae. The transition tergum/clypeus is angular and steep. Chelicerae frontally set with spines, distally and proximally brown, in between cream colored. Sternum elongate-oval with a yellow-brown margin around a cream colored area. Opisthosoma dorsally with a white margin enclosing an oval light-brown field with a white folium (zigzag shaped pattern). Ventral side beige to cream colored.

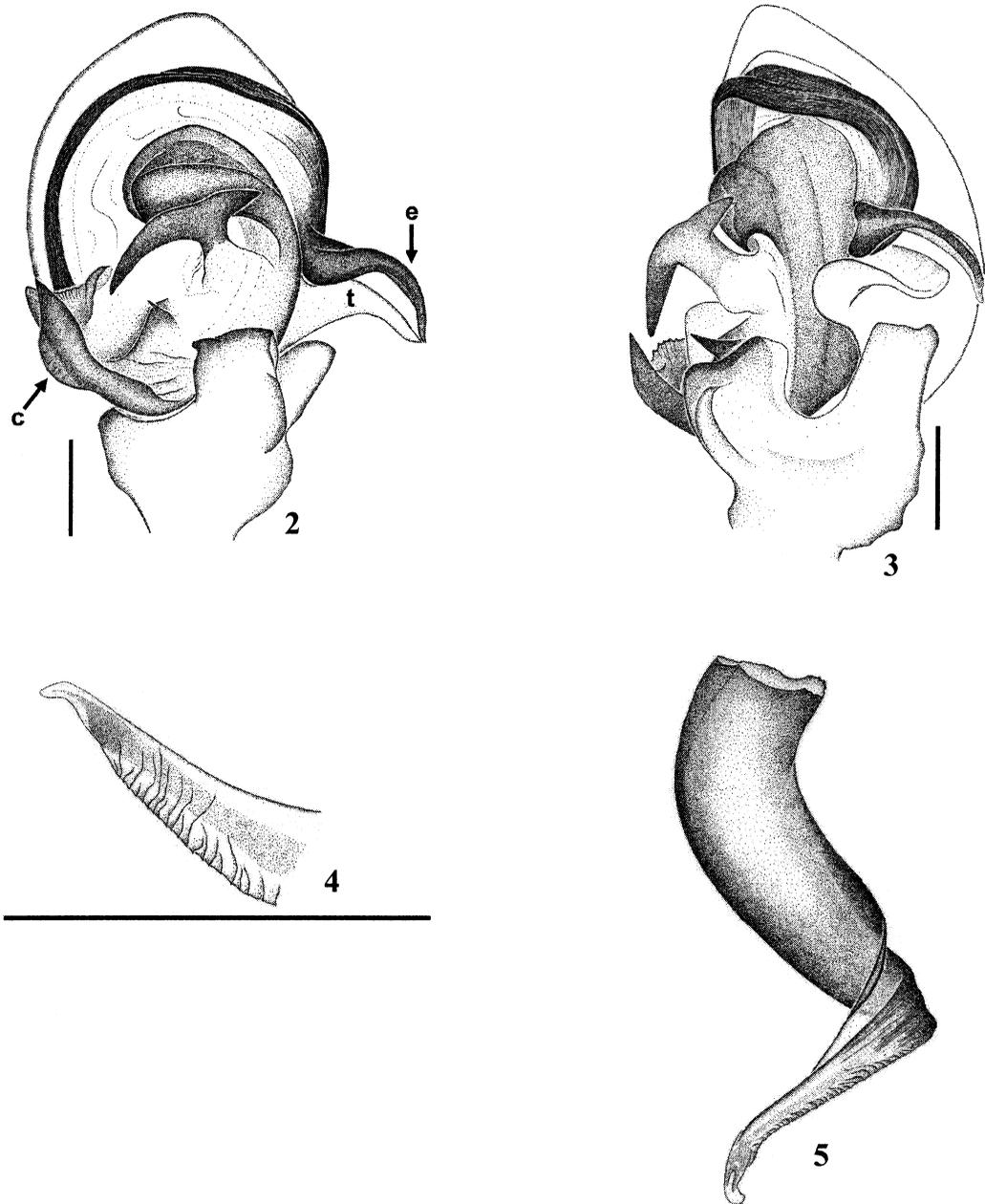
Legs and spination: Middle brown, proximally yellow-brown. A cream colored median stripe is present on the ventral and dorsal side but can in part be broken up on the femora. Tarsal claws with 6 teeth. Retrolateral sides of all femora with a smooth, spineless and elongate field. Spination: LI: Fe 5-18-0-0, Pa 0-1-1-1, Ti 0-3-4+4-3, Mt 0-3-3+2-3, LII: Fe 8-0-0-0, Pa 0-1-1-1, Ti 0-3-4+4-3, Mt 0-3-4+3-3, LIII: Fe 4-0-0-0, Pa 1-1-0-1, Ti 1-2-3+3-2, Mt 0-3-2+2-3, LIV: Fe 5-0-0-1, Pa 1w-1-0-1, Ti 2w-2-3+3-2, Mt 0-3-2+2-3.

Pedipalp (Figs. 2–4): Tibia with two apophyses. Ventral apophysis in ventral view more or less rectangular with a slanting distal edge. Additionally a tiny projection on the prolateral distal edge is present. Retrolateral tibial apophysis in ventral view massive and club shaped, tapering off towards the tip, in retrolateral view also more or less rectangular (Fig. 3). The complex structured tegulum bears a T or hammer-shaped median tegular apophysis and a broad lateral apophysis. Both

ends of the median apophysis are pointed, with the prolateral branch being distinctly longer than the retrolateral branch. The horizontal angle is slightly turned downwards, i.e. the tip of the median tegular apophysis points towards the tibia. The whole area of the lateral tegular apophysis is shovel-shaped and forms in ventral view two distinct tips. The uppermost (i.e. most ventral) tip is formed by the strongly sclerotized margin of the shovel and is distally blade-like and pointed. On its prolateral edge a distinct crest-shaped bulge (Fig. 2, c) is visible. The, in ventral view, triangular area behind this tip is marginally serrated and forms the second tip. The retrolateral view (Fig. 3) reveals the presence of two further structures. A thin and rather large but only slightly sclerotized, blunt structure is present as well as a distinct thin, but very sharply pointed tooth. Both structures are easily overlooked in ventral view, but are rather distinct in retrolateral view. The blunt structure is represented by an inconspicuous ridge in ventral view. The strap-like embolus (Fig. 2, e) encloses the bulb in a half-circle. Its last third is slightly twisted to make a lateral-turn to the retrolateral side. The distal part of the embolus is conspicuously large and massive (Figs. 2, 4). The tutaculum (Fig. 2, t) beneath it is also very large and points to the retrolateral side. Higher magnification reveals that the surface of the embolus is not completely smooth but exhibits fine folds and scales (Fig. 5)

Description.—*Female*: Measurements ($n = 7$): BL: 6.3–7.4; PL: 2.6–3.1; PW: 2.6–2.9; AME/AME: 5.4–6.9; PE/AME: 4.9–6.9; ALE/AME: 2.9–3.6.

Color and structure: Prosoma dorsally dark brown to middle brown with a distinct white marking which more or less forms a “U” shape. The median field, i.e. the area enclosed by the U-shape, is middle brown and usually divided by a light, longitudinal median line. U-shaped markings cream colored and anteriorly reaching the yellow-brown to cream colored eye-field. The anterior eyes and PLE are embedded in a white or cream colored stripe. Posterior to the U-shaped markings a light colored, white, cream or pale white rectangular field is present. On each of its sides an independent additional light patch can be present or an anchor-shaped pattern can be developed instead. Clypeus, especially medially, light colored and frontally set with 7 spines.

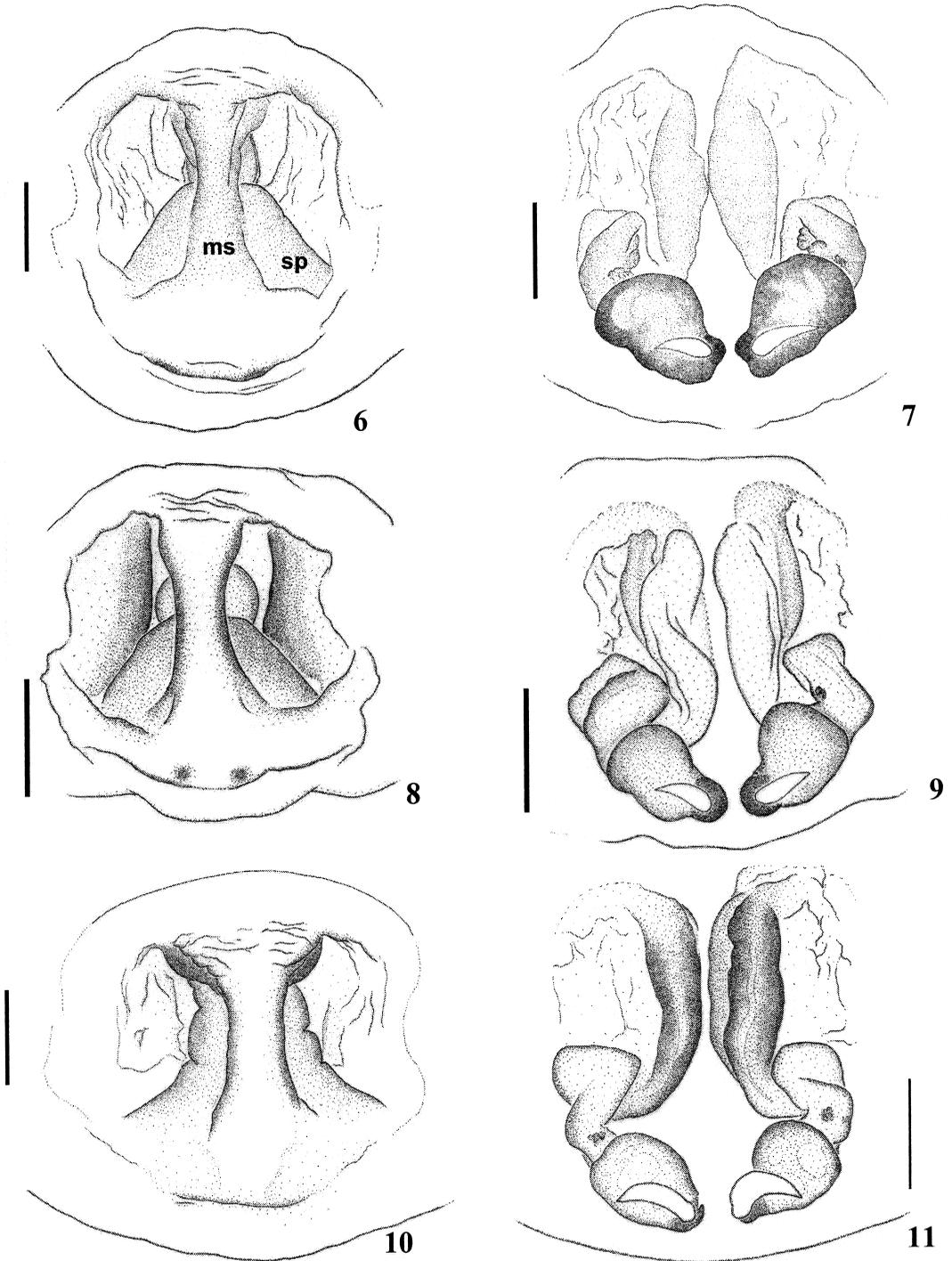


Figures 2–5.—*Xysticus brevidentatus*, specimen from northern Albania: 2, 3, Left male pedipalp: 2. Ventral aspect; c = crest on LTA, e = embolus, t = tutaculum; 3. Retrolateral aspect; 4, 5, Right embolus; 4. Distal region, ventral aspect; 5. Terminal region, lateral aspect. Scale = 200 μ m.

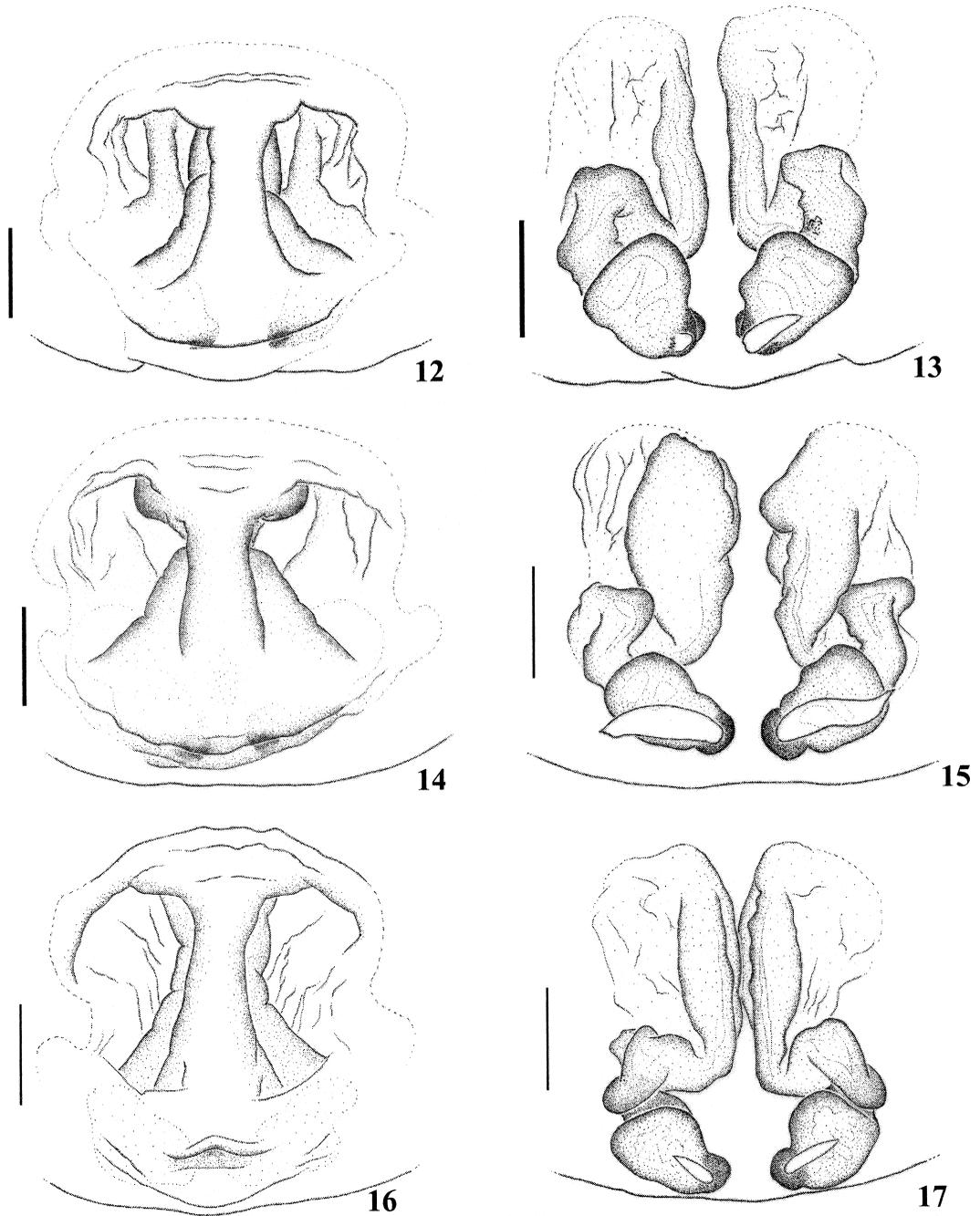
Clypeal margin centrally somewhat elongated to form a small, triangular prong medially between the chelicerae. The transition tergum/clypeus is angular and steep. Chelicerae proximally brown, distally light brown to cream colored and frontally set with spines. Sternum

elongate oval with a yellow margin enclosing a cream and brown mottled area.

Opisthosomal margin white, dorsally enclosing a gray, gray-brown or hazel brown oval area with a white folium (usually a broad lancet-shaped pattern with three transverse



Figures 6–11.—*Xysticus brevidentatus*, epigynes: 6, 7. specimen from Castelnuovo. 6, Ventral aspect, ms = median septum, sp = side plate; 7. Dorsal aspect (vulva); 8–11. Specimens from northern Albania; 8, 10. Ventral aspect; 9, 11. Dorsal aspect (vulva). Scale = 200 μ m.



Figures 12–17.—*Xysticus brevidentatus*, epigyne, specimen from northern Albania: 12, 14, 16. Ventral aspect; 13, 15, 17. Dorsal aspect (vulva). Scale = 200 μ m.

stripes). Opisthosoma ventrally cream-beige to beige-brown with light brown to middle brown spinnerets.

Legs and spination: Legs robust, light-brown to middle or dark brown, legs I and II

can either be distally somewhat darker or are generally considerable darker. Prolateral sides of femora often light colored with cream and brown dots and/or brown rings around the spinal bases. Cream or yellow-cream colored me-

dian stripes are present on the ventral and dorsal side (coxa to tarsus) but can in part be broken up on the femora. Tarsal claws with 4–5 teeth. Coxae ventrally brown with inconspicuous white pattern. Retrolateral sides of all femora with a smooth, spineless and elongate field. Spination: LI: Fe 0-3-0-0, Pa 0-0-0-0, Ti 0-0-3+4-0, Mt 0-3-4+4-3, LII: Fe 1-0-0-0, Pa 0-0-0-0, Ti 0-0-4+4-0, Mt 0-3-4+4-3, LIII: Fe 1-0-0-0, Pa 1w-0-0-0, Ti 1w-2-3+2-0, Mt 0-3-2+2-3, LIV: Fe 1-0-0-0, Pa 1w-0-0-1w, Ti 2-2-3+0-0, Mt 0-3-2+2-3.

Epigyne (Figs. 6–17): Epigyne shows a median septum which separates two epigynal grooves. The usually slender, but not especially narrow, septum is accompanied on each side by side plates. These structures are enormously variable both in shape and degree of sclerotization (Figs. 6, 8, 10, 12, 14, 16). Usually one plate consists of several often bulgy components. The posterior region of the groove is dominated by one distinct segment which broadens posteriorly. The lateral margins of the grooves are characterized by several folds and edges. Occasionally the base of the grooves are distinctly marked with sclerotised folds, giving the impression of column-shaped structures. The posterior margin of the grooves is situated some distance away from the epigastric fold. The vulvar structure (Figs. 7, 9, 11, 13, 15, 17) is rather complex and consists of a huge, membranous area, a distinct duct and the receptacula. The membranous area is formed by the soft and dilatable bases of the grooves which contract medially to form the duct-section. Here there is not a simple horizontal passage but instead a twisted course, leading to the receptacula which show an inner compartmentalization. Translucent fertilization ducts are attached to the receptacula at their medial margin. Glands are present anterior to the receptacula within the folds of the duct.

Distribution.—This species has been found in Croatia, northern Albania, Yugoslavia and southern Italy (Fig. 1).

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