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Discrimination between **Xysticus luctuosus** (Blackwall) and **X. acerbus** Thorell (Araneae, Thomisidae)

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Summary

The spacing of the eyes and the chaetotaxy offer good differential characters for two species of the *sabulosus* group of the genus *Xysticus*: *X. luctuosus* (Blackwall) and *X. acerbus* Thorell.

Résumé

Deux espèces du groupe *sabulosus* du genre *Xysticus* (*X. luctuosus* (Blackwall), *X. acerbus* Thorell) sont aisément discriminées à l'aide de caractères biométriques concernant la structure du champ oculaire et la chaetotaxie.

Introduction

Crabspiders form to some extent an underprivileged group. They have received less attention than some other families. The Philodrominae (now considered a separate family by some), the genus *Philodromus* in particular, have been the subject of intensive research by BRAUN, DONDALE and others because the complex variability in colourpatterns and genital structures within this taxon offered a challenge. In other Thomisid genera the infraspecific variability may be less, but the morphological differences between related species are often very slight and these genera equally deserve the interest of taxonomists.

The genus *Xysticus* is one of the larger genera of the family. Species have been described from most zoogeographic regions, but predominantly from the northern temperate regions in the Old and New World. SIMON (1932) recognized several species-groups, which have been generally accepted by subsequent authors. His key to the identification of the species from France (SIMON, 1932) is very useful, but his illustrations are of much less help. CHYZER & KULCZYŃSKI (1891) presented a key (in Latin) and good figures for the species then known from Hungaria; later (CHYZER & KULCZYŃSKI, 1897) they provided some very useful additional remarks. BÖSENBERG (1902) composed an

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analytic tabel of the German species with details on coloration of body, legs ad epigyne and morphological characters of the male palp; the characters were repeated in the separate descriptions for each species, while all species were depicted in full together with detailed figures of the genitalia. TULLGREN (1944) is the only author, who consistently added figures of the female vulval structures to the (European) species descriptions and usual figures of palp and epigyne. PALMGREN (1950), LOCKET & MILLIDGE (1951 and subsequent volumes) and ROBERTS (1985) all give keys, or diagnostic characters, and figures of genitalia, but do not make use of vulval structures. In this short and incomplete survey of available descriptive taxonomic literature we truly miss a volume on the Thomisidae in Tierwelt Deutschlands, a gap that W. CROME had planned to fill in before his untimely death in 1967. TURNBULL, DONDALE & REDNER (1965) have depicted the vulval structures of all known Nearctic species.

Density and mobility

Many *Xysticus* species are living on the ground or on low herbs. When searching on the ground, turning stones or sifting litter and moss one collects specimens now and then. One gets the impression that the densities are low but this may be caused by the way the animals hide in depressions in the soil, between roots of plants, etc. If one uses pitfalls for collecting one often traps more specimens, usually more males than females, but rarely large numbers. The individual specimens are not very mobile.

During a survey of an area of chalk grassland in the southern part of Limburg, the Netherlands, specimens were collected of a *Xysticus* species, which later could be identified as *Xysticus acerbus* Thorell. The process of identification brought me in closer contact with the available literature.

Characters mentioned in the literature

It soon became clear that the species belonged to the *Xysticus sabulosus* group of SIMON (1932), which comprises, among several others, three closely resembling species, viz. *X. luctuosus* (BLACKWALL), *X. acerbus* THORELL and *X. kempeleni* THORELL.

X. kempeleni would be easily separable by the relatively small size (3.5 mm) of the male (CHYZER & KULCZYŃSKI, 1897: 300; BOESENBERG, 1902: 351), the absence of ventral spines other than apicals on the posterior metatarsi (SIMON, 1932: 833), and the genitalia, especially the tibial apophyses of the male palp. I have hardly any experience with *X. kempeleni*, having examined only three males (Austria, surroundings of Vienna, Lobau, 1972, leg. & det. K. THALER). These specimens are distinctly different from *acerbus* and *luctuosus* and their palps agree with SIMON's description and the illustrations by various authors (e.g. BOESENBERG, 1902: pl. 33 fig. 518; SIMON, 1932: fig. 1252). However, they are not so small as indicated (4.2-4.4 mm), while in one specimen one posterior metatarsus (III) bears a pro-ventral spine in the middle. Thus it is not advisable to use size or chaetotaxy as key-characters for *kempelini*.

The available keys and diagnostic remarks generally refer to differences in the spacing of the eyes to discriminate between the two other species, *X. luctuosus* and *X. acerbus*.

Generally speaking *X. acerbus* has the eyes more widely spaced than *X. luctuosus*, which was expressed into two character statements:

(i) the rectangular area formed by the posterior median eyes (PM) and anterior median eyes (AM) is about square in *luctuosus*, as against broader than long in *acerbus*;
(ii) the distance between anterior median (AM) and anterior lateral (AL) eyes is hardly larger than the diameter of an AL (SIMON, 1932) or 1.5-2.0 diameters (LOCKET , MILLIDGE & MERRETT , 1974) in *luctuosus*, as against more than 3 diameters in *acerbus*.

The females of *X. acerbus* would reach a length of 9 mm, as against 7-8 mm in *X. luctuosus*; males of either species would be smaller and not surpass the 5 mm.

For the males the spination of metatarsus I is said to offer an additional character (SIMON, 1932: 831): *X. luctuosus* bears two pro-lateral (l′) and two retro-lateral (l″) spines, one of which at either side is situated apically; for *X. acerbus* the presence or absence of l′ or l″ spines on metatarus I is not indicated.

As usual, the male palp and female epigyne of both species have been depicted by most authors. The male palpal tibia bears lateral and ventral apophyses, which were described in detail by SIMON; together with a ventral aspect of the bulbus they offer sufficient differences to separate the two species. The two epigynes, on the contrary, are very much alike in size and shape and at first sight offer nothing to go by.

Results of present study

With the aid of material from various sources the characters given by the different authors were tested. The identification of the males is easily made, because the palps offer several useful morphological characters. Females can be identified with certainty by their vulval structures, but it is highly unpractical to have to dissect the epigyne of every female specimen. Therefore I have tried to evaluate the traditional key-characters (spacing of eyes, chaetotaxy, size) and to find additional characters.

The study is based on material of *X. luctuosus* from France, Austria and Sweden, and of *X. acerbus* from the Netherlands. The two species can be diagnosed as follows.

Xysticus luctuosus (BLACKWALL)

Measurements (in mm): total length ♀ 5.1-8.2, ♂ 4.0-4.9; width of cephalothorax, ♀ 2.40-3.25, ♂ 2.20-2.50.

Chaetotaxy. Tibiae I and II with pairs of v-spines; in males l′ and l″-spines well developed; dorsal spines on all tibiae distinctly spine-like (fig. 1), the basal (d")spine on tibia I about half as long (♀ 0.42-0.54, ♂ 0.35-0.63) as diameter of tibia. Metatarsi I and II with pairs of v-spines and one l′ and one l″-spine at appr. 0.6 (fig. 1).

Eyes. More closely set than in *acerbus*. PME separated from each other by 4.0-5.5 (♀) or 3.3-4.8 (♂) times their diameter (see fig. 9). Distance of AME to ALE 1.4-1.9 (♀) or 1.2-1.7 (♂) times diameter of ALE (fig. 10).

Genitalia. Vulva (fig. 3) shorter than in *acerbus*, not reaching anterior margin of epigyneal depression. Male palpal tibia (fig. 5) with the lower branch of the ventral apophysis with curved tip. Bulbus (fig. 7) with a lightly curved, isolated, sclerotized ridge.

Xysticus acerbus THORELL

Measurements (in mm): total length, ♀ 5.4-8.4, ♂ 3.8-4.8; width of cephalothorax, ♀ 2.85-3.30, ♂ 2.12-2.72.

Chaetotaxy. Tibiae I and II with pairs of v-spines, in males with 3 l'- and 3 l"-spines as well; dorsal spines on all tibiae present, but on tibiae I and II hair-like, long and very

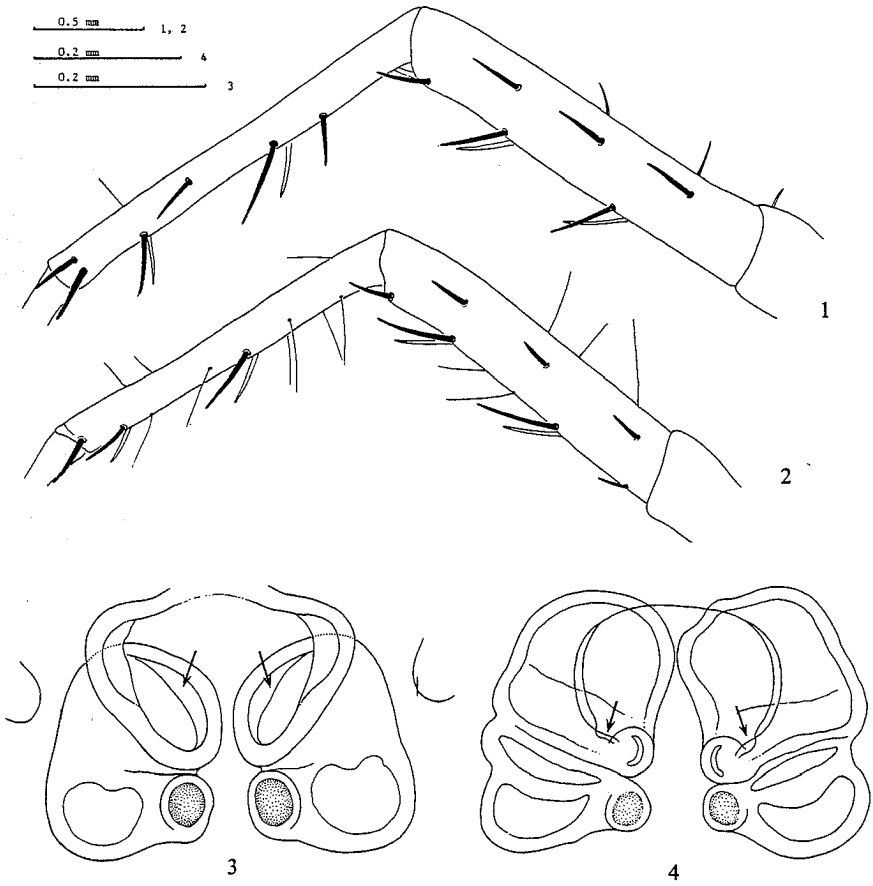

Fig. 1, 2. Prolateral view of tibia and metatarsus of leg I (♂) of (1) *Xysticus lctuosus* (Blackwall) and (2) *X. acerbus* Thorell. Fig. 3, 4. Vulva, ventral view, of (3) *X. luctuosus* and (4) *X. acerbus*; entrances indicated by arrows.

slender (fig. 2), the basal "spine" on tibia I more than half as long (0.60-0.75) as diameter of tibia (♀), or as long as or slightly longer (0.97-1.40) than diameter of tibia (♂). Metatarsi I and II with pairs of v-spines, but never with a l′ or l″-spine at about 0.6 (fig. 2).

Eyes. Eyes more widely spaced; PME separated from each other by 6.0-7.5 (♀) or 4.5-5.7 (♂) times their diameter (see fig. 9). Distance of AME to ALE 2.1-2.4 (♀) or 1.6-2.0 (♂) times diameter of ALE (fig. 10).

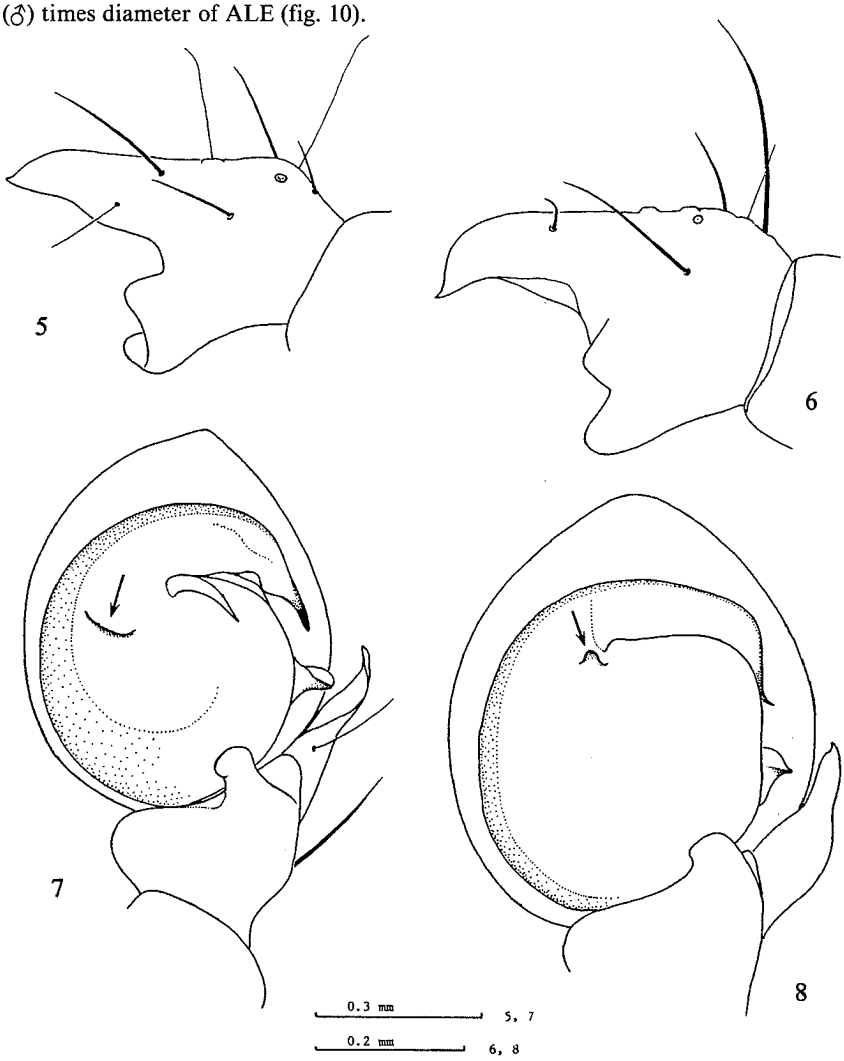

Fig. 5, 6. Tibia of male palp, lateral view, of (5) *Xysticus luctuosus* (Blackwall) and (6) *X. acerbus* Thorell. Fig. 7, 8. Male palp, ventral view, of (7) *X. luctuosus* and (8) *X. acerbus*.

Genitalia. Vulval structures (fig. 4) longer than in *luctuosus*, the receptacula reaching beyond anterior border of epigyneal depression. Male palpal tibia (fig. 6) in lateral aspect with tip of ventral apophysis straight (cf. *luctuosus*). Bulbus in ventral aspect with a narrow, projecting ridge in the shape of a blunt tooth, situated next to the beginning of the black margin which encircles the bulbus and finally ends as the embolus (fig. 8).

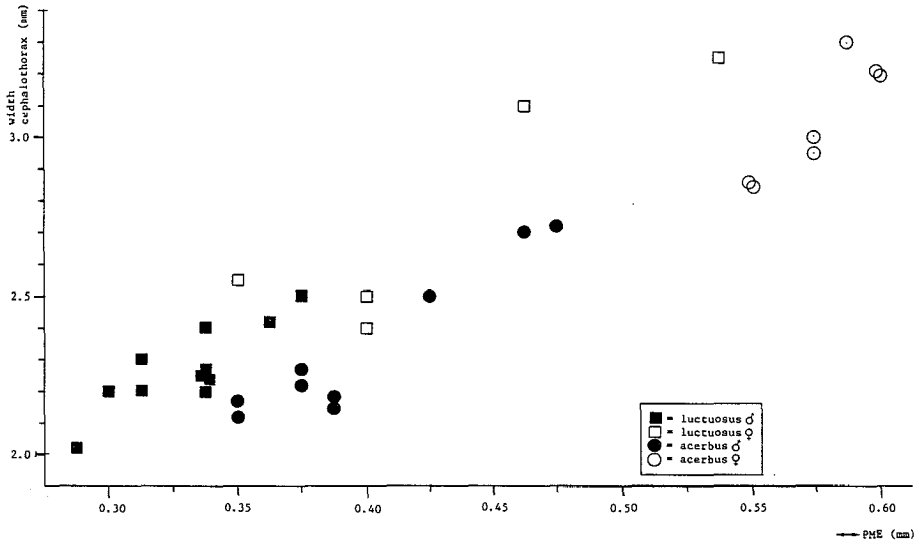

Fig. 9. Graph showing correlation of distance bewteen PME with size of specimen for both sexes of *Xysticus luctuosus* (Blackwall) and *X. acerbus* Thorell.

Differential characters

From the data presented we can conclude that the two species concerned cannot be separated by their size.

The spacing of the eyes, the common character to distinguish the two species, can be used indeed, but the values presented in the literature were found to be too superficial. It appears that the distance between the AME and ALE, expressed in diameters of the ALE, forms a useful character (fig. 10), especially for females; for males the values for the two species overlap to some extent; in either species, but most obviously so in *acerbus*, the values differ for the two sexes and therefore have to be used with great care (see table 1). It appears that the distance between the PME, expressed in diameters of the PME, can be used just as well; it has the advantage that it is easier to measure and the same disadvantage of the anterior eye character, i.e. overlap for the males of the two species and different values for males and females within either species, most clearly so in *acerbus*. Fig. 9 shows the correlation of the distance between the PME with the width of the cephalothorax; the latter is used as an indication of body-size, because it is more easily measured than the length of the cephalothorax (half hidden below the abdomen) and less variable than the total length of a specimen.

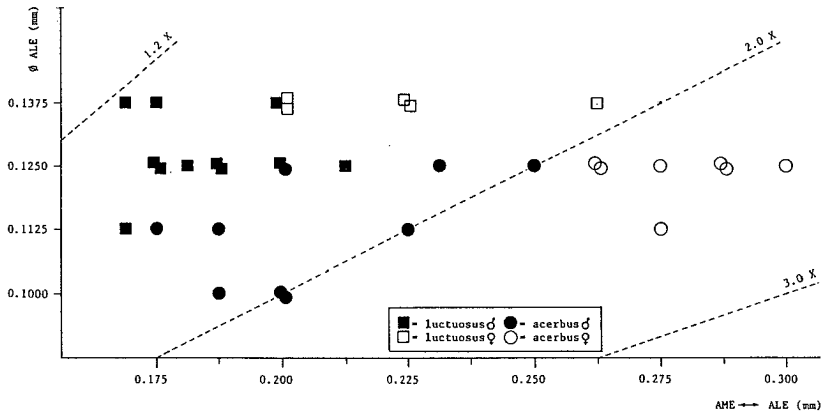

Fig. 10. Graph, showing correlation of distance between AME and ALE with size of ALE for both sexes of *Xysticus luctuosus* (Blackwall) and *X. acerbus* Thorell.

	luctuosus	*acerbus*
⟷ PME (in Ø PME)	♀: 4.0-5.5 ♂: 3.3-4.8	♀: 6.0-7.5 ♂: 4.5-5.7
AME ⟷ ALE (in Ø ALE)	♀: 1.4-1.9 ♂: 1.2-1.7	♀: 2.1-2.4 ♂: 1.6-2.0
basal dorsal spine tibia I	spine, fig.1 ♀: 0.42-0.54 Ø ♂: 0.35-0.63 Ø	hair-like, fig.2 ♀: 0.60-0.75 Ø ♂: 0.97-1.40 Ø
metatarsus I 1' and 1"-spines at ca. 0.6	present	absent
vulva	shorter, fig.3	longer, fig.4
male palp tibia bulbus	 fig.5 fig.7	 fig.6 fig.8

Table 1. Main diagnostic characters for discriminating between *Xysticus luctuosus* (Blackwall) and *X. acerbus* Thorell.

The chaetotaxy offers excellent characters by the hair-like dorsal "spines" on the anterior tibiae in *acerbus* (fig. 2) instead of true spines in *luctuosus*. The l' and l"-spines at 0.6 on the anterior tibiae in *luctuosus* (fig. 1) are equally reliable.

Chaetotaxy and eye-characters together form a reliable set of characters to identify both sexes, and even subadults and juveniles of these two closely related species. We may expect the biometric approach presented here to be equally helpful when the other species of the *sabulosus* group will be studied taxonomically.

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