

The *Porrhomma microphthalmum* species-group

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Summary

The general use of characters in the genus *Porrhomma* is discussed. The species show a remarkable overall resemblance and there is a high degree of variation within the species, especially in (semi)troglobionts. Chaetotaxy and sizes and spacing of eyes are to be used with great care. Genitalia have not always been depicted in full (and without magnifications indicated). The practical value of the graphic representation of the correlation between somatic and genitalia measurements is demonstrated. *P. lativela* Tretzel, now found in the Netherlands, is diagnosed and depicted, and its habitat is analysed. *P. spipolae* Di Caporiacco is found to be closely related.

Introduction

Many arachnologists have invested time and energy in clarifying the complexities of *Porrhomma*. An important monograph by Miller & Kratochvil (1940) was for a long time the general guide for identification of the species and the basis for a classification of this genus. It was followed by Thaler's (1968) treatise on the *Porrhomma* species of the Alps, which, although it dealt with a restricted geographical area, included critical remarks on most species-groups in a much wider context. During the intervening period of 28 years the taxonomy of Linyphiidae had evolved and several other characters had come into use to solve the problems of species recognition and classification. While Miller & Kratochvil still concentrated on genitalia, especially the tip of the embolus and the vulva, and the distribution of spines on the femora, Thaler included the position of the trichobothrium on metatarsus I, the range of somatic measurements, and the presence or absence of stridulating files on coxae I, as described by Locket & Millidge (1957) and even earlier by Bishop (1925). The enlarged set of characters allows a better characterisation of the species.

The problems are still numerous. They concern both species identification and classification. In no other genus within the Linyphiidae have so many subspecific entities been recognized. There are, I think, two reasons for this. In the first place the species of this genus show a considerable overall resemblance. In the second place there is a high degree of variability within the species.

Overall resemblance

The male palps have a characteristic, thin embolus, which is rigidly curved in a semi-circle. The lamella possesses an upper apophysis, which is curved or straight, sharp or blunt-tipped and lies in plane with the embolus. The organ is traditionally viewed from the tip (antero-mesal aspect) and the configuration of the embolus and the lamellar apophysis are described and depicted in detail in order to characterize the species. Other elements, such as the paracymbium, cymbium,

subtegulum, median apophysis and other parts of the lamella seem to be of no use.

The epigynes in *Porrhomma* species are all very similar: a central opening is bordered posteriorly by a median plate, which bears a socket-like impression. At either side of the opening the integument is sclerotized to some degree. Anteriorly the opening of the atrium is bordered by an elevated portion of the ventral integument, which is hardly sclerotized and often allows the recognition of a general outline of the internal parts (vulva). The opening may be more roundish or more square, the posterior median plate varies in the outline of its anterior border, and one may observe differences in the curvature of the anterior side of the opening. Despite all the small differences observed the epigynes look very much alike.

The vulval structures are of some help, especially in recognizing the species-groups. However, these structures also show a very generalized pattern, with the entrances of the ducts at the sides of the atrium, these ducts gradually passing from membranous into thick-walled and sclerotized at the turning-points. The receptacula seminis are slender, and their direction and shape (often bent at the tips) are of some diagnostic value.

Differences and variability

Despite the overall resemblances, diagnostic characters have been found in the genitalia and identifications will be based, finally, on the often very detailed differences found in these organs between the different taxonomic entities.

Early authors attached much value to the size and spacing of the eyes, because they noticed remarkable differences. *Porrhomma* species occur in and outside caves and show remarkable reactions to environmental conditions. Obligatory troglobionts show less pigmentation, longer legs and reduction of eyes. One should not think exclusively of underground spaces such as caves that are accessible to man, but also of crevices, burrows of other animals and cavities under large boulders. Some species may extend their range even into the leaf-litter stratum. Facultative cave-dwelling species show wide variability. Reduction of eyes starts with the anterior median eyes and by under-development of the eye-lenses. In epigeic species the eyes are of normal shape, with well-developed lenses and normal pigmented rings around them. For the above reasons, in many *Porrhomma* species both the size and spacing of the eyes is variable, and they are very susceptible to environmental changes. We know this phenomenon from other linyphiid genera, such as *Lepthyphantes* and *Troglohyphantes*. Deeleman-Reinhold (1978) describes the same phenomenon for *T. kordunlikanus* Deeleman-Reinhold, where the outside, leaf-litter inhabiting populations have larger eyes than the troglobitic populations. For *T. polyophthalmus*, *T. jamatus* and *T. typhlonetiformis* she mentions constant eye-sizes within each cave-dwelling population but differing from cave to cave (Deeleman-Reinhold, 1978: 186). In another case, *T. excavatus* Fage, there appear to be no apparent differences between populations out-

side caves and those that inhabit even the darkest parts of the caves. This shows how unstable this character is and, consequently, with how much reserve it should be used for the characterization of species. Sanocka (1982) devoted a paper to irregularities in the eye pattern in *Porrhomma moravicum* Miller & Kratochvil.

Two other types of characters used for species delimitation are the chaetotaxy of the legs and the position of the metatarsal trichobothrium on the first leg. As to the latter, this is more or less constant within the genus (c. 0.30-0.40) with only exceptionally larger values, e.g. 0.6 in *P. rosenhaueri* L. Koch (Wiehle, 1956: fig. 382, but 0.4 according to Locket & Millidge, 1953: 332), *P. errans* (Blackwall) (0.6, at least in my specimens from the Netherlands; but 0.4 according to Locket & Millidge, 1953: 334), and *P. pygmaeum convexum* (Westring) (0.38-0.48) and *P. p. myops* (Simon) (0.55-0.68) (Thaler, 1968: 372, but both Wiehle, 1956: 241, and Locket & Millidge, 1953: 330 give a value of 0.4 for *P. convexum*). Bourne (1977: fig. 2) presents a biometrical scatter diagram for Tm I values of *P. myops* (0.50-0.62), *P. convexum* (0.39-0.52) and *P. rosenhaueri* (0.35-0.38). From the above different values given by different authors one may infer that for this character, too, the values are not constant within their geographical range.

The chaetotaxy, as far as I could observe, is constant for the tibiae, viz., all tibiae have one d' and one d''-spine, while tibia I additionally has one l' and one l''-spine, and tibia II only one l''-spine. I have not seen any deviation from this pattern. Only one species appears

to have metatarsal spines, viz., *P. errans* (Blackwall) (at 0.2, on all metatarsi), a good specific character. The spination of the femora has been used (Locket & Millidge, 1953, and Wiehle, 1956) as a key character. However, femoral spination appears to be slightly variable. This is most distinct in the case of femur III, where a dorsal spine is sometimes present on one side but lacking on the opposite leg (observed in *P. lativela* Tretzel). Likewise femur II may vary within one specimen as to the presence of a d-spine (observed in *P. pallidum* Jackson and *P. errans* (Blackwall)) or the exceptional presence of a l'-spine (in *P. lativela* Tretzel). Femur I may occasionally have 2 d-spines instead of one, as observed in *P. lativela* and *P. microphthalmum* (O. P.-Cambridge), while in the latter species a second l'-spine has also been found. Thaler (1968) to some extent pays attention to this variation in chaetotaxy in the species covered by his publication.

The above characters which are, for whatever reason, subject to variation are not very suitable as diagnostic characters and, when used, may lead to wrong identifications or interpretations.

Genitalia

Which characters can be used then to diagnose the different species? As usual it is the combination of characters which offers the best support. The above, variable characters certainly may be used to enlarge the number of parameters used, but one should realize that they have a second-rate value. It appears that the

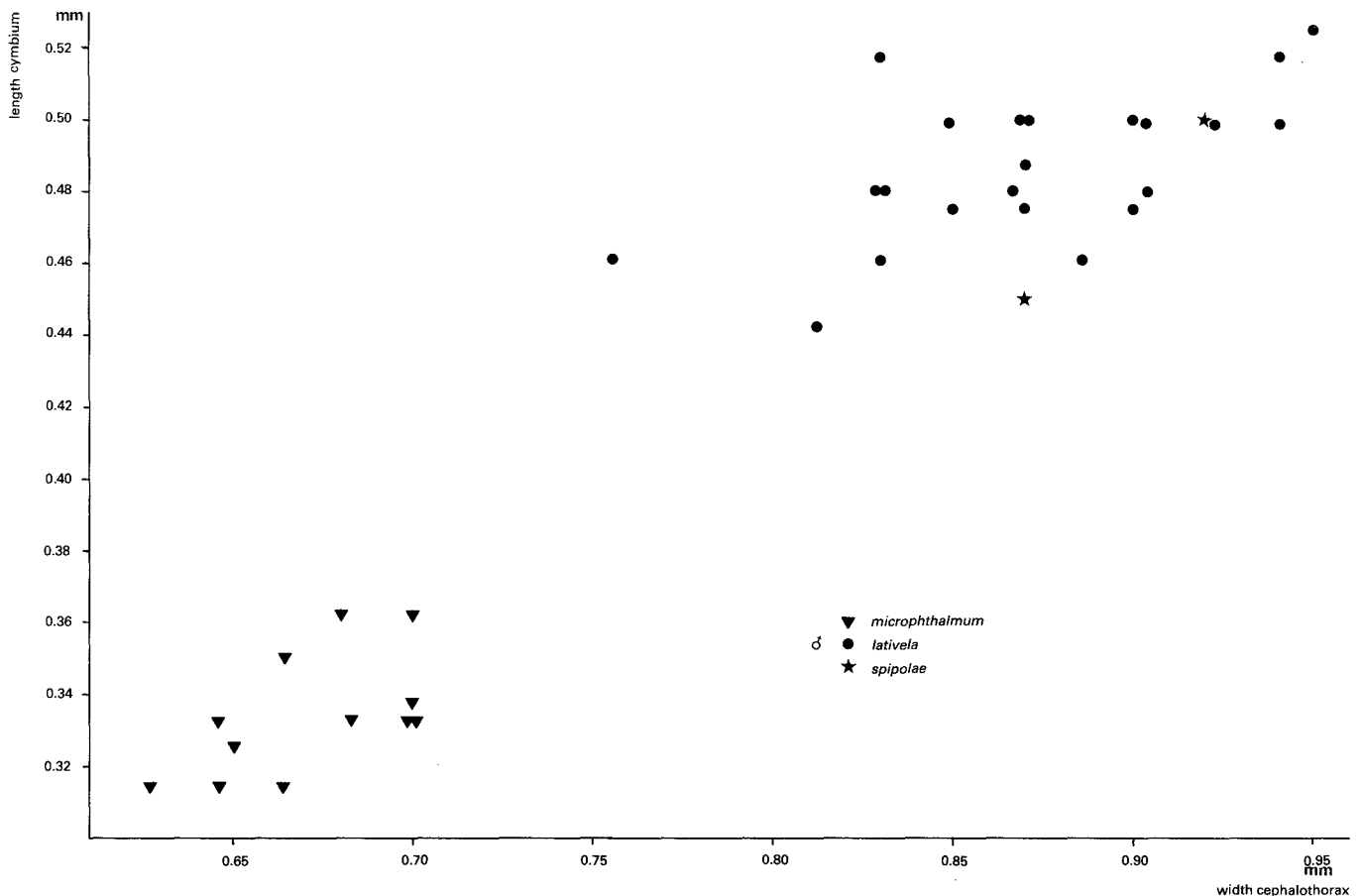


Fig. 1: Diagrammatic presentation of correlation between width of cephalothorax and length of cymbium for males of *Porrhomma microphthalmum* and *P. lativela*.

genitalia of the different species, although resembling each other in general outline, fall into different size-classes, even when the species are comparable in size. This can be visualized by plotting a somatic measurement, e.g. width of cephalothorax, against a genital measurement, e.g. width of epigyneal aperture or length of cymbium. This biometrical method has already been used with good results (Van Helsdingen, 1969: 63, 162, 163; 1970: 37, 38; and subsequent authors). Thaler (1983: 146, 147) introduced this practice in *Porrhomma* taxonomy and demonstrated, irrefutably in my opinion, that *P. microphthalmum* and *P. lativela* are distinct species.

For *P. lativela* I have found absolute values for the width of the epigyneal opening of 0.112-0.125 mm, for *P. campbelli* F. O. P.-Cambridge of 0.087-0.112 mm, for *P. pygmaeum* (Blackwall) 0.050-0.075 mm and for *P. microphthalmum* 0.062-0.075 mm. For the length of the cymbium the absolute values are: for *P. lativela* 0.47-0.52 mm, for *P. campbelli* 0.32-0.35 mm, for *P. pygmaeum* 0.28-0.30 mm, and for *P. microphthalmum* 0.32-0.36 mm. Those of *P. lativela* and *P. microphthalmum* have been added to Thaler's graphs (Thaler, 1983: figs. 2, 3) in order to demonstrate that the data presented by him are also valid outside the Alpine region (Figs. 1, 2). For other species the same method might be followed, but to my regret the available literature does not supply the relevant information. The length of the cymbium is never mentioned; the width of the epigyneal aperture at best can be taken from the illustrations (if the magnification is indicated), but the results thus obtained appear to be inaccurate. Moreover, the values thus found in most cases cannot be correlated with the selected somatic measurement of the same specimen (cephalothorax width). Just as the standard description of a linyphiid now comprises the position of the trichobothrium on metatarsus I, it should also consistently include the data requested above.

Diagnosis of *Porrhomma lativela*

Descriptions of specimens have been given by Tretzel (1956: 45, ♂) and Dobat (1969: 195, ♂), both with illustrations of the male palp, and Miller & Obrtel

(1975: 9, first description of female). Useful figures and some additional descriptive remarks have been supplied by Miller & Obrtel (1975: 9, pl. 1 figs. 1-7, pl. 2 figs. 8-10), Thaler & Plachter (1983: 257, figs. 20-22) and Thaler (1983: 146, figs. 102, 103, text-figs. 2, 3).

P. lativela is large for a *Porrhomma*. Measurements (in mm): Total length 2.4-3.0 (♀), 2.4-2.5 (♂); cephalothorax, length 1.05-1.27 (♀), 1.15-1.22 (♂), width 0.75-0.92 (♀), 0.85-0.95 (♂). Femur I 1.20-1.30 (♀), 1.05-1.20 (♂); tibia I 1.15-1.27 (♀), 1.05-1.15 (♂). Width of epigyneal opening 0.112-0.125, height of opening 0.085-0.100; length of cymbium 0.47-0.52. Femur I with one d-spine and one l'-spine (a second, lower d-spine exceptionally present), femur II with one d-spine (and exceptionally a l'-spine), femur III without or with a d-spine, but hardly ever on both sides. Tibial spines very slender, the basal (retro-) dorsal spine 2 diam. long or more; chaetotaxy of tibiae as given for genus. Metatarsi spineless; Tm I 0.32-0.37. Eyes small, PME slightly reduced; widely spaced. Epigyne large, wider than high, with strongly pigmented areas at either side (Fig. 3). The position of the internal ducts (of *microphthalmum*-configuration) usually visible through the integument anterior to the opening (Fig. 5). Male palp large; lamella with a conspicuous convex margin between slender, lightly curved and bluntly tipped dorsal apophysis and conical ventral protrusion. Embolus with a widened, pigmented, velum well below tip (Fig. 4).

The convex margin of the lamella is a very useful character, correctly indicated by Tretzel (1956: fig. 2), Miller & Obrtel (1975: pl. 2 fig. 9), Thaler & Plachter (1983: figs. 21, 22) and Thaler (1983: fig. 102). Some authors have devoted their attention first to the tip of the embolus, the membrane (conductor) and the dorsal apophysis of the lamella (e.g. Miller & Kratochvil, 1940).

Distribution and habitat

P. lativela specimens measured by me originated from southern Norway (leg. E. Hauge) and from the Netherlands. I have also seen specimens from Denmark (leg. S. Toft). *P. lativela* was described originally from Erlangen, Germany (Tretzel, 1956: 45)

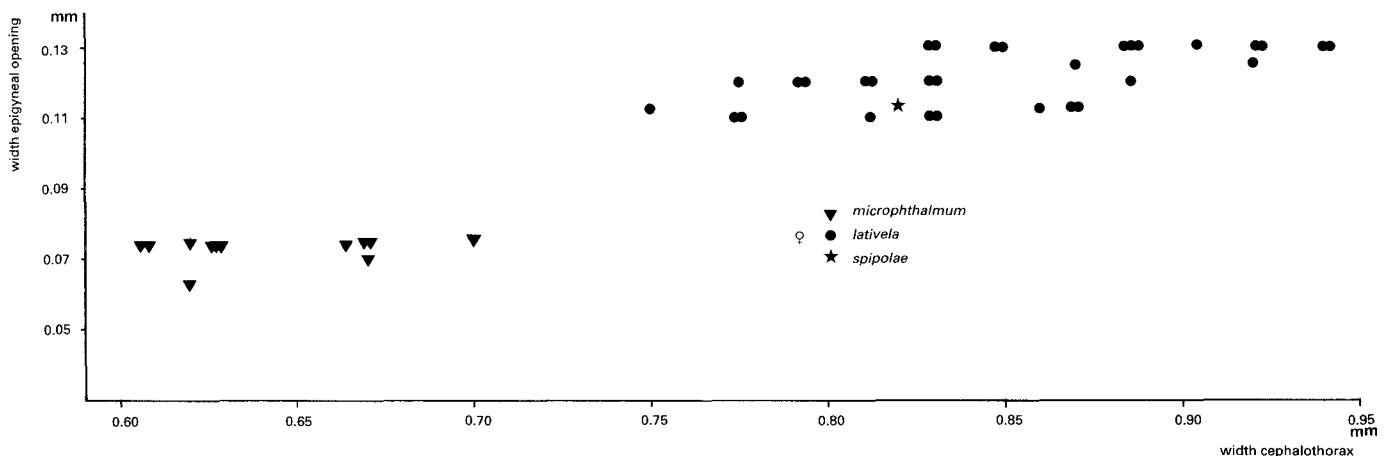


Fig. 2: Diagrammatic presentation of correlation between width of cephalothorax and width of epigyneal opening for females of *Porrhomma microphthalmum* and *P. lativela*.

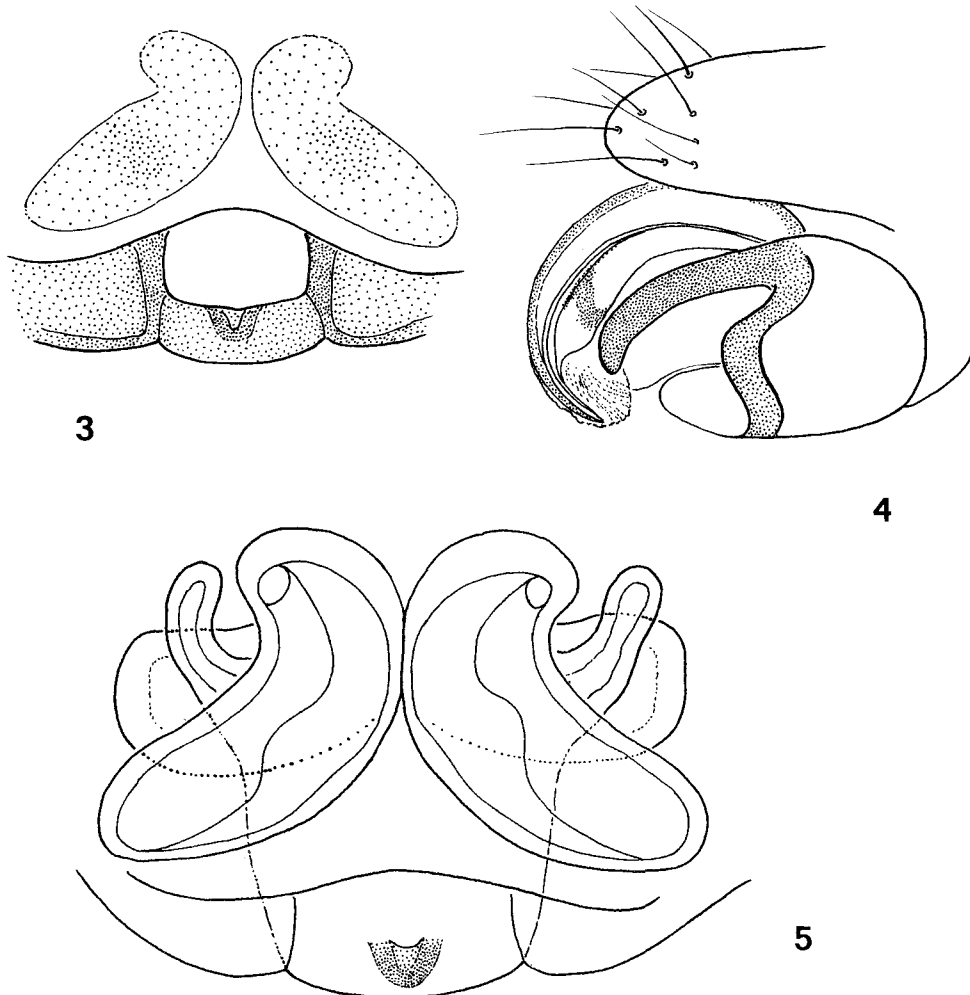
and has been found since in Czechoslovakia (Moravia) (Miller & Obrtel, 1975), Denmark (Toft, 1976), Austria (Thaler, 1983) and now in Norway and the Netherlands. A record of *P. microps* (Roewer) from Sweden (Holm, 1968: 190) suggests the occurrence of *P. lativela* in Sweden (Uppsala, on the wall of a house). These are all epigeic records, but the species has also been recorded from inside caves in Germany (Dobat, 1969, as *P. kolosvaryi*; Thaler & Plachter, 1983: 257), possibly Sweden (Gotland, in cave; Hippa, Koponen & Mannila, 1984) and Austria (Strouhal & Vornatscher, 1975: 450); Thaler (1983: 147) summarizes this as follows: "*lativela* könnte somit eine lokal gegen die Alpen vordringende Tieflandsart des ausseralpinen Mitteleuropa darstellen."

Tretzel's 1956 specimen came from an area with grass and some heather, with a sparse cover of mixed trees (pines and Aspen) (November-December). Miller & Obrtel (1975: 8) collected their Moravia specimens "in moist oak or mixed deciduous forests, living there in leafy litter, grass and detritus." The forest is classified elsewhere (p. 3) as a lowland forest of the Ulmeto-Fraxinetum carpinetosum type. In Denmark (Toft, 1976) the species was found in a 90-year-old Beech wood (*Fagus silvaticus* L.), where it occurred, again, in the leaf-litter stratum. Thaler (1983: 146), among others, mentions specimens from the

"Donauauen" in an area with Pedunculate Oak (*Quercus robur* L.) and Hornbeam (*Carpinus betulus* L.). In Norway *P. lativela* has been found (E. Hauge, in litt.) in mixed deciduous forest of *Acer*, *Alnus*, *Betula*, *Corylus*, *Pinus*, *Populus*, *Prunus*, *Quercus*, *Salix* and *Ulmus*, with a rich undergrowth of herbs.

In Holland it has been collected now for the first time. All specimens (1 ♀, 4 ♂) came from "Amelisweerd", a former country estate, now managed by the public authorities and maintained more or less in its original state, although some of its area has been sacrificed for the construction of a motor-road. The specimens were captured in pitfalls below *Rhododendron*, *Fraxinus*, *Quercus* and *Betula* between 5 May and 26 June 1973. As main undergrowth *Ranunculus ficaria* L. is mentioned, which indicates a moist, fertile soil. (All data supplied by the collector A. Noordam.)

One may rightly wonder why this species turned up so late in spider-history. The specific habitat is not particularly rare, nor has it escaped the attention of collectors. In my opinion it is most likely that the relatively new method of pitfall trapping brings this and other cryptically living species to light, while they easily escaped the collector's eye before. A recent expansion of the species' range is also theoretically possible, but there is no good case to be made out for this assumption and I therefore reject it.



Figs. 3-5: *Porrhomma lativela*. 3 Epigyne; 4 Embolic section of male palp; 5 Vulva, ventral view. 3, 4, $\times 160$; 5, $\times 210$.

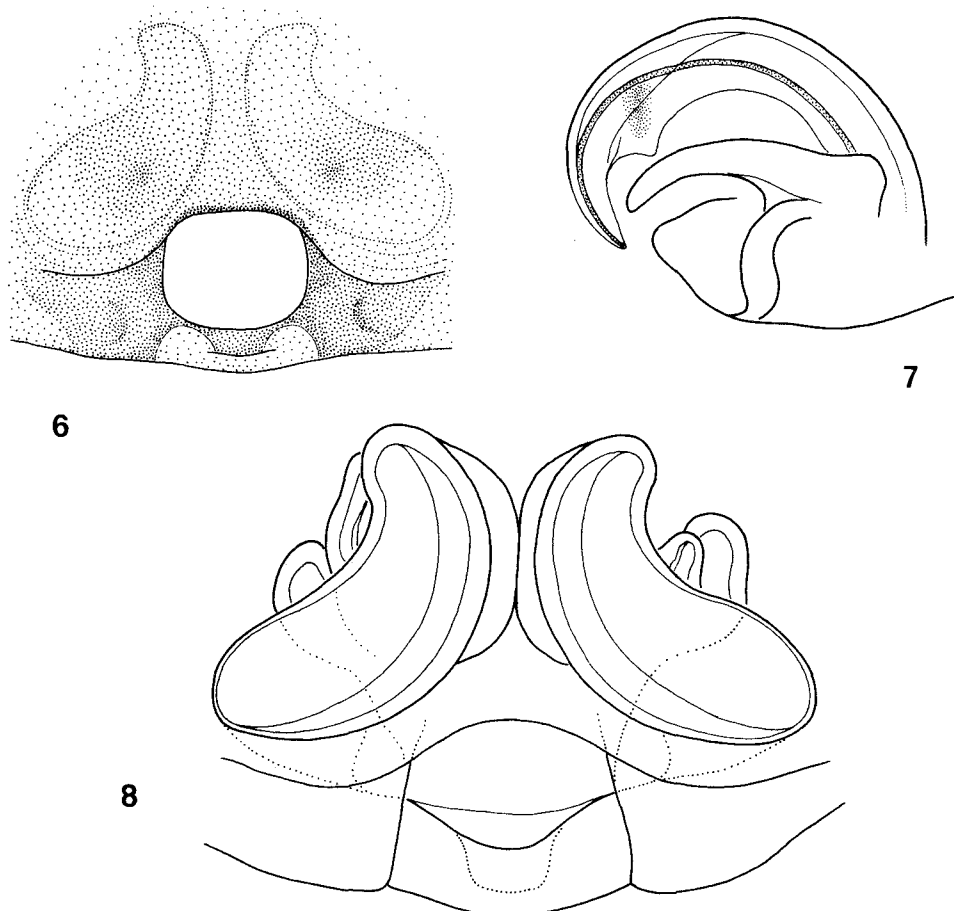
The position of *Porrhomma sipolae* Di Caporiacco

Di Caporiacco described (in Bianchi, Di Caporiacco, Massera & Valle, 1949: 500) a new *Porrhomma* species from the Grotta di Sipola near Bologna, collected there in March 1948. At the same time he corrects his earlier record of *P. microphthalmum* from the same cave, collected in July 1933 (Di Caporiacco, 1934: 395), which he now assigns to his new species. Although Tretzel (1956) mentions the paper by Bianchi *et al.* (1949) in his references, he does not refer to *P. sipolae* in the text. Thaler (1968: 384) lists *P. sipolae* among his "species inquirendae". Brignoli (1979: 27) finally synonymizes the species with *P. convexum* (Westring), a view he maintains in his recent catalogue (Brignoli, 1983) but I will not follow this here.

I have examined the type-specimens (2 ♂, 1 ♀) of *P. sipolae* in "La Specola" at Florence. I took measurements and made drawings of the genitalia, which I present here (Figs. 6-8). The species fits in the *microphthalmum* species-group of Miller & Kratochvil (1940: 169), which is characterized by the strongly developed and evenly curved ventral portion of the first loop of the duct in the vulva, and the preapically slightly widened and pigmented velum of the embolus. Thaler (1968: 384) recognizes two species in this species-group, viz. *P. rosenhaueri* (L. Koch) and *P. microphthalmum* (O. P.-Cambridge), the latter with four subspecies (the nominate form, *lativela* Tretzel,

microps Roewer and *profundum* Dahl). This is the subdivision of Tretzel (1956) with synonymies added. Recently Thaler (1983: 146) demonstrated that *microphthalmum* and *lativela* are distinct species, a conception that I fully support (Figs. 1, 2). This leaves the status of three (sub)species unsolved, viz., *microps*, *profundum* and *sipolae*. All three are troglobionts, but in different geographic regions, viz., the Carpathian Mountains (*profundum*), the Alpine offshoots in NE Italy and NW Yugoslavia (*microps*), and the Apennines (*sipolae*). *P. lativela*, finally, occurs as an optional cave-inhabitant in the so-called Fränkischer Jura in Germany (Nürnberg region) and Austria.

Tretzel (1956), when describing *P. microphthalmum lativela*, gave a thorough analysis of the differences between the four subspecies mentioned above. The reader is referred to that publication for details. Leaving out *microphthalmum*, which is now considered to be a distinct species, the main differences observed then concerned their size, the chaetotaxy of the femora, the sizes and spacing of the eyes, and details of the genitalia. New data in the literature deny the first difference as all three appear to be of the same size class. As to the chaetotaxy, I have indicated above how variable this character is. The only difference mentioned is the presence or absence of a d-spine on femur III. In *P. lativela* I regularly observed a d-spine on femur III on one side, while it was lacking on the opposite side. For that reason I do not attach much value to this character. It is well-known how variable



Figs. 6-8: *Porrhomma sipolae*. 6 Epigyne; 7 Vulva, ventral view; 8 Embolic section of male palp. 6, 8, $\times 170$; 7, $\times 225$.

the rate of reduction of eyes is in cave-dwelling spiders and I would never base any subspecific division on such a character.

The only morphological characters that remain then are the genitalia. I know *P. sipolae* from my own observation, but of the other two (sub)species I have only the descriptions and illustrations of the different authors at my disposal. With all the restrictions mentioned above, e.g. the magnifications not always being indicated or only showing a certain element (tip of embolus), one has not much to go by. A slightly different angle of observation, moreover, can give a different outline to an element. For the time being I follow the current view that *microps* and *profundum* are separate entities. *P. sipolae* has comparable status and is considered a separate entity for zoogeographical reasons. If one inserts the relevant data of *sipolae* into the biometrical diagrams (Figs. 1, 2), the specimens appear to fall well within the range of *lativela*. I would not be surprised if this would also hold for the two other "species". Since the view of a *microphthalmum* subspecies complex has been abandoned we had better restore the simple situation of a group of strongly related species, comprising the *microphthalmum* species-group: *rosenhaueri*, *microphthalmum*, *lativela*, *profundum*, *microps* and *sipolae*. Other taxa remain enigmatic: *fronsfrigidum* Drensky, *indecorum* Simon, *jacksoni* Simon, *subterraneum* Simon and *hungaricum* Loksa (see Thaler, 1975: 142).

It may be of help to future students to have available the illustrations of male and female genitalia of *sipolae* presented here (Figs. 6-8) and the following numerical data (all in mm).

Males: Total length 2.4 (and 2.6); cephalothorax, length 1.12 (1.25), width 0.87 (0.92). Length femur I 1.17 (1.27), length tibia I 1.15 (1.27). Tm I 0.35 (0.34). Position of d"-spine on tibia I 0.28 (0.27), length of spine 0.25 (0.25), diameter of tibia I at base of spine 0.10 (0.10). One specimen has dl' on femur I and d on femur II; the other specimen had dl' on the right femur I, but ddl' on the left side, and femur II with dl' (right) and dd (left). Length cymbium 0.45 (0.50).

Female: Total length 2.6; cephalothorax, length 1.12, width 0.82. Length femur I 1.25, length tibia I 1.22. Tm I 0.36. Position of d"-spine on tibia I 0.27, length of spine 0.25, diameter of segment 0.105. Eyes: PME 0.025 × 0.062 (longest axis parallel to midline animal); PME 0.062 apart and 0.087 from laterals; AME 0.037, separated from each other by 0.012 and from ALE by 0.090. Width of epigyneal aperture 0.112.

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