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IS META MENGEI BLACKWALL A VARIETY OF META SEGMENTATA (CLERCK)? (ARANEI — ARGIOPIDAE)

by

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Since 1870 it has been a matter of debate among araneologists whether *Meta mengei,* described by Blackwall in that year, and separated by him from *Meta segmentata* (Clerck, 1757), is a real species or only a variety.

In order to find an answer to this question I give an historical survey of the views of the most important authors concerning this matter, followed by a discussion of the peculiarities generally regarded as characters distinguishing the two species or varieties, and a short account of my own investigations.

1757. Clerck figures and describes a species of spiders of which in the beginning of September he observed a great number; he names it (*Araneus*) *segmentatus.*

1758. Linnaeus publishes a concise description of the same species and names it *Aranea reticulata.*

Further synonyms are to be found in Roewer (1942, pp. 915-916).

1862. Next to *Meta segmentata,* Westring distinguishes a species named by him *Meta albimacula* (Koch?), because in his opinion it is identical with Koch's *Zilla albimacula.*

1866. To his elaborate notes on *M. segmentata,* Menge adds an appendix about "eine neue art oder abart" (a new species or variety), referring to Westring's *M. albimacula.* He proves that this species is not identical with Koch's *Zilla albimacula* (= *Zilla diodia* Walckenaer), but he considers the differences from *M. segmentata* not sufficiently marked for a separate species and regards it as "eine kleinere abart" (a smaller variety).

1870. Blackwall, who in 1864 had given an account and a drawing of

Epeira inclinata (= *M. segmentata*), now elaborately describes the "variety" meant by Menge, regarded by him as a separate species, especially on account of the different times at which it appears; in honour of Menge he names it *Meta mengii.*

1870. Thorell considers the distinctive characters unimportant, and regards var. *β mengei* as "a smaller race of *M. segmentata*".

1873. Examining the spider more closely, Thorell states that it is "a good species": *M. mengei.*

1874. Simon judges the distinguishing marks not distinct and not constant; he concludes to var. b (= *Epeira mengei* Blw.).

1879-1885. Hermann (1879), Pickard Cambridge (1881), Dahl, Bertkau, and Karsch (1885) consider *M. mengei* the spring brood of *M. segmentata.* Some later authors are of the same opinion, others consider the former only a variety of the latter.

1901. Bösenberg again regards *M. mengei* as a distinct species, and gives descriptions and drawings of the two species, including the distinctive details.

1929. Berland and Fage (2nd edition of Simon's treatise) provisionally regard *M. mengei* as a variety of *M. segmentata* but not as the spring brood, for also in the autumn specimens of *mengei* are known to occur beside *segmentata.* In their opinion closer investigations, and especially breeding experiments are necessary to elucidate the relation.

1931. Wiehle holds the same opinion, and uses the name *M. reticulata* var. *mengei.*

1934. Kolosváry lists *M. mengei* as a distinct species because of constant differences (without transitions) in the genital organs (he does, however, not give exact details), and because *M. segmentata,* that is known to live in the wooded areas of Hungary, was not to be found in the "waldarme Gegenden" (not wooded areas) of that country, in which *M. mengei* is one of the commonest spiders.

1939. Bristowe does not even mention *M. mengei* in his catalogue of the species of Great Britain and Ireland: so he regards it at most as a variety.

1943. Drensky records *M. reticulata* and *M. reticulata mengei.*

The following peculiarities are mentioned to distinguish the two "species" (cf. in detail: Simon, 1929, pp. 652-654; Wiehle, 1932, pp. 119-124):

a) *M. mengei* is adult about May, *M. segmentata* about August; Berland and Fage (2nd edition of Simon's treatise) (1929, p. 654), however, remark that *M. mengei* is found in August too; Denis (1950, p. 103) came across adult ♀♀ of both forms in the second part of July; van der Hammen told me that once in early October he found two adult ♂♂ of *M. mengei* at a

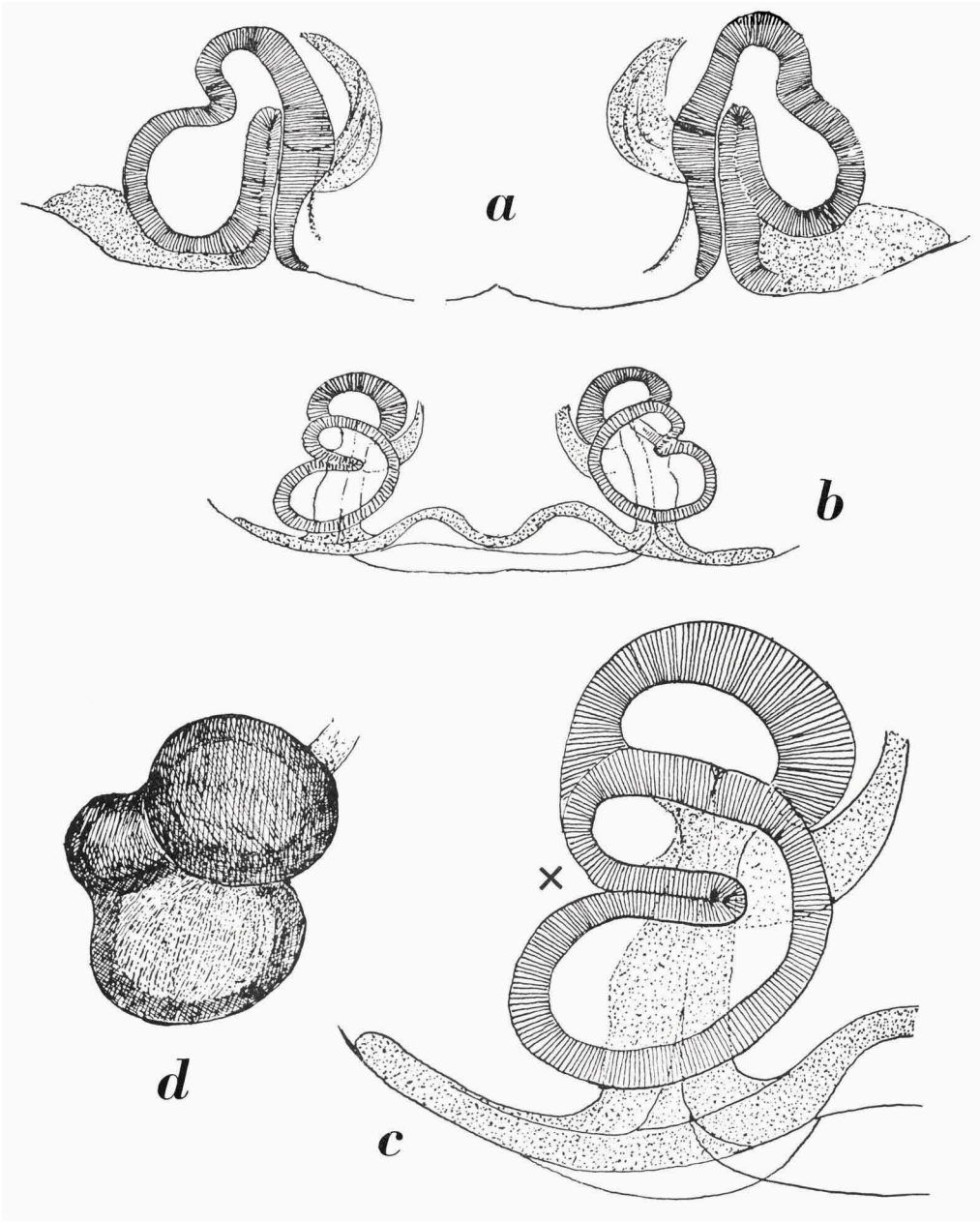

Fig. 1. a, vulva of *Meta segmentata* (Clerck); b, vulva of *Meta mengei* Blackwall; c, left part of fig. 1 b; d, the same part, freshly dissected, obliquely from above. a, b, × 160; c, × 480; d, × 300.

short distance from each other in the same wood. The opinion that *mengei* might be the spring brood of *segmentata* is also refuted by the fact that in August, when *segmentata* has just become adult, young specimens of *mengei* are already numerous.

b) *M. mengei* is distinctly smaller than *M. segmentata,* viz., ♀ 5 mm, ♂ 3.5-4.5 mm, whereas in *M. segmentata* the dimensions are ♀ 6.5-9, ♂ 7-7.5 mm.

c) In the undermost part of the dark band at the ventral side of the abdomen *M. mengei* possesses two white spots, which are absent in *M. segmentata.*

d) The middle part of the epigyne has a dark margin in *M. mengei,* in *M. segmentata* this margin is light (cf. figures in Wiehle, 1932, pp. 119, 123).

e) The broad chitinous band on the male palp (Osterloh, 1922, p. 361 calls it a modified retinaculum) narrows towards the end in *M. mengei,* in *M. segmentata* it becomes wider (cf. figures 2a, b; 3 a-d). The apophysis at the base of the tarsus of the male palp (Osterloh, 1922, p. 421 calls it "Schiffchenretinulum") in *M. mengei* has a median rounded excrescence; in *M. segmentata* this excrescence is obtuse and situated near the base. According to Simon (1874, p. 149) this character is not constant.

f) On the metatarsus of the first leg of the male of *M. mengei* there are strikingly long hairs which protrude perpendicularly (trichobothria), in *M. segmentata* these hairs are short (cf. figures in Wiehle, 1932, pp. 121, 124).

As mentioned above, neither Berland & Fage nor Wiehle consider these distinctive characters sufficiently marked to decide the question, both point to the fact that further research is required, especially breeding experiments.

As far as I could ascertain none of these investigations have been done. Further researches on the sexual organs were made by von Engelhardt (1910) and by Osterloh (1922) only with regard to *M. segmentata.* Osterloh's figures of the vulva, however, (l.c., pp. 376, 377) are very poor, that of von Engelhardt (l.c., p. 40) is slightly better, but it does not clearly show the inward structure. Osterloh's figures of the male palp in normal position and at the moment of copulation (l.c., pp. 359-363), are very good but they do not show the differences between this species and *M. mengei*—which, as a matter of fact, was not his intention.

I prepared a great number of microscopic slides of vulvae and palps of the two animals concerned, and examined them closely. The vulvae were for a short time put in a strong solution of caustic potash, and then via xylol enclosed in Canada balsam or transferred into lactic acid. During some minutes the palps were treated with almost boiling acetic acid; the

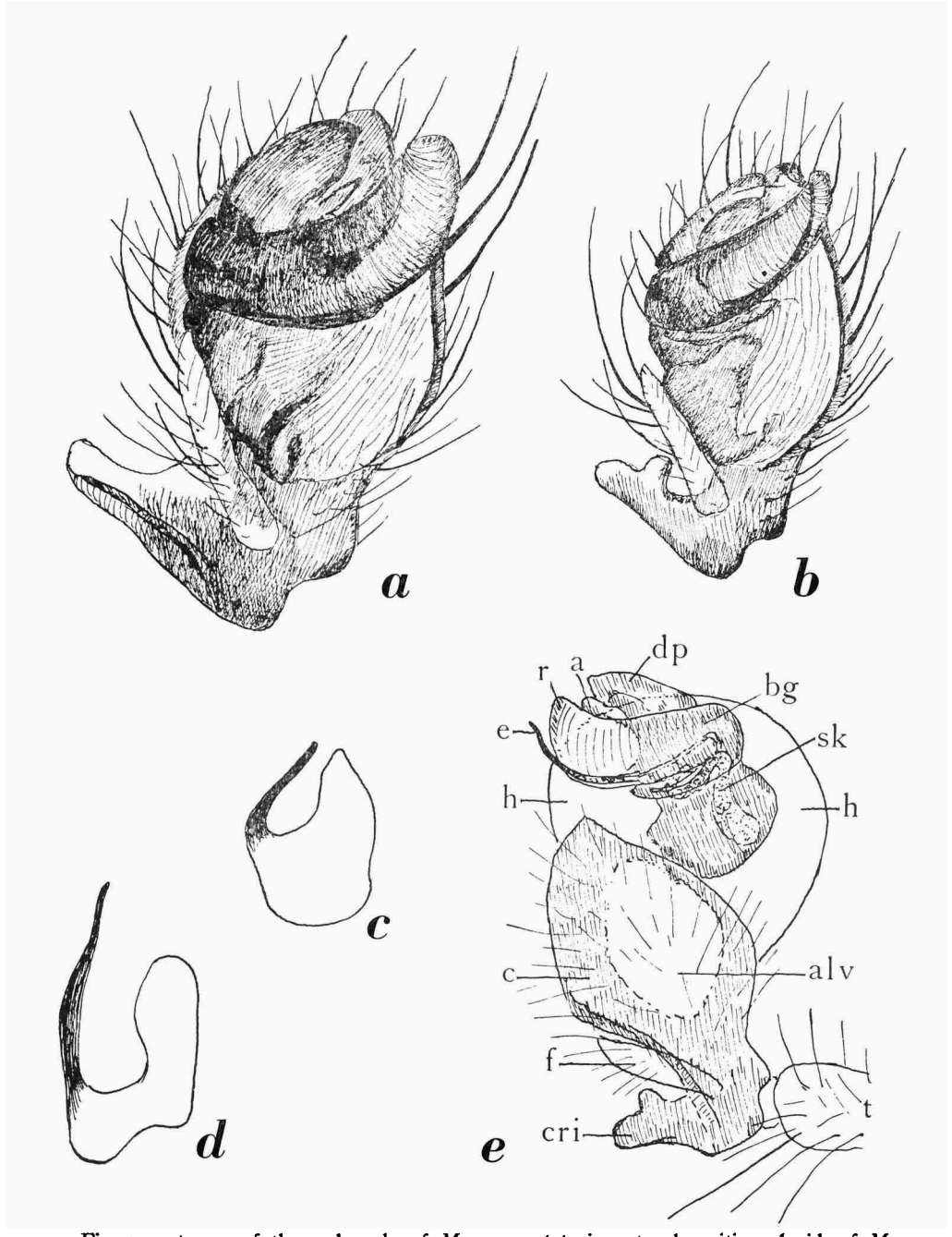

Fig. 2. a, tarsus of the male palp of *M. segmentata* in natural position; b, id. of *M. mengei;* c, tongs-shaped organ with embolus and arm of *M. segmentata*; d, id. of *M. mengei;* e, tarsus of the male palp of *M. mengei* in uncoiled position. a, arm of the tongs-shaped organ; alv, alveolus; bg, bulbus genitalis; c, cymbium; cri, retinulum of the cymbium ("Schiffchenretinulum"); dp, covering plate ("Deckplatte"); e, embolus; f, appendix of the cymbium ("Fortsatz am Schiffchen"); h, haematodocha; r, modified retinaculum; sk, sperm canal; t, tibia. a, b, × 80; c, d, × 112; e, × 62.

haematodocha then swells, and the parts of the palp expand; this position resembles that during copulation. Afterwards the palps were put into a mixture of acetic acid and glycerine or into lactic acid, leading to slight shrinking, but all separate details remain sufficiently distinguishable.

Vulva (fig. 1). In the two species each half of the vulva consists of two receptacula seminis, which are situated over each other and closely connected. In *M. segmentata* the two receptacula together constantly have a pear-shape; the upper receptaculum is considerably smaller than the lower, lies immediately over it, and is connected with it by a straight neck. The chitin of the two receptacula is thick and rather dark. The entrance canal ("Einführungsgang", von Engelhardt, l.c., p. 40) to the upper receptaculum, lies near the lower receptaculum, at its median side. In fig. 1 a, a combination of two different vulvae, at the left side the common situation is represented, whilst at the right a vulva has been drawn in which, on account of a slight distortion of the lower receptaculum, the entrance canal has become more distinctly visible.

In *M. mengei* each half of the vulva consists of two receptacula of about equal size; the upper, considerably darker and more strongly chitinized than the lower, lies obliquely over the lower, slightly backwards; the two receptacula are connected by a broad neck that is not straight as in *M. segmentata,* but curved and turned towards the lateral surface. The entrance canal to the upper receptaculum is curved along the inner surface of the lower receptaculum. In the majority of the Canada balsam slides the lower receptaculum presents a strong fold of variable development (× in fig. 1 c); in fresh dissections this fold is hardly to be seen, in the slides it must be caused by the pressure of the cover-glass on the tripartite organ resulting into a slight disfiguring of the weakly chitinized lower receptaculum.

Palp (figs. 2, 3). For the different parts I use the nomenclature of Osterloh because this is easiest for comparison. Fundamentally the palps of the two species are alike, but they show some clear differences:

a) In *M. segmentata* the bulbus genitalis is more strongly chitinized than in *M. mengei.*

b) In uncoiled position the difference in the chitinous band mentioned above (r) is more pronounced than in normal position.

c) In *M. segmentata* the "Deckplatte" (covering plate) is wrinkled, rather strongly chitinized, and clearly marked off from the membranous parts; the shape is like the bulb of a tulip. In *M. mengei* it is wrinkled too, but far less chitinized, and it nearly imperceptibly passes into the membranous parts; the shape differs strongly from that of *M. segmentata.*

d) In *M. segmentata* the embolus is short, strongly curved at the base,

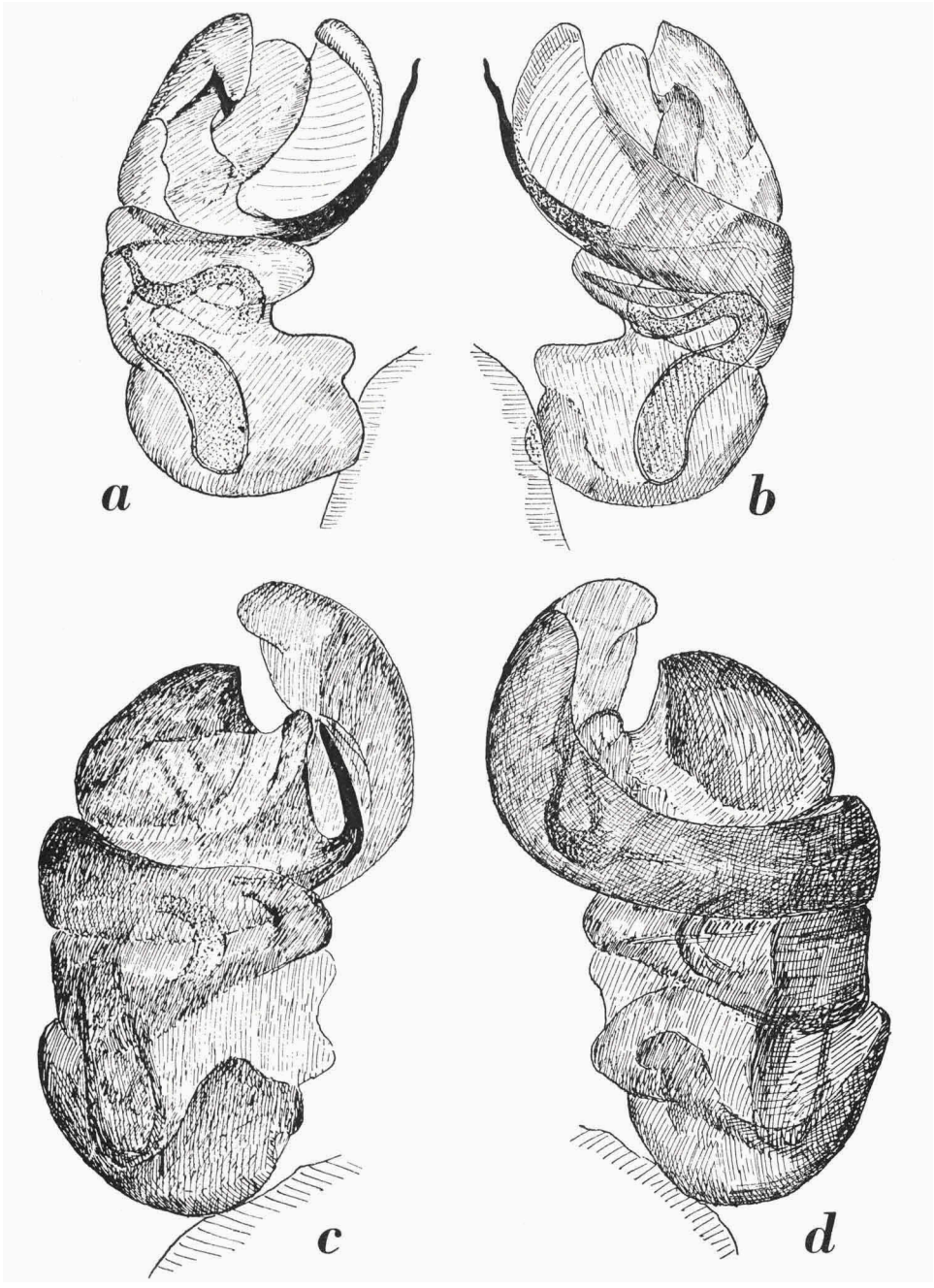

Fig. 3. a, bulbus genitalis of *M. mengei*; b, id. from the opposite side; c, bulbus genitalis of *M. segmentata*; d, id. from the opposite side. × 112.

but further on it is straight; in *M. mengei* it is long, slightly curved, and somewhat corrugated. Even in normal position these differences can be seen through the more or less transparent r; the here mentioned peculiarities are vaguely indicated by Wiehle in his drawings (1932, pp. 120, 123, 124).

e) The "tongs-shaped organ", of which the embolus forms one arm and the linguiform plate the other—according to Osterloh the last named is either a stemaretinaculum or a conductor (l.c., p. 363)—in *M. segmentata* is shorter but thicker than in *M. mengei.*

I could not find any distinct difference either in the number and the position of the spines or in the number, the position, and the length of the trichobothria, except the difference mentioned above sub f). When measuring the different parts of the legs, I observed that in the two species the mutual ratio of their length is not completely identical, but the differences are small and not sufficiently constant.

Owing to the kindness of Dr. W. Hackman (Helsingfors, Finland) and Dr. H. Homann (Göttingen, Germany) I was able to compare a number of adult ♀♀ and ♂♂ of *M. mengei* (Helsingfors, 15-6-1952) and of *M. segmentata* (Tvärminne, 26-8-1952; Oldenburg, 11-10-1952; Göttingen, 15-9-1952 and 12-10-1952) with specimens from my own country. The genital organs of the Finnish and the German specimens in both species are exactly alike to those from the Netherlands. Specimens from other countries were not available.

Taking into account the distinct and constant differences in fundamental parts of the copulatory organs (receptacula seminis and embolus with immediate surroundings)—differences greater than sometimes occurring between two species in other genera—considering, moreover, the other differences which have been known for a long time, it appears fully justified to conclude that *M. mengei* Blackwall is a distinct species and not a variety of *M. segmentata* (Clerck).

Because it is certain that *M. mengei* is not the spring brood of *M. segmentata,* as shown above, it was not thought worth while to make breeding experiments, as these would not have yielded results useful for an elucidation of our problem. Moreover, attempts for hybridization do not seem to promise results bearing on the question of the status of the two forms as species or varieties. It is highly probable that, on account of the striking differences in the copulatory organs of the two forms, hybridization will prove to be altogether impossible.

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