

## The genus *Enoplognatha* Pavesi, 1880 in the Mediterranean region (Araneae: Theridiidae)

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### Summary

In a revision of 28 valid European and North African *Enoplognatha* species, seven new species are described: *Enoplognatha verae* n. sp., *E. mariae* n. sp., *E. gemina* n. sp., *E. carinata* n. sp., *E. hermani* n. sp., *E. gershomi* n. sp. and *E. almeriensis* n. sp., as well as the previously unknown males of *E. biskrensis* Denis, 1945 and *E. quadripunctata* Simon, 1884. The following new synonyms and status are proposed: *Theridium mansuetum* L. Koch, 1882 = *Enoplognatha mandibularis* (Lucas, 1846); *E. mandibularis nigrocincta* Simon, 1884 = *E. mandibularis* (Lucas, 1846); *E. thoracicoides* Nosek, 1905 = *E. quadripunctata* Simon, 1884; *E. ambigua* Kulczyński, 1894, *E. jacksoni* Schenkel, 1927 and *E. hungarica* Kolosváry, 1934 = *E. serratosignata* (L. Koch, 1879); *E. robustula* Roewer, 1942 = *E. diversa* (Blackwall, 1859); *Robertus cottarellii* Brignoli, 1980 = *Enoplognatha testacea* Simon, 1884. The following previously proposed synonyms are rejected: *E. quadripunctata* Simon, 1884 = *E. thoracica* (Hahn, 1831) (Levy, 1957); *E. biskrensis* Denis, 1945 = *E. quadripunctata* Simon, 1884 (Levy & Amitai, 1981); *E. biskrensis* Denis, 1945 = *E. testacea* Simon, 1884 (Wunderlich, 1995b).

The following new status of an Asian species is proposed: *E. mandibularis orientalis* Schenkel, 1963 = *E. orientalis* Schenkel, 1963.

### History

The genus *Enoplognatha* Pavesi is one of the most unpopular spider genera among arachnologists, because of the difficulty of species identification.

In the first descriptions of *Enoplognatha* species, specimens were identified using two characters: abdominal pattern and male cheliceral dentition. Specimens with a whitish abdomen with black or reddish spots and with one large cheliceral tooth were identified as *E. ovata* (Clerck, 1757). Specimens with an abdominal folium and with two large, equal cheliceral teeth were identified as *E. mandibularis* (Lucas, 1846). Specimens with indistinct whitish spots or a uniformly dark abdomen and with two unequal cheliceral teeth were identified as *E. thoracica* (Hahn, 1831). Finally, some species were separated from all others by their peculiar cheliceral dentition: *E. nigromarginata* (Lucas, 1846), *E. mordax* (Thorell, 1875) and *E. tecta* (Keyserling, 1884). These were recognised as separate species before the end of the 19th century. Some species were described more than once and thus have numerous synonyms: *E. crucifera* (Thorell, 1875), *E. schaufussi* (L. Koch, 1882) and *E. maritima* Simon, 1884, all synonyms of *E. mordax*, and *E. caricis* sensu Simon, 1884 (not *E. caricis* (Fickert, 1876)), a synonym of *E. tecta*.

Several described variations of *E. ovata* were based on colour patterns of the abdomen and appeared to be of no taxonomic importance. It was not until the studies of Hippa & Oksala (1982, 1983) that it became evident that the species generally called *E. ovata* was in fact a species group, composed of four species, three of which they described as new: *E. latimana*, *E. penelope* and *E. afrodite*. This species group appears to be satisfactorily known at the moment. It was surprising to see that, even in countries such as Great Britain and Belgium where the arachnofauna is well known, species with such different palps and epigynes as *E. ovata* and *E. latimana* had always been regarded as the same species.

Specimens with an abdominal folium and with two large cheliceral teeth in the male were generally called *E. mandibularis*. This species was said to be common all over Europe. Simon (1914) thought he recognised two subspecies, the nominal one and *E. mandibularis nigrocincta*. Two species described from the Canary Islands, *E. diversa* (Blackwall, 1859) and *E. sattleri* Bösenberg, 1895, were thought to be endemic to those islands. Some other species resembling *E. mandibularis* were described, but it took a long time before they were correctly diagnosed, or they never were at all. One of these is the Central European *E. oelandica* (Thorell, 1875). In volume 2 of Locket & Millidge's *British Spiders* (1953), the presence of *E. mandibularis nigrocincta* in England was cited. Later (Merrett & Snazell, 1975) it was pointed out that this was not *E. mandibularis nigrocincta* but *E. oelandica*, which occurs also in France, Belgium and the Netherlands. There are several other species resembling *E. mandibularis*, but these are mostly known only from their original descriptions and their type localities: *E. ambigua* Kulczyński, 1894 from Hungary, *E. hungarica* Kolosváry, 1934 from Hungary, *E. jacksoni* Schenkel, 1927 from Switzerland, *E. mansueta* (L. Koch, 1882) from Mallorca, *E. robusta* Simon, 1884 (= *E. robustula* Roewer, 1942) from Greece, and *E. serratosignata* (L. Koch, 1879) from Siberia. Recently some additions were made to the species group with a dorsal folium. Wunderlich (1995b) described *E. franzi* from Spain, and Levy & Amitai (1981) described *E. deserta* and *E. macrochelis*, and they redescribed what they thought to be *E. mandibularis*.

The specimens with a uniform or spotted abdomen were called *E. thoracica*. Simon (1884b) distinguished some related species: *E. quadripunctata* Simon, 1884 and *E. testacea* Simon, 1884; the former has generally been considered a synonym of *E. thoracica* and the latter appears to be a widespread Mediterranean species. As its name indicates, *E. thoracicoides* Nosek, 1905 from Turkey is another related species, but only the female is known and it has never been rediscovered. Another enigmatic species of this group is *E. biskrensis* Denis, 1945, which was synonymised with *E. quadripunctata* by Levy & Amitai (1981) but with *E. testacea* by Wunderlich (1995b). Recently described members of this group are *E. parathoracica* Levy & Amitai, 1981 and *E. mediterranea* Levy & Amitai, 1981.

No further proof is needed to conclude that the genus *Enoplognatha*, except for the *ovata* group, is badly in

need of revision. Correct descriptions, based on the examination of type material or if necessary with designation of neotypes, are necessary. Such a revision is presented here.

### Material and methods

The characters used in this paper to diagnose species are cheliceral dentition and shape of palpal sclerites in the male, and shape of the epigyne, spermathecae and copulatory ducts in the female.

Several different sclerites can be distinguished in the male palp (Figs. 98, 99). The main part is the tegulum, containing the sperm reservoir, from where a wide duct runs to the embolus. As it turns towards the antero-medial part of the bulbus, the duct suddenly narrows to enter a membranous part, connecting the tegulum to the distal part of the bulbus. This membranous part is supported by a semicircular, dorsal sclerite, of which only the distal parts are not covered by the cymbium; its base is visible in ventral view at the mesal side of the bulbus, its tip at the anterolateral side of the bulbus, mostly covered by other sclerites. It is generally termed the **radix**. The radix for half its length supports the sperm duct on its course to the base of the embolus. From the median part of the radix, situated at the anteromedial side of the bulbus, several sclerites originate: the **median apophysis**, protruding in a posterior direction and protecting the embolus at rest; the **conductor**, protecting the tip of the embolus and guiding the embolus during copulation; an **accessory apophysis** (not present in all species), situated at the dorsomesal side of the conductor; and the **embolus**.

There has been some confusion in the past concerning the definition of the median apophysis and the radix. The terminology applied by Levi (1957, 1962) was corrected by the same author in 1968 in a paper on Araneidae. Median apophysis and radix were used correctly by Levy & Amitai (1981) and Hippa & Oksala (1983), but in the incorrect, reversed sense by Hippa & Oksala (1982) and Wunderlich (1995b), following Levi (1957, 1962).

All measurements are in mm. Scale lines equal 0.5 mm for the chelicerae, and 0.2 mm for all genital structures.

Abbreviations: AMNH=American Museum of Natural History; CCD=collection Christa Deeleman; CHV=collection Herman Vanuytven; CJB=collection Jan Bosselaers; CJFM=collection John and Frances Murphy; CJvK=collection Johan Van Keer; CMP=collection Magdalena Perez; CPP=collection Piet Poot; CPS=collection Paul Selden; CRB=collection Robert Bosmans; CRJ=collection Rudy Jocqué; HUI=Hebrew University of Jerusalem; IRSNB=Institut royal des Sciences naturelles de Belgique, Bruxelles; IZPAN=Instytut Zoologiczny, Polska Akademia Nauk, Warsaw; MNHNP=Muséum national d'Histoire naturelle, Paris; MRAC=Musée royal de l'Afrique centrale, Tervuren; MNZHB=Museum für Naturkunde Zentralinstitut der Humboldt-Universität, Berlin; NHML=Natural History Museum, London; NMB=Naturhistorisches

Museum, Wien; NMS=Naturhistorisches Museum, Basel; NMS=Naturmuseum Senckenberg, Frankfurt am Main.

We tried to examine as much material as possible. It appeared that many specimens were incorrectly identified. Citations and older distribution data thus cannot be trusted; all this material should be re-examined. Only citations of recently described species or readily distinguished species are therefore mentioned in the text.

The following *Enoplognatha* species are treated in this paper (valid species are in bold):

- Enoplognatha afrodite*** Hippa & Oksala, 1983: p. 211  
*Enoplognatha ambigua* Kulczyński, 1894: p. 236  
*Enoplognatha arganoi* (Brignoli, 1980): p. 222  
***Enoplognatha biskrensis*** Denis, 1945: p. 220  
*Enoplognatha caricis* (Fickert, 1876): p. 215  
*Enoplognatha corollata* (Bertkau, 1883): p. 224  
*Enoplognatha cottarellii* (Brignoli, 1980): p. 222  
*Enoplognatha crucifera* (Thorell, 1875): p. 213  
***Enoplognatha deserta*** Levy & Amitai, 1981: p. 230  
***Enoplognatha diversa*** (Blackwall, 1859): p. 226  
***Enoplognatha franzi*** Wunderlich, 1995: p. 224  
*Enoplognatha hungarica* Kolosváry, 1934: p. 236  
*Enoplognatha jacksoni* Schenkel, 1927: p. 236  
***Enoplognatha latimana*** Hippa & Oksala, 1982: p. 212  
***Enoplognatha macrochelis*** Levy & Amitai, 1981: p. 229  
***Enoplognatha mandibularis*** (Lucas, 1846): p. 231  
*Enoplognatha mandibularis nigrocincta* Simon, 1884: p. 232  
*Enoplognatha mandibularis orientalis* Schenkel, 1963: p. 234  
*Enoplognatha mansueta* (L. Koch, 1882): p. 231  
*Enoplognatha maritima* Simon, 1884: p. 213  
***Enoplognatha mediterranea*** Levy & Amitai, 1981: p. 223  
***Enoplognatha mordax*** (Thorell, 1875): p. 213  
***Enoplognatha nigromarginata*** (Lucas, 1846): p. 214  
*Enoplognatha oelandica* (Thorell, 1875): p. 224  
***Enoplognatha orientalis*** Schenkel, 1963: p. 234  
***Enoplognatha ovata*** (Clerck, 1757): p. 212  
***Enoplognatha parathoracica*** Levy & Amitai, 1981: p. 220  
***Enoplognatha penelope*** Hippa & Oksala, 1982: p. 212  
***Enoplognatha quadripunctata*** Simon, 1884: p. 218  
*Enoplognatha robusta* Simon, 1884: p. 226  
*Enoplognatha robustula* Roewer, 1942: p. 226  
***Enoplognatha sattleri*** Bösenberg, 1895: p. 224  
*Enoplognatha schaufussi* (L. Koch, 1882): p. 213  
***Enoplognatha serratosignata*** (L. Koch, 1879): p. 236  
***Enoplognatha tecta*** (Keyserling, 1884): p. 215  
***Enoplognatha testacea*** Simon, 1884: p. 222  
***Enoplognatha thoracica*** (Hahn, 1831): p. 216  
*Enoplognatha thoracicoides* Nosek, 1905: p. 218  
*Enoplognatha vicina* (Lucas, 1846): p. 231

The following species are newly described:

- Enoplognatha verae*** n. sp.: p. 213  
***Enoplognatha mariae*** n. sp.: p. 215  
***Enoplognatha gemina*** n. sp. (*E. mandibularis* sensu Levy & Amitai, 1981): p. 235  
***Enoplognatha carinata*** n. sp.: p. 237  
***Enoplognatha hermani*** n. sp.: p. 229  
***Enoplognatha gershomi*** n. sp.: p. 231  
***Enoplognatha almeriensis*** n. sp.: p. 231

According to Simon (1929: 754), followed by Roewer (1942), *Zilla gigas* Franganillo, 1913 is probably an *Enoplognatha* species. In his most inadequate description, Franganillo mentions the presence of spines on the femora. The femora of *Enoplognatha* species never possess spines, hence *Zilla gigas* cannot be an *Enoplognatha* species.

We will not discuss Wunderlich's (1995a) description of *Enoplognatha militaris*, based on two specimens with expanded palps.

## Groups

Considering morphological (mainly based on males) as well as ecological characters, the species treated in this paper can be classified in the following groups:

### *ovata* group:

*Diagnosis:* Male chelicerae with one large tooth; abdomen predominantly white; legs long, in females femur I 1.7–2.1 times as long as cephalothorax; living on low bushes and in herbage.

*Species included:* *E. afrodite* Hippa & Oksala, *E. latimana* Hippa & Oksala, *E. ovata* (Clerck), *E. penelope* Hippa & Oksala, *E. verae* n. sp.

### *nigromarginata* group:

*Diagnosis:* Male chelicerae, apart from teeth in fang groove, with anterior and posterior teeth; abdomen with dorsal folium; legs moderately long, in females femur I 1.1–1.4 times as long as cephalothorax; living in herbage and in ground layer.

*Species included:* *E. mariae* n. sp., *E. mordax* (Thorell), *E. nigromarginata* (Lucas), *E. tecta* (Keyserling).

### *diversa* group:

*Diagnosis:* Male chelicerae with two, rarely three teeth in fang groove; abdomen with dorsal folium; legs relatively short, in females femur I 0.8–1.2 times as long as cephalothorax; male palp with poorly developed accessory apophysis and large conductor; living in ground layer.

*Species included:* *E. almeriensis* n. sp., *E. deserta* Levy & Amitai, *E. diversa* (Blackwall), *E. franzi* Wunderlich,

*E. gershomi* n. sp., *E. hermani* n. sp., *E. macrochelis* Levy & Amitai, *E. oelandica* (Thorell), *E. sattleri* Bösenberg.

### *thoracica* group:

*Diagnosis:* Male chelicerae with two large unequal teeth; abdomen uniformly dark grey to black or with pattern of white or greyish-white spots; legs relatively short, in most species females with femur I shorter than length of cephalothorax; living in ground layer.

*Species included:* *E. biskrensis* Denis, *E. mediterranea* Levy & Amitai, *E. parathoracica* Levy & Amitai, *E. quadripunctata* Simon, *E. testacea* Simon, *E. thoracica* (Hahn).

### *mandibularis* group:

*Diagnosis:* Male chelicerae with two large equal or unequal teeth; abdomen with dorsal folium; legs relatively short, in females femur I 0.8–1.1 times as long as cephalothorax; male palp with accessory apophysis and conductor as two large, parallel sclerites; living in ground layer.

*Species included:* *E. carinata* n. sp., *E. gemina* n. sp., *E. mandibularis* (Lucas), *E. orientalis* Schenkel, *E. serratosignata* (L. Koch).

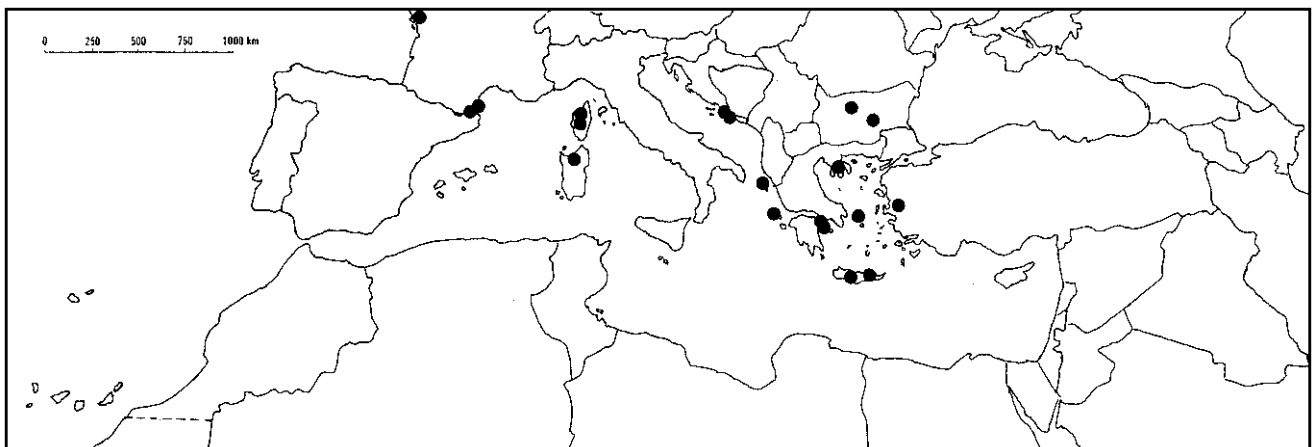
## Description of species

### *Enoplognatha afrodite* Hippa & Oksala, 1983 (Map 1)

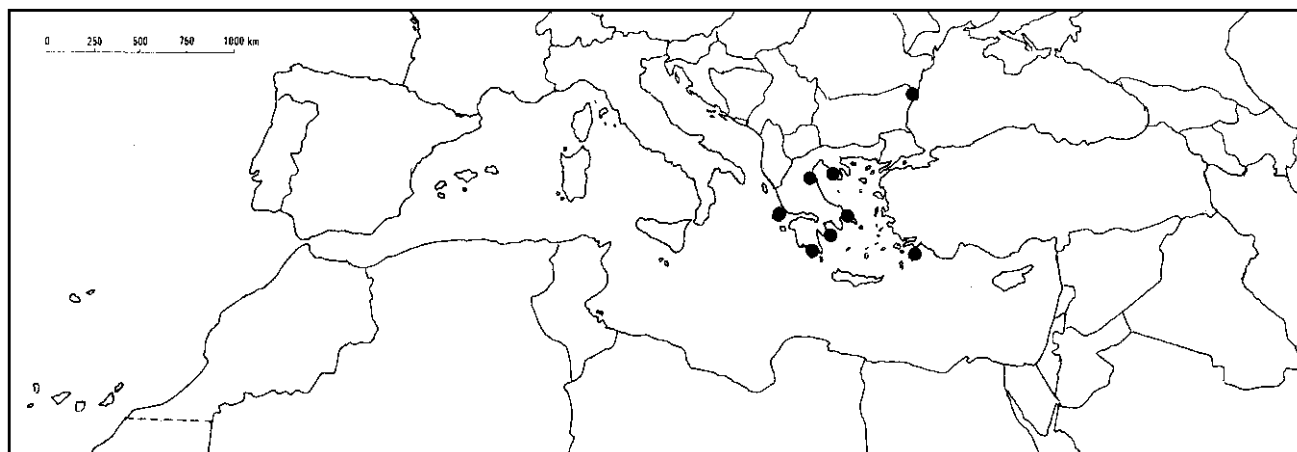
*Enoplognatha afrodite* Hippa & Oksala, 1983: 73 (descr. ♂, ♀); Deltshv, 1992: 14; Vanuytven *et al.*, 1994: 13.

*Description:* See Hippa & Oksala (1983).

*Material examined:* FRANCE: *Charente Maritime*: Côte Sauvage, 4♀, 2 June 1992, J. & F. Murphy leg. (CJFM 20729, 21558); Forêt de la Coubre, 1♀, 21 May 1993, J. & F. Murphy leg. (CJFM 21590); Ronce, 1♂, 8 June 1991, J. & F. Murphy leg. (CJFM 19652). *Corsica*: Calenzana, Vero, Col de Tana (Hippa & Oksala, 1983); Venaco, 4♂ 4♀, 15–16 May 1989, J. & F. Murphy leg. (CJFM 17755, 17898, 18067); Noceta road, 3♂ 1♀, 23 May 1989, J. & F. Murphy leg. (CJFM 17968); Corte, 1♂ 5♀, near citadel, 25 May 1995, R. Bosmans leg. (CRB); Zicavo, 730 m, 2♂ 5♀, on herbs in maquis, 26 May 1995, J. & K. Van Keer leg. (CJvK). *Deux Sèvres*: La Maucarière, 2♀, 4 June 1992, J. & F. Murphy leg. (CJFM 20765). *Pyrénées Orientales*: Collioure (Hippa & Oksala, 1983); Col d'Ouillat, 1♂, 26 May 1988, P. Poot leg. (CPP; Vanuytven *et al.*, 1994). ITALY: *Sardinia*: Sassari: Calangianus, 5♂ 3♀, *Quercus suber* forest, 16 May 1997, J. & K. Van Keer leg. (CJvK); Tempio-Pausania, 3♂ 1♀, park area, 15 May 1997,



Map 1: Distribution of *Enoplognatha afrodite* Hippa & Oksala.



Map 2: Distribution of *Enoplognatha penelope* Hippa & Oksala.

J. & K. Van Keer leg. (CJvK). BOSNIA: Neum, 1♂, 4 May 1988, P. Poot leg. (CPP; Vanuytven *et al.*, 1994); Ston, 1♂, 7 May 1988, P. Poot leg. (CPP; Vanuytven *et al.*, 1994). CROATIA: Dubrovnik (Hippa & Oksala, 1983); idem, 1♂, 10 April 1976, J. & F. Murphy leg. (CJFM 5323); Slano, 1♂, 13–24 May 1988, P. Poot leg. (CPP; Vanuytven *et al.*, 1994). BULGARIA: Haskovo (Deltshev, 1992). GREECE: *Crete*: Kastelli (Hippa & Oksala, 1983); Matala, 1♂, 9 April 1995, J. Bosselaers leg. (CJB); Plakias, 1♂ 2♀, April 1995, J. Bosselaers leg. (CJB); Spili, 1♂, 16 May 1994, J. & K. Van Keer leg. (CJvK). *Ionian Islands*: Corfu: Kassioi. Kefalonia: Asos, Spiridon, 1♀, 27 May 1987, J. & F. Murphy leg. (CJFM 14896); Atsoupades, 1♂ 4♀, 22 May 1987, J. & F. Murphy leg. (CJFM 14747); Pastra, 2♂ 3♀, 21 May 1987, J. & F. Murphy leg. (CJFM 14714); Sami, 1♀, 24 May 1987, J. & F. Murphy leg. (CJFM 14951); Skala, 3♂ 3♀, 21 May 1987, J. & F. Murphy leg. (CJFM 14727). *Macedonia*: Halkidiki: Poligiros, 1♂, 18 April 1978, J. & F. Murphy leg. (CJFM 3460; Hippa & Oksala, 1983). *Northern Sporades*: Skiathos, Troulos, Moni Panafios, 2♂, 28 April 1986, P. R. Deeleman leg. (CCD). *Peloponnesos*: Argolida: Arachnaio N., 2♂ 9♀, herbs in *Quercus* maquis, 24 May 1998, R. Bosmans leg. (CRB). Korinthia: Pisia E., 1♀, 1 June 1998, R. Bosmans leg. (CRB). TURKEY: Izmir: Yamanlar Dagi (Hippa & Oksala, 1983).

**Distribution** (Map 1): See Oxford & Reillo (1994). Cited here for the first time in Italy (Sardinia) and Bosnia.

**Ecology**: Males and females collected from April to June.

### *Enoplognatha latimana* Hippa & Oksala, 1982

*Enoplognatha latimana* Hippa & Oksala, 1982: 217; Heimer & Nentwig, 1991: 288; Roberts, 1995: 290.

**Remarks**: This species was for a long time confused with *E. ovata*. It is not an exclusively Mediterranean species, as it also occurs in temperate Europe.

**Description**: See Hippa & Oksala (1982), Roberts (1995) or Heimer & Nentwig (1991).

**Material examined**: SPAIN: *Gerona*: Between Berga and Borreda, Embalse de la Baels, 800 m, 1♀, 14 July 1991, J. Van Keer leg. (CJvK); Puigmal, S. slope, Font de l'Homme Mort, 1800–2000 m, 1♀, 13 July 1991, J. Van Keer leg. (CJvK); Ripoll, 900 m, 1♂ 2♀, 12 July 1991, J. Van Keer leg. (CJvK); Sant Jaume de la Frontanya, 1100 m, 1♂ 1♀, along rivulet, 14 July 1991, J. Van Keer leg. (CJvK). *Málaga*: Ronda, banks of Rio Guadalevin, 1♀, 9 May 1956 (IRSNB). ALGERIA: *Blida*: Atlas Blidéen, Meurdja, 950 m, 1♂, sweeping herbs, 13 September 1987, R. Bosmans leg. (CRB). MOROCCO: *Ifrane*: Cascades des Vierges, 1600 m, 1♂ 10♀, 24 July 1971, R. Jocqué leg. (MRAC). Rabat, 1♂ 1♀, 16 May 1934 (IRSNB). BOSNIA: Mjesici, Rogatica, 1♂, July 1969, C. Deeleman leg. (CCD). BULGARIA: Russalka, 1♀, near coast, 6 August 1990, K. Van Keer leg. (CJvK). GREECE: *Thessalia*: Trikkala: between Kastraki and Meteora, 1♂, herbs around spring,

11 June 1997, R. Bosmans leg. (CRB). TURKEY: Alanya, 1♀, May 1968 (IRSNB).

**Distribution**: See Oxford & Reillo (1994). Cited here for the first time in Bosnia, Bulgaria, Greece, Turkey and Algeria.

**Ecology**: Males collected from May to July, one occasional male in September, and females from May to August.

### *Enoplognatha ovata* (Clerck, 1757)

*Araneus ovatus* Clerck, 1757: 58

*Enoplognatha ovata*; Hippa & Oksala, 1982: 216; Roberts, 1995: 290. *Enoplognatha lineata*; Heimer & Nentwig, 1991: 288.

**Description**: See Hippa & Oksala (1982), Roberts (1995) or Heimer & Nentwig (1991, sub *E. lineata*).

**Material examined**: SPAIN: *Asturias*: Arenas de Cabrales, 1♂, 20 July 1985, R. Bosmans leg. (CRB). *Cantabria*: Bulnes, 2♀, along rivulet, 19 July 1985, R. Bosmans leg. (CRB); between Pandetrave and Portilla de la Reina, 1♀, 12 July 1985, R. Bosmans leg. (CRB); between Potes & Puerto de San Glorio, 700 m, 4♀, in grassland, 11 July 1985, R. Bosmans leg. (CRB). *Gerona*: Between Baels and Borreda, 800 m, 1♀, herbs along road, 14 July 1991, J. Van Keer leg. (CJvK); between Dòrria and Planoles, 1200 m, 2♂ 1♀, sweeping herbs, 10 July 1991, R. Bosmans & J. Van Keer leg. (CRB & CJvK); between Nùria and Queralbs, 1♂ 1♀, 18 July 1991, R. Bosmans leg. (CRB); Ogassa, Sierra de Sant Amand, 900 m, 1♂ 6♀, in herbs, 8 July 1991, R. Bosmans & J. Van Keer leg. (CRB & CJvK); Puerto de Toses, 1800 m, 3♂, sweeping herbs, 10 July 1991, R. Bosmans & J. Van Keer leg. (CRB & CJvK); Puigmal, S. slope, Font de l'Homme mort, 1800–2200 m, 2♀, in grasses, 13 July 1991, J. Van Keer leg. (CJvK). *Huesca*: Garganta de Bujaruelo, 1♀, 2 August 1984, R. Bosmans leg. (CRB). PORTUGAL: Penacova road, 1♂, 1953 (IRSNB). FRANCE: *Doubs*: Charquemont, 2♀, 9 September 1991, J. & F. Murphy leg. (CJFM 19955); Etang du Moulin, 1♀, 8 September 1991, J. & F. Murphy leg. (CJFM 19935). *Haute Savoie*: Valloire, 1♂, 2 June 1980, R. Bosmans leg. (CRB). *Pyrénées Orientales*: Hospitalet, Mérens-le-Vals, 1200 m, 3♂ 3♀, grassland, 11 July 1991, J. Van Keer leg. (CJvK); Nohèdes, 7♂ 3♀, July 1991, J. & F. Murphy leg. (CJFM 19808). LEBANON: Ain Dara, Nahr, Jessayer, 1000 m, 1♀, 24 May 1966 (IRSNB).

**Distribution**: Very common in temperate Europe, but apparently rarer in the Mediterranean region (see also Oxford & Reillo, 1994). Cited here for the first time from Portugal and Lebanon.

### *Enoplognatha penelope* Hippa & Oksala, 1982 (Map 2)

*Enoplognatha penelope* Hippa & Oksala, 1982: 221 (descr. ♂, ♀).

**Description**: See Hippa & Oksala (1982).

*Material examined and citations:* BULGARIA: Rusalka, plain near Black Sea coast, 1♀, 6 August 1990, K. Van Keer leg. (CJvK). GREECE: *Ionian Islands*: Kefalonia: Sami, 1♂, 24 May 1987, J. & F. Murphy leg. (CJFM 14827); Skala, 1♂, 21 May 1987, J. & F. Murphy leg. (CJFM 16229). *Peloponnesos*: Kastoriani, 1♂, 30 May 1994, Metzner leg. (CJvK). Lakonia: Githeo S., Mavrovouni, 2♀, herbs along river, 26 May 1998, R. Bosmans leg. (CRB). *Dodekanesos*: Rhodes: Apolakia-Vatio, 1♀, sweeping herbs, 22 May 1996, J. Van Keer leg. (CJvK); Archipolis-Platania, 1♂, sweeping grassland, 20 May 1996, J. Van Keer leg. (CJvK); Filerimos, 1♀, sweeping herbs, 23 May 1996, J. Van Keer leg. (CJvK); Laerma, 1♀, 21 May 1996, R. Bosmans leg. (CRB); Salachos (Hippra & Oksala, 1982). *Cyclades*: Spetses, 2♂ 2♀, herbs along dry rivulet, 25 May 1998, R. Bosmans leg. (CRB). *Macedonia*: Halkidiki: Kallithea, 2♂ 9♀, 13 June 1997, R. Bosmans leg. (CRB). Pieria: Pandeimonas, 1♂, 9 June 1997, R. Bosmans leg. (CRB); Platamonas, 1♂, herbs, 19 June 1997, R. Bosmans leg. (CRB). *Thessalia*: Magnissia: Kata Gadzea, 1♀, 10 June 1997, R. Bosmans leg. (CRB).

*Distribution* (Map 2): Previously known only from Greek islands (Oxford & Reillo, 1994), here also cited from Bulgaria and the Greek mainland.

*Ecology*: Males collected in May and June, females in May, June and August.

### *Enoplognatha verae* n. sp. (Figs. 1–5, Map 3)

*Type material*: Holotype ♀ from Tunisia, Psihou, 16 May 1917 (sub *E. nigromarginata*, MNHNP AR 3675); 2♀ paratypes (one without abdomen), same data.

*Etymology*: The second author is very happy to dedicate this species to his mother Vera.

*Diagnosis*: By its colour, *E. verae* n. sp. is closely related to *E. nigromarginata*, but easily distinguished by the speckled legs, the single cheliceral tooth in the male, the transverse conductor in the male palp, and the small posteromedian depression in the epigyne.

*Description*: Male: Total length 3.3–3.8; cephalothorax 1.48–1.50 long, 1.15–1.23 wide; Fe I 1.32–2.76 long. Female: Total length 2.8–5.7; cephalothorax 0.95–1.85 long, 0.81–1.60 wide; Fe I 1.90–3.61 long. Colour: Cephalothorax yellowish brown, with dark median and lateral stripes; sternum yellowish brown, in male with dark grey posteromedian spot, in female with bifurcate stripe; legs yellowish brown, distal part of segments and scattered spots dark brown to black; abdomen whitish with dorsal elongate dark grey to black folium, ventrally with dark grey median band, laterally flanked

by two relatively wide whitish stripes. Male chelicera (Fig. 3): With one, basally curved tooth. Male palp (Figs. 1–2): Tibia 0.27–0.29 long, cymbium 0.56–0.61 long; radix large, with small marginal and submarginal denticles; median apophysis elongated, sickle-shaped; accessory apophysis a small, blunt sclerite, conductor a large, transverse sclerite, terminally bluntly pointed and curved in anterior direction; embolus long and linear, describing half a circle. Epigyne (Fig. 4): With small, posteromedian depression, 0.08–0.10 wide, with only its anterior margin chitinised, and with small posteromedian incision. Vulva (Fig. 5): Receptacula large and oval, connected by short, thick-walled ducts to posteromedian depression.

*Other material examined*: SPAIN: *Almería*: Los Escullos, 1♀, 23 March 1990, J. & F. Murphy leg. (CJFM 18357). *Málaga*: Maro, 1♂, March–April 1987, J. & F. Murphy leg. (CJFM 14422). *Mallorca*: Puerta de Pollensa, 1♀, 6 April 1975, J. & F. Murphy leg. (CJFM 4363). ITALY: *Sardinia*: Cagliari: Costa Verde, Marina di Arbus, 50 m, 2♀, 19 May 1997, J. & K. Van Keer leg. (CJvK). Oristano: Santa Catarina di Pittinuri, 1♀, under stone near coast, 19 May 1997, J. & K. Van Keer leg. (CJvK). GREECE: *Crete*: Aghia Ghalini, 1♂, stones near hotel, 28 April 1997, J. Van Keer leg. (CJvK); Lendas, 6♀, small trees near coast, 18 May 1994, J. & K. Van Keer leg. (CJvK); Mallia, 1♀, 8 April 1972 and 1♀, 19 April 1979, J. & F. Murphy leg. (CJFM 1187, 7614). *Dodekanesos*: Rhodes: NW Laerma, 1♀, stone along river Xerivriissi, 21 May 1996, J. Van Keer leg. (CJvK). MOROCCO: Agadir: Anza, N. Agadir, 1♀, on slope with *Euphorbia*, 3 February 1996, J. Van Keer leg. (CJvK). TUNISIA: Bizerte: Lac Ichkeul, 15 m, 1♀, stones in pasture, 25 January 1995, J. Van Keer leg. (CJvK). Zaghuan: E. Saouaf, 750 m, 1♀, stones in *Juniperus* maquis, 24 January 1995, R. Bosmans leg. (CRB).

*Distribution* (Map 3): Apparently a coastal species, as it was always collected near the coast. Known from Morocco, Tunisia, Spain, Italy and Greece. It is surprising that it was not collected in Algeria during the four years the first author spent there.

*Ecology*: Males collected in March–April, females in January–May.

### *Enoplognatha mordax* (Thorell, 1875) (Figs. 6–11)

*Zilla mordax* Thorell, 1875a: 82 (descr. ♂).

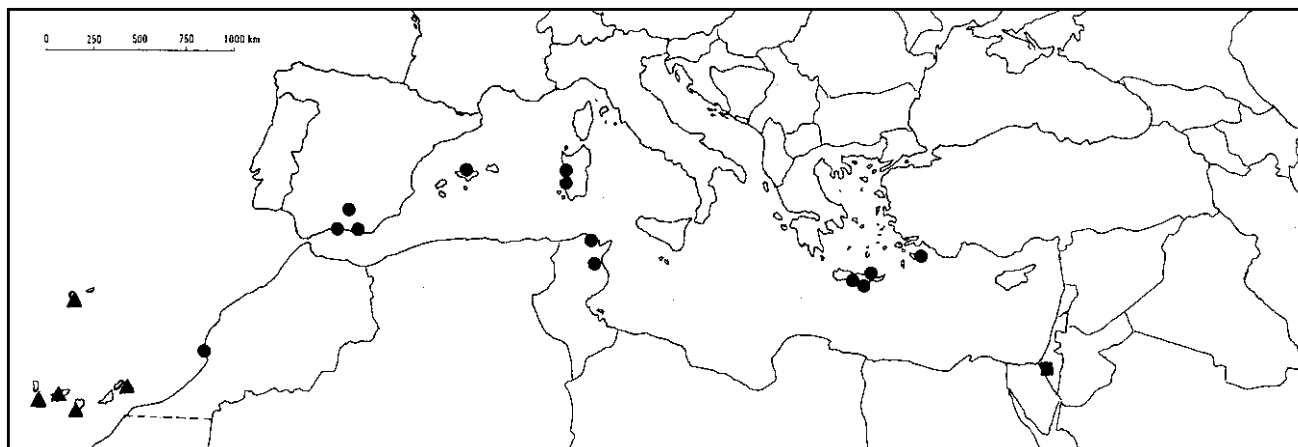
*Zilla crucifera* Thorell, 1875b: 57 (descr. ♂, ♀).

*Meta schaufussi* L. Koch, 1882: 628.

*Enoplognatha maritima* Simon, 1884a: 189 (descr. ♂, ♀).

*Enoplognatha schaufussi*; Heimer & Nentwig, 1991: 288.

*Enoplognatha mordax*; Roberts, 1995: 291.



Map 3: Distribution of *Enoplognatha verae* n. sp. (circles), *E. sattleri* Bösenberg (triangles) and *E. gershomii* n. sp. (square).

**Description:** See Roberts (1995) or Heimer & Nentwig (1991, sub *E. schaufussi*) and Figs. 6–11.

**Material examined:** BELGIUM: *Antwerpen*: Retie, Prinsenspark, 1♂ 7♀, in pitfalls in grassland, 7 June–5 July 1995, R. Bosmans leg. (CRB). *West-Vlaanderen*: Knokke, Zwin, 1♀, salt marsh, 15 August 1988, J. Van Keer leg. (CJvK); Wenduine, 1♂, *Ammophila* in dunes, 10 June 1988, J. & K. Van Keer leg. (CJvK). FRANCE: Col de Palhères, 900 m, 1♀, stony grassland, 22 June 1995, B. Vercammen leg. (CJvK). *Loire Atlantique*: Brière, 1♂, 31 May 1992, J. & F. Murphy leg. (CJFM 20678). MOROCCO: Tetouan: Mdicq, 5 m, 1♂, *Juncus* in salt marsh, 16 May 1984, R. Bosmans leg. (CRB). CYPRUS: Prastio, Dhiarizos river, 1♂, 7 April 1993, P. Selden leg. (CPS).

**Distribution:** Mainly a coastal species, known from all over Europe. It is new to Africa.

**Ecology:** Males collected from April to June, females from June to August.

***Enoplognatha nigromarginata* (Lucas, 1846)** (Figs. 12–17, Map 4)

*Theridion nigromarginatum* Lucas, 1846: 258 (descr. ♀); Simon, 1873a: 98 (descr. ♂); 1881: 136.

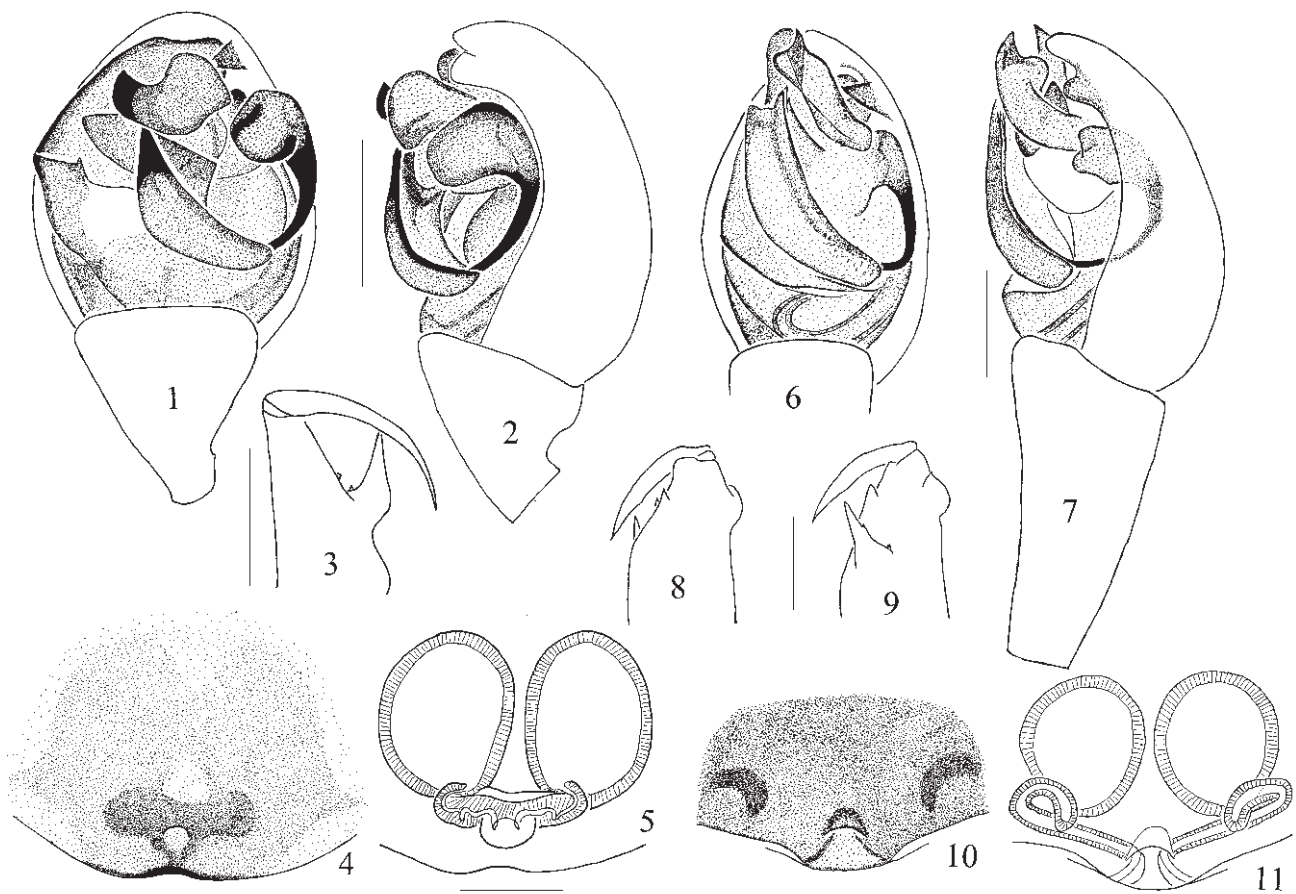
*Enoplognatha nigromarginata*; Simon, 1884a: 185; 1914: 283, 305; Baccalar, 1928: 185; Caporiacco, 1932: 236; Wunderlich, 1995b: 707.

**Type material:** Neotype ♂ from Algeria, Tlemcen, plain between Tal Terny and Terny Beni Hadiel, 1175 m, in *Juncus* tufts along an oued, 6 May 1984, R. Bosmans leg.; deposited in MNHNP.

**Diagnosis:** Males are easily recognised by the presence of frontal cheliceral teeth, and by the elongated accessory apophysis, females by the wide arched structure in the epigyne.

**Remarks:** Wunderlich (1995b) stated that the type material of *Enoplognatha nigromarginata* from Algeria has been lost and that the identity of the species thus will remain unclear. He described the species on material from Morocco and Corsica, identified by Simon as *E. nigromarginata*. In Algeria, we collected the same species on four occasions. The material closely resembles Lucas' (1846) figure of the general view of the animal. For stability, one of these specimens is here selected as neotype.

**Description:** Male: Total length 2.9–4.7; cephalothorax 1.30–2.06 long, 1.00–1.55 wide; Fe I 1.70–2.71 long. Female: Total length 3.9–5.2; cephalothorax 1.45–1.90 long, 1.30–1.55 wide; Fe I 1.8–2.36. Colour: Cephalothorax yellowish brown with black median and lateral stripes; sternum brown with black posteromedian stripe; legs uniformly yellowish brown; abdomen with distinct folium, olive, in middle with elongate whitish band with central dark spot, ventrally from epigastric furrow to spinnerets with broad black band flanked by two narrow lateral stripes. Male chelicera (Figs. 14–15): With two frontal teeth, one posterior tooth and two teeth in fang groove, basal one strongest and with small basal denticle. Male palp (Figs. 12–13): Tibia 0.29–0.45



Figs. 1–11: 1–5 *Enoplognatha verae* n. sp. 1 Male palp, ventral view; 2 Idem, lateral view; 3 Male chelicera, posterior view; 4 Epigyne; 5 Vulva, ventral view. 6–11 *Enoplognatha mordax* (Thorell). 6 Male palp, ventral view; 7 Idem, lateral view; 8 Male chelicera, anterior view; 9 Idem, posterior view; 10 Epigyne; 11 Vulva, ventral view.

long; cymbium 0.45–0.56 long; basal part of radix with small, mesal denticle; median apophysis nearly quadrangular, minutely dentate along its mesal margin; accessory apophysis a strong, pointed tooth, longer than more or less rectangular, terminally bluntly pointed conductor; embolus describing half a circle. Epigyne (Fig. 16): With an arched, chitinised structure, 0.16–0.18 wide, with small apertures of copulatory ducts situated at base of arms of arch. Vulva (Fig. 17): Copulatory ducts first winding outwards, then converging abruptly to median part of epigyne and turning posteriorly to apertures.

**Material examined:** "Maroc Corsica" (*sic*) 1♂ 12♀ (MNHNP AR 3676). SPAIN: *Cádiz*: Tarifa, 1♂, March 1994, P. Poot leg. (CPP; Vanuytven *et al.*, 1994). *Jaén*: Alcalá la Real E., Ribera Baja, 600 m, 1♂, along rivulet in *Populus* plantation, 6 April 1997, R. Bosmans leg. (CRB). *Huelva*: Zufre, 1♀, river bank, 10 April 1992, R. Jocqué leg. (CRJ). *Málaga*: Ojén, 2♂, 17 April 1974, J. & F. Murphy leg. (CJFM 3337). PORTUGAL: Algarve: Without further locality (Simon, 1881; Bacelar, 1928). ITALY: *Sardinia*: Nuoro: Villa Nova Strisaili, Lago alto del Flamendosa, 1♂, stones along rivulet, 13 May 1997, J. & K. Van Keer leg. (CJvK). ALGERIA: *Alger*: Alger (Lucas, 1846). *Bouira*: E. Bechloul, Oued Zaiane, 400 m, 1♀, tamarisk litter, 28 April 1988, R. Bosmans leg. (CRB). *Tizi Ouzou*: Between Tizi Ghenif and Chabet-el-Ameur, 125 m, 1♀, stones along Oued Djemaâ, 1 May 1984, R. Bosmans leg. (CRB). *Tlemcen*: Plain between Tal Terny and Terny Beni Hadiel, 1175 m, 2♂ (one of them the neotype) 1♀, *Juncus* tufts along an oued, 6 May 1984, R. Bosmans leg. (CRB); idem, 1♂ 2♀, 23 May 1990, R. Bosmans leg. (CRB). MOROCCO: Marrakech: Merader (Caporiacco, 1932).

**Distribution** (Map 4): A widely distributed, but rarely collected species. We examined material from Spain, France (Corsica), Italy (Sardinia), Algeria and Morocco. The species is also cited from continental Italy

(Caporiacco, 1923, 1951) and from Greece (Bristowe, 1935), but these citations should be confirmed.

**Ecology:** Collected exclusively near rivers or in river beds. Males found from March to May, females from April to May.

### *Enoplognatha tecta* (Keyserling, 1884) (Figs. 18–23)

*Steatoda caricis* Fickert, 1876: 57 (nomen dubium).

*Lithyphantes tectus* Keyserling, 1884: 129.

*Enoplognatha caricis*: Simon, 1884a: 188; Merrett & Snazell, 1975: 109; Heimer & Nentwig, 1991: 286.

*Enoplognatha tecta*: Roberts, 1995: 291.

**Description:** See Roberts (1995) or Heimer & Nentwig (1991, sub *E. caricis*) and Figs. 18–23.

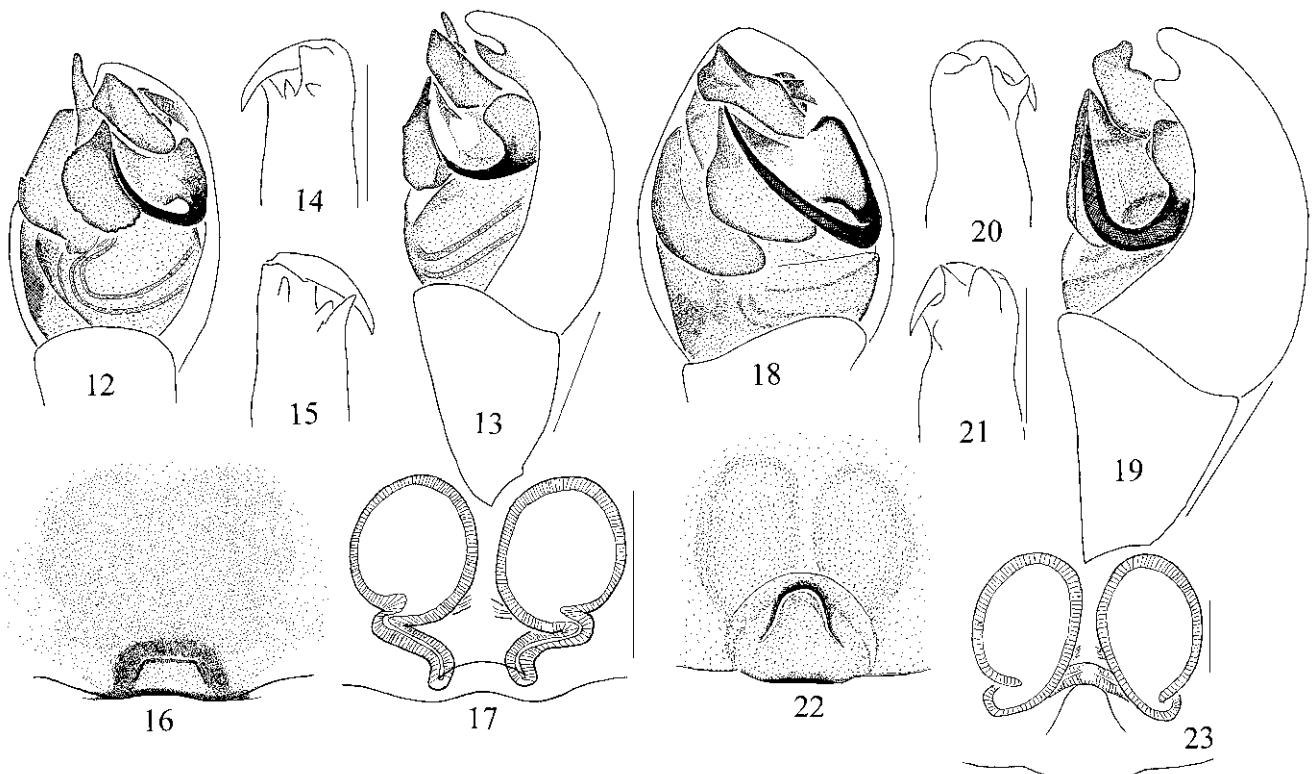
**Material examined:** No material examined from the Mediterranean region.

**Distribution:** Southern England, Belgium, the Netherlands, France, Germany, Switzerland, the former Czechoslovakia; cited also from Italy (Caporiacco, 1940) and Rhodes (Caporiacco, 1948) but this should be confirmed.

### *Enoplognatha mariae* n. sp. (Figs. 24–29, Map 4)

**Type material:** Holotype ♂ from Greece, Crete, Malia, 2 April 1972, J. & F. Murphy leg.; 1♀ paratype, same locality, 12 April 1972, deposited in AMNH.

**Etymology:** The first author is happy to dedicate this species to his mother Maria.



Figs. 12–23: 12–17 *Enoplognatha nigromarginata* (Lucas). 12 Male palp, ventral view; 13 Idem, lateral view; 14 Male chelicera, anterior view; 15 Idem, posterior view; 16 Epigyne; 17 Vulva, ventral view. 18–23 *Enoplognatha tecta* (Keyserling). 18 Male palp, ventral view; 19 Idem, lateral view; 20 Male chelicera, anterior view; 21 Idem, posterior view; 22 Epigyne; 23 Vulva, ventral view.

**Diagnosis:** The species is immediately recognisable by its general pale yellowish and cream-white colour, looking like a species of the *ovata* group, but males have anterior and posterior teeth on the chelicerae, as in the *nigromarginata* group, and females distinguished by the small, less sclerotised epigyne.

**Description:** Male: Total length 4.4; cephalothorax 1.80 long, 1.54 wide; Fe I 2.88 long. Female: Total length 4.1–6.5; cephalothorax 1.86–2.11 long, 1.52–1.70 wide; Fe I 2.36–2.76 long. Colour (based on a recently collected ♀ from Rhodes, the material from Crete being bleached): Cephalothorax pale yellowish brown, median stripe and margin greyish; sternum yellowish brown, margin and short posteromedian stripe grey; legs pale yellowish brown; abdomen dorsally cream-white, ventrally with median greyish stripe flanked by two cream-white stripes; spinnerets surrounded on both sides by 3 blackish spots. Male chelicera (Figs. 26, 27): With 5 large teeth, one anterior, one posterior, one near fang base and two in fang groove. Male palp (Figs. 24–25): Tibia 0.43 long, cymbium 0.54 long; radix not prominent, rounded mesally; median apophysis wide, for a large part with parallel margins, rounded at its base, anteriorly with two teeth; accessory apophysis wide, terminally rounded; conductor widened distally, terminally pointed; embolus long, describing 3/4 of a circle. Epigyne (Fig. 28): Posterior width 0.16; with transverse, oval pit, 0.05 wide, with only its anterior border well-marked and chitinised, separated by 1.5 × its diameter from epigastric furrow. Vulva (Fig. 29): Copulatory ducts short, first curving outwards, then returning in a sharp angle to median pit.

**Other material examined:** GREECE: Crete: Phaestos, 1♀, 18 April 1979, J. & F. Murphy leg. (CJFM 7594). Dodekanesos: Rhodes: SE Laerma, 1♀, stones along rivulet, 21 May 1996, J. Van Keer leg. (CJvK).

**Distribution** (Map 4): Known only from the Greek islands Crete and Rhodes.

**Ecology:** The single male was collected in April, females in April and May.

***Enoplognatha thoracica* (Hahn, 1831)** (Figs. 30–35, Map 5)

*Theridion thoracicum* Hahn, 1831: 88.

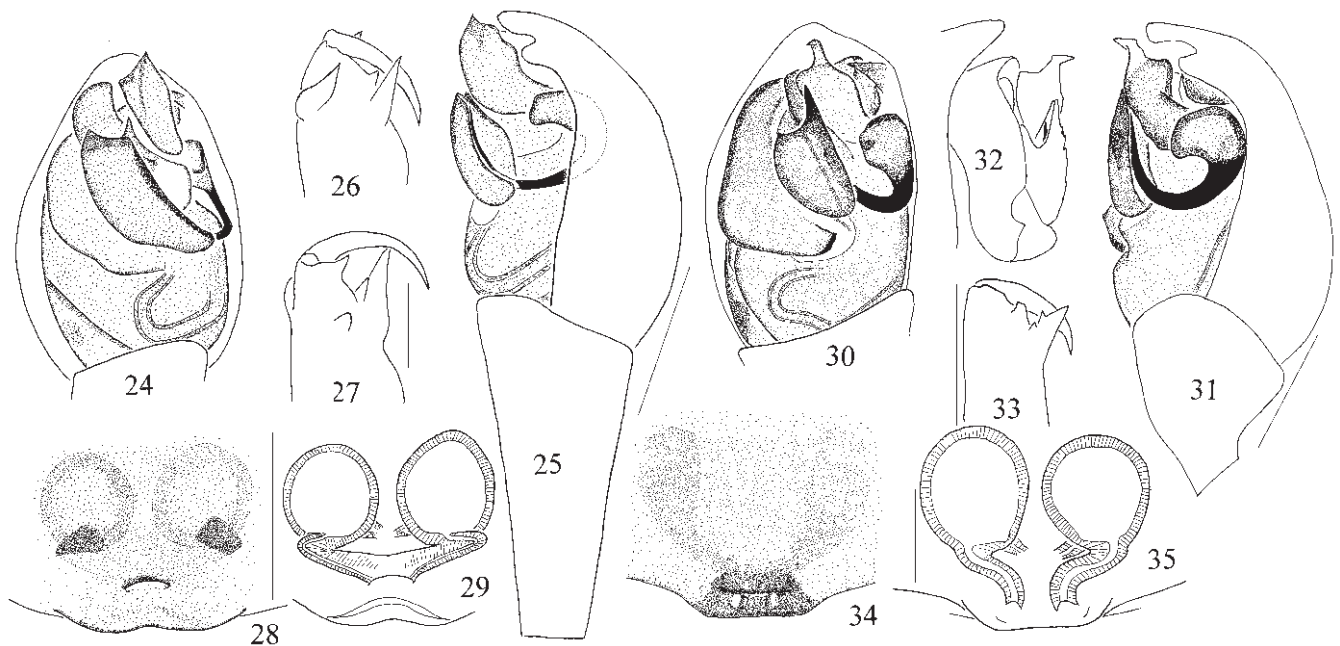
*Enoplognatha thoracica*; Heimer & Nentwig, 1991: 286; Roberts, 1995: 290.

**Type material:** The species was described from Nürnberg, Germany. No type material was examined. As only one species of the *thoracica* group occurs in Germany, there can be no doubt about its identity.

**Diagnosis:** Closely related to *E. quadripunctata*. The two species cannot be separated by colour. Males of *E. thoracica* are easily distinguished by the much more sharply pointed tip of the median apophysis (Fig. 30 cf. Fig. 36); females have a square, domed median part of the epigyne, whereas it is trapezoid and flat in *E. quadripunctata* (Fig. 34 cf. Fig. 40). Males also distinguished from *E. parathoracica* by lacking a distal raised swelling on the chelicerae and by the straighter mesal margin of the radix, and females by lacking the large oval depressions in the epigyne.

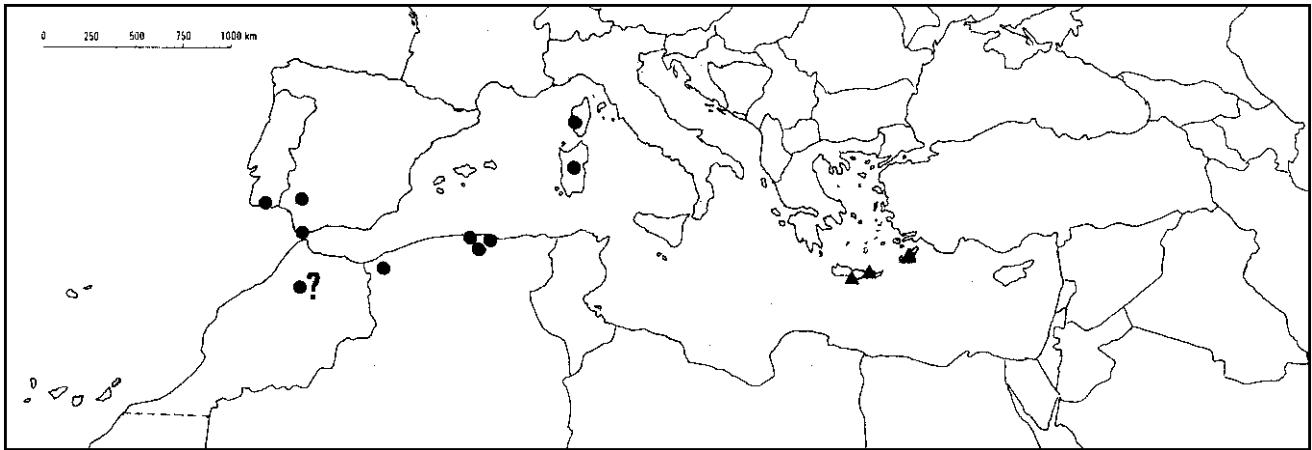
**Remarks:** *E. thoracica* and *E. quadripunctata* have not hitherto been differentiated. Previous records cannot be trusted, although generally *E. thoracica* is a northern species, absent from North Africa, and *E. quadripunctata* is southern.

**Description:** Male: Total length 2.6–3.7; cephalothorax 1.25–1.75 long, 0.95–1.35 wide; Fe I 1.10–1.40 long. Female: Total length 3.0–4.5; cephalothorax 1.25–1.75 long, 1.00–1.35 wide; Fe I 1.00–1.50 long. Colour:



Figs. 24–35: **24–29** *Enoplognatha mariae* n. sp. **24** Male palp, ventral view; **25** Idem, lateral view; **26** Male chelicera, anterior view; **27** Idem, posterior view; **28** Epigyne; **29** Vulva, ventral view. **30–35** *Enoplognatha thoracica* (Hahn). **30** Male palp, ventral view; **31** Idem, lateral view; **32** Idem, mesal view; **33** Male chelicera, anterior view; **34** Epigyne; **35** Vulva, ventral view.



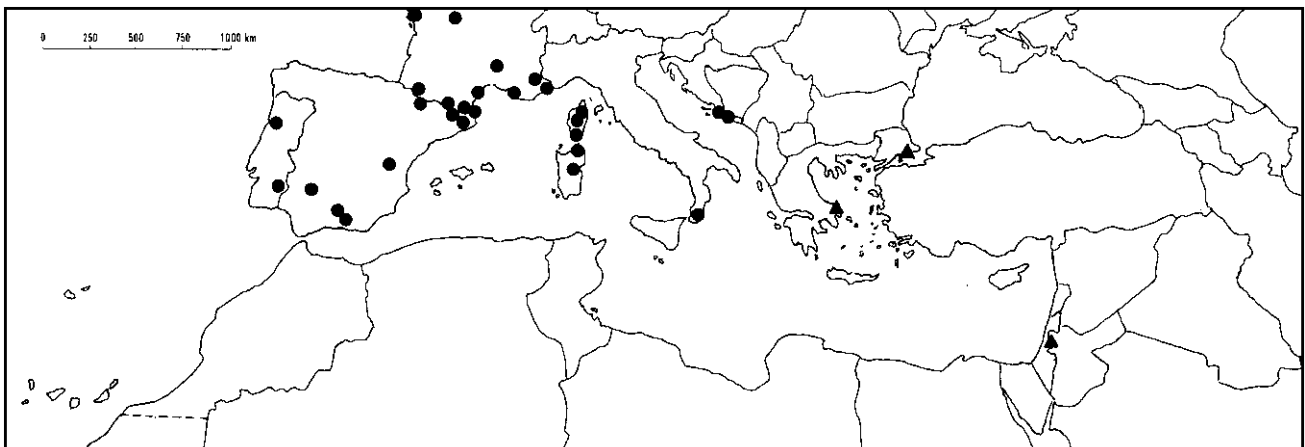


Map 4: Distribution of *Enoplognatha nigromarginata* (Lucas) (circles) and *E. mariae* n. sp. (triangles).

Cephalothorax and legs yellowish brown; abdomen mostly uniformly dark brown, but 12% of examined specimens have two pairs of pale spots. Male chelicera (Fig. 33): With strong, pointed proximal tooth and stub-like distal tooth, both with one or two denticles. Male palp (Figs. 30–32): Tibia 0.24–0.29 long, cymbium 0.48–0.56 long; radix wide, with angular basal corner; median apophysis sharply pointed anteriorly, in mesal view strongly incised; accessory apophysis hardly developed, difficult to detect; conductor with broad base, distally strongly narrowed and membranous; embolus long, describing 2/3 of a circle. Epigyne (Fig. 34): Posterior width 0.18–0.21; square, with large, rounded apertures; in fresh specimens heavily chitinised, with receptacula rarely visible through integument. Vulva (Fig. 35): Receptacula rounded; copulatory ducts short, curving directly to apertures.

*Material examined*: “Europe”, 3♀, sub *E. mandibularis* (MNHNP AR 3714). “Volo-Constantinople”, 2♀, sub *E. quadripunctata* (MNHNP AR 3690). BELGIUM: *West-Vlaanderen*: Knokke, Zwin, 2♂ 1♀, dunes, 5 June 1975, R. Bosmans leg. (CRB); Koksijde, 1♂, 4 April 1983, R. Bosmans leg. (CRB). *Antwerpen*: Ekeren, 1♂ 2♀, June 1990, H. Vanuytven leg. (CHV); Turnhout, 1♂, 21 June 1985, J. Van Keer leg. (CJvK). *Brabant*: Zemst, 1♂, 10 May 1986 and 1♀, 21 June 1986, J. Van Keer leg. (CJvK). *Hainaut*: Viroinval, 2♀, 19 June 1993, H. Vanuytven leg. (CHV). *Limburg*: Lommel, 1♀, 8 August 1993, H. Vanuytven leg. (CHV). *Luxembourg*: Torgny, 2♂, 28 May 1987, H. Vanuytven leg. (CHV). *Namur*: Antheit, Corphalie, 3♀, 2 June 1990, J. Van Keer leg. (CJvK); Dinant, Rocher de Fréyr, 1♀, 2 June 1976, R.

Bosmans leg. (CRB); Namur, 16–23 May 1995, 7♀, H. Vanuytven leg. (CHV). FRANCE: “Gallia” 24♂ 105♀ (MNHNP AR 3688). *Alpes Maritimes*: Menton, 3♂ 8♀ (MNHNP AR 3692). *Ardèche*: Coux, 1♀, 7 June 1987, P. Poot leg. (CPP; Vanuytven *et al.*, 1994). *Ariège*: Pause de Saut, 700 m, 1♀, 1 June 1991, J. & F. Murphy leg. (CJFM 19558). *Aude*: Gruissan, 1♂, 1 April 1980, R. Bosmans leg. (CRB). *Bouches du Rhone*: St. Martin de Crau, 1♂, 19 May 1986, R. Poot leg. (CPP). *Charente Maritime*: Côte Sauvage, 5 m, 1♂ 9♀, 2 June 1992, J. & F. Murphy leg. (CJFM 20730). *Corsica*: Forêt d’Aitone, 1♀, stones in *Pinus* forest, 24 May 1995, J. Van Keer leg. (CJvK); Calacuccia, 2♀, 25 May 1995, R. Bosmans leg. (CRB); Casabianca, Col de St.-Antoine, 690 m, 2♀, stones, 22 May 1995, J. Van Keer leg. (CJvK); Castirla, along D18, 345 m, 4♀, *Quercus suber* litter, 25 May 1995, J. Van Keer leg. (CJvK); between Col de Cortone and Pietrosella, 4♀, in litter, 27 May 1995, R. Bosmans & J. Van Keer leg. (CJvK & CRB); Noceta road, 1♀, 23 May 1989, J. & F. Murphy leg. (CJFM 17966); Gorges de Restonica, 1300 m, 1♂ 3♀, stones, 26 May 1995, R. Bosmans & J. Van Keer leg. (CJvK & CRB); Chapelle San Quilico, 500 m, 1♀, 19 May 1989, J. & F. Murphy leg. (CJFM 17852); Tattone, 850 m, 3♀, 24 May 1989, J. & F. Murphy leg. (CJFM 18021); Venaco, 250 m, 2♀, 21 May 1989, J. & F. Murphy leg. (CJFM 17899); Col de Vergio, 1480 m, 1♂ 4♀, stones, 24 May 1995, R. Bosmans & J. Van Keer leg. (CJvK & CRB); S. Vivario, Col de Sorba, 1320 m, 1♀, stones, 26 May 1995, J. Van Keer leg. (CJvK); Col de Vizzavona, 1200 m, 5♀, 20 May 1989, J. & F. Murphy leg. (CJFM 17863, 18103) and 1930 m, 2♀, stones, 28 May 1995, R. Bosmans leg. (CRB). *Ille et Vilaine*: Lassy, 100 m, 1♂, 18 May 1993, J. & F. Murphy leg. (CJFM 21537); Forêt de Rennes, 100 m, 1♂, 23 May 1992, J. & F. Murphy leg. (CJFM 20418). *Hautes Alpes*: Banon, 11 May 1986, 1♀, P. Poot leg. (CPP). *Lot*: Bernades, 300 m, 1♀, 15 May 1984, J. & F. Murphy leg. (CJFM 11740). *Morbihan*: Penvins, 1♂, sandy shore, 25 May 1992, J. & F. Murphy leg. (CJFM 20459). *Pyrénées Atlantiques*: Larrau, 3♀, 28 September 1989, P. Poot leg. (CPP; Vanuytven *et al.*, 1994). *Pyrénées*



Map 5: Distribution of *Enoplognatha thoracica* (Hahn) (circles) and *E. parathoracica* Levy & Amitai (triangles).

*Orientalis*: Banyuls, 7♀ (MNHNP AR 3697); Canigou, Vilmanga, 22♀ (MNHNP AR 3674); Cerdagne, 2♀ (MNHNP AR 3685); Col de Jou, 1100 m, 3♀, 9 June 1982, J. & F. Murphy leg. (CJFM 10527); Miglos, Norgeat, 1♂, 11–21 June 1996, H. Vanuytven leg. (CHV); Nohèdes, 1000 m, 2♀, July 1991, J. & F. Murphy leg. (CJFM 19821). *Val d'Oise*: Montmorency, 4♂ 9♀ (MNHNP AR 3687). *Vendée*: Barbâtre, 2♂ 1♀, dunes, 27 May 1992, J. & F. Murphy leg. (CJFM 20533). *Yvelines*: Verneuil s/S., 1♂ 8♀, August 1908 (MNHNP). SPAIN: *Albacete*: S. Tarazona de la Mancha, 600 m, 4♀, stones in degraded *Quercus ilex* forest, 8 April 1997, R. Bosmans leg. (CRB). *Córdoba*: S. Iznájar, 500 m, 1♀, stones near lake, 5 April 1997, R. Bosmans leg. (CRB). *Gerona*: Bruguera, 3♀, 8 July 1991, R. Bosmans leg. (CRB); Odello, 1♀, 6 July 1991, R. Bosmans leg. (CRB); Ogassa, Col de Jou, 1♀, 8 July 1991, J. Van Keer leg. (CJvK); Puigmal, S. slope, Font de l'Homme mort, 1800–2000 m, 1♀, among stones, 13 July 1991, J. Van Keer leg. (CJvK); San Jaume de la Frontanya, 1♀, 14 July 1991, R. Bosmans leg. (CRB); Sant Martí d'Ogassa, 2♀, 15 July 1991, R. Bosmans leg. (CRB). *Granada*: Sierra de la Contreviesa, Puerto Camacho, 1230 m, 1♀, stone in pine forest, 6 April 1997, R. Bosmans leg. (CRB). *Huelva*: Sierra del Viento, N. La Nava, 600 m, 1♀, stone in *Quercus ilex* forest, 2 April 1997, R. Bosmans leg. (CRB). *Huesca*: Broto, 1♂, 14 May 1987, P. Poot leg. (CPP; Vanuytven *et al.*, 1994). PORTUGAL: *Alto Alentejo*: Portel N., 250 m, 3♀, litter and stones in open *Q. suber* forest, 8 April 1996, R. Bosmans leg. (CRB). *Douro*: Porto, 1♀ (MNHNP AR 3691, sub *E. lusitanica* (nomen nudum), together with 1♂ of *Robertus arundineti*). BOSNIA: Neum, 1♂, 4 May 1988, P. Poot leg. (CPP; Vanuytven *et al.*, 1994). CROATIA: Slano, 3♀, 24 May 1988, P. Poot leg. (CPP). ITALY: *Calabria*: Aspromonte, 1♂ 2♀ (NMW 517, sub *E. mandibularis*). *Sardinia*: Nuoro: Baunei, Golgo, 700 m, 1♀, under stones, 12 May 1997, J. & K. Van Keer leg. (CJvK); Calangianus de Gallura, 1♀, in *Quercus suber* forest, 16 May 1997, J. & K. Van Keer leg. (CJvK); Cantoniera Pira e Onni, 870 m, 2♀, along Calaresi river, 14 May 1997, J. & K. Van Keer leg. (CJvK); Monte Spada, 1450 m, 1♀, under stones, 14 May 1997, J. & K. Van Keer leg. (CJvK). *Sassari*: Callangianus, 1♀, in *Quercus suber* forest, 16 May 1997, J. & K. Van Keer leg. (CJvK).

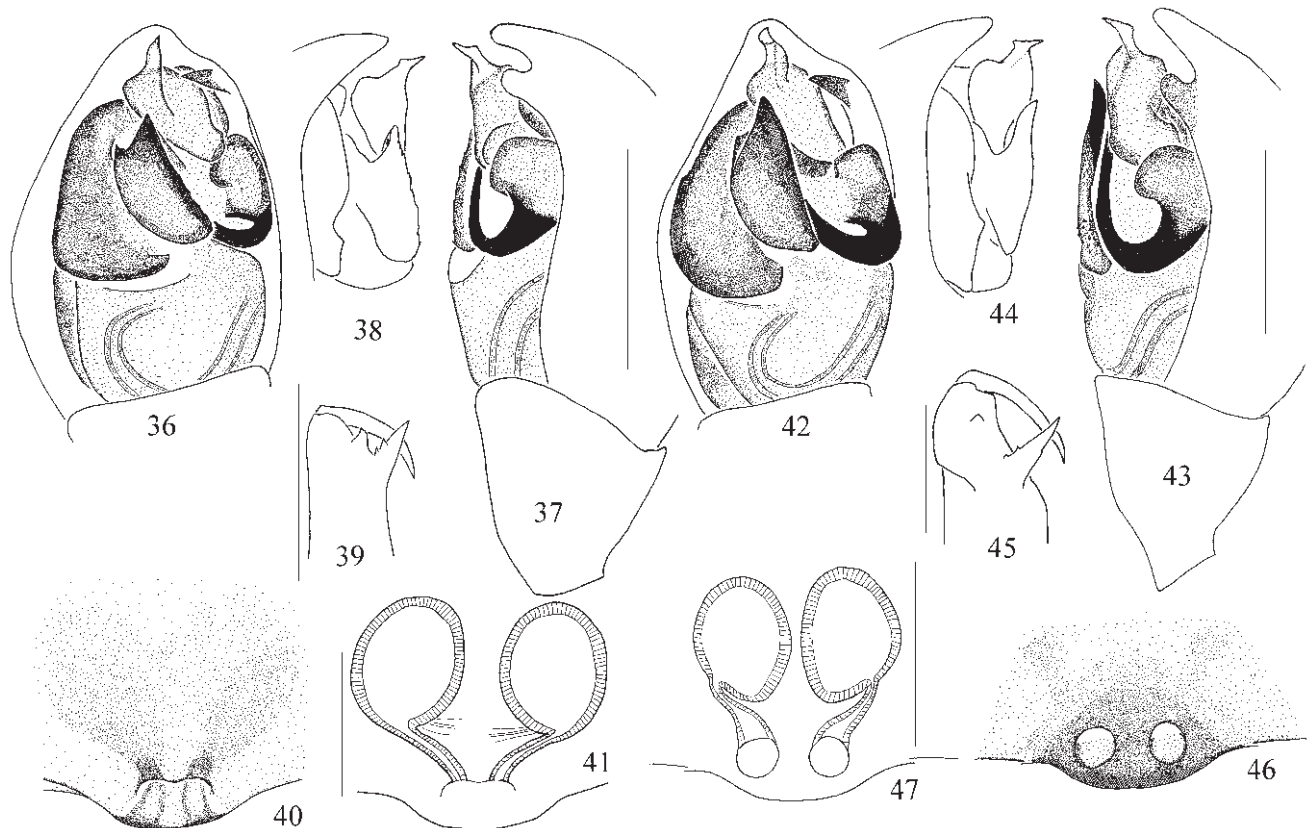
*Distribution* (Map 5): We examined material from Belgium, France (including Corsica), Spain, Portugal, Italy, Croatia, Bosnia and Greece or Turkey (see remarks under *E. quadripunctata* below). In Corsica, it is the dominant species at higher altitudes, while *E. quadripunctata* occurs in the lower parts. All citations from the north of Europe most probably concern *E. thoracica*.

***Enoplognatha quadripunctata* Simon, 1884** (Figs. 36–41, Map 6)

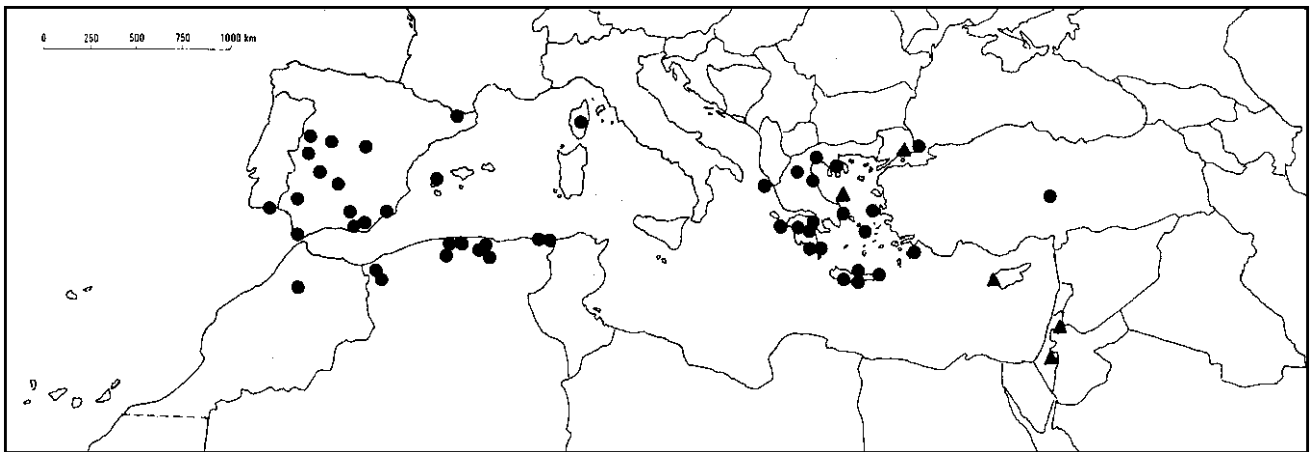
*Enoplognatha quadripunctata* Simon, 1884b: 333; 1885: 27 (descr. ♀). *Enoplognatha thoracicoïdes* Nosek, 1905: 116, 129 (descr. ♀). **Syn. n.**

*Type material*: Lectotype ♀ of *E. quadripunctata*, by present designation, labelled “Volo, Constantinople” (MNHNP AR 3690); 1♀ paralectotype, same data. Type series of *E. thoracicoïdes*, comprising 2♀ from Turkey, Erdschias Dag, A. Penther leg. (NMW 518); examined.

*Diagnosis*: The species cannot be distinguished from *E. thoracica* by abdominal pattern, as previously thought. Males can be distinguished by the less sharply pointed anterior part of the median apophysis; females by the less sclerotised, narrower and trapezoid median part of the epigyne. Males also distinguished from *E. parathoracica* by lacking a distal raised swelling on the chelicerae and by the straighter mesal margin of the radix, and females by lacking the large oval depressions in the epigyne.



Figs. 36–47: **36–41** *Enoplognatha quadripunctata* Simon. **36** Male palp, ventral view; **37** Idem, lateral view; **38** Idem, mesal view; **39** Male chelicera, anterior view; **40** Epigyne; **41** Vulva, ventral view. **42–47** *Enoplognatha parathoracica* Levy & Amitai. **42** Male palp, ventral view; **43** Idem, lateral view; **44** Idem, mesal view; **45** Male chelicera, anterior view; **46** Epigyne; **47** Vulva, ventral view.



Map 6: Distribution of *Enoplognatha quadripunctata* Simon (circles) and *E. mediterranea* Levy & Amitai (triangles).

**Remarks:** The type locality of *E. quadripunctata* is Greece, Euboea, near Steni. No material from this site was found in the MNHNP. There are, however, 7♀ identified by Simon, labelled “*E. quadripunctata* Volo, Constantinople”. Volos is the most important nearby town on the Greek mainland only 30 km away from Euboea and it is most probable that Simon united all material from near Volos and Constantinople in one tube, as he did in other cases. We therefore consider these specimens as part of the type series. The seven females appear to belong to four different species: 2♀ of *E. thoracica* (Hahn), 2♀ of *E. mediterranea* Levy & Amitai, 1♀ of *E. parathoracica* Levy & Amitai and 2♀ of another species, closely related to *E. thoracica* and showing four distinct abdominal spots. As first revisers, we have the right to select a lectotype, which could be any of the four species. For stability, we select one of the last two specimens as lectotype of *E. quadripunctata*.

Further material in the MNHNP identified by Simon as *E. quadripunctata* and identical to the lectotype came from Spain and Algeria and was cited by him in 1884 and 1885. This material is labelled “Alg. Hisp.” and contains 1♂ 5♀ of *E. quadripunctata*, but also 23♀ of another species with abdominal spots, described in 1945 as *E. biskrensis* by Denis. Levy & Amitai (1981) erroneously concluded that *E. biskrensis* and *E. quadripunctata* were synonyms. Levi (1957) on the other hand considered *E. quadripunctata* a synonym of *E. thoracica*, without giving arguments. This is also rejected here.

**Description:** Male: Total length 1.8–3.8; cephalothorax 0.85–1.90 long, 0.65–1.45 wide; Fe I 0.75–1.65 long. Female: Total length 2.2–4.1; cephalothorax 1.05–1.65 long, 0.75–1.30 wide; Fe I 0.90–1.40 long. Colour: As in *E. thoracica*; mostly with abdominal spots, but uniformly coloured specimens occur as well. Male chelicera (Fig. 39): As in *E. thoracica*. Male palp (Figs. 36–38): Tibia 0.13–0.32 long, cymbium 0.37–0.54 long; as in *E. thoracica*, except for median apophysis being less sharply pointed anteriorly and more moderately incised in mesal view. Epigyne (Fig. 40): Not strongly sclerotised, median part flat and trapezoid, 0.10–0.13 wide. Vulva (Fig. 41): Receptacula large; copulatory ducts oblique, directed straight to apertures.

**Material examined:** “Alg. Hisp.”, 1♂ 5♀, sub *E. quadripunctata* (MNHNP AR 3713). FRANCE: *Corsica*: Tattonne, 850 m, 1♂, chestnut wood, 24 May 1989, J. & F. Murphy leg. (CJFM 18021). SPAIN: *Alicante*: Altea la Vieja, 1♀, M. Pérez leg. (CMP). *Almería*: Sierra de Alhamilla, 600 m, 5♀, 6 May 1990, J. & F. Murphy leg. (CJFM 18636, 19334); Sierra de Filabres, 1800 m, 4♂ 2♀, 8 April 1990, J. & F. Murphy leg. (CJFM 18672); Sierra de Gádor, 500 m, 2♂, 2 April 1990, J. & F. Murphy leg. (CJFM 19334). *Ávila*: Mombeltrán, 1♂, May 1990, P. Poot leg. (CPP; Vanuytven *et al.*, 1994); Sierra de Gredos, 1♂ 1♀, 22 May 1992, P. Poot leg. (CPP; Vanuytven *et al.*, 1994, sub *E. thoracica*); Puerto del Pico, 1500 m, 2♀, 20 May 1991, P. Poot leg. (CPP). *Badajoz*: Peloché, embalse de García de Sola, 3♀, 12 April 1994, R. Bosmans leg. (CRB). *Cáceres*: Monfragüe, 1♀, 12 May 1991, P. Poot leg. (CPP); Plasencia, 2♀, April 1990, P. Poot leg. (CPP; Vanuytven *et al.*, 1994, sub *E. thoracica*). *Cádiz*: Tarifa, 1♂, April 1992, 1♀, April 1994, 1♀, 3–6 May 1994, P. Poot leg. (CPP; Vanuytven *et al.*, 1994, sub *E. thoracica*). *Ciudad Real*: Pozuelo, 1♂, de Fuente leg., sub *E. thoracica* (MNHNP AR 3688). *Gerona*: Ogassa, Puerto de Toses, 1800 m, 2♀, stones in grassland, 10 July 1991, J. Van Keer leg. (CJvK); Puigmal, S. slope, Font de l’Homme mort, 1800–2000 m, 1♀, among stones, 13 July 1991, J. Van Keer leg. (CJvK). *Granada*: Ventoros de San Jose, 1♂ 1♀, stones in *Quercus suber* forest, 12 April 1998, R. Bosmans leg. (CRB). *Guadalajara*: Molinia de Aragon, 1♂, 14 April 1998, R. Bosmans leg. (CRB). *Ibiza*: Puig de Perella, 50 m, dry shrub, 1♂ 7♀, 1–8 April 1980, J. & F. Murphy leg. (CJFM 8561, 8640, 8676). *Salamanca*: Ciudad Rodrigo N.E., 650 m, 1♂, stones in maquis, 10 April 1996, R. Bosmans leg. (CRB). *Sevilla*: El Ronquillo, Embalse de Cala, 1♂ 2♀, 6 April 1994, R. Bosmans leg. (CRB). PORTUGAL: *Algarve*: Albufeira, 2♂ 2♀, 9 March 1992, P. Poot leg. (CPP; Vanuytven *et al.*, 1994, sub *E. thoracica*). GREECE: *Aegean Islands*: Chios, 1♀, Brondadis, Plata, 24 May 1982, P. R. Deeleman leg. (CCD). *Attika*: Alepohori, 2♀, 22 May 1998, R. Bosmans leg. (CRB). *Ionian Islands*: Corfu: Barbati, 100 m, 1♂, wooded valley, 3 April 1983, J. & F. Murphy leg. (CJFM 10960); Korission, 0 m, 5♂, sand dunes, 1 April 1983, J. & F. Murphy leg. (CJFM 10897). Kefalonia: Atsoupades, 150 m, 1♂, 22 May 1987, J. & F. Murphy leg. (CJFM 16395); Castle hill, 200 m, 1♂, 30 May 1987, J. & F. Murphy leg. (CJFM 14661); Lakithra, 200 m, 1♀, 18 May 1987, J. & F. Murphy leg. (CJFM 14624); Mount Enos, 1600 m, 1♂, 20 May 1987, J. & F. Murphy leg. (CJFM 14690); Sami, 100 m, 1♀, 31 May 1987, J. & F. Murphy leg. (CJFM 16144); Sisia, 100 m, 2♀, 23 May 1987, J. & F. Murphy leg. (CJFM 14796); Svoronata, 10 m, 2♀, 30 May 1987, J. & F. Murphy leg. (CJFM 14908). *Crete*: Aghios Nicolais, 20 m, 3♀, scrub, 6 April 1979, J. & F. Murphy leg. (CJFM 7433); Akrotiri, near Kalathas bay, 1♀, 9 April 1996, J. Bosselaers leg. (CJB); Frangokastello, 1♀, 13 April 1995, J. Bosselaers leg. (CJB); Kalathas, 30 m, 1♀, shrub, 7 April 1981, J. & F. Murphy leg. (CJFM 9436); Karteros, 1♂ 1♀, 17 March 1978, R. Bosmans leg. (CRB); Mallia, 0 m, 2♀, in marsh, 2 and 9 April 1972, J. & F. Murphy leg. (CJFM 1112, 1151); Omalos, 1000 m, 4♀, stony hillside, 15 April 1979 and 11 April 1981, J. & F. Murphy leg. (CJFM 7559, 9569); Phaestos, 150 m, 1♀, 4 April 1972, J. & F. Murphy leg.

(CJFM 1137); Skoteini, 1♀, 27 February 1981, C. Deeleman leg. (CCD); between Vai and Paleokastrion, 1♀, 12 March 1978, R. Bosmans leg. (CRB); Zoniana, near cave Sventoni, 1♀, 6 April 1996, J. Bosselaers leg. (CJB). *Cyclades*: Paros, pitfalls in maquis, 1♂, 30 March 1994, 2♂, 18 April 1994, 2♀, 14 May 1994, Gück & Steinmetz leg. (CJvK). *Dodekanesos*: Rhodes: Eptapiges, 1♀, pine forest along rivulet, 19 May 1996, J. Van Keer leg. (CJvK). Laerma, 1♂ 3♀, 9 May 1983, C. Deeleman leg. (CCD); Filerimos, 1♀, 22 May 1996, R. Bosmans leg. (CRB); W. Laerma, 1♀, along river Xerivri, 21 May 1996, R. Bosmans leg. (CRB); Petaloudes, 1♂ 1♀, 13 April 1984, C. Deeleman leg. (CCD). *Macedonia*: Grevena: Eleftherohori, 1♀, 12 June 1997, R. Bosmans leg. (CRB). Halkidiki: Gerakina, 5 m, 1♀, in marsh, 16 April 1978, J. & F. Murphy leg. (CJFM 21801). Pieria: Pandeimonas, 2♀, 9 June 1997, R. Bosmans leg. (CRB). Thessaloniki: Saloniki, 2♀, P. Denier leg. 1916 (MNHNP 3699). *Peloponnesos*: Argolida: Arachnaio S., 1♀, 24 May 1998, R. Bosmans leg. (CRB); Kosta, 1♀, 26 May 1998, R. Bosmans leg. (CRB). Arkadia: Paradisio, 1♀, 29 May 1998, R. Bosmans leg. (CRB). Lakonia: Githio S., Mavrovouni, 4♀, 26 May 1998, R. Bosmans leg. (CRB). *Thessalia*: Magnissia: Kata Gatzea, 2♀, 10 June 1997, R. Bosmans leg. (CRB). Volos, 1♀ lectotype, 1♀ paralectotype (MNHNP AR 3690). ALGERIA: *Alger*: Les Eucalyptus, 35 m, 1♂, stones around house, 27 April 1988, R. Bosmans leg. (CRB). *Aïn Defla*: Miliana, Djebel Zaccar, 1200 m, 1♂ 2♀, stones in grassland, 23 April 1989, R. Bosmans leg. (CRB). *Annaba*: Djebel Edough, Seraidi, 810 m, 6♂ 1♀, *Quercus faginea* forest, 24 November 1989, R. Bosmans leg. (CRB). *Blida*: Atlas Blidéen, Chrea, les Glacières, 1045 m, 1♂, pitfall in *Quercus ilex* forest, 15 June 1988; idem, Djebel Ferroukha, Ghellai, 1350 m, 1♂ 2♀, pitfalls in planted *Cedrus atlantica* forest, 20 June 1987–27 May 1988, R. Bosmans leg. (CRB). *Bordj Bou Areridj*: Between Ras el Oued and El Tetla, 1400 m, 2♂ 1♀, degraded *Quercus ilex* forest, litter and stones, 20 April 1989, R. Bosmans leg. (CRB). *Bouïra*: E. Bechloul, Oued Zaiane, 400 m, 1♀, tamarisk litter, 28 April 1988, R. Bosmans leg. (CRB); between Dirah and Sour el Gozlane, 800 m, 1♂, stones in grassland, 10 March 1990, R. Bosmans leg. (CRB). *Boumerdes*: Bordj-Menaïel N., Oued Menaïel, 30 m, 1♂, Eucalyptus litter, 4 March 1988, R. Bosmans leg. (CRB); Zemmouri, 10 m, 1♀, dead plants in dunes, 27 April 1984, R. Bosmans leg. (CRB). *Chleff*: Damous, 5 m, 1♀, garrigue, 16 April 1987, R. Jocqué leg. (MRAC 167586). *El Tarf*: El Kala, E. Cap Rosa, 50 m, 1♀, pitfalls in maquis in dunes, 29 March 1988, R. Bosmans leg. (CRB). *Medea*: Dirah, 900 m, 1♂, pitfalls in rough grassland along Oued Djenane, 10 April 1988, R. Bosmans leg. (CRB). *M'sila*: Chott el Hodna, S. Baniou, 400 m, 1♂, *Limonium* salt marsh, 13 May 1988, R. Bosmans leg. (CRB). *Tissemsilt*: Theniet-el-Had, Djebel Meddad, 1450 m, 1♀, stones in mixed *Cedrus atlantica* and *Quercus ilex* forest, 18 May 1988, R. Bosmans leg. (CRB); idem, 1500 m, 6♂ 1♀, pitfalls in mixed *Cedrus atlantica* and *Quercus faginea* forest, 18 June 1988, R. Bosmans leg. (CRB). *Tizi Ouzou*: 5 km E. d'Azeffoun, 30 m, 1♂, stones in *Olea* plantation, 27 April 1990, R. Bosmans leg. (CRB); El Tleta, Oued Boghni, 180 m, 3♀, stones along the oued, 10 April 1988, R. Bosmans leg. (CRB); S. Tamda, 160 m, 1♀, *Olea* plantation, 27 April 1990, R. Bosmans leg. (CRB); Massif du Djurdjura, Tizi Bousouil, 1740–1780 m, pitfalls in montane grassland, 2♂, January–December 1990, R. Bosmans leg. (CRB); *Tlemcen*: Mansourah, Lalla Setti plateau, 975 m, 1♂ 1♀, stones in dry *Pinus halepensis* litter, R. Bosmans leg. (CRB); Col de Zarifète, 1150 m, 1♂ 1♀, pitfall in *Quercus ilex* maquis, 24 April–6 May 1984, R. Bosmans leg. (CRB). MOROCCO: Khenifra: S. Khenifra, Aguelman (Lake) Azigza, 1575 m, 2♂ 4♀, mixed *Cedrus*, *Q. ilex*, *Q. faginea* and *Fraxinus* forest, 13 May 1984, R. Bosmans leg. (CRB). TURKEY: “Constantinople”, 2♀, type series (MNHNP AR 3690). *Cappadocia*: Erdschias Dagh, 2♀, A. Penther leg. (type material of *E. thoracicoides*; NMW 518); Goreme, 38.40N, 34.45E, 1♀, 28 May 1992, J. & F. Murphy leg. (CJFM 20815).

**Distribution** (Map 6): This forgotten species appears to be common in the Mediterranean region. Many records of *E. thoracica* from the Mediterranean region refer to *E. quadripunctata*. We examined material from Portugal, Spain, France (Corsica only), Greece, Algeria, Morocco and Turkey.

### *Enoplognatha parathoracica* Levy & Amitai, 1981 (Figs. 42–47, Map 5)

*Enoplognatha parathoracica* Levy & Amitai, 1981: 58 (descr. ♂, ♀).

**Type material**: Holotype ♂ from Israel, Mt. Carmel, 3 April 1971 (HUJ 11716); not examined.

**Diagnosis**: Males are closely related to *E. thoracica* and *E. quadripunctata* and differ from both by the distal raised swelling on the chelicerae and by the rounded mesal margin of the radix; males differ further from *thoracica* by the less sharply pointed anterior part of the median apophysis and from *quadripunctata* by the median apophysis being more deeply notched in mesal view. Females are easily distinguished by the heavily sclerotised oval depressions with median septum in the epigyne.

**Description**: Male: Total length 2.9–4.0; cephalothorax 1.50–1.80 long, 1.10–1.35 wide; Fe I 1.38 long. Female: Total length 3.3–4.7; cephalothorax 1.2–1.8 long, 1.0–1.3 wide. Colour: As in *E. quadripunctata*. Male chelicera (Fig. 45): Distal part distinctly swollen. Male palp (Figs. 42–44): As in *E. quadripunctata*, except for radix being rounded on mesal margin in ventral view, and median apophysis which is more deeply incised in mesal view. Epigyne (Fig. 46): With large median septum, separating two large circular orifices. Vulva (Fig. 47): Copulation ducts thick, first converging, then parallel and leading to orifices.

**Material examined and citations**: ISRAEL: Jerusalem, 1♀, 25 April 1973, P. Amitai leg. (HUJ 12703); Rosh Pinna, 1♂, March 1993, S. Ashikenazi leg. (HUJ 15035). GREECE, TURKEY: 1♀ labelled “Volo, Constantinople”, in type series of *E. quadripunctata* (MNHNP AR 3690).

**Distribution**: Israel, also recorded from Greece or European Turkey.

### *Enoplognatha biskrensis* Denis, 1945 (Figs. 48–52, Map 7)

*Enoplognatha quadripunctata* Simon, 1884b: 333 (in part: material from Algeria only); 1885: 27 (misidentifications).

*Enoplognatha biskrensis* Denis, 1945: 49 (descr. ♀).

**Type material**: Lectotype ♀, 1 paralectotype ♀ from Algeria, Biskra, J. Hirst leg. (NHML 1940.12.21.68–69); designated by Levy & Amitai (1981); examined.

**Diagnosis**: Males of *E. biskrensis* are best recognised by the small, triangular median apophysis and terminally incised conductor, females by the widely separated apertures of the copulatory ducts.

**Remarks**: *Enoplognatha biskrensis* has twice been synonymised with other *Enoplognatha* species, but it appears to be a distinct species. The male is described here for the first time.

Levy & Amitai (1981) stated that *E. biskrensis* Denis, 1945 is a synonym of *E. quadripunctata* Simon, 1884. They examined the type material of *E. biskrensis* and compared it with material from Spain and Algeria identified by Simon as *E. quadripunctata*. They concluded they were the same species and considered *E. biskrensis* a junior synonym of *E. quadripunctata*. We also examined Simon's material of *E. quadripunctata* as

well as the type material of *E. biskrensis* and come to another conclusion. *E. quadripunctata* was described from the Balkans, as pointed out above, and a lectotype from the Balkans is selected in this paper. It is related to, but quite different from *E. biskrensis*. Simon's material from Spain and Algeria contains two species: 1♂ and 5♀ of *E. quadripunctata* and 23♀ of *E. biskrensis*. Probably this led to the incorrect interpretation of Levy & Amitai (1981), and the synonymy between *E. biskrensis* and *E. quadripunctata* as indicated in Platnick (1989) is thus rejected.

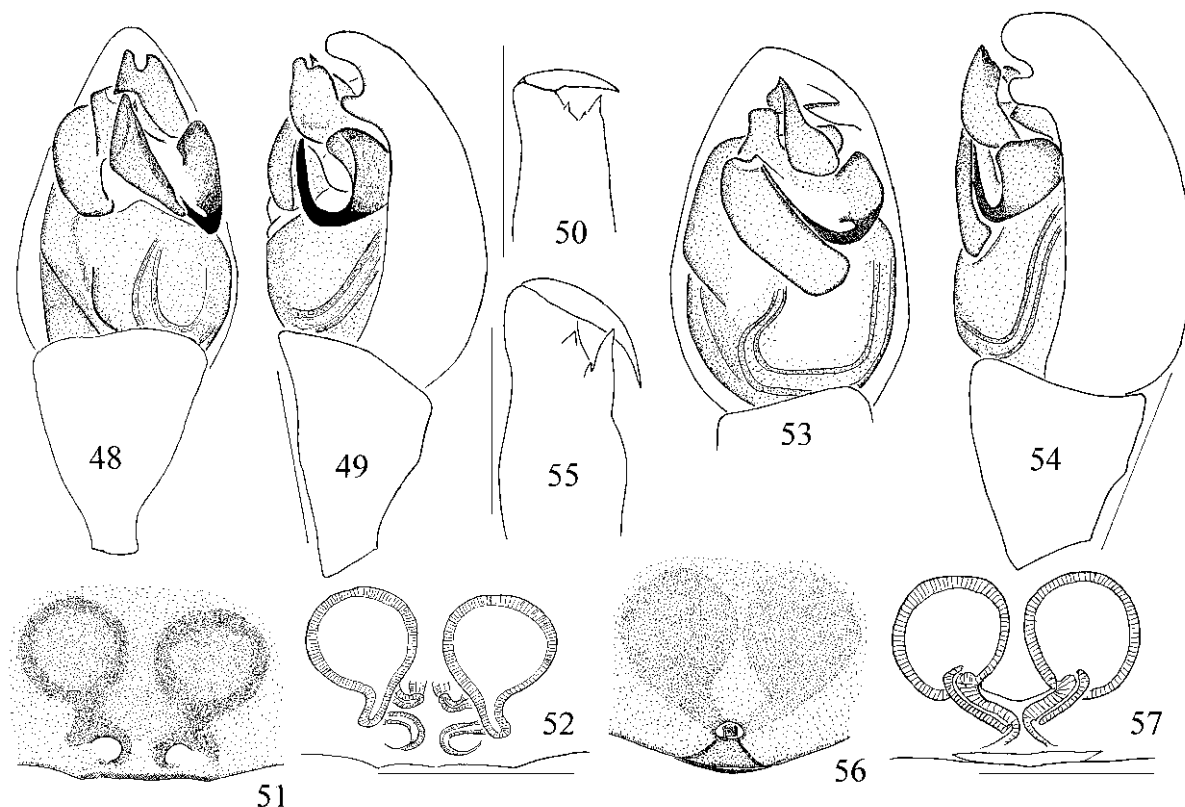
Wunderlich (1995b) on the other hand, synonymised *E. biskrensis* Denis, 1945 with *E. testacea* Simon, 1884. The epigynes of the two species are indeed very similar, but are clearly different (Fig. 51 cf. Fig. 56), as pointed out in the diagnosis. This synonymy is also rejected.

**Description:** Male: Total length 2.4–3.1; cephalothorax 1.05–1.35 long, 0.8–1.05 wide; Fe I 1.40–1.55 long. Female: Total length 2.8–4.1; cephalothorax 1.10–1.46 long, 0.84–1.05 wide. Fe I 1.15–1.51 wide. Colour: Cephalothorax yellowish brown to brown, margins mostly darkened; sternum yellowish brown to brown; legs uniformly yellowish brown; abdomen very variable, from generally pale grey with darker spots, to generally dark grey with pale spots. Male chelicera (Fig. 50): With large proximal tooth provided with two basal denticles, and much smaller distal tooth. Male palp (Figs. 48–49): Tibia 0.18–0.24 long, cymbium 0.37–0.48 long; median apophysis small and triangular, occupying less than half length of bulbus; radix basally and laterally gently

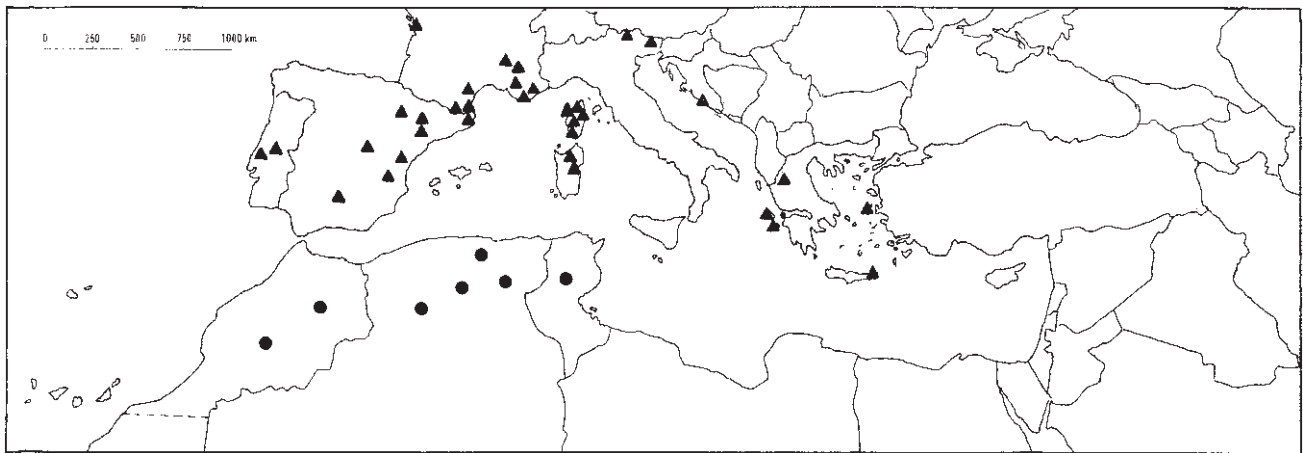
rounded; accessory apophysis poorly developed, much shorter than wide conductor, which is incised terminally as seen in ventral view; embolus describing 3/4 of a circle. Epigyne (Fig. 51): With two widely separated apertures; posterior margin somewhat protruding, 0.10–0.13 wide. Vulva (Fig. 52): Copulatory ducts short, first winding posterolaterally, then returning to middle to separated apertures.

**Material examined and citations:** "Alg. Hisp.", 23♀ (MNHNP AR 3713), sub *E. quadripunctata*, together with 1♂ 5♀ of *E. quadripunctata*. ALGERIA: Without exact locality (Simon, 1884b, sub *E. quadripunctata*). Biskra: Biskra (type locality, Denis, 1945). Bourdj-Bou-Arredj: Hammam-el-Biban, Portes de Fer, 1♀, 14 April 1987, R. Jocqué leg. (MRAC 167.563). Djelfa: Hassi Babbah, El Mesrane, 900 m, 1♂, pitfalls in dunes, 28 March 1989, R. Bosmans leg. (CRB). El Bayad: E. Brezina, 800 m, 2♂ 2♀, stones in steppe region, 9 February 1987, R. Bosmans leg. (CRB). Tizi Ouzou: Hennia, near Frikat, 700 m, 1♀, 14 April 1987, R. Jocqué leg. (MRAC, 167.596). MOROCCO: Errachidia: 25 km N. Errachidia, 1400 m, 8♀, stones on slope to palm yard, 6 February 1996, R. Bosmans leg. (CRB). Ouarzazate: Dades valley, between Skoura and Tour, 1200 m, 1♀, stones along an oued, 6 February 1996, R. Bosmans leg. (CRB). TUNISIA: Tunis, Kairouan (Simon, 1885, sub *E. quadripunctata*).

**Distribution (Map 7):** Verified material has been examined from the steppe region at the northern border of the Algerian Sahara. The species also occurs in comparable habitats in Morocco and Tunisia; Simon's citation (1885) from Tunisia as *E. quadripunctata* however needs confirmation in the absence of material. We consider the specimens labelled "Alg. Hisp." in the MNHNP as originating from Algeria only, until further captures confirm the presence of *E. biskrensis* in Spain.



Figs. 48–57: 48–52 *Enoplognatha biskrensis* Denis. 48 Male palp, ventral view; 49 Idem, lateral view; 50 Male chelicera, anterior view; 51 Epigyne; 52 Vulva, ventral view. 53–57 *Enoplognatha testacea* Simon. 53 Male palp, ventral view; 54 Idem, lateral view; 55 Male chelicera, anterior view; 56 Epigyne; 57 Vulva, ventral view.



Map 7: Distribution of *Enoplognatha biskrensis* Denis (circles) and *E. testacea* Simon (triangles).

**Ecology:** Exclusively found in arid and semi-arid conditions. Males collected from February to March, females from February to April.

***Enoplognatha testacea* Simon, 1884** (Figs. 53–57, Map 7)

*Enoplognatha testacea* Simon, 1884a: 192 (descr. ♂, ♀); 1898: 2; Caporiacco, 1927: 86; Denis, 1933a: 563; 1933b: 92; 1934: 151; 1935: 108; 1937: 167; Machado, 1941: 27; Dresco, 1962: 180; Denis, 1962: 278; Wunderlich, 1976: 105; Brignoli, 1984: 293; Noflatscher, 1990; 64; 1991: 81; Raphael *et al.*, 1992: 167.

*Robertus monticola*; Machado, 1949: 25 (misidentification).

*Robertus cottarellii* Brignoli, 1980: 260 (descr. ♀). **Syn. n.**

*Robertus arganoi* Brignoli, 1980: 262 (descr. ♀).

**Type material:** Simon (1884), in his original description, mentioned two localities: Arcachon (Gironde) and Corsica. No material from these sites was found in the MNHNP.

**Diagnosis:** Closely related to *E. biskrensis*, males differ by the longer course of the tegular ducts and the parallel margins of the median apophysis, females by the raised posterior margin of the epigyne, the absence of two clearly separated apertures and the much shorter copulatory ducts.

**Remarks:** Machado (1949) identified a female theridiid from Portugal as *Robertus monticola* Simon (= *R. scoticus* Jackson). Brignoli (1980) discovered the same species in Italy and stated that it was quite different from the central and northern European *Robertus scoticus* and described it as *Robertus cottarellii*. In the same paper, Brignoli described *Robertus arganoi* from Sardinia. According to Eskov (1987) both species belong in the genus *Enoplognatha*, where *R. arganoi* is a junior synonym of *E. testacea*. The type specimens of both species are not available for study.

Brignoli (1980) stated that the vulvae of *cottarellii* and *arganoi* are “sufficiently different as shown in the figures”, but does not explain what these differences are. Examining the figures, the main difference seems to be the presence of a dark transverse stripe, which could be a sclerotised ridge. The course of the copulation ducts seems somewhat different, but this could be due to ventral and dorsal aspects of the vulva. To deal with this problem, it is best to consider the most important

diagnostic characters which distinguish females of *Enoplognatha*: the protruding hind margin of the epigyne, the distance between the copulation openings and their distance from the hind margin. These characters are the same in *E. testacea*, *R. cottarellii* and *R. arganoi*. Until the contrary has been proved, we consider both species as synonyms of *E. testacea*. The presence of *E. testacea* in Sardinia was recently confirmed by a recent capture there of the species by one of us.

**Description:** Male: Total length 2.2–3.3; cephalothorax 1.0–1.45 long, 0.85–1.2 wide. Fe I 1.14 long. Female: Total length 2.4–4.1; cephalothorax 1.05–1.5 long, 0.9–1.2 wide. Fe I 1.01–1.40 long. Colour: Cephalothorax yellowish brown, with narrow grey margin; legs yellowish brown, Fe and Ti with indistinct grey annulations; abdomen with indistinct folium, greyish brown, with 3 pairs of often fused dorsal whitish to pale grey spots, dorsolateral stripe and some ventral spots whitish to pale grey. Male chelicera (Fig. 55): With large proximal tooth, accompanied by small basal denticle and small distal tooth. Male palp (Figs. 53–54): Tibia 0.24 long, cymbium 0.37 long. Tegular ducts long, closely following lateral and posterior margins of tegulum; median apophysis large, with parallel margins; radix with poorly pronounced, blunt basal corner, distal part rounded, hidden by other sclerites; accessory apophysis broad, truncate terminally; conductor with folded distal part in ventral view, in lateral view truncate terminally; embolus describing half a circle, distal third straight. Epigyne (Fig. 56): Posterior width of epigyne 0.10; distinctly depressed anterior to protruding, narrowly chitinised hind margin, in depression a very small aperture. Vulva (Fig. 57): Copulatory ducts short, first winding for a short distance in posterolateral direction, then directly turning to apertures.

**Material examined and citations:** “Europe”, 28♀, sub *E. mandibularis* (MNHNP AR 3714). FRANCE: *Ardèche*: Cave near Auriolles (Dresco, 1962); Château de Galo (Raphaël *et al.*, 1992). *Aude*: Carcassonne, St Pierre des Camps, 1♀, 3 April 1995, R. Jocqué leg. (CRJ). *Bouches du Rhone*: Without further locality, 2♀ (MNHNP AR 3656, sub *E. mandibularis*). *Charente Maritime*: Côte Sauvage, 1♀, 2 June 1992, J. & F. Murphy leg. (CJFM 20742). *Corsica*: Ajaccio, 2♀ (MNZHB 29089, sub *E. mandibularis*); Calacuccia, Lozzi, 1200 m, 1♀, among stones, 25 May 1995, R. Bosmans leg. (CRB); Castirla, 345 m,

1♂ 3♀, *Quercus suber* litter, 25 May 1995, J. & K. Van Keer leg. (CJvK); Noceta road, 3♀, 18–23 May 1989, J. & F. Murphy leg. (CJFM 17827, 18145); between Pietrosella and Col de Cortone, 1♀, litter, 27 May 1995, R. Bosmans leg. (CRB). *Pyrénées Orientales*: Banyuls, 1♀ (MNHNP AR 3706, sub *E. mandibularis*); Banyuls, Amélie, Montalba, Sait-Laurent de Cerdans, Prats-de-Mollo (Denis, 1933a). *Var.*: Agay (Denis, 1935); Cavalaire (Denis, 1933b); Collobrières (Simon, 1898); Ile de Port Cros (Denis, 1934); La Garde (Denis, 1935); Ollioules, vallée de Destel (Denis, 1937). **SPAIN**: *Albacete*: Almansa, 950 m, 1♀, stones in maquis, 3 April 1996, R. Bosmans leg. (CRB). *Cuenca*: Los Baños de Valdeganga, 1♀, stones along river, 13 April 1998, R. Bosmans leg. (CRB). *Gerona*: Calonge, San Jorge (Denis, 1962). *Huesca*: S. Ontiñena, 300 m, 2♀, stones in dry river bed, 1 April 1996, R. Bosmans leg. (CRB). *Jaen*: Jaen, Jabalcuz, 2♀, stones in *Pinus* forest, 12 April 1998, R. Bosmans leg. (CRB). *Teruel*: Aguaviva, 500 m, 1♀, maquis and *Pinus* along Rio Bergantes, 2 April 1996, R. Bosmans leg. (CRB). *Valencia*: Rincón de Ademuz, Torrebaja, 740 m, 1♀, stones in pine forest, 8 April 1997, R. Bosmans leg. (CRB). *Zaragoza*: Daroca, 2♀, stones in *Pinus* forest, 14 April 1998, R. Bosmans leg. (CRB). **PORTUGAL**: Regua (Machado, 1941). *Estremadura*: Serra de Montejunto (Machado, 1949, sub *Robertus monticola*). *Ribatejo*: Amiaes de Baixo (Machado, 1949, sub *Robertus monticola*). **GERMANY**: *Baden-Württemberg*: Kaiserstuhl, Badberg (Wunderlich, 1976). **ITALY**: *Alto Adige*: Saben and Güntscha (Noflatscher, 1990); Mitterberg (Noflatscher, 1991). *Carnia*: Tolmezzo (Caporiacco, 1927). *Sardinia*: Nuoro: Laconi, 550 m, 1♀, stones along cliff, 21 May 1997, J. & K. Van Keer leg. (CJvK). Sassari: Oschiri, 1♀ (MNZHB 29086, sub *E. mandibularis*). **CROATIA**: Lastovo, Larbovo, 1♂, 2 December 1964, E. Prettnner leg. (CCD). **GREECE**: *Aegean Islands*: Chios: Chios, 1♂, stones in pine forest, 16 February 1982, C. Deeleman leg. (CCD). *Crete*: Lasithi: Sitia (Brignoli, 1984). *Epiro*: Ioannina: Konitsa (Brignoli, 1984). *Ionian Islands*: Ithaki: Exoghi (Brignoli, 1984). Kefalonia: Sami, Aphragias-Poros (Brignoli, 1984). Zakynthos: A. Nikolaos (Brignoli, 1984).

**Distribution** (Map 7): The European part of the Mediterranean region, northwards to SW Germany. Recorded from Portugal, Spain, France, Germany, Italy, Croatia and Greece.

**Ecology**: Males collected from December to May, females from April to June.

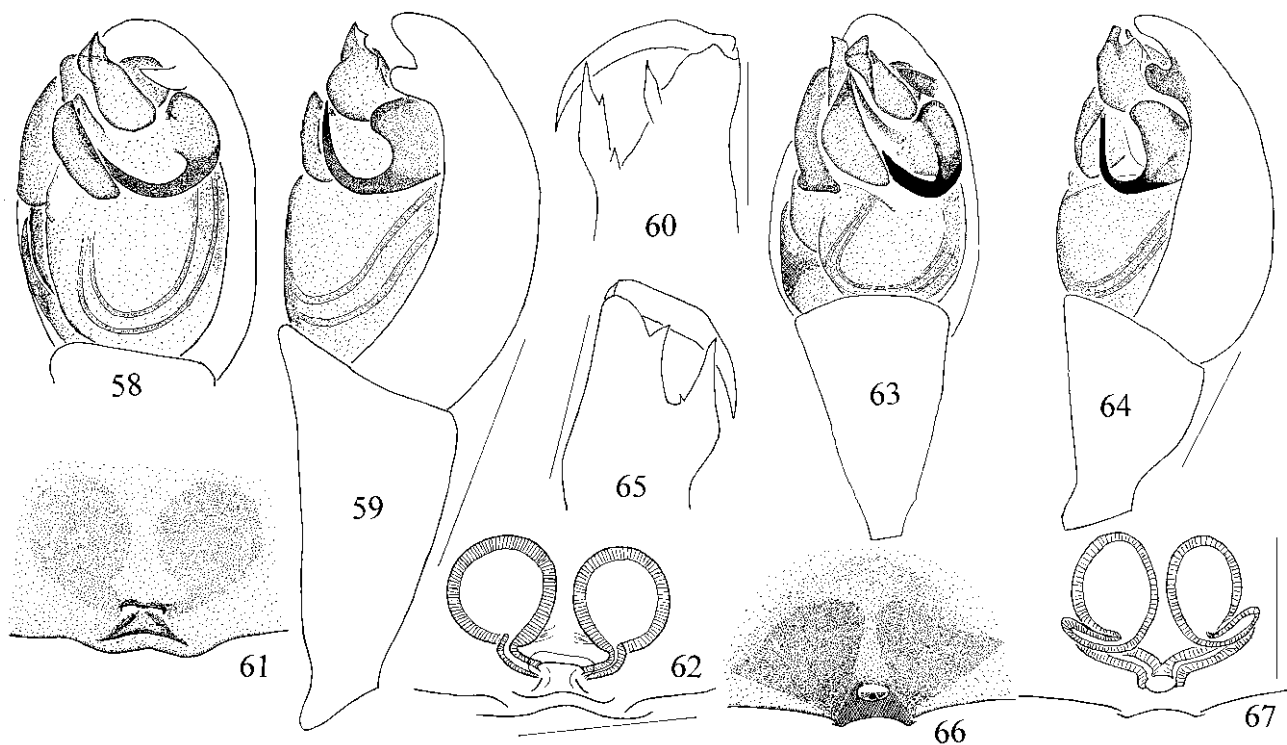
***Enoplognatha mediterranea* Levy & Amitai, 1981** (Figs. 58–62, Map 6)

*Enoplognatha mediterranea* Levy & Amitai, 1981: 62 (descr. ♂, ♀).

**Type material**: Holotype ♂ from Israel, Mt. Hermon, 6 April 1971, P. Amitai leg. (HUJ 12699); examined.

**Diagnosis**: Males are recognised by the relatively small median apophysis, occupying only one third of the length of the bulbus, females by the oval, transverse groove with anterior sclerotised bridge and by the recurved hind margin of the epigyne.

**Description**: Male: Total length 3.1–4.4; cephalothorax 1.29–1.51 long, 1.06–1.30 wide; Fe I 1.65–1.90 long. Female: Total length 3.0–4.4; cephalothorax 1.30–1.50 long, 1.05–1.30 wide; Fe I 1.65–1.90 long. Colour: Cephalothorax deep to light brown with dark margins; legs brown with darkened tips of segments; abdomen black to grey, usually with four dorsal white spots, venter black. Male chelicera (Fig. 60): With two large teeth, proximal one largest and accompanied by some denticles. Male palp (Figs. 58–59): Tibia as long as cymbium, 0.42 long; radix rounded mesally; median apophysis relatively small, occupying only one third of length of bulbus, with nearly parallel margins; conductor with subterminal, membranous tooth, best seen in lateral view; accessory apophysis wide, rounded terminally; embolus relatively short, describing half a circle. Epigyne (Fig. 61): Width of aperture 0.10 mm; with transverse, bridge-like structure; distinctly depressed



Figs. 58–67: **58–62** *Enoplognatha mediterranea* Levy & Amitai. **58** Male palp, ventral view; **59** Idem, lateral view; **60** Male chelicera, anterior view; **61** Epigyne; **62** Vulva, ventral view. **63–67** *Enoplognatha oelandica* (Thorell). **63** Male palp, ventral view; **64** Idem, lateral view; **65** Male chelicera, anterior view; **66** Epigyne; **67** Vulva, ventral view.

anterior to recurved, narrowly sclerotised hind margin. Vulva (Fig. 62): Copulatory ducts very short, first turning posteriorly, then medially to bridge-like structure.

*Material examined*: CYPRUS: Akamas, 1♀, 16 April 1994, P. Selden leg. (CPS). GREECE, TURKEY: "Volo, Constantinople", 2♀ (MNHNP AR 3690, sub *E. quadripunctata*). ISRAEL: En Gedi, 1♀, P. Amitai leg. (HUI 11490); Mount Hermon, holotype ♂ of *E. mediterranea*, P. Amitai leg. (HUI 12699).

*Distribution* (Map 6): We examined material from Greece or the European part of Turkey, Cyprus and Israel.

### *Enoplognatha oelandica* (Thorell, 1875) (Figs. 63–67)

*Steatoda oelandica* Thorell, 1875a: 92 (descr. ♀).

*Drepanodus corollatus* Bertkau, in Förster & Bertkau, 1883: 246 (descr. ♂).

*Enoplognatha corollata*; Chyzer & Kulczyński, 1894: 43 (descr. ♂, ♀).

*Enoplognatha oelandica*; Wiehle, 1960: 234 (descr. ♂, ♀); Roberts, 1985: 192, fig. (♀ only); Heimer & Nentwig, 1991: 288; Roberts, 1995: 292.

*Description*: See Roberts (1995), Heimer & Nentwig (1991) and Figs. 63–67.

*Material examined*: BELGIUM: *West-Vlaanderen*: Wenduine, 1♂, dunes, 10 June 1988, J. Van Keer leg. (CJvK). FRANCE: *Charente Maritime*: Côte Sauvage, 2♂ 6♀, 20 March 1993, J. & F. Murphy leg. (CJFM 21559 and CRB). *Loire Atlantique*: Pen Bron, 4♀, pine forest on sand dunes, 29 May 1992, J. & F. Murphy leg. (CJFM 20635). *Vendée*: Barbâtre, 2♀, pine forest on sand dunes, 27 May 1992, J. & F. Murphy leg. (CJFM 20534).

*Distribution*: A northern species, in the western part of its range extending to the south along the French coast; in the eastern part, cited from several Balkan countries as *E. corollata*, but these citations should all be confirmed.

### *Enoplognatha sattleri* Bösenberg, 1895 (Figs. 68–72, Map 3)

*Enoplognatha sattleri* Bösenberg, 1895: 4 (descr. ♀); Denis, 1962: 69; Schmidt, 1975: 508; Wunderlich, 1987: 206 (descr. ♂, ♀); 1992: 43, 58, 71.

*Type material*: Not examined.

*Diagnosis*: Males are distinguished by the presence of three cheliceral teeth in the fang groove and the long palpal tibia compared to the cymbium; females are closest to *E. deserta* and *E. diversa*, differing by the shorter ducts in the vulva, turning directly to the median pit, without posterolaterally directed part.

*Description*: Male: Total length 3.2–3.7; cephalothorax 1.35–1.65 long, 1.05–1.30 wide; Fe I 1.35–1.65 long. Female: Total length 3.8–5.1; cephalothorax 1.40–2.06 long, 1.25–1.60 wide; Fe I 1.50–2.06 long. Colour: Cephalothorax yellowish brown, margin and spot behind fovea grey; sternum dark brown; legs pale brown, with dark annulations; abdomen with dorsal folium, ventrally with large, quadrangular whitish spot, usually with median, often broken grey stripe. Male chelicera (Fig. 70): With 3 teeth, a large, curved basal one and small distal and median ones, the latter accompanied at its base by a denticle; not rugose. Male

palp (Figs. 68–69): Tibia 0.38–0.53 long, cymbium 0.30–0.41 long; radix with mesal concavity; median apophysis relatively wide, gently curved; accessory apophysis poorly developed, completely covered by large, oblique conductor, the latter terminally curved in anterior direction; embolus rather short, describing half a circle. Epigyne (Fig. 71): Pit 0.08–0.10 wide, its anterior margin slightly sclerotised, its hind margin strongly and widely sclerotised. Vulva (Fig. 72): Receptacula circular, ducts short, slightly curved, leading to posteromedian pit.

*Material examined and citations*: PORTUGAL: *Madeira Islands*: Madeira: Funchal (Bösenberg, 1895): *Calderia inferno*, 2♀, 25–29 April 1957, H. Coiffait leg. (MNHNP AR 3695). *Salvage Islands*: Salvagem Grande (Wunderlich, 1992). SPAIN: *Canary Islands*: "Palma Teneriffe (All.)", 2♀, sub *E. mandibularis* (MNHNP AR 3830). *Gran Canaria*: Roque Nubio (Wunderlich, 1987); near Parador Nacional (Wunderlich, 1987). *La Gomera*: Benchijuta (Wunderlich, 1987); las Hayas (Wunderlich, 1987). *El Hierro*: Tinor (Wunderlich, 1987); El Golgo, Brezal (Wunderlich, 1987); El Golfo (Wunderlich, 1992). *Lanzarote*: Haria (Wunderlich, 1992). *Las Palmas*: Fuente de Olen (Wunderlich, 1987); Las Palmas, 1♀, sub *E. mandibularis* (NMB). *Tenerife*: Punta del Hidalgo, Fuente Fria (Schmidt, 1975); Esperanza (Wunderlich, 1987); Santa Cruz, 1♂, sub *E. mandibularis* (NMB); Santiago de Teide, 1♂ 1♀, 21 December 1984 and 7♂ 11♀, 17 March 1996, J. & F. Murphy leg. (CJFM 22005, 21820 and CRB).

*Distribution* (Map 3): The Madeira, Salvage and Canary Islands.

*Ecology*: Males collected from December to March, females from December to April.

### *Enoplognatha franzi* Wunderlich, 1995 (Figs. 73–77, Map 8)

*Enoplognatha mandibularis*; Wiehle, 1937: 210 (♀ only, ♂=*E. mandibularis*); Chen & Zhang, 1991: 146 (♀ only, ♂=*E. mandibularis*). *Enoplognatha diversa*; Wunderlich, 1976: 99 (♀ only). *Enoplognatha franzi* Wunderlich, 1995b: 704 (descr. ♂, ♀).

*Type material*: Holotype ♂, 3♂ 3♀ paratypes from Spain, Tunisia and Israel/Palestine, designated by Wunderlich; not examined.

*Diagnosis*: Males are distinguished by the long embolus and the strongly elongated median apophysis, females by the epigyne with almost circular pit with internal septum, very close to the hind margin of the epigyne; examination of the vulva, showing an additional loop in the copulatory ducts, further distinguishes the female from all other species.

*Remarks*: This recently described species (Wunderlich, 1995b) appears to be present in several museum collections, but was not recognised until 1995. The female was described and figured as *E. mandibularis* by Wiehle (1937) and Chen & Zhang (1991) and described as *E. diversa* by Wunderlich (1976).

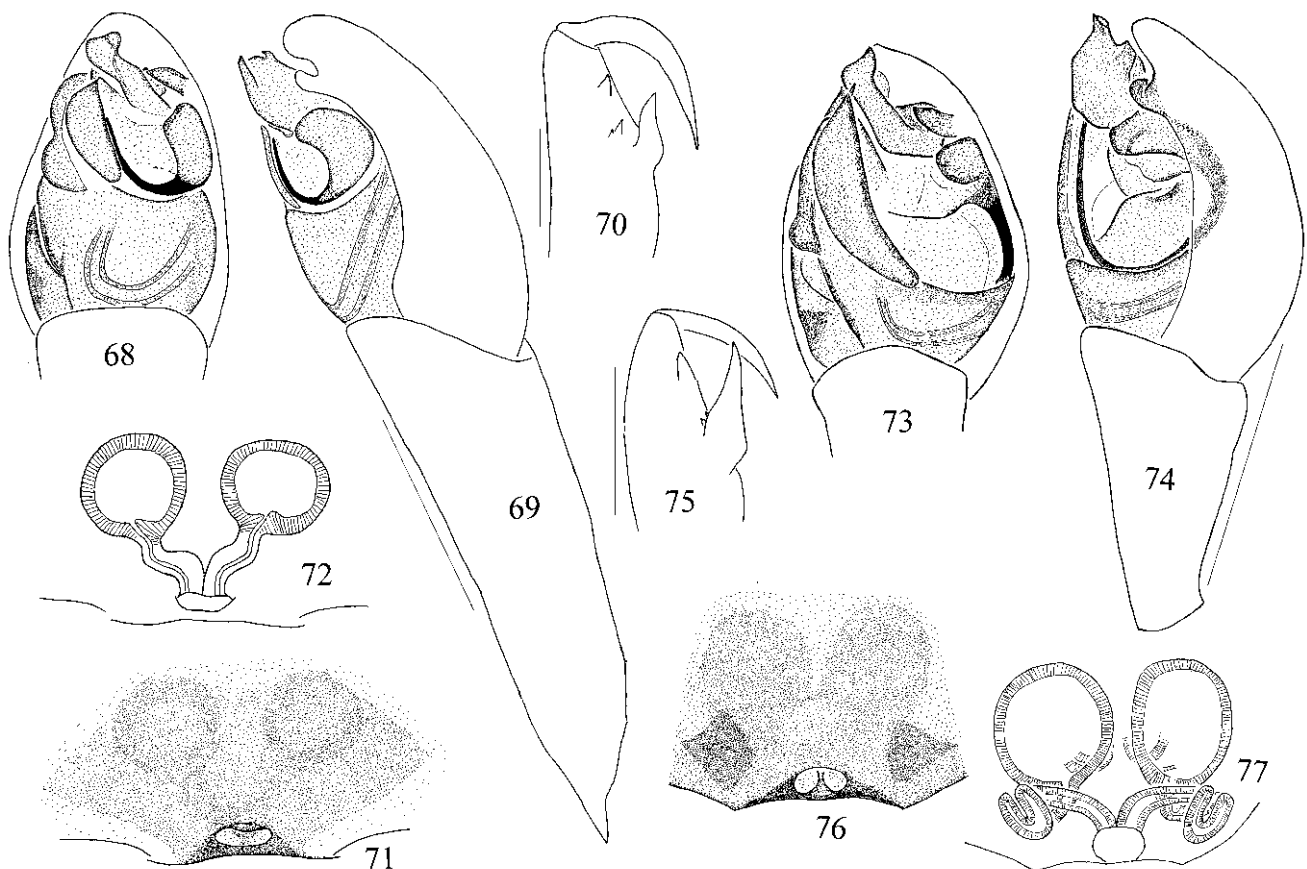
*Description*: Male: Total length 2.1–5.1; cephalothorax 1.00–2.41 long, 0.81–1.80 wide; Fe I 1.10–2.61 long. Female: Total length 2.4–5.5; cephalothorax 1.15–2.01 long, 0.75–1.80 wide. Fe I 1.25–2.36 long. Colour: Cephalothorax brown to grey-brown with narrow black margin; sternum dark brown with black margin; legs brown with dark brown annulations; abdomen with dorsal folium with median elongate, black spot, ventrally with broad black band between spinnerets and epigyne, bordered at each side by a white stripe. Male



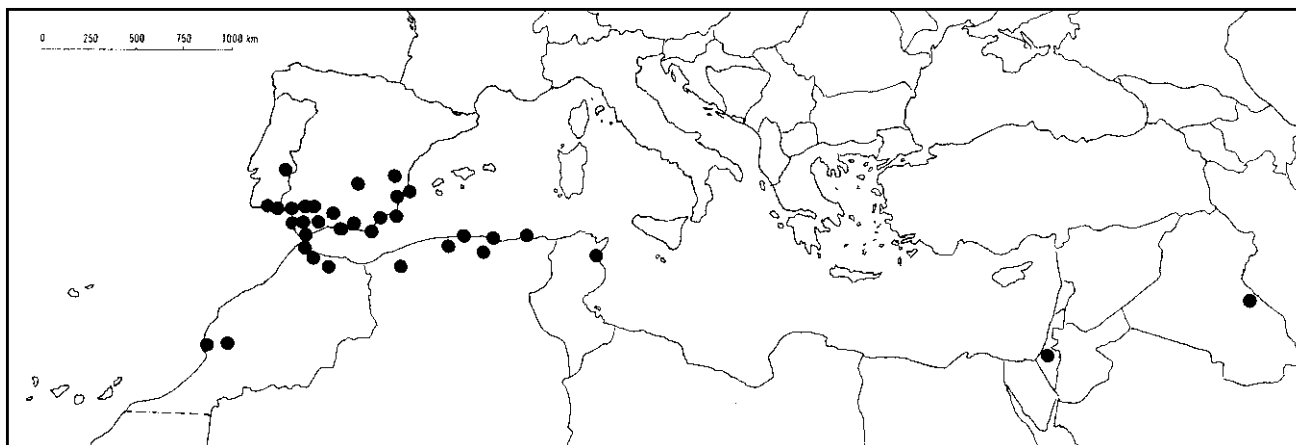
chelicera (Fig. 75): With two long teeth, basal one strongest, accompanied at its base by two denticles; anteriorly moderately rugose. Male palp (Figs. 73–74): Tibia 0.24–0.62 long, cymbium 0.37–0.64 long; radix small, with small basal tubercle; median apophysis elongated, occupying more than half length of bulbus; accessory apophysis a triangular tooth, slightly shorter than conductor; conductor with broad base, terminally pointed; embolus very long, describing a complete circle. Epigyne (Fig. 76): Pit 0.08–0.13 wide, circular or slightly wider than long, close to concave hind margin, pit with narrow median septum, often obscured by plugging. Vulva (Fig. 77): Copulatory ducts first winding in lateral direction, then turning to median pit, with a supplementary loop.

*Material examined and citations:* "Europe", 27♀, sub *E. mandibularis* (MNHN AR 3714). SPAIN: *Alicante*: Altea la Vieja, 50 m, 1♂ 1♀, stones, 29 January 1995, 1♂, 15 March 1994, 1♂, on wall, 22 March 1995, 1♀, 18 May 1996, M. Pérez leg. (CMP); Altea, Sierra de Bernia, 200 m, 3♀, under stones, 17 April 1994; idem, 600 m, 1♂ 7♀, stones, 14 April 1995, 4♂, 15 November 1995, M. Pérez leg. (CMP); Sierra de Aitana, 1♀, 18 May 1996, 1♀, 5 July 1996, M. Pérez leg. (CMP); between Villajoyosa and Alicante, 1♂ holotype, 1♀ paratype (Wunderlich, 1995b); Calpe, Venta de la Chata, 1♂ paratype (Wunderlich, 1995b). *Almería*: Cabo de Gata, 1♀, 30 March 1990, J. & F. Murphy leg. (CJFM 18507); idem, 8♀, slopes near coast, 7 April 1997, R. Bosmans leg. (CRB); Carboneras, 1♀, 1 April 1990, J. & F. Murphy leg. (CJFM 18528); La Serrata, 1♀, 24 March 1990, J. & F. Murphy leg. (CJFM 18383); San José, 1♂ 3♀, 22 March and 10 April 1990, J. & F. Murphy leg. (CJFM 18714, 18718). *Cádiz*: Bolonia, 1♂,

8 May 1993, P. Poot leg. (CPP); Embalse de Palmones, 1♀, 6 April 1994, P. Poot leg. (CPP); Getares, 1♀, 25 April 1994, P. Poot leg. (CPP); Vanuytven *et al.*, 1994); San Roque, Torre Guadiaro, 5 m, 1♀, slopes near coast, 4 April 1997, R. Bosmans leg. (CRB); Tarifa, 2♂, March 1991, 1♂, March 1992, 3♂, April 1992, 1♂, March 1994, P. Poot leg. (CPP); Zahara de los Atunes, 1♀, 14 April 1974, J. & F. Murphy leg. (CJFM 3279); Zahara de la Sierra, 1♀, 8 April 1993, R. Bosmans leg. (CRB). *Castellón*: Alcalá de Chivert, 1♀, 13 March 1996, M. Pérez leg. (CMP). *Ciudad Real*: Pozuelo de Calatrava, 1♀ paratype, 1913, Fuente leg. (MNHN AR 3822). *Granada*: Sierra de la Contrevesa, Puerto Camacho, 1230 m, 1♀, stones in pine forest, 6 April 1997, R. Bosmans leg. (CRB). *Huelva*: La Granada de Riotinto, 2♀, 11 April 1992, R. Jocqué leg. (CRJ); Torre de la Higuera, 1♀, stones in dunes, 9 April 1994, R. Bosmans leg. (CRB); Zufre, 1♀, 10 April 1992, R. Jocqué leg. (CRJ). *Málaga*: Archedona W., La Pena, 1♀, stones in grassland, 11 April 1998, R. Bosmans leg. (CRB); Canillas de Albaida, 1♂ 1♀, 29 March 1987, J. & F. Murphy leg. (CJFM 14460); Frigiliana, 1♂ 1♀, 6 April 1987, J. & F. Murphy leg. (CJFM 14562); Rio Guadalmedina, 10 km N. Málaga, 1♂ 12♀, river bank, 5 April 1997, R. Bosmans leg. (CRB); Maro, 3♂ 5♀, 1 April 1987, J. & F. Murphy leg. (CJFM 14323, 14339, 14423); Ronda, banks of rio Guadalevin, 2♀ (IRSNB). *Murcia*: Cartagena, 9 km E. Mazarrón, 1♀ paratype (Wunderlich, 1995b). *Sevilla*: E. Ronquillo, Embalse de Cala, 1♂ 1♀, 6 April 1994, R. Bosmans leg. (CRB); W. Ronquillo, Embalse de la Minilla, 8♀, 5 April 1994, R. Bosmans leg. (CRB); idem, 3♀, stones in *Quercus* forest, 7 April 1996, R. Bosmans leg. (CRB). *Valencia*: Embalse de Cofrentes, 400 m, 1♀, tamarisk and *Phragmites* litter near water, 3 April 1996, R. Bosmans leg. (CRB). PORTUGAL: *Algarve*: Albufeira, 2♂, 1–9 March 1992, P. Poot leg. (CPP); Monte Gordo, 2♂ 2♀, 2–15 April 1971 (CJFM 2, 55, 153, 224) and 2♀, 5 April 1982, J. & F. Murphy leg. (CJFM 10222). *Alto Alentejo*: Monforte S., Ribero do Almugro, 475 m, 1♀, stones in *Eucalyptus* plantation, 8 April 1996, R. Bosmans leg. (CRB). ALGERIA: *Aïn Defla*: Miliana, Djebel Zaccar, 1200 m, 1♀, stones in grassland, 23 April 1989, R. Bosmans leg. (CRB).



Figs. 68–77: **68–72** *Enoplognatha sattleri* Bösenberg. **68** Male palp, ventral view; **69** Idem, lateral view; **70** Male chelicera, anterior view; **71** Epigyne; **72** Vulva, ventral view. **73–77** *Enoplognatha franzi* Wunderlich. **73** Male palp, ventral view; **74** Idem, lateral view; **75** Male chelicera, anterior view; **76** Epigyne; **77** Vulva, ventral view.



Map 8: Distribution of *Enoplognatha franzi* Wunderlich.

*Chleff*: Damous, 5 m, 1♀, garrigue, 16 April 1987, R. Jocqué leg. (MRAC 167.585). *M'Sila*: Kalaa Beni Hammad, 980 m, 3♀, stones in grassland, 28 April 1988, R. Bosmans leg. (CRB). *Saida*: Saida, 850 m, 1♀, stones in hotel garden, 5 May 1985, R. Bosmans leg. (CRB). *Skikda*: Bouchata, 400 m, 1♂, stones in grassland, 12 March 1990, R. Bosmans leg. (CRB). *Tizi Ouzou*: S. Tamda, 160 m, 1♀, stones in *Olea* yard, 27 April 1990, R. Bosmans leg. (CRB). MOROCCO: *Agadir*: Aourir, 12 km N. Agadir, 75 m, 4♀, stones along river, 3 February 1996, R. Bosmans leg. (CRB). *Ketama*: 40 km E. Ketama, 1030 m, 1♂, stones in degraded *Quercus ilex* forest, 20 April 1984, R. Bosmans leg. (CRB). *Ouarzazate*: Tizi 'n Bachkoun, 1650 m, 1♀, stones along rivulet, 4 February 1996, R. Bosmans leg. (CRB). *Taroudannt*: between Aoulouz and Taliouine, 600 m, 1♂ 1♀, stones in arganier steppe, 4 February 1996, R. Bosmans leg. (CRB). *Taza*: Cascades de Ras El Oued, 1000 m, 1♂, herbs near water, 22 April 1984, R. Bosmans leg. (CRB). *Tetouan*: Oued Hadjera near Tetouan, 1♂ 1♀, abandoned garden, 20 April 1984, R. Bosmans leg. (CRB). TUNISIA: *Sousse*: Near Sousse, 1♂ paratype (Wunderlich, 1995b). ISRAEL/PALESTINE: "Palestine", without further locality (Wiehle, 1937, ♀, sub *E. mandibularis*; Wunderlich, 1976, ♀, sub *E. diversa*; Wunderlich, 1995b, 1♂ paratype of *E. franzi*). IRAQ: Amara, 1♀ (NMW 514, sub *E. mandibularis nigrocincta*).

**Distribution** (Map 8): Apparently widely distributed in the Mediterranean region, from Morocco and Spain in the west to Israel/Palestine in the east, but incompletely known. Material has been examined from Spain, Portugal, Morocco, Algeria, Tunisia, Israel/Palestine and Iraq.

**Ecology**: Males collected from November to May, females from January to July.

***Enoplognatha diversa* (Blackwall, 1859)** (Figs. 78–82, Map 9)

*Epeira diversa* Blackwall, 1859: 262 (descr. ♀).

*Enoplognatha diversa*; Kulczyński, 1899: 377 (descr. ♂, ♀); Wunderlich, 1987: 199; 1995b: 705.

*Enoplognatha robusta* Simon, 1884b: 332 (descr. ♀).

*Enoplognatha robustula* Roewer, 1942: 402 (nom. n.). **Syn. n.**

**Type material**: The type material of *Epeira diversa* Blackwall was not traced. Holotype ♀ of *Enoplognatha robusta* Simon, without epigyne, from Greece, Euboia, Steni; examined (MNHNP AR 3664).

**Diagnosis**: Fresh specimens are fairly easy to distinguish from other species by the speckled femora and tibiae and the rough chelicerae. Males are further distinguished by the basolateral tubercle of the radix

and the symmetrical, gently curved median apophysis, females by the angular, strongly protruding and heavily sclerotised posterior margin of the epigyne.

**Remarks**: Excellently redescribed by Kulczyński (1899), on material from Madeira. For a long time, the species was only known from these islands, the Canary Islands and Morocco. However, many specimens cited as *E. mandibularis* from the rest of Europe and examined by us appeared to be *E. diversa*.

*Enoplognatha robustula* is considered a synonym of *E. diversa*, as has already been suggested by Wunderlich (1995b). Although the epigyne of the holotype is lost, its large size, the speckled femora and tibiae and the rugose chelicera leave no doubt about the synonymy and Wunderlich's view is hereby confirmed. In the original description of *E. robusta*, Simon (1884b) had already mentioned the rugosity of the chelicerae as a character to differentiate *E. robusta* (= *E. diversa*) from *E. mandibularis*.

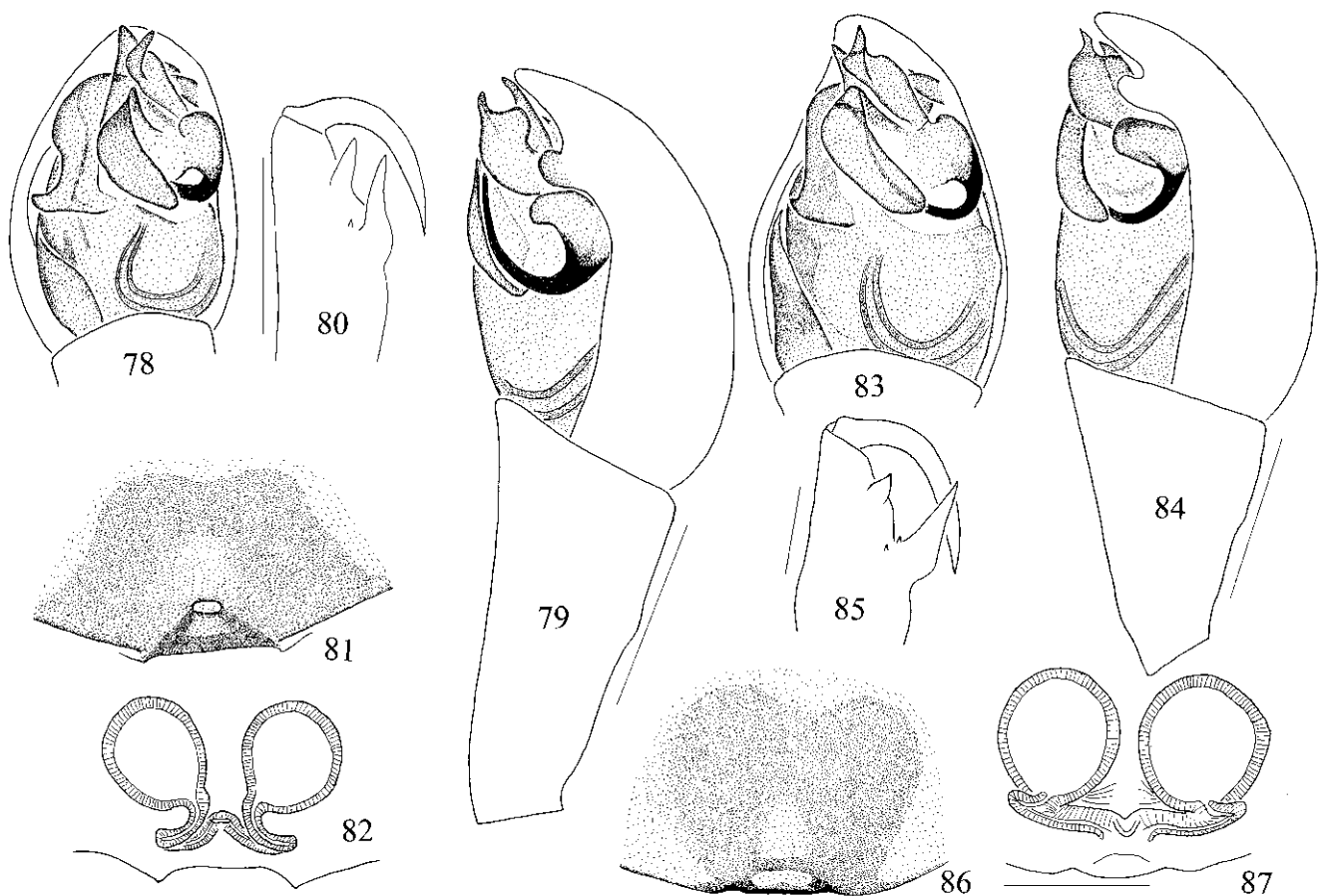
Wunderlich (1976) erroneously considered Wiehle's figure (1937) of the vulva of *E. mandibularis* as that of *E. diversa*. In reality it is *E. franzi*, as explained earlier in this paper.

**Description**: Male: Total length 2.5–4.9; cephalothorax 1.25–2.44 long, 0.95–1.80 wide; Fe I 1.30–2.31. Female: Total length 3.2–6.3; cephalothorax 1.15–2.26 long, 1.00–1.70 wide. Fe I 1.10–2.21 long. Colour: Cephalothorax brown with dark margin; sternum dark brown with black margin; legs brown, femora and tibiae typically speckled with dark brown to black spots; abdomen with dorsal folium with black median stripe, ventrally between epigaster and spinnerets with wide black band flanked by narrow lateral whitish stripes. Male chelicera (Fig. 80): With two large teeth, basal one somewhat larger and basally curved, accompanied at its base by a small tooth; distinctly rugose. Legs: Males with Mt I and II with a row of short, ventral denticles. Male palp (Figs. 78–79): Tibia 0.21–0.48 long, cymbium 0.37–0.54 long; radix rather wide, with distinct mesal concavity, making basal tubercle very pronounced; median apophysis symmetrical, lunate, occupying almost half length of bulbus; accessory apophysis and conductor terminally diverging, both bluntly pointed, latter in lateral view with broad base and anteriorly

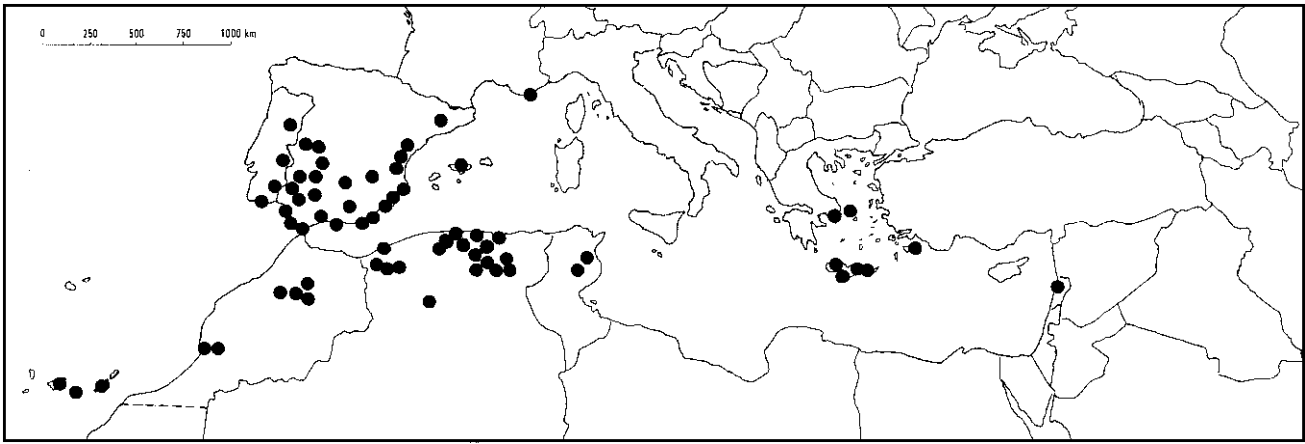
directed terminal tooth; embolus describing half a circle. Epigyne (Fig. 81): With oval, posteromedian pit 0.05–0.08 wide, separated from hind margin by oblique, trapezoid, heavily sclerotised plate with two lateral angularities; as seen in lateral view, this plate is not flat, but descends gradually to epigastric furrow. Vulva (Fig. 82): Copulatory ducts first winding posterolaterally, then abruptly turning to aperture.

*Material examined and citations:* "Europe", 5♂ 30♀, sub *E. mandibularis* (MNHNP AR 3714). FRANCE: *Bouches du Rhône*: 1♂ 1♀ (MNHNP AR 3656, sub *E. mandibularis*). SPAIN: *Albacete*: Tarazona de la Mancha, 600 m, 1♀, stones in degraded *Quercus ilex* forest, 6 April 1997, R. Bosmans leg. *Alicante*: Altea, río Algar, riverside, 1♀, under stones, 15 April 1992, M. Pérez leg. (CMP); Aspe, 250 m, 2♂ 2♀, under waste material and stones in dry maquis, 4 April 1996, R. Bosmans leg. (CRB); Crevillente, 2♂ 2♀, stones in wasteland, 8 April 1998, R. Bosmans leg. (CRB). *Almería*: Cabo de Gata, 50 m, 3♀, 5 April 1996, 3♀, stones in dunes, 6 April 1997, R. Bosmans leg. (CRB); idem, 1♀, 26 March 1990, J. & F. Murphy leg. (CJFM 18429); El Playazo, 4♀, 27 March 1990, J. & F. Murphy leg. (CJFM 18450); Los Escullos, 7♀, 23 March–5 April 1990, J. & F. Murphy leg. (CJFM 18355); Los Genoveses, 3♀, 28 March 1990, J. & F. Murphy leg. (CJFM 18468); Padules, 2♀, 9 April 1998, R. Bosmans leg. (CRB); San José, 1♂ 2♀, 22 March 1990, J. & F. Murphy leg. (CJFM 18326); Sierra de Alhamilla, 1♂ 3♀, J. & F. Murphy leg. (CJFM 18694); Sierra de Cabrera, 1♀, 6 April 1990, J. & F. Murphy leg. (CJFM 18624); Sierra da Filabres, 1♂, 8 April 1990, J. & F. Murphy leg. (CJFM 18673). *Badajoz*: Conquista del Guadiana, 1♀, 4 April 1994, R. Bosmans leg. (CRB); Embalse de la Serena, río Siruela, 1♂ 5♀, 12 April 1994, R. Bosmans leg. (CRB); Peloeche, Embalse de García de Sola, 1♀, 12 April 1994, R. Bosmans leg. (CRB); Puebla de Alcocer, 1♀, stones in grassland, 12 April 1994, R. Bosmans leg. (CRB); S.W. Zafra, 2♂ 4♀,

stones along río Bodión, 2 April 1997, R. Bosmans leg. (CRB). *Cáceres*: Plasencia, 1♂, April 1990, P. Poot leg. (CPP); Vilarreal de San Carlos, Monfragüe, 1♀, *Quercus suber* forest, 9 April 1992, R. Jocqué leg. (CRJ). *Cádiz*: Cabo de Trafalgar, 1♂, 11 April 1974, J. & F. Murphy leg. (CJFM 734); San Roque Torre Guadiaro, 5 m, 1♀, slopes near beach, 4 April 1997, R. Bosmans leg. (CRB); Tarifa, 1♂, April 1994, P. Poot leg. (CPP); *Canary Islands*: "Palma Tenerife", 1♀ (MNHNP AR 3830). *Gran Canaria*: Roque Nublo (Wunderlich, 1987); Las Palmas, 1♀, 7 April 1898, sub *E. mandibularis* (MNZHB 29084); idem, 12♀, sub *E. mandibularis* (NMB). *Tenerife*: Los Rodeos (Schmidt, 1975); Playa del Inglés (Schmidt, 1973); Puerto de Orotava (Denis, 1941); Santa Cruz, 1♂, sub *E. mandibularis* (NMB). *Ciudad Real*: Laguna del Camino de Villafranca, 1♂, stones in grassland, 13 April 1998, R. Bosmans leg. (CRB); Pozuelo, 2♂ 5♀ (sub *E. nigromarginata*, MNHNP AR 368), 1♂ 4♀, 1913, de la Fuente leg. (sub *E. mandibularis*, MNHNP 3822). *Granada*: Lacallahora, 1200 m, 1♂ 1♀, stones in grassland around castle, 5 April 1996, R. Bosmans leg. (CRB); Lobres-Motril, 1♂, April 1987, J. & F. Murphy leg. (CJFM 14440); Sierra de Contreviesa, Puerto Camacho, 1230 m, 1♂, stones in pine forest, 6 April 1997, R. Bosmans leg. (CRB). *Huelva*: Campofrío, 2♀, 9 April 1993, R. Jocqué leg. (CRJ); La Granada de Riotinto, 3♀, 11 April 1992, R. Jocqué leg. (CRJ); Matalascañas, 2♀, dunes, 8 April 1988, R. Jocqué leg. (CRJ); Sierra del Viento, N. La Nava, 600 m, 1♀, stones in *Quercus ilex* forest, 2 April 1997, R. Bosmans leg.; Zufre, 3♀, river bank, 10 April 1992, R. Jocqué leg. (CRJ). *Huesca*: S. Ontiñena, 300 m, 1♀, stones in dry river bed, 1 April 1996, R. Bosmans leg. (CRB). *Jaén*: Jabalcuz, 1♂ 1♀, stones in *Pinus* forest, 12 April 1998, R. Bosmans leg. (CRB). *Málaga*: Archidona W., La Pena, 1♀, stones in grassland, 11 April 1998, R. Bosmans leg. (CRB); río Guadalmedina, 10 km N. Malaga, 2♀, river banks, 5 April 1997, R. Bosmans leg. (CRB); Maro, 1♂ 1♀, April 1987, J. & F. Murphy leg. (CJFM 14322). *Mallorca*: P. Pollensa, 1♀, 6 April 1975, J. & F. Murphy leg. (CJFM 4362). *Murcia*: Totana W., Sierra de la Tercia, 300 m, 1♀, stones in maquis, 4 April 1996, R. Bosmans leg. (CRB). *Sevilla*: El Ronquillo,



Figs. 78–87: **78–82** *Enoplognatha diversa* (Blackwall). **78** Male palp, ventral view; **79** Idem, lateral view; **80** Male chelicera, anterior view; **81** Epigyne; **82** Vulva, ventral view. **83–87** *Enoplognatha macrochelis* Levy & Amitai. **83** Male palp, ventral view; **84** Idem, lateral view; **85** Male chelicera, anterior view; **86** Epigyne; **87** Vulva, ventral view.



Map 9: Distribution of *Enoplognatha diversa* (Blackwall).

Embalse de Cala, 4♀, 6 April 1994, R. Bosmans leg. (CRB); idem, W. Embalse de la Minilla, 12♀, 5 April 1994, R. Bosmans leg. (CRB); idem, 3♀, stones in *Quercus* forest, 7 April 1996, R. Bosmans leg. (CRB); Puerto Padrona, 600 m, 1♀, 9 April 1993, R. Jocqué leg. (CRJ). **Valencia:** Embalse de Cofrentes, 400 m, 1♀, stones in maquis, 3 April 1996, R. Bosmans leg. (CRB). **PORTUGAL:** *Algarve:* Albufeira, 1♂, 1–9 March 1992, P. Poot leg. (CPP); Monte Gordo, 2♂, 8–10 April 1982, J. & F. Murphy leg. (CJFM 10263, 21826). *Alto Alentejo:* Monforte S., Ribera de Almugro, 1♂ 1♀, stones in *Eucalyptus* plantation, 8 April 1996, R. Bosmans leg. (CRB); Portel N., 1♂, stones in *Quercus suber* forest, 8 April 1996, R. Bosmans leg. (CRB). *Beira Baixa:* Castelo Bom, Rio Coa, 700 m, 1♀, stones in burnt forest, 9 April 1996, R. Bosmans leg. (CRB). *Madeira islands:* *Porto Santo:* Without further locality (Kulczyński, 1899); Espigao; Ilheu de Cima (Wunderlich, 1987); *Madeira:* Caniçal, 5♀, 18–24 April 1974, J. & F. Murphy leg. (CJFM 804, 873, 874); Funchal, 1♀ (sub *E. mandibularis*, MNHNP AR 3823); Prainha, 1♀, 1983, J. & F. Murphy leg. (CJFM 16103). **ALGERIA:** *Ain-Defla:* Between Bordj Emir Khaled and Tarik Ibn Ziad, 700 m, 2♀, stones on banks of Oued Massine, 18 May 1988, R. Bosmans leg. (CRB). *Batna:* Djebel Metlili, 1000 m, 1♀, *Pinus halepensis* forest, 13 April 1987, R. Jocqué leg. (MRAC 167.554). *Bejaia:* E. of mouth of Oued Daas, 5♂ 1♀, stones on beach, 22 May 1988, R. Bosmans leg. (CRB). *Biskra:* Biskra, 1♀ (MNHNP AR 3817); 20 km E. Biskra, 1♂ 4♀, palm orchard, 9 April 1987, R. Jocqué leg. (MRAC 167.605); 120 km E. Biskra, 1♂, steppe, 8 April 1987, R. Jocqué leg. (MRAC 167.546). *Blida:* Atlas de Blida, Meurdja, 950 m, 1♀, *Q. ilex* forest, 1 May 1982, R. Bosmans leg. (CRB). *Bordj Bou Arreridj:* Sidi Embarek, 900 m, 5♂ 1♀, stones in cultivated fields, 27 February 1990, R. Bosmans leg. (CRB). *Bouira:* Between Aomar and Kadiria, Oued Isser, 200 m, 1♀, litter in small *Eucalyptus* plantation, 18 March 1988, R. Bosmans leg. (CRB); E. Bechloul, Oued Zaiane, 400 m, 1♀, stones, 28 April 1988, R. Bosmans leg. (CRB); S. Sour el Ghozlane, Col du Dirah, 900 m, 1♀, stones along rivulet, 21 May 1987, R. Bosmans leg. (CRB); Tikjda, 1750 m, 1♀, stones in grassland, 11 June 1984, R. Bosmans leg. (CRB). *El Bayadh:* E. Aflou, 1450 m, 1♀, stones in abandoned fields, 22 May 1990, R. Bosmans leg. (CRB). *M'Sila:* Aïn-El-Hadjel S.E., Mergueb Reserve, 540 m, 1♀, stones in steppe, 11 May 1988, R. Bosmans leg. (CRB); N. Baniou, Chott El Hodna, 400 m, 4♂ 8♀, herbs in small dunes bordering chott, 30 April 1988, and 1♀, pitfalls along creek in chott, 13 May 1988, R. Bosmans leg. (CRB); Bou Saada, 560 m, 3♀, irrigated garden of hotel, 21 May 1987, R. Bosmans leg. (CRB); 10 km S. Hammam Delaa, 800 m, 1♀, along permanent oued, 13 May 1988; Kalaa Beni Hammad, 980 m, 1♀, stones in grassland, 28 April 1988, R. Bosmans leg. (CRB). *Oran:* Daiet el Bragat, 1♀, 25 April 1984, R. Bosmans leg. (CRB); N. Misserghin, 200 m, 2♀, stones in irrigated garden, 25 April 1984, R. Bosmans leg. (CRB). *Saida:* Monts de Daia, maison forestière de Merdja, 750 m, 2♀, stones in *Pinus halepensis* forest, 4 May 1984, R. Bosmans leg. (CRB); Saida, 850 m, 1♀, stones around hotel, 5 May 1985, R. Bosmans leg. (CRB). *Tissemsilt:* Theniet-el-Had, Rond Point des cèdres, 1550 m, 1♂, stones in grassland, 3 May 1984, R. Bosmans leg. (CRB). *Tizi Ouzou:* N. Boghni, 180 m, 3♀, stones along Oued

Boghni, 27 April 1989, R. Bosmans leg. (CRB); Oued Youcef, 10 m, 1♀, stones along oued, 22 May 1988, R. Bosmans leg. (CRB). *Tlemcen:* S. Col d'Hafir, bridge on Oued Tafna, 900 m, 3♀, stones along oued, 5 May 1984, R. Bosmans leg. (CRB); N. El Gor, Djebel Ouargla, 1180 m, 1♀, stones in open *Q. ilex* forest, 23 May 1990, R. Bosmans leg. (CRB); Ghar-Boumazaa, spring Oued Tafna, 1100 m, 1♂ 1♀, stones along oued, 24 April 1984, R. Bosmans leg. (CRB); Mansourah, plateau Lalla Setti, 975 m, 2♀, stones in dry *Pinus halepensis* forest, 6 May 1984, R. Bosmans leg. (CRB); 5 km west of Tlemcen, 850 m, 2♀, stones along rivulet, 23 April 1984, R. Bosmans leg. (CRB); Plaine de Tal Terny, 1175 m, 12♀, tufts of *Juncus*, 23 May 1990, R. Bosmans leg. (CRB). **MOROCCO:** *Agadir:* Anza, 3♂, 3 February 1996, J. Van Keer leg. (CJvK). *Ifrane:* Azrou, 1250 m, 1♀, stones along oued, 11 May 1984, R. Bosmans leg. (CRB); Dayet Ifrah, 1780 m, 2♂ 4♀, stones along lake, 11 May 1984, R. Bosmans leg. (CRB). *Errachidia:* 25 km N. Errachidia, 1♀, 6 February 1996, J. Van Keer leg. (CJvK). *Khenifra:* Aguelman Azigza, 1550 m, 3♀, stones along lake, 13 May 1984, R. Bosmans leg. (CRB). *Oued Zem:* Oued Zem, 750 m, 4♀, stones near a spring, 12 April 1984, R. Bosmans leg. (CRB). *Taroudannt:* Sebt Guerdane, 6♂ 4♀, 4 February 1996, J. Van Keer leg. (CJvK). **TUNISIA:** Without further locality, 1♂ 2♀ (MNHNP AR 3675, sub *E. mandibularis*); Psihou, 2♀, sub *E. nigromarginata* (MNHNP AR 3675). *Kairouan:* 12 km W. Kairouan, Oglet Tarfa, 60 m, 1♂, stones in dry river bed, 23 January 1995, R. Bosmans leg. (CRB); Hayek el Ayoun, 300 m, 1♂, stones in steppe, 26 January 1995, R. Bosmans leg. (CRB). **GREECE:** *Attika:* Thoriki, Velatouri, 1♀, 16 May 1974, P. Goemaere leg. (CRB). *Crete:* Aghia Ghalini, 3♂ 1♀, R. Bosmans leg. (CRB), 1♂ 3♀, 9 April 1995, J. Bosselaers leg. (CJB) and 1♂ 3♀, 28 April 1997, J. Van Keer leg. (CJvK); Aghios Nicolais, 1♀, 11 April 1979, J. & F. Murphy leg. (CJFM 21800); Akrotiri, 1♀, 13 April 1979, J. & F. Murphy leg. (CJFM 7527); between Apesokari and Miamou, 1♀, stones, 18 May 1994, J. & K. Van Keer leg. (CJvK); Chania, 1♀, stones, 10 May 1994, J. & K. Van Keer leg. (CJvK); Hersonniou, 1♂ 2♀, 10 April 1978, R. Bosmans leg. (CRB); Karteros, 1♀, 17 March 1978, R. Bosmans leg. (CRB); Kommos near Pitidia, 2♀, 11 April 1995, J. Bosselaers leg. (CJB); Cape Koutri, 1♀, 18 April 1981, J. & F. Murphy leg. (CJFM 9590); Matala, 1♀, 9 April 1995, J. Bosselaers leg. (CJB); Mallia, 1♂ 4♀, 31 March–8 April 1972, J. & F. Murphy leg. (CJFM 1030, 1185, 1199); Sfinari, 1♀, on wall, 12 May 1994, J. & K. Van Keer leg. (CJvK). *Euboia:* Steni, 1♀, holotype of *E. robusta* (Simon, 1884; MNHNP AR 3664). *Dodekanesos:* Rhodes: Ladiko Bay, 3♀, 15 May 1996, R. Bosmans leg. (CRB). *Peloponnesos:* Argolida: Arachnaio S., 1♀, stones in grassland, 24 May 1998, R. Bosmans leg. (CRB); Didymo, 4♀, stones in grassland, 25 May 1998, R. Bosmans leg. (CRB). **LEBANON:** Kartaba, Houdeine, 1♂ 1♀, G. Fagel leg. (IRSNB).

**Distribution (Map 9):** The commonest *Enoplognatha* species in the western part of the Mediterranean region, rarer in the eastern part, known from Madeira, the Canary Islands, Spain, Portugal, France, Greece, Morocco, Algeria, Tunisia and Lebanon.

*Ecology*: Males collected from January to May, females from February to June.

***Enoplognatha macrochelis* Levy & Amitai, 1981**  
(Figs. 83–87, Map 10)

*Enoplognatha macrochelis* Levy & Amitai, 1981: 51 (descr. ♂, ♀); Wunderlich, 1995b: 705; Baldacchino *et al.*, 1993: 55.

*Type material*: Holotype ♂ from Israel, Be'er Sheva, 29 January 1962 (HUJ 10695); not examined.

*Diagnosis*: Closely related to *E. diversa*, but distinguished by the unspeckled legs and the smooth chelicerae. Male palps are nearly identical in lateral view; in *E. diversa* the tip of the conductor is curved antero-dorsally, in *E. macrochelis* anteroventrally; they are, however, easily distinguished in ventral view by the much narrower radix in *E. macrochelis*, with much smaller basal tubercle. Females are further recognised by the almost unsclerotised pit, very close to the hind margin of the epigyne.

*Description*: *Male*: Total length 2.9–4.2; cephalothorax 1.50–1.80 long, 1.10–1.45 wide; Fe I 1.65–1.90. *Female*: Total length 3.1–5.2; cephalothorax 1.30–1.85 long, 1.05–1.56 wide; Fe I 1.35–2.01 long. *Colour*: Except for unspeckled legs, as in *E. diversa*. *Male chelicera* (Fig. 85): With two large teeth, proximal one with two basal denticles and twice as long as distal one. *Male palp* (Figs. 83–84): Tibia 0.27–0.37 long, cymbium 0.43–0.54 long; radix with small basal tubercle; median apophysis asymmetrical, curved, parallel-sided in basal 2/3; accessory apophysis a pointed tooth; conductor oblique, terminally curved in anterior direction, in lateral view terminally pointed and curved downwards. *Epigyne* (Fig. 86): With unsclerotised pit of variable form and size, close to posterior margin; posterior margin sclerotised, here twice as wide as pit; width of sclerotised posterior border 0.16–0.21. *Vulva* (Fig. 87): Receptacula large; copulatory ducts first winding outwards, then abruptly turning to a sclerotised arch in median part of vulva.

*Material examined*: GREECE: Crete: Merader, 1♀ (MNZHB 29080, sub *E. mandibularis*); Nidha, 1♀ (MNZHB 29082, sub *E. mandibularis*). Macedonia: Halkidiki: Gerakina, 6♂ 5♀, 6–16 April 1978, J. & F. Murphy leg. (CJFM 3424, 6721, 6766, 6839, CRB). Dodekanesos:

Rhodes: Petaloudes, 1♀, 18 May 1996, R. Bosmans leg. (CRB); Ladiko bay, 3♀, 17 May 1996, R. Bosmans & J. Van Keer leg. (CRB, CJvK); Laerma, 1♀, 15 April 1984 (CCD); Theologos, 2♀, 16 April 1987, C. L. & P. R. Deeleman leg. (CCD). Peloponnesos: Didymo, 5♀, stones in grassland, 25 May 1998, R. Bosmans leg. (CRB). Santorini: Thira (Wunderlich, 1995b). MALTESE ISLANDS: Malta: Salina (Baldacchino *et al.*, 1993). Gozo: Ghajnsielem (Baldacchino *et al.*, 1993). CYPRUS: Akamas peninsula, 1♀, 16 April 1994, 4♀, 14 April 1995, P. Selden leg. (CPS, CRB) and 4♀, 31 March–2 April 1997, J. Bosselaers leg. (CJB); Kouklia, 1♀, 6 April 1997, J. Bosselaers leg. (CJB); Lara, 1♀, 11 April 1993, P. Selden leg. (CPS); Limassol, 1♀, near salt lake, 13 May 1995, P. Selden leg. (CPS) and 1♀, 2 April 1997, J. Bosselaers leg. (CJB); Pano, Arkhimandrita road, 1♀, 20 April 1995, P. Selden leg. (CPS); Paphos, 1♀, 15 April 1994, 6♀, 10 April 1995, P. Selden leg. (CPS, CRB), 2♀, 31 March and 4 April 1997, J. Bosselaers leg. (CJB); Petra tou Roumiou, 1♀, 15 April 1993, 1♀, 13 April 1994, P. Selden leg. (CPS); Pissouri, 1♀, 16 April 1993, 1♂ 1♀, 8 April 1995, 4♀, 11 April 1995, 2♀, 16 April 1995, P. Selden leg. (CPS). ISRAEL: Be'er Sheva, holotype ♂, 29 January 1962 (Levy & Amitai, 1981); Jerusalem, 1♂, 22 January 1935, A. Shulov leg. (HUJ 11099). TURKEY: Smyrna, 1♂ 2♀ (MNZHB 29085, sub *E. mandibularis*); Yay Golu, 1♀, 30 May 1992 (CJFM 20778).

*Distribution* (Map 10): We examined material from Greece, Cyprus, Israel and western Turkey; cited from Malta by Baldacchino *et al.* (1993).

*Ecology*: Males collected in January and April, females from March to May.

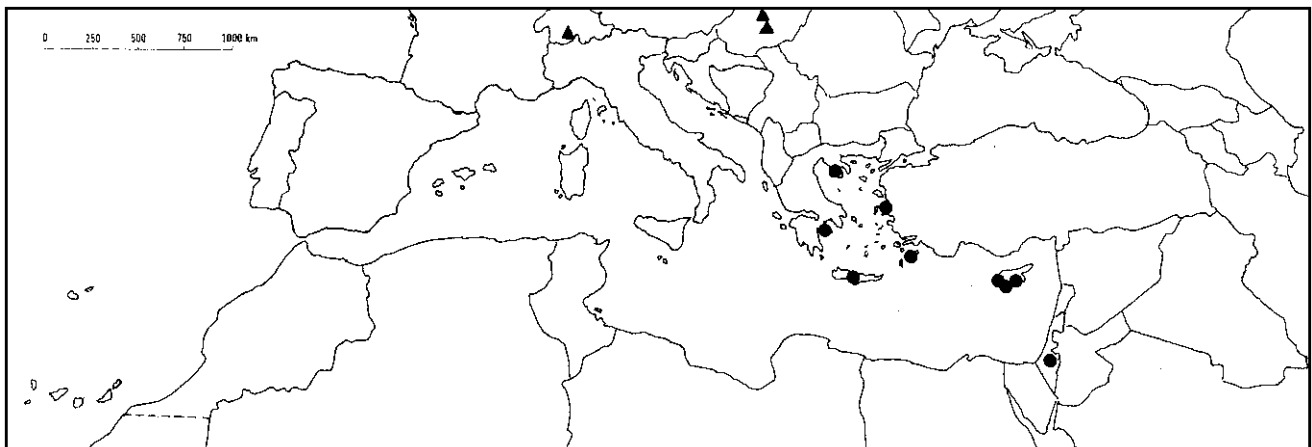
***Enoplognatha hermani* n. sp.** (Figs. 88–90, Map 11)

*Type material*: Holotype ♂, 1 paratype ♂ from Algeria, Biskra (MNHNP AR 3817).

*Etymology*: The species is dedicated to our friend and eminent specialist of theridiid spiders Herman Vanuytven. Furthermore, the species occurs in the Sahara desert, its orange-red coloured sand also reminiscent of Herman's hair colour.

*Diagnosis*: Closely related to *E. macrochelis* and best recognised by the much more elongated median apophysis with parallel margins and by the absence of a basal tubercle on the radix.

*Description*: *Male*: Total length 2.6–3.6; cephalothorax 1.20–1.55 long, 0.95–1.25 wide; Fe I 1.15–1.40 long. *Colour*: Cephalothorax yellowish brown, foveal region and margin grey; legs pale yellowish brown, bleached; abdomen bleached, with traces of dorsal folium. *Chelicera* (Fig. 90): Fang groove with two teeth,



Map 10: Distribution of *Enoplognatha macrochelis* Levy & Amitai (circles) and *E. serratosignata* (L. Koch) (triangles).

basal one with broad, curved base and a denticle, distal one smaller. Palp (Figs. 88–89): Tibia 0.27–0.32 long, cymbium 0.34–0.39 long; radix with indistinct basal angularity, without tubercle; median apophysis elongated, with parallel margins for almost all its length; accessory apophysis straight, terminally rounded; conductor oblique, terminally folded, in lateral view relatively wide and hardly pointed terminally; embolus describing 3/4 of a circle.

*Female*: Unknown.

*Material examined*: Only the types.

*Distribution* (Map 11): Known only from the type locality in Algeria.

***Enoplognatha deserta* Levy & Amitai, 1981** (Figs. 91–95, Map 11)

*Enoplognatha deserta* Levy & Amitai, 1981: 56 (descr. ♂, ♀).

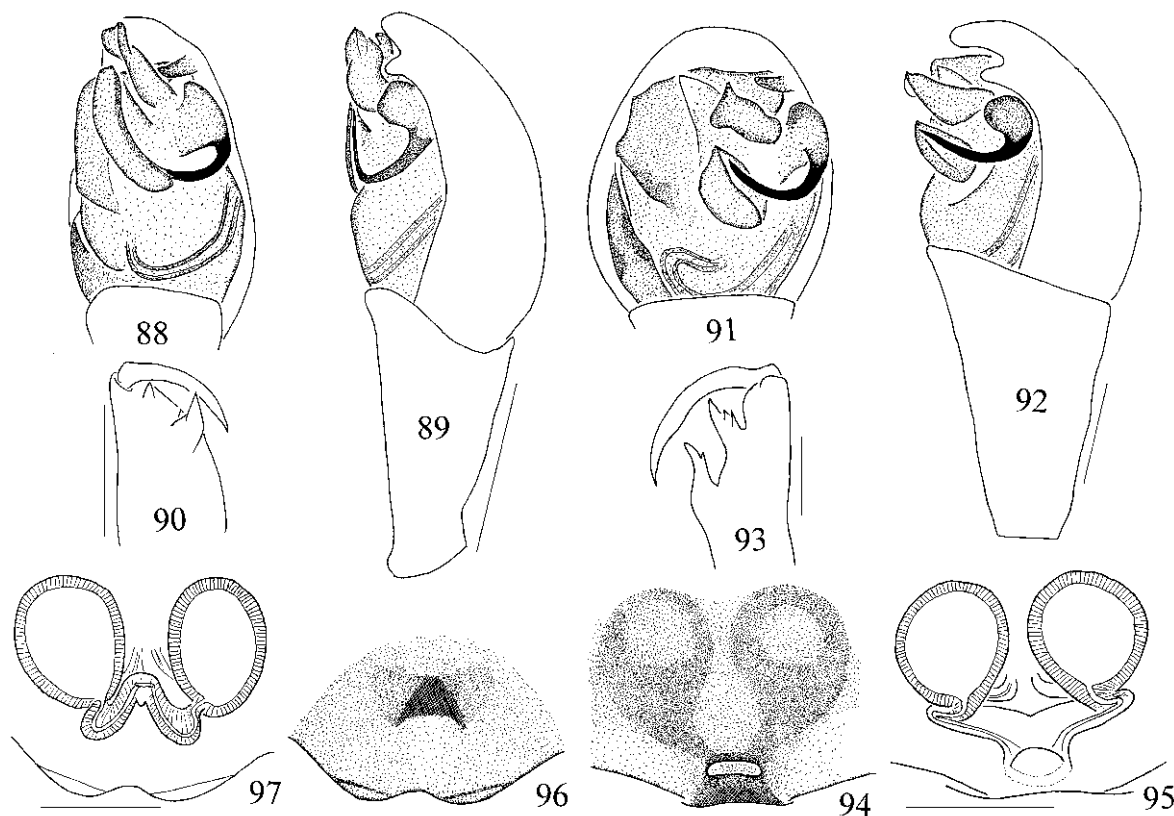
*Type material*: Holotype ♂ from Israel, En Faschka, near Dead Sea, 24 January 1972, P. Amitai leg. (HJ 12468); examined.

*Diagnosis*: Males are recognised by the presence of two blunt teeth on the mesal margin of the radix, females by the epigyne with sclerotised, concave posterior margin and the anteriorly sclerotised wide pit.

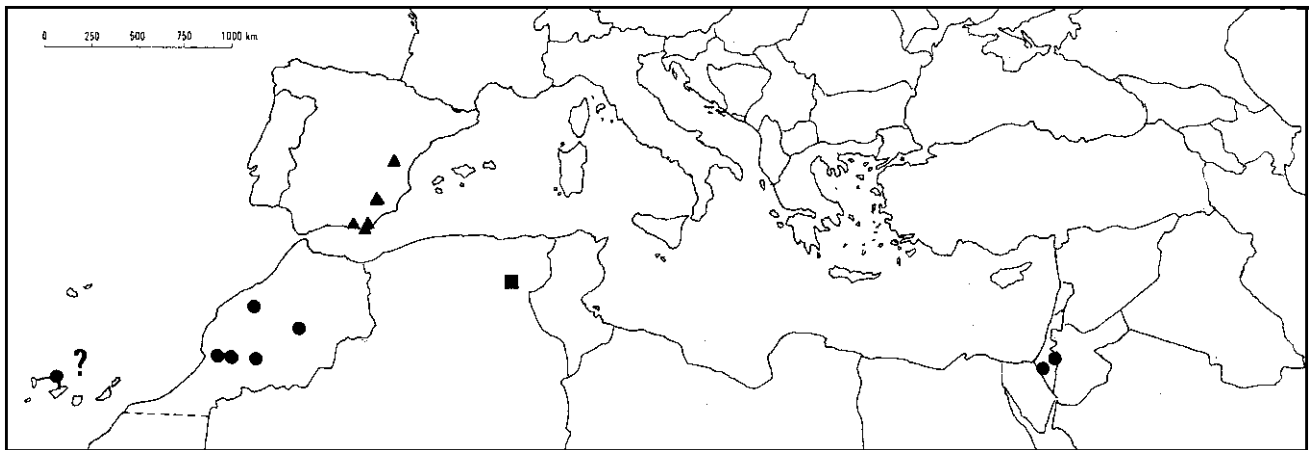
*Description*: Male: Total length 5.7; cephalothorax 2.7 long, 1.8 wide; Fe I 2.81. Female: Total length 3.3–5.9; cephalothorax 1.2–2.4 long, 1.0–1.9 wide; Fe I 1.50–2.06 long. Colour: Cephalothorax brown with dark margins;

legs brown to yellowish brown; abdomen grey with distinct dorsal folium, venter grey to black. Male chelicera (Fig. 93): With two large teeth of almost equal length, basal one with curved base and one denticle, distal one with two denticles. Male palp (Figs. 91–92): Tibia as long as cymbium; radix with two blunt teeth on mesal margin; median apophysis occupying median position in palp, relatively small, not much longer than wide; accessory apophysis large, triangular; conductor directed anterolaterally, distinctly pointed; embolus relatively short, describing half a circle. Epigyne (Fig. 94): Pit 0.08–0.10 wide, oval, close to hind margin, with sclerotised anterior and posterior margins; hind margin of epigyne concave, with sclerotised region slightly wider than pit. Vulva (Fig. 95): Spermathecae rounded; copulatory ducts directed posteriorly for a very short distance, then turning to median pit, fused in their terminal part.

*Other material examined*: ISRAEL: Ma'ale Adummin, 1♀, 14 March 1980, G. Levy leg. (HJ 13318, sub *E. macrochelis*); Sede Boqer, 1♀, 4 March 1992, Y. Lubin leg. (HJ 14751). MOROCCO: *Errachidia*: 25 km N. Errachidia, 1♀, stones on slope to palm yard, 6 February 1996, J. Van Keer leg. (CJvK). *Ouarzazate*: Tizi n'Bachkoun, 1♀, stones along rivulet, 4 February 1996, J. Van Keer leg. (CJvK). *Settat*: Mechra-Ben-Abou, 400 m, 4♀, recent mixed forest plantation in steppe, 9 February 1996, R. Bosmans & J. Van Keer leg. (CRB and CJvK). *Taroudannt*: Between Aoulouz and Taliouine, 600 m, 9♀, stones in arganier steppe, 4 February 1996, R. Bosmans & J. Van Keer leg. (CRB and CJvK); Sebti Guerdane, 200 m, 5♀, stones in abandoned fields, 4 February 1996, R. Bosmans & J. Van Keer leg. (CRB and CJvK). SPAIN: Canary Islands: "Palma Tenerife", 1♀ (MNHNP AR 3830).



Figs. 88–97: **88–90** *Enoplognatha hermani* n. sp. **88** Male palp, ventral view; **89** Idem, lateral view; **90** Male chelicera, anterior view. **91–95** *Enoplognatha deserta* Levy & Amitai. **91** Male palp, ventral view; **92** Idem, lateral view; **93** Male chelicera, anterior view; **94** Epigyne; **95** Vulva, ventral view. **96–97** *Enoplognatha orientalis* Schenkel. **96** Epigyne; **97** Vulva, ventral view.



Map 11: Distribution of *Enoplognatha deserta* Levy & Amitai (circles), *E. hermani* (square) and *E. almeriensis* (triangles).

**Distribution** (Map 11): According to Levy & Amitai (1981), occurs in Israel, Egypt, Tunisia, Algeria and Morocco. The species was not found in our abundant material from Algeria. Females from Morocco and Palma are identified here as *E. deserta*, but this should be confirmed by the capture of males.

***Enoplognatha gershomi* n. sp.** (Figs. 118–120, Map 3)

**Type material:** Holotype ♂ from Israel, Sede Boqer, Haluqim ridge, 4 March 1992, Y. Lubin leg. (HUJ 14750).

**Diagnosis:** Closely related to *E. macrochelis*, but differs by the smaller median apophysis and the presence of a longitudinal fold on the radix, instead of a basal tooth as in the latter species.

**Etymology:** The species is dedicated to Gershon Levy, in honour of his work on Israeli spiders.

**Description: Male:** Total length 2.8–3.2; cephalothorax 1.24–1.59 long, 0.98–1.11 wide; Fe I 1.11–1.65 long. Colour and chelicera (Fig. 120): As *E. macrochelis*. Palp (Figs. 118–119): Tibia 0.24–0.33 long, cymbium 0.36–0.42 long; mesal part of radix small, with a distinct fold; median apophysis small and symmetrical, only 1/3 of length of cymbium; accessory apophysis relatively short, hidden by large conductor, latter oblique with straight terminal tooth; embolus describing 3/4 of a circle.

**Female:** Unknown.

**Other material examined:** ISRAEL: Sede Boqer, Haluqim ridge, 1♂ (damaged), 14 January 1991, Y. Lubin leg. (CRB).

**Distribution** (Map 3): Only known from the type locality in Israel.

***Enoplognatha almeriensis* n. sp.** (Figs. 121–122, Map 11)

*Enoplognatha* sp. Wunderlich, 1995b: 709.

**Type material:** Holotype ♀, 2♀ paratypes from Spain, province of Almería, near Carboneras, 1 April 1990, J. & F. Murphy leg., deposited in AMNH.

**Remarks:** A few female specimens from the south of Spain could not be attributed to any species and are

described here as new. Wunderlich (1995b) mentioned an *Enoplognatha* sp. from Murcia, which is probably the same species.

**Diagnosis:** Closely related to *E. diversa*, differing by the unspotted legs, the smooth chelicerae and the smaller distance between the epigynal pit and the epigastric furrow.

**Etymology:** Almost all the material was collected in the province of Almería and the species is therefore named *almeriensis*.

**Description: Female:** Total length 2.6–3.6; cephalothorax 1.20–1.55 long, 0.95–1.25 wide; Fe I 1.15–1.40 long. Colour: Cephalothorax olive brown, spot before fovea and margin greyish; sternum olive brown mixed with grey; legs pale brown, annulated with grey; abdomen grey suffused with white, dark grey folium with median dark grey stripe and small grey spots, not expressed clearly in all specimens. Epigyne (Fig. 121): With small, oval, transverse pit, 0.05 wide, only anterior margin sclerotised, separated from epigastric furrow by slightly more than its narrowest diameter; posterior margin protruding in middle. Vulva (Fig. 122): Copulatory ducts very short, first turning outwards, then curving straight to pit.

**Male:** Unknown.

**Other material examined and citation:** SPAIN: Almería: Cabo de Gata, 1♀, 26 March 1990, J. & F. Murphy leg. (CJFM 18340); Los Escullos, 1♀, 23 April 1990, J. & F. Murphy leg. (CJFM 18356); Los Geneveses, 1♀, 31 March 1990, J. & F. Murphy leg. (CJFM 18516); Mt. Cuevas, 1♀, 7 April 1990, J. & F. Murphy leg. (CJFM 18646); Sierra de Alhamilla, 1♀, 29 March 1990, J. & F. Murphy leg. (CJFM 18486). Murcia: 3 km S.W. Moratalla (Wunderlich, 1995b, sub *Enoplognatha* sp.). Teruel: Aguaviva, 500 m, 2♀, maquis along río Bergantes, 2 April 1996, R. Bosmans leg. (CRB).

**Distribution** (Map 11): Known only from a few localities in Spain in the provinces Almería and Teruel and probably in Murcia.

**Ecology:** Females collected in March and April.

***Enoplognatha mandibularis* (Lucas, 1846)** (Figs. 98–102, Map 12)

*Theridion mandibulare* Lucas, 1846: 260 (descr. ♂); Simon, 1874: 66.

*Theridion vicinum* Lucas, 1846: 261 (descr. ♀).

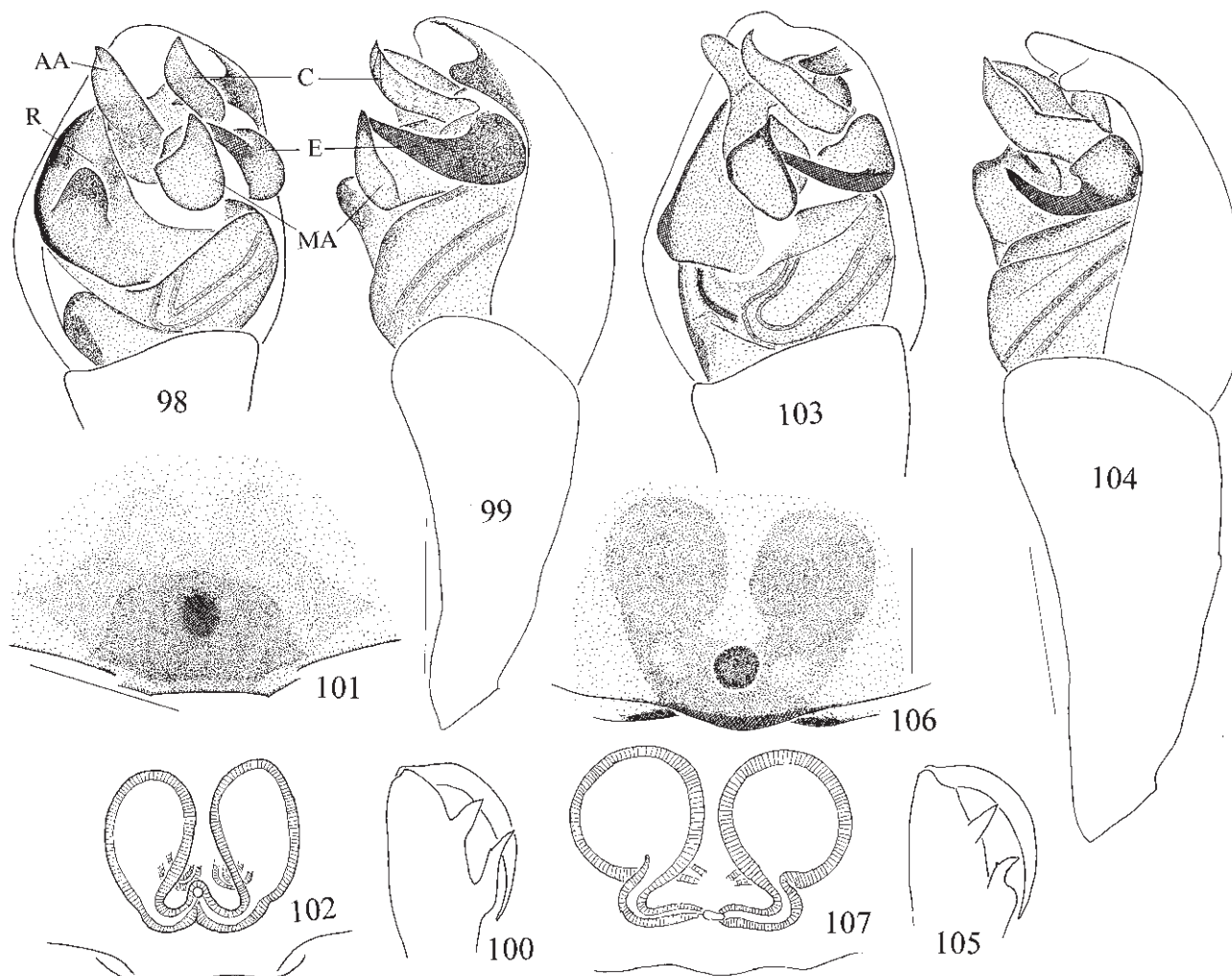
*Theridium mansuetum* L. Koch, 1882: 631 (descr. ♀). **Syn. n.**

*Enoplognatha mandibularis*; Kulczyński, 1899: 378, figs. 41, 44, 47; Wiehle, 1937: 210 (♂ only); Tullgren, 1949: 59 (♀ only); Benoit, 1977: 138; Wunderlich, 1987: 198; Chen & Zhang, 1991: 146 (♂ only); Roberts, 1995: 293; Vanuytven *et al.*, 1994: 13.  
*Enoplognatha nigrocincta* Simon, 1884a: 193 (descr. ♂, ♀). **Syn. n.**  
*Enoplognatha mandibularis nigrocincta*; Simon, 1914: 286, 306.  
*Enoplognatha oelandica*; Roberts, 1985: 192 (♂ only); Vanuytven *et al.*, 1994: 13.  
*Enoplognatha nigrocincta*; Wunderlich, 1995b: 707.

**Type material:** Originally described from El Kala in Algeria; material not available, probably lost. Neotype ♂, by present designation, from Algeria, El Kala, E. of Cap Rosa, 50 m, pitfalls in maquis in dunes, 29 March 1988, R. Bosmans leg.; deposited in MNHNP. Holotype ♀ of *Theridium mansuetum* from Toro, Mallorca, Balears (MNZHB 7926); examined. Type series of *E. nigrocincta* from "Gall. M. Gr. Alger" composed of 2♂ (MNHNP), examined.

**Diagnosis:** Males are easily distinguished by the presence of a strong tubercle on the radix of the palp, absent in all other species; females are less readily distinguished, but differ from related species by the heavily sclerotised median depression and contrasting unsclerotised posterior margin of the epigyne.

**Remarks:** There has been considerable confusion about the identity of *E. mandibularis* in the past. Even recent illustrations evidently concern two different species (Levy & Amitai, 1981; Roberts, 1985). To decide about the exact identity of the species, one has to study the original description and figures of Lucas (1846). Lucas' figures clearly show a species with a distinct abdominal folium and two large cheliceral teeth, the basal one curved at its base. The type locality of *E. mandibularis* is El Kala in the extreme NE of Algeria. This locality was frequently visited by the first author and three *Enoplognatha* species were captured there. The first species has no abdominal folium and thus cannot possibly be *E. mandibularis*. The other two have a similar abdominal pattern, but only one has a curved basal cheliceral tooth, corresponding with Lucas' figure; we consider this to be *E. mandibularis*. A male specimen collected near the type locality is hereby selected as the neotype. It is clearly different from the species described as *E. mandibularis* by Levy & Amitai (1981) from Israel. In fact, this species does not occur in Algeria, which is another reason that it cannot be *E. mandibularis*. Levy & Amitai's species is described later in this paper as *E. gemina* sp. n.



Figs. 98–107: **98–102** *Enoplognatha mandibularis* (Lucas). **98** Male palp, ventral view; **99** Idem, lateral view; **100** Male chelicera, anterior view; **101** Epigyne; **102** Vulva, ventral view. **103–107** *Enoplognatha gemina* n. sp. **103** Male palp, ventral view; **104** Idem, lateral view; **105** Male chelicera, anterior view; **106** Epigyne; **107** Vulva, ventral view. Abbreviations: AA=accessory apophysis, C=conductor, E=embolus, MA=median apophysis, R=radix.



*E. mandibularis* is at once recognised by the presence of a blunt tubercle on the radix of the male palp, already excellently described by Kulczyński, when he compared the species with *E. diversa* (1899: 378: “huius bulbis vero dente instructus est corneo, fulvo, compresso, lato, obtuso, obliquo, a margine alveoli paullo remoto”), but never mentioned since. Recently, Wunderlich (1995b) observed the same tubercle, but erroneously concluded that the species he observed was *E. nigrocincta*.

*E. mandibularis* has been confused with several other species. A good example of this is a tube in the Simon collection labelled “Europe” containing 21♂ and 210♀, which belong to no fewer than 6 different species: *E. mandibularis* 12♂ 100♀, *E. diversa* 5♂ 30♀, *E. franzi* 27♀, *E. gemina* n. sp. 4♂ 21♀, *E. testacea* 28♀, and *E. thoracica* 4♀. It is in fact only a coincidence that this species also is the commonest Mediterranean *E. mandibularis*-like species.

In 1884, Simon described *E. nigrocincta* as a separate species, but in 1914 (p. 286) he described it as a subspecies of *E. mandibularis*, distinguishing it from the nominate species by its smaller size and shorter palpal tibia. He also (1914: 306) considered it as only “un petit développement du précédent”. We observed that *E. mandibularis* is indeed very variable in size, especially the males. Moreover, the chelicerae show allometric growth and specimens with longer chelicerae have longer palpal tibiae. Simon’s size criteria are insufficient to define a subspecies. Examination of possible type material leads to the same conclusion. *E. mandibularis nigrocincta* was originally described from about 15 localities situated all over France. The collections in the MNHNP contain only two tubes labelled *E. mandibularis nigrocincta*, 1♂ from Banyuls in the Pyrénées Orientales and 2♂ (considered here as type series) labelled “Gall. M. Gr. Alger”. These three males are indeed very small individuals, but with palps identical to *E. mandibularis*. The conclusion therefore has to be that *E. mandibularis nigrocincta* is a junior synonym of the nominate species. Wunderlich also considered this problem. In 1976, like us he synonymised the two subspecies, but later (1995b) he treated them as two valid species. He redescribed *E. nigrocincta*, indicating that the species differs from *E. mandibularis* by the presence of a blunt lateral tubercle on the radix. We showed above that the species with the blunt tubercle on the radix is in fact *E. mandibularis*, while the species which Wunderlich and also Levy & Amitai (1981) considered to be *E. mandibularis* is a new species, described later in this paper as *E. gemina* sp. n.

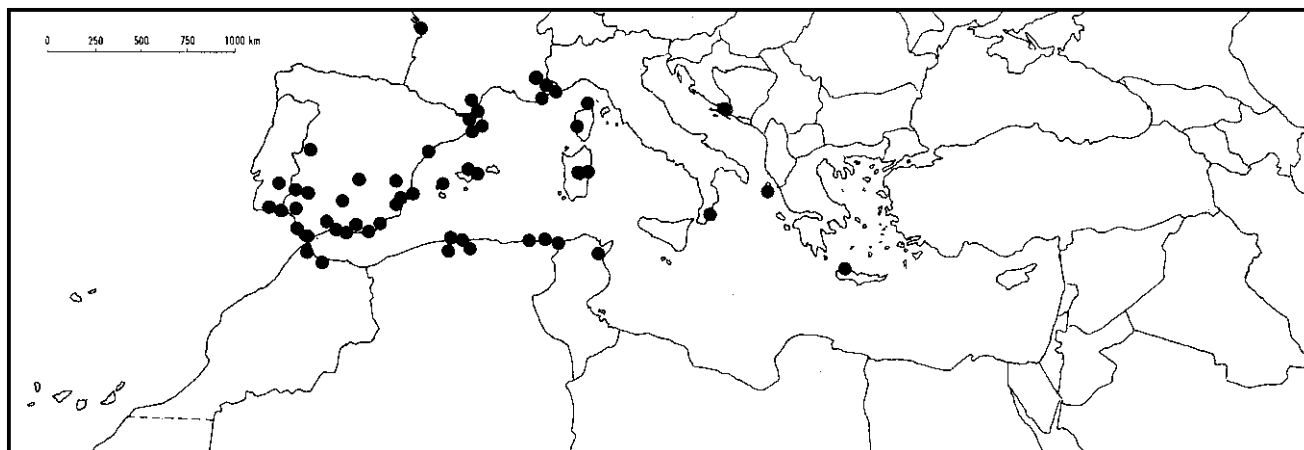
The type material of *Theridium mansuetum* L. Koch is a single female. It is a “forgotten” species and appears to be identical to *E. mandibularis*. *T. mansuetum* L. Koch, 1882 thus becomes a junior synonym of *E. mandibularis* (Lucas, 1846).

Illustrations which correctly refer to *E. mandibularis* are given by Wiehle (1937, ♂ only), Tullgren (1949, ♀ only), Roberts (1985, sub *E. oelandica*, ♂ only), Roberts (1995), Wunderlich (1995b, sub *E. nigrocincta*, only ♂ described) and Chen & Zhang (1991, ♂ only).

**Description:** Male: Total length 2.2–4.8; cephalothorax 1.05–1.70 long, 0.90–1.55 wide; Fe I 1.05–1.75

long. Female: Total length 2.4–5.3; cephalothorax 1.10–1.75 long, 0.85–1.40 wide; Fe I 1.10–1.70. Colour: Cephalothorax yellowish brown, narrowly bordered with black, sternum dark brown; legs pale brown, all segments with basal and subterminal annulations; abdomen with dorsal, sometimes poorly defined, greyish brown folium with anterior white spot; ventrally dark speckled with white; in females, abdomen shiny. Male chelicera (Fig. 100): With two large teeth, basal one with curved base and a small median denticle. Male palp (Figs. 98–99): Palpal tibia 0.27–0.56 long; cymbium 0.40–0.51 long; length of tibia variable compared with length of cymbium; radix with large, blunt mesal boss; median apophysis only slightly longer than wide; conductor and accessory apophysis similar, both elongated, parallel in ventral view; embolus robust, relatively short, describing less than half a circle. Epigyne (Fig. 101): With small, circular depression, 0.05–0.08 wide; posterior margin unsclerotised, somewhat protruding. Vulva (Fig. 102): Copulatory ducts very short, curving directly to median depression.

**Material examined and citations:** “Europe”, 12♂ 100♀ (MNHNP AR 3714). “Gall. M. Gr. Alger”, 2♂, sub *E. mandibularis nigrocincta* (type series). FRANCE: *Alpes du Haute Provence*: Banon, 1♂, 11 May 1986, P. Poot leg. (Vanuytven *et al.*, 1994, sub *E. oelandica*). *Alpes Maritimes*: Villefranche, 1♀, April 1935 (NMB). *Aude*: Carcassonne, St Pierre des Camps, 1♀, 3 April 1995, R. Jocqué leg. (CRJ). *Bouches du Rhone*: Bouches du Rhone, 18♂ 76♀ (MNHNP AR 3656). *Charente Maritime*: Côte Sauvage, 1♀, 20 May 1993, J. & F. Murphy leg. (CJFM 21561). *Corsica*: Ajaccio, 1♀ (MNZHB 29889); W. Urtaca, 1♀, among stones, 23 May 1995, R. Bosmans leg. (CRB); Rogliano, 1♀, among stones, 20 May 1995, K. & J. Van Keer leg. (CJvK); Capo Corvoli, 1♀, stones in dry river bed, 20 May 1995, J. Van Keer leg. (CJvK). *Pyrénées Orientales*: Banyuls, 1♂, sub *E. nigrocincta* (MNHNP AR 3831), 15♂ 51♀ (MNHNP AR 3706). *Var*: La Gabinière, 11♀ (MNHNP AR 3833). SPAIN: *Alicante*: Altea, 2♀, 24 February 1997, M. Pérez leg. (CMP); Altea la Vieja, 1♀, 13 March 1996, M. Pérez leg. (CMP); Aspe, 250 m, 1♀, stones and waste material, 4 April 1996, R. Bosmans leg. (CRB); Benidorm, S.C. Cortina, 2♂ 5♀, M. Pérez leg. (CMP); Sierra de Bernia, 4♂, 15 November 1995, M. Pérez leg. (CMP); Calpe, near seaside, 1♂, 4 February 1994, 1♀, 4 March 1996, M. Pérez leg. (CMP); Crevillente, 1♀, stones in wasteland, 8 April 1998, R. Bosmans leg. (CRB); La Nucía, 2♀, 19 March 1996, M. Pérez leg. (CMP); Sta Pola, salinas, 1♂ 2♀, 11 October 1996, M. Pérez leg. (CMP). *Almería*: Cabo de Gata, 2♂ 1♀, 9 April 1998, R. Bosmans leg. (CRB); El Playazo, 2♀, 27 March 1990, J. & F. Murphy leg. (CJFM 18451); Mojácar, 1♀, 6 April 1990, J. & F. Murphy leg. (CJFM 18632); Sierra de Cabrera, 1♀, 25 March 1990, J. & F. Murphy leg. (CJFM 18406); Padules, 2♀, 9 April 1988, R. Bosmans leg. (CRB). *Cáceres*: S. Monfragüe, río Almonte, 1♀, 15 April 1994, R. Bosmans leg. (CRB); Monfragüe, Vilarreal de San Carlos, 1♀, *Quercus suber* forest, 9 April 1992, R. Jocqué leg. (CRJ). *Cádiz*: Barbate de Franco, 1♀, 8 April 1974, J. & F. Murphy leg. (CJFM 662); Tarifa, 1♂ 1♀, March 1992, 1♂, March 1993, 3♂ 3♀, March–April 1992, P. Poot leg. (CPP, Vanuytven *et al.*, 1994, sub *E. oelandica*); Torre de Higuera, 1♀, stones in dunes, 9 April 1994, R. Jocqué leg. (MRAC); Zahara de los Atunes, 4♀, 6–18 April 1974, J. & F. Murphy leg. (CJFM 622, 3366). *Ciudad Real*: Pozuelo, 2♀ (MNHNP AR 3822) and 2♀, de la Fuente leg. (MNHNP AR 3681, sub *E. nigromarginata*). *Gerona*: Calella de Palafrugell, 2♀, 4 April 1991, R. Bosmans leg. (CRB); Ogassa, Sierra de San Amand, 900 m, 3♀, stones along rivulet, J. Van Keer leg. (CJvK); Pals, 2♀, 2 January 1987, P. Poot leg. (CPP; Vanuytven *et al.*, 1994, sub *E. oelandica*); Puerto de Toses, 1800 m, 2♀, stones in *Pinus* forest, 10 July 1991, J. Van Keer leg. (CJvK); Ripoll, 900 m, 1♀, stones, 7–14 July 1991, E. Bovens leg. (CJvK); Rosas, 2♂ 4♀ (MNHNP). *Granada*: Sierra de la Contreviesa, Puerto Camacho, 1230 m, 4♀, stones in pine forest, 6 April 1997, R. Bosmans leg. (CRB). *Huelva*: Almonte, Los



Map 12: Distribution of *Enoplognatha mandibularis* (Lucas).

Cabezudos, 3♀, *Pinus* forest, 10 April 1988, R. Jocqué leg. (CRJ); La Granada de Riotinto, 9♀, April 1992 and April 1993, R. Jocqué leg. (CRJ); Puerto Padrona, 1♂, 9 April 1993, R. Jocqué leg. (CRJ); Zufre, 2♀, along river, 9 April 1993, R. Jocqué leg. (CRJ); Sierra del Viento, N. La Nava, 600 m, 1♀, stones in *Quercus ilex* forest, 2 April 1997, R. Bosmans leg. (CRB). *Jaén*: Jaén, Jabalcuz, 13♀, stones in *Pinus* forest, 12 April 1998, R. Bosmans leg. (CRB). *Ibiza*: Sa Talaïassa, 1♀, 15 April 1980, J. & F. Murphy leg. (CJFM 8772); Aubarca, 2♀, 2 April 1980, J. & F. Murphy leg. (CJFM 8619); Es Codolar, 1♂ 2♀, 2 January 1982, J. & F. Murphy leg. (CJFM 10126); Puig de Perella, 2♂, 21 July 1981, J. & F. Murphy leg. (CJFM 10047); Puig d'en Bossa, 1♂ 2♀, 30 December 1981, J. & F. Murphy leg. (CJFM 10094). *Málaga*: Alhaurín el Grande, 5♀, stones in *Olea* orchard, 19 December 1998, R. Bosmans leg. (CRB); Benalmádena, 3♂ 1♀, slopes near sea, 19 December 1998, R. Bosmans leg. (CRB); Coín, 1♀, grassland along Rio Seco, 19 December 1997, R. Bosmans leg. (CRB); Maro, 1♂ 5♀, April 1987, J. & F. Murphy leg. (CJFM 14340, 24813, 21814); Mijas 3♂ 9♀, stones in *Pinus* forest, 19 December 1998, R. Bosmans leg. (CRB); Ojén, 1♀, 17 April 1974, J. & F. Murphy leg. (CJFM 3338); Sierra de la Chiminea, el Torcal, 2♀, stones in grassland, 17 December 1998, R. Bosmans leg. (CRB). *Mallorca*: Albufera, 2♀, 8–16 April 1975, J. & F. Murphy leg. (CJFM 4414, 4593); Ermita Betlem, 5♂ 5♀, 3 April 1985, J. & F. Murphy leg. (CJFM 12945, 21812); Puerto Pollensa, 3♀, 9 April 1975, J. & F. Murphy leg. (CJFM 4455); Ses Covelles, 1♀, 6 April 1985, J. & F. Murphy leg. (CJFM 12988); Sierra Meletta, 3♂ 3♀, 7 April 1985, J. & F. Murphy leg. (CJFM 13008); Ternelles, 2♀, 2–14 April 1985, J. & F. Murphy leg. (CJFM 4538, 13126). *Tarragona*: St. Carles de la Rapita, 1♀, stones in *Olea* orchard, 6 April 1998, R. Bosmans leg. (CRB). *Valencia*: Embalse de Forata, 400 m, 1♀, maquis and *Pinus* forest, 2 April 1996, R. Bosmans leg. (CRB). PORTUGAL: *Algarve*: Albufeira, 1♀, 9 March 1992, P. Poot leg. (CPP, Vanuytven *et al.*, 1994); Monte Gordo, 5♀, 5–15 April 1982, J. & F. Murphy leg. (CJFM 136, 163, 10221, 10264). *Alto Alentejo*: N. Portel, 250 m, 3♀, litter and stones in *Quercus suber* forest, 8 April 1996, R. Bosmans leg. (CRB). ITALY: *Calabria*: Gerace, 1♀ (MNW 513). *Sardinia*: Nuoro: Aritzo, M. Sa Scova, 600 m, 2♀, under stones, 13 May 1997, J. & K. Van Keer leg. (CJvK); 4 km W. Villanova (Wunderlich, 1995b, sub *E. nigrocineta*). CROATIA: Dalmatia: Peljesac (Wunderlich, 1995b, sub *E. nigrocineta*). GREECE: *Ionian Islands*: Corfu: Korission, 3♀, 1 April 1983, J. & F. Murphy leg. (CJFM 10896, 21811). *Crete*: Chania, 1♀, stones, 10 May 1994, J. Van Keer leg. (CJvK). ALGERIA: *Alger*: Surroundings of Alger (MNHNP AR 3698; Simon, 1874); El Harrach, 25 m, 1♂, pitfall in garden of I.N.A., 20 February 1983, 1♂, 25 July 1983, R. Bosmans leg. (CRB). *Annaba*: Chetaibi, 810 m, 1♀, stones in grassland, 1 March 1990, R. Bosmans leg. (CRB). *Blida*: Atlas de Blida, Meurdja, 950 m, 2♀, stones in grassland, 25 April 1982, 1♂, 11 June 1986, R. Bosmans leg. (CRB); Meftah, Djebel Zerouela, 450 m, 1♂, stones in grassland, 29 January 1986, R. Bosmans leg. (CRB). *Bouira*: Col des 2 Bassins, Djebel Tamesguida, 950 m, 1♂, stones in clearing in *Quercus ilex* maquis, 17 February 1989, R. Bosmans leg. (CRB). *Constantine*: Constantine (Lucas, 1846, sub *T. vicinum*). *El Tarf*: El Kala, Lac Tonga (Lucas, 1846, sub *Theridion mandibulare*, type locality); E. El Kala, Kef Oum Teboul, 200 m, 1♀, litter in *Q.*

*suber* forest, 5 April 1982, R. Bosmans leg. (CRB); El Kala, E. Cap Rosa, 50 m, 1♂ (neotype), 3♀, pitfalls in maquis in dunes, 29 March 1988, R. Bosmans leg. (CRB). *Medea*: Col des 2 Bassins, 920 m, 6♂, pitfalls in small *Cedrus* plantation, 23 October, 16 December and 18 February 1989, R. Bosmans leg. (CRB). *Skikda*: Ben Azouz, 200 m, 1♀, open *Eucalyptus* plantation, 2 March 1990, R. Bosmans leg. (CRB); Bouchata, 400 m, 2♀, stones in grassland, 12 March 1990, R. Bosmans leg. (CRB); E. Collo, Tamanart, 15 m, 4♀, stones in maquis, 6 June 1987, R. Bosmans leg. (CRB). *Tipaza*: Sidi Fredj, 10 m, 10♂, pitfalls in *Olea* maquis, 19 January 1987, R. Bosmans leg. (CRB); Staoueli, 100 m, 1♂ 2♀, litter and stones in *Quercus ilex* maquis, 27 February 1988, 2♂, 3 January 1987, R. Bosmans leg. (CRB). *Tissem-silt*: Théniet el Had, Djebel Meddad, 1400 m, 1♂, pitfalls in open *Cedrus atlantica* forest, 23 October 1987–5 October 1988, R. Bosmans leg. (CRB). *Tizi Ouzou*: Forêt d'Akfadou, Lac Agoulmin Abermane, 1250 m, 1♀, stones and litter in *Q. faginea* forest, 22 April 1982, R. Bosmans leg. (CRB). MOROCCO: Aïn Sebaa, 2♀ (MNHNP). Ketama, 40 km W. Ketama, 1030 m, 1♀, stones in degraded *Quercus* forest, 20 April 1984, R. Bosmans leg. (CRB). Tetouan: Tetouan, 10 m, 1♂ 1♀, abandoned garden along Oued Hadjera, in *Oxalis*, 20 April 1984, R. Bosmans leg. (CRB). TUNISIA: Zaghouan: Djebel Zaghouan, 500 m, 1♂ 3♀, stones in *Pinus halepensis* forest, 24 January 1995, R. Bosmans leg. (CRB). ST HELENA: Sandy Bay south, Baptist Chapel, 1♂ 1♀ (MRAC; Benoit, 1977).

*Distribution* (Map 12): This species has frequently been misidentified and therefore older citations cannot be trusted. Citations from Israel (O. P.-Cambridge, 1872; Levy & Amitai, 1981) and Egypt (O. P.-Cambridge, 1876) concern *E. gemina* n. sp., described elsewhere in this paper.

We examined specimens from Portugal, Spain, France, Italy, Croatia, Greece, Algeria, Morocco, Tunisia and St Helena, where it was probably introduced. Citations from all other countries from which it was previously cited have to be confirmed.

*Ecology*: Males and females collected from October to July.

### *Enoplognatha orientalis* Schenkel, 1963, n. status (Figs. 96–97)

*Enoplognatha mandibularis orientalis* Schenkel, 1963: 107 (descr. ♀).

*Type material*: Lectotype ♀ from China, Kansu, "Potanin 133" (MNHNP AR 3649), hereby selected; paralectotypes: "Potanin 44", 1♀ (MNHNP AR 3650); "Potanin 114", 1♀ (MNHNP AR 3654); "Potanin 128", 1♀ (MNHNP AR 3653).

**Diagnosis:** Closely related to *E. mandibularis*, but relatively easily distinguished by the incised posterior margin of the epigyne.

**Remarks:** *E. mandibularis orientalis* was described by Schenkel (1963) from China, Kansu. The type material is deposited in the MNHNP and the tubes only have labels with numbers referring to the Potanin collection. None of these numbers, however, corresponds with those mentioned in Schenkel's book. The material contains two species, both different from what we consider *E. mandibularis*. Schenkel (1963) figured an epigyne with a distinctly incised posterior margin and a female corresponding with this figure is hereby selected as lectotype. There are three more females that are conspecific. Six other females are *E. serratosignata* (L. Koch).

**Description: Female:** Colour and size as in *E. mandibularis*. Epigyne (Fig. 96): Posterior margin distinctly incised; median depression truncate posteriorly. Vulva (Fig. 97): Spermathecae oval; copulatory ducts first turning in posterolateral direction, then abruptly turning to anteromedian depression.

**Male:** Unknown.

**Distribution:** China, Kansu.

### *Enoplognatha gemina* n. sp. (Figs. 103–107, Map 13)

*Pachygnatha mandibulare*; O. P.-Cambridge, 1872: 294 (misidentification).

*Steatoda mandibularis*; O. P.-Cambridge, 1876: 568 (misidentification).

*Enoplognatha mandibularis*; Levy & Amitai, 1981: 48; Wunderlich, 1995b: 706 (misidentifications).

**Type material:** Holotype ♂, 2 paratype ♀ from Spain, Gerona, Rosas, December 1912 (MNHNP, sub *E. mandibularis*).

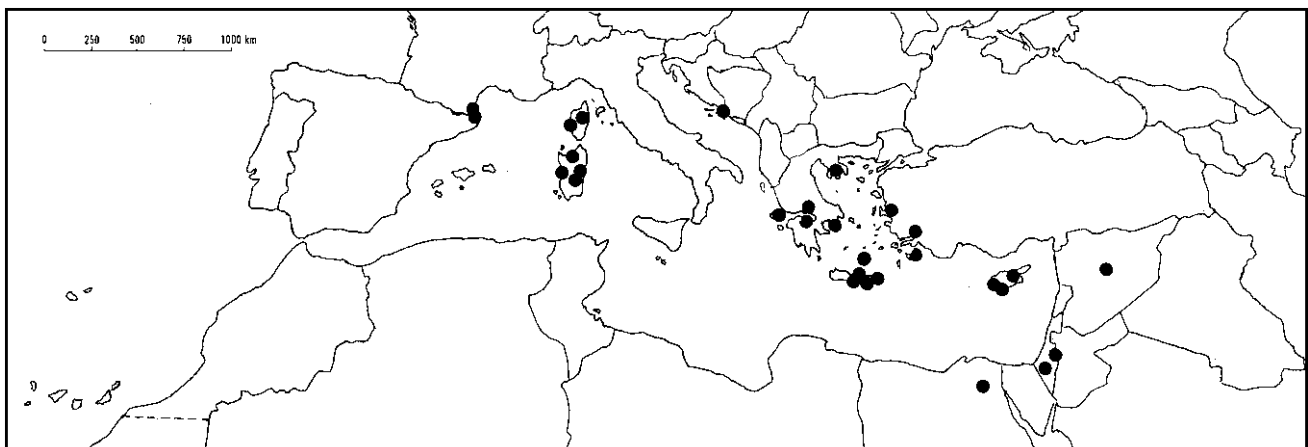
**Diagnosis:** Closely related to and currently misidentified as *E. mandibularis*. Males are most easily distinguished by the absence of the tubercle on the palpal radix. Females are less easily distinguished by the strongly sclerotised posterior margin of the epigyne, which is unsclerotised in *E. mandibularis*.

**Etymology:** The name (Latin *geminus*=twin) refers to the fact that this species has been confused with *E. mandibularis* until now.

**Remark:** The species described here was mentioned as *mandibularis* in O. P.-Cambridge (1872, 1876) and in Levy & Amitai (1981).

**Description:** Male: Total length 3.4–4.1; cephalothorax 1.55–1.75 long, 1.50–1.55 wide; Fe I 1.40–1.60 long. Female: Total length 3.0–5.8; cephalothorax 1.10–1.70 long, 0.90–1.40 wide; Fe I 0.90–1.60 long. Colour: Cephalothorax brown, narrowly bordered with black; sternum dark brown; legs brown, annulated; abdomen dorsally brown, with clearly defined folium with anterior whitish spot, ventrally greyish brown speckled with white; abdomen of ♀ shiny. Male chelicera (Fig. 105): As in *E. mandibularis*. Male palp (Figs. 103–104): Tibia 0.48–0.59 long, cymbium 0.40–0.45 long; radix with blunt basal corner; median apophysis as wide as long, pointed anteriorly; accessory apophysis and conductor two large sclerites, terminally diverging in ventral view, the former blunt terminally, the latter pointed; embolus short, describing less than half a circle. Epigyne (Fig. 106): With small, circular, blackish depression, 0.05–0.08 wide, separated from posterior margin by a wide, transverse depression; posterior margin heavily chitinised, extending as lip over epigastric furrow. Vulva (Fig. 107): Copulatory ducts first winding outwards, then converging to depression.

**Material examined:** "Europe", 4♂ 21♀, sub *E. mandibularis* (MNHNP AR 3714). FRANCE: *Corsica*: Without further locality, 2♂ 1♀ (NMW 512, sub *E. mandibularis*); Ajaccio, 2♀ (MNZHB 29089, sub *E. mandibularis*); Venaco, 1♂, 16 May 1989, J. & F. Murphy leg. (CJFM 18831). *Pyrénées Orientales*: Banyuls, 1♂, November 1908–April 1909 (MNHNP, sub *E. mandibularis*). SPAIN: *Gerona*: Rosas, 1♂ 2♀, December 1912 (MNHNP, sub *E. mandibularis*, types). ITALY: *Sardinia*: Nuoro: Baunei, Golgo, 3♀, under stones, 12 May 1997, J. & K. Van Keer leg. (CJvK); Cantoniera Pira'e Onni, 7♀, stones in grassland, 14 May 1997, J. & K. Van Keer leg. (CJvK); Lanusei NW, Lago alto del Flumendosa, 2♀, under stones, 13 May 1997, J. & K. Van Keer leg. (CJvK). Oristano: Santa Caterini di Pittinuri, 2♀, under stones, 19 May 1997, J. & K. Van Keer leg. (CJvK). Sassari: Oschiri, 1♀ (MNZHB 29086, sub *E. mandibularis*); Oschiri, Lago del Coghinas, 200 m, 3♀, stones, 15 May 1997, J. & K. Van Keer leg. (CJvK); 4 km NW Villanova (Wunderlich, 1995b, sub *E. mandibularis*); Villanova Strisaili, Lago alto del Flumendosa, 2♀, under stones, 13 May 1997, J. & K. Van Keer leg. (CJvK). CROATIA: Dalmatia: Peljesac (Wunderlich, 1995b, sub *E. mandibularis*). GREECE: *Attika*: Athens, Akropolis, 1♂ 1♀, 21 February 1978, R. Bosmans leg. (CRB). *Crete*: Aghia Ghalini, 3♀, 15 March 1978, R. Bosmans leg. (CRB); Aghios Nicolais, 1♀, 11 April 1979, J. & F. Murphy leg. (CJFM 7500);



Map 13: Distribution of *Enoplognatha gemina* n. sp.

Hersonniou, 4♀, 10 April 1978, R. Bosmans leg. (CRB); Irakleo, 1♂ 1♀, 18 March 1978, R. Bosmans leg. (CRB); Kalathas, 1♀, 18 April 1981, J. & F. Murphy leg. (CJFM 9474); Karteros, 3♀, 17 March 1978, R. Bosmans leg. (CRB); Mallia, 1♀, 10 April 1972, J. & F. Murphy leg. (CJFM 1058); Matala, 1♀, 8 April 1995, J. Bosselaers leg. (CJB); Merader, N.W. Crete, 3♀ (MNZHB 29077, sub *E. mandibularis*); Mirtos, 2♀, 4 April 1978, R. Bosmans leg. (CRB); Phaestos, 1♀, 4 April 1972, J. & F. Murphy leg. (CJFM 1136); Zakros, E. Crete, 1♂, *Acer litter*, 12 February 1981, P. R. Deeleman leg. (CCD). *Cyclades*: Santorini (Wunderlich, 1995b, sub *E. mandibularis*). *Dodekanesos*: Rhodes: Filerimos, 1♂ 2♀, 2 January 1965, C. Deeleman leg. (CCD). *Ionian Islands*: Kefalonia: Sami, 1♀, 24 May 1987, J. & F. Murphy leg. (CJFM 14836). *Macedonia*: Halkidiki: Gerakina, 3♀, 6–11 April 1978, J. & F. Murphy leg. (CJFM 6765, 21810). *Peloponnesos*: Korinthia: Korinthos, 1♂, 6 March 1978, R. Bosmans leg. (CRB). *Southern Sporades*: Kapsos: Poli, 1♀, in gorge, 12 April 1987, C. L. & P. R. Deeleman leg. (CCD). *Sterea Eleda*: Fokis: Delphi, 1♀, 6 March 1978, R. Bosmans leg. (CRB). **CYPRUS**: Akamas peninsula, Aghias Minas, 1♀, 3 April 1997, J. Bosselaers leg. (CJB); idem, Avgas estuary, 2♀, 31 March 1997, J. Bosselaers leg. (CJB); idem, Lara bay, 7♀, 3 April 1997, J. Bosselaers leg. (CJB); Nicosia, 1♀, 29 March 1989, P. Selden leg. (CPS); Paphos, 1♀, near hotel, 31 March, J. Bosselaers leg. (CJB); Pissouri, 1♀, 11 April 1995, P. Selden leg. (CPS). **TURKEY**: Mugla, 1♀ (MNZHB 29087, sub *E. mandibularis*); Smyrna, 1♀, 19 March 1916 (MNZHB 29088, sub *E. mandibularis*). **ISRAEL**: North and central parts of country (Levy & Amitai, 1981, sub *E. mandibularis*); Jerusalem (O. P.-Cambridge, 1872, sub *E. mandibularis*); idem; 1♀, Y. Lubin leg. (HUJ 13179); Sede Boqer, Hativa ridge, 1♂, 4 March 1992, Y. Lubin leg. (HUJ 14748). **EGYPT**: Cairo (O. P.-Cambridge, 1876, sub *E. mandibularis*). **SYRIA**: Without further locality, 1♂ 3♀, C. de Brulerie leg., sub *E. mandibularis* (MNHNP AR 3821).

**Distribution** (Map 13): Spain, France, Italy, Croatia, Greece, Cyprus, Turkey, Israel, Syria and Egypt; not yet recorded in the Maghreb countries or southern Spain.

**Ecology**: Males and females collected from December to May.

***Enoplognatha serratosignata* (L. Koch, 1879)** (Figs. 108–112, Map 10)

*Theridium serrato-signatum* L. Koch, 1879: 79 (descr. ♀).

*Enoplognatha ambigua* Kulczyński, in Chyzer & Kulczyński, 1894: 43 (descr. ♀). **Syn. n.**

*Enoplognatha jacksoni* Schenkel, 1927: 235 (descr. ♀); Vogelsanger, 1944: 173; Wunderlich, 1976: 103 (descr. ♂, ♀). **Syn. n.**

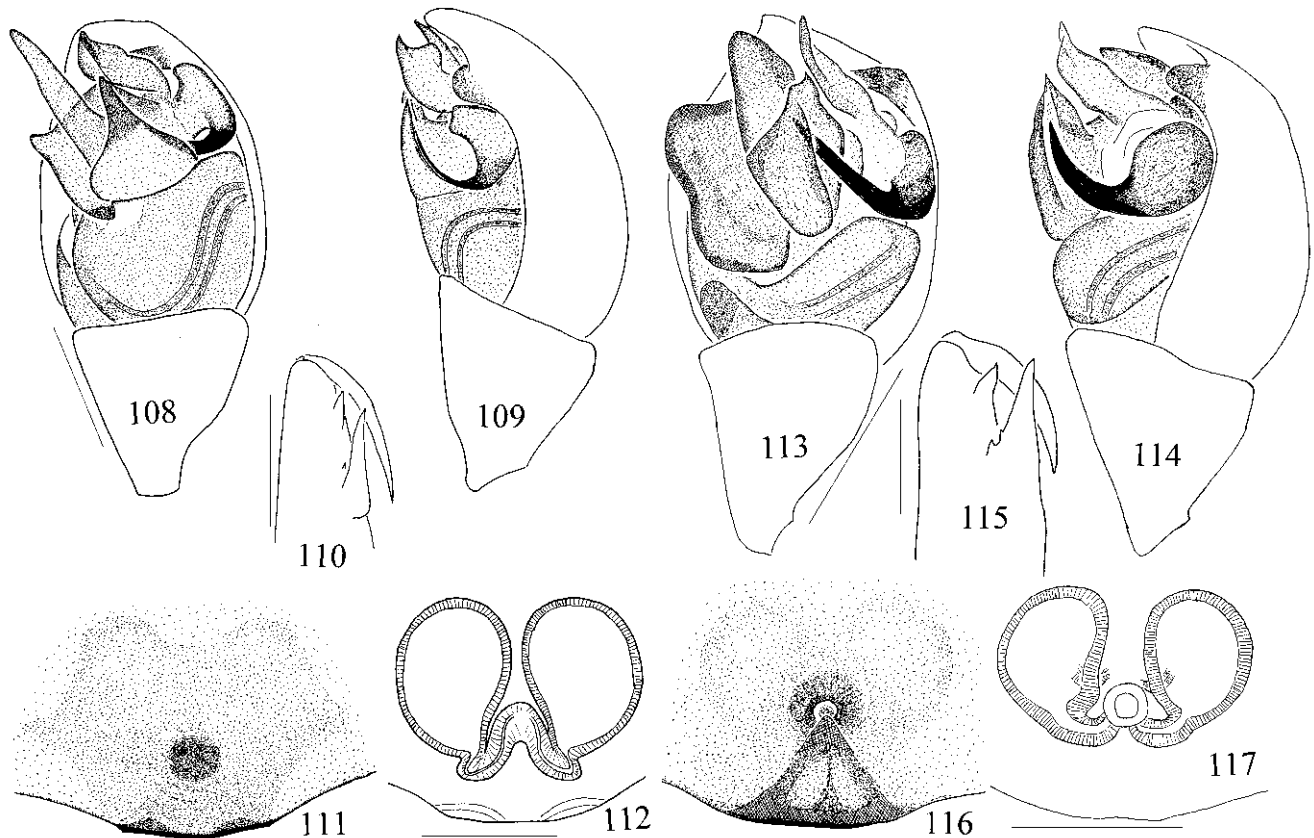
*Enoplognatha hungarica* Kolosváry, 1934: 14 (descr. ♂, ♀); 1935: 136. **Syn. n.**

*Enoplognatha serratosignata*; Holm, 1973: 76 (descr. ♀).

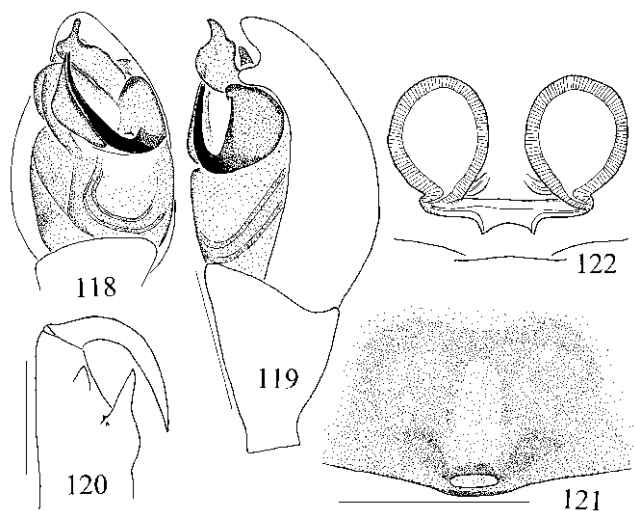
**Type material**: Type series of *E. ambigua* containing 3 ♀ and 1 subadult ♀ from Hungary, Budapest (Sashegy), 1 May 1889 and from Kecskemet, 20 April–2 May 1892 (IZPAN 46/51U); examined. Lectotype ♀, 22♀ paralectotypes of *E. jacksoni* from Switzerland, Wallis, Saas-Tal, Heidenfriedhof-Mittaghorn, June–July (NMB 1422a); designated by Wunderlich, 1976, examined.

**Diagnosis**: Closely related to *E. mandibularis*. Males are easily distinguished by the very long, pointed accessory apophysis and the large mesal tooth on the radix; females are distinguished by the broadly sclerotised, raised posterior margin of the epigyne, clearly visible in lateral view.

**Remarks**: *E. serratosignata* (L. Koch, 1879) was re-described by Holm (1973), on material from the L. Koch collection in London. Examination of the type material



Figs. 108–117: **108–112** *Enoplognatha serratosignata* (L. Koch). **108** Male palp, ventral view; **109** Idem, lateral view; **110** Male chelicera, anterior view; **111** Epigyne; **112** Vulva, ventral view. **113–117** *Enoplognatha carinata* n. sp. **113** Male palp, ventral view; **114** Idem, lateral view; **115** Male chelicera, anterior view; **116** Epigyne; **117** Vulva, ventral view.



Figs. 118–122: **118–120** *Enoplognatha gershomi* n. sp. **118** Male palp, ventral view; **119** Idem, lateral view; **120** Male palp, anterior view. **121–122** *Enoplognatha almeriensis* n. sp. **121** Epigyne; **122** Vulva, ventral view.

of *E. ambigua* Kulczyński, 1894 and *E. jacksoni* Schenkel, 1927 reveals that they are the same species, and are not different from *E. serratosignata*. Both become junior synonyms of *E. serratosignata*.

*E. hungarica* Kolosváry, 1934 was originally described from Hungary, near Kecskemet, as was *E. ambigua*. Kolosváry's very simple sketch of the male palp shows a long, pointed accessory apophysis, and his drawing of the epigyne shows a small, dark pit as in *E. serratosignata* and *E. ambigua*. The deposition of the type material of *E. hungarica* is unknown, but we think these sketches allow us to consider *E. hungarica* a junior synonym of *E. serratosignata* as well.

**Description:** Male: Total length 3.6; cephalothorax 1.31 long, 1.22 wide, Fe I 1.12 long. Female: Total length 3.6–5.6; cephalothorax 1.61–1.84 long, 1.22–1.50 wide; Fe I 1.42–2.16 long. Colour: As in *E. mandibularis*. Male chelicera (Fig. 110): As in *E. mandibularis*. Male palp (Figs. 108–109): Tibia 0.33 long, cymbium 0.57 long; radix with large pointed tooth on mesal side; median apophysis as long as wide, anteriorly distinctly pointed; accessory apophysis very long, straight and

pointed in anteromesal direction; conductor oblique, blunt terminally; embolus short, describing half a circle. Epigyne (Fig. 111): With large, transverse depression, anterior part with small rounded pit; gradually raised to strongly sclerotised posterior margin. Vulva (Fig. 112): Copulatory ducts first winding outwards, then converging anteriorly to depression.

**Other material examined and citations:** SWITZERLAND: Wallis, Saas Fee, 1♂ 4♀, sub *E. jacksoni* (NMS 29037). HUNGARY: Orkeny, between Budapest and Kecskemet (Kolosváry, 1934, sub *E. hungarica*). CHINA: Kansu, "Potanin 36", 2♀ (MNHNP AR 3648); "Potanin 59", 1♀ (MNHNP AR 3824); "Potanin 106", 1♀ (MNHNP AR 3655); "Potanin 114", 2♀ (MNHNP AR 3654); all sub *E. mandibularis orientalis*. SIBERIA: Jenisejks, Krasnojarsk (L. Koch, 1879; Holm, 1973).

**Distribution** (Map 10): Known from Switzerland, Hungary, China and Siberia.

#### *Enoplognatha carinata* n. sp. (Figs. 113–117, Map 14)

**Type material:** Holotype ♂ from Algeria, Lac Tonga E., litter in *Quercus suber* forest, 15 January 1996, K. De Smet leg., 15 January 1996; 2♂ 2♀ paratypes, same data; deposited in IRSNB.

**Etymology:** The name refers to the ridge on the posterior part of the epigyne.

**Diagnosis:** Closely related to *E. mandibularis* and *E. gemina*. Males are easily distinguished by the median apophysis being much longer than wide, the large anteromesal lobe on the radix and the broad accessory apophysis; females by the ridge connecting the depression to the hind margin of the epigyne, absent in the other species.

**Description:** Male: Total length 2.0–2.8; cephalothorax 0.95–1.35 long, 0.75–1.15 wide; Fe I 0.85–1.50 long. Female: Total length 2.1–4.3; cephalothorax 0.85–1.55 long, 0.70–1.20 wide; Fe I 0.75–1.50 long. Colour: Cephalothorax yellowish brown with dark margins; sternum greyish brown; legs yellowish brown with dark annulations; abdomen with dark folium with anterior whitish spot, venter usually with two whitish spots. Male chelicera (Fig. 115): With two large teeth, basal one larger and with two basal denticles. Male palp (Figs. 113–114): Tibia 0.21–0.35 long, cymbium 0.37–0.48



Map 14: Distribution of *Enoplognatha carinata* n. sp.

long; radix large, with large anteromesal lobe; median apophysis  $1.5 \times$  as long as wide, with pointed tip; accessory apophysis a large, blunt sclerite, much wider than oblique, terminally pointed conductor; embolus relatively thick and short, describing less than half a circle. Epigyne (Fig. 116): Depression small, 0.05–0.08 wide, widely separated from hind margin, connected to it by a ridge. Vulva (Fig. 117): Copulatory ducts short, curving in a semi-circle to depression situated at base of receptacula.

*Material examined:* ALGERIA: *Aïn-Defla*: Col Kandek, 600 m, 2♀, pitfalls in *Pistacia lentisca* maquis, 18 May 1989; Oued Djer, Forêt des Soumatas, 150 m, 1♀, pitfalls in *Pistacia lentisca* maquis, 17 February 1988. *Alger*: Forêt de Bainem, 290 m, 1♀, sieving *Pinus canariensis* litter, 30 April 1984, 1♀, litter in *Pinus halepensis* forest, December 1986, R. Bosmans leg. (CRB). *Annaba*: Chetaibi, 810 m, 2♀, stones in grassland, 1 March 1990, R. Bosmans leg. (CRB). *Bejaia*: 15 km S. Bejaia along Oued Soummam, 20 m, 1♀, litter in *Populus alba* forest, 18 April 1982, R. Bosmans leg. (CRB). *Blida*: Atlas de Blida, Chrea: les Glacières, 1140 m, 1♂ 2♀, mixed *Quercus ilex* and *Cedrus atlantica* forest, 12 April 1987, R. Bosmans leg. (CRB); Ghellai, 1350 m, 3♂, pitfalls in planted *Cedrus* forest, 2 January–9 May 1988, R. Bosmans leg. (CRB); 1450 m, Pic Fertasse, 6♂ 2♀, 23 May 1987–9 May 1988, R. Bosmans leg. (CRB); Pic Abdelkader, 1550 m, 9♂ 11♀, 20 October 1987–21 September 1988, R. Bosmans leg. (CRB). *Bouira*: Massif du Djurdjura, Ait Ouabane, 1410 m, 2♀, pitfalls in *Cedrus* forest, 3 May 1989, R. Bosmans leg. (CRB). *Chleff*: Forêt de Tacheta, 850 m, 2♂ 2♀, pitfalls in *Q. faginea* forest, 11 April 1989, 29 September 1989 and 25 May 1990, R. Bosmans leg. (CRB). *El Tarf*: El Kala, N. Lac Tonga, 10 m, 2♂ 2♀, pitfalls in *P. halepensis* forest in dunes, 28 March 1988, R. Bosmans leg. (CRB); Lac Tonga E., 3♂ 2♀, litter in *Quercus suber* forest, 15 January 1996, K. De Smet leg., type material (IRSNB); El Kala, coast near Cap Rosa, El Oued en Nhal, 2 m, 1♀, litter in *Quercus suber* and *Chamaerops humilis*, 4 April 1982, R. Bosmans leg. (CRB); idem, 1♂ 1♀, pitfalls in maquis in dunes, 29 March 1988, R. Bosmans leg. (CRB); E. El Kala, Kef Oum Teboul, 200 m, 2♀, litter in *Q. suber* forest, 5 April 1982, R. Bosmans leg. (CRB). *Medea*: Col de Beni Chicao, 1230 m, 1♂ 2♀, pitfalls in mixed *Quercus ilex* and *Q. suber* forest, 13 January 1989, R. Bosmans leg. (CRB); Col des 2 Bassins, 920 m, 4♀, pitfalls in small *Cedrus* plantation, 18 February 1989, R. Bosmans leg. (CRB). *Mila*: Forêt de Zouagha, 1♀ (MNHNP 3829, sub *E. mandibularis*). *Sétif*: Djebel Babor, 1550 m, 14♂ 7♀, pitfalls in open *Cedrus atlantica* forest, 2 December 1988, R. Bosmans leg. (CRB). *Tipasa*: Sidi Fredj, 10 m, 1♂ 1♀, dunes, 26 February 1984, R. Bosmans leg. (CRB). *Tissemsilt*: Theniet-el-Had, 1525 m, 1♀, pitfalls in mixed *Cedrus atlantica* and *Q. faginea* forest, 26 April–3 May 1984. *Tizi Ouzou*: Beni Yenni, 850 m, 1♂ 3♀, among stones and *Oxalis pescaprae* in garden, 14 April 1982, R. Bosmans leg. (CRB). MOROCCO: *Ketama*: 40 km W. Ketama, 1030 m, 1♀, stones in degraded *Quercus ilex* forest, 20 April 1984, R. Bosmans leg. (CRB).

*Distribution* (Map 14): Widespread and common in the north of Algeria; one locality in Morocco, probably also common in the northern part.

*Ecology*: Males collected from December to April, females from December to May.

### Key to the *Enoplognatha* species of Europe and North Africa

#### Males (male of *almeriensis* unknown)

For an exact identification, it is necessary to study the male palp in ventral view.

1. Chelicera with one large tooth, sometimes accompanied at its base by denticles (*ovata* group) (Fig. 3) .....2
  - Chelicera with more than one tooth (Figs. 9,33,60).....6
2. Conductor in ventral view a robust, transverse sclerite with bluntly pointed tip (Fig. 1).....*verae*
  - Conductor in ventral view slender, tip sharply pointed.....3

3. Base of embolus and conductor nearly touching; median apophysis having anterior position in bulb.....*afrodite*
  - Embolus and conductor clearly separated; median apophysis having median or basal position in bulb.....4
4. Radix in ventral view smaller than median apophysis .....*ovata*
  - Radix in ventral view large, wider than median apophysis .....5
5. Median apophysis with parallel margins, having basal position in bulb .....*latimana*
  - Median apophysis with mesal angularity, having median position in bulb .....*penelope*
6. Chelicera with frontal and posterior teeth (*nigromarginata* group) (Figs. 8,14,20,26).....7
  - Chelicera with teeth only in fang groove (Figs. 33,39,100).....10
7. Median apophysis distally truncate, with parallel margins (Figs. 6,24).....8
  - Median apophysis pointed distally, widest in middle (Figs. 12,18) .....9
8. Median apophysis  $3.5 \times$  as long as wide (Fig. 6).....*mordax*
  - Median apophysis twice as long as wide (Fig. 24).....*mariae*
  - Accessory apophysis distinctly pointed (Fig. 12).....*nigromarginata*
  - Accessory apophysis indistinct, not pointed (Fig. 18).....*tecta*
10. Abdomen uniformly dark or with scattered white or whitish spots on dark background (*thoracica* group).....11
  - Abdomen with dorsal folium.....16
11. Radix prominent mesally (Figs. 30,36,42).....12
  - Radix small, not prominent (Figs. 48,53,58).....14
12. Tip of median apophysis sharply pointed (Fig. 30).....*thoracica*
  - Tip of median apophysis less pointed (Figs. 36,42) .....13
13. Radix in ventral view with rounded mesal margin (Fig. 42); median apophysis deeply incised in mesal view (Fig. 44) .....*parathoracica*
  - Radix in ventral view with angular mesal margin (Fig. 36); median apophysis moderately incised in mesal view (Fig. 38) .....*quadripunctata*
14. Median apophysis triangular, pointed at both ends (Fig. 48) .....*biskrensis*
  - Median apophysis nearly rectangular, truncate or rounded at both ends (Figs. 53,58).....15
15. Median apophysis large, occupying half length of bulbus (Fig. 53).....*testacea*
  - Median apophysis small, occupying one third length of bulbus (Fig. 58).....*mediterranea*
16. Accessory apophysis not strongly developed (Figs. 63,68,73, 78,83,88,91,118); embolus generally long, distinctly curved, describing at least half a circle (*diversa* group) .....17
  - Accessory apophysis and conductor two large, parallel sclerites (Figs. 98,103,108,113); embolus generally short, gently curved, describing less than half a circle (*mandibularis* group).....24
17. Palpal tibia  $1.5 \times$  longer than cymbium (Fig. 69); chelicera with 1 large and 2 smaller teeth .....*sattleri*
  - Palpal tibia as long as or shorter than cymbium (Figs. 64,74, 79,84,92,119); chelicera with 2 teeth .....18
18. Embolus long, describing a large circle (Figs. 74,89); median apophysis elongate,  $4 \times$  as long as wide (Figs. 73,88).....19
  - Embolus shorter (Figs. 64,79,84,92,119); median apophysis less than  $3 \times$  as long as wide (Figs. 63,78,83,91,118).....20
19. Median apophysis widest in middle (Fig. 73) .....*franzi*
  - Median apophysis with parallel margins (Fig. 88) .....*hermani*
20. Radix with two mesal teeth (Fig. 91).....*deserta*
  - Radix without mesal teeth, or tubercle only on basal corner (Figs. 63,78,83,118).....21
21. Radix without basal tubercle (Fig. 118).....*gershomi*
  - Radix with basal tubercle (Figs. 63,78,83) .....22
22. Radix with strong basal tubercle, mesal margin strongly concave (Fig. 78) .....*diversa*
  - Radix with small basal tubercle (Figs.63,83).....23
23. Median apophysis sickle-shaped, widest in middle (Fig. 63) .....*oelandica*
  - Median apophysis with parallel margins, not sickle-shaped (Fig. 83).....*macrochelis*
24. Radix with large basal tubercle (Fig. 98).....*mandibularis*
  - Radix without basal tubercle (Figs. 103,108,113).....25

25. Median apophysis distinctly longer than wide; accessory apophysis much wider than conductor (Fig. 113).....*carinata*  
 – Median apophysis approximately as long as wide; accessory apophysis as wide as conductor (Figs. 103,108).....26
26. Radix with mesal tooth; accessory apophysis strongly elongated (Fig. 108).....*serratosignata*  
 – Radix without mesal tooth; accessory apophysis less elongated (Fig. 103).....*gemina*

#### Females (females of *hermani* and *gershomi* unknown)

1. Pale coloured species; abdomen predominantly white; long-legged, femur I more than  $1.7 \times$  as long as cephalothorax (*ovata* group).....2  
 – Colour different: grey, olive, brown, black, abdomen often with folium; rarely white, but then femur I less than  $1.4 \times$  as long as cephalothorax.....6
2. Epigyne with narrow median septum.....*afrodite*  
 – Epigyne with no narrow median septum.....3
3. Epigyne with small posteromedian depression (Fig. 4).....*verae*  
 – Epigyne with large depression.....4
4. Epigynal depression about as long as wide; hind margin of epigyne very broad, with prominent sclerotised lateral corners.....*latimana*  
 – Epigynal depression transversely elongate.....5
5. Posterior margin of epigyne distinctly raised and heavily sclerotised.....*penelope*  
 – Posterior margin of epigyne less raised and less sclerotised.....*ovata*
6. Abdomen dorsally cream-white; epigyne with very small sclerotised region (Fig. 28).....*mariae*  
 – Abdomen not cream-white; sclerotised region of epigyne larger.....7
7. Epigyne with arched, chitinised structure (Figs. 10,16,22) (*nigromarginata* group).....8  
 – Epigyne different.....10
8. Abdomen ventrally with scattered white spots.....*tecta*  
 – Abdomen ventrally with longitudinal median dark stripe flanked by white lines.....9
9. Arched chitinised structure in epigyne wider than long (Fig. 16).....*nigromarginata*  
 – Arched chitinised structure in epigyne as wide as long (Fig. 10).....*mordax*
10. Abdomen without distinct folium, uniformly coloured or with spots (*thoracica* group).....11  
 – Abdomen with dorsal folium.....16
11. Epigyne with large median septum (Figs. 46,51).....12  
 – Epigyne without large median septum (Figs. 34,40,56,61).....13
12. Septum separating two large circular orifices (Fig. 46).....*parathoracica*  
 – Septum separating two smaller oval orifices (Fig. 51).....*biskrensis*
13. Epigyne with raised posterior margin and central depression (Figs. 56,61).....14  
 – Posterior margin not raised (Figs. 34,40).....15
14. Epigyne with small, rounded central depression (Fig. 56).....*testacea*  
 – Depression anteriorly limited by a transverse sclerotised bridge (Fig. 61).....*mediterranea*
15. Posteromedian part of epigyne heavily sclerotised, square (Fig. 34).....*thoracica*  
 – Posteromedian part of epigyne less sclerotised, trapezoid (Fig. 40).....*quadripunctata*
16. Epigyne with clearly defined posteromedian oval, rarely circular, pit (Figs. 66,71,76,81,86,94,121) (*diversa* group).....17  
 – Epigyne with dark, heavily sclerotised depression, its margins not clearly defined (Figs. 101,106,111,116) (*mandibularis* group).....23
17. Pit almost circular, very close to incised posterior border (Fig. 76); vulva with copulatory ducts with supplementary lateral loop (Fig. 77).....*franzi*  
 – Pit oval (Figs. 66,71,81,86,94,121); copulatory ducts without supplementary lateral loop (Figs. 67,72,82,87,95,122).....18
18. Pit separated from posterior margin by less than its smallest diameter (Figs. 71,86,121).....19  
 – Pit separated from posterior margin by more than its smallest diameter (Figs. 66,81,94).....21
19. Pit situated on hind margin, its borders often indistinct (Fig. 86).....*macrochelis*  
 – Pit clearly separated from hind margin (Figs. 71,121).....20
20. Posterior margin of epigyne slightly concave; copulatory ducts mostly visible, short, leading directly to pit (Figs. 71,72).....*sattleri*  
 – Posterior margin protruding in middle; copulation ducts for a short distance curved in posterolateral direction (Figs. 121,122).....*almeriensis*
21. Posterior margin of pit heavily sclerotised, oblique,  $3-4 \times$  as wide as diameter of pit (Fig. 81).....*diversa*  
 – Sclerotised posterior margin  $1-2 \times$  times as wide as pit, flat (Figs. 66, 94).....22
22. Pit  $1.5 \times$  as wide as long; copulatory ducts describing a large lateral loop (Figs. 66,67).....*oelandica*  
 – Pit  $3 \times$  as wide as long; copulatory ducts shorter, with a short lateral loop (Figs. 94,95).....*deserta*
23. Posterior margin of epigyne unsclerotised, much paler than sclerotised depression (Fig. 101).....*mandibularis*  
 – Posterior margin of epigyne sclerotised, as dark as depression (Figs. 106,111,116).....24
24. Sclerotised depression in anterior position, widely separated from posterior margin by area with median ridge (Fig. 116).....*carinata*  
 – Depression closer to posterior margin (Figs. 106,111).....25
25. Sclerotised depression situated in a larger, transverse depression (Fig. 111), posterior margin of epigyne distinctly raised, as seen in lateral view.....*serratosignata*  
 – Epigyne flat behind depression, extending as markedly concave lip (Fig. 106).....*gemina*

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## Social behaviour by captive juvenile *Kukulcania hibernalis* (Araneae: Filistatidae)

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### Summary

This paper describes the interactions of captive *Kukulcania hibernalis* spiderlings both among themselves and with regard to the maternal females. We found that, at least through the third post-emergence instar, *K. hibernalis* spiderlings display behaviours consistent with the criteria outlined by Kullmann (1972) for a spider to be considered a social species: tolerance, aggregation, and co-operation. Spiderlings were observed daily from emergence through the third post-emergence instar and were seen to exhibit sibling recognition, co-operative prey capture and feeding, and formation of aggregations both after feeding and after dispersal from the maternal web. No spiderlings were observed to feed with the mother and there appeared to be no consistent provisioning for the spiderlings by the mother. These results represent the first example of social behaviour by a filistatid species and extend the taxonomic range of social behaviour in araneomorph spiders.

### Introduction

Spiders usually are considered to be non-social predators. Cannibalism is a common source of mortality in some species and in many species special behaviours

are necessary for males to approach females safely for mating. Nonetheless, some level of sociality has been documented in at least 17 spider families (Buskirk, 1981; Aviles, 1997) and it is considered to be of polyphyletic origin (Kullmann, 1972). Social behaviour in spiders is postulated to have evolved along either of two pathways. The “sub-social pathway” is thought to be an extension of maternal-juvenile and sibling tolerance into adulthood (Kullmann, 1972). In contrast, the “para-social route” is thought to occur through decreased aggression in response to favourable environmental circumstances (e.g. Uetz & Hodge, 1990).

To study the evolution of sociality in spiders, one strategy is to examine species that display less advanced forms of social behaviour for clues as to the ancestral condition. Papers by Shear (1970) and Kullmann (1972) stimulated searches for intermediate forms of sociality in spiders over the past two decades, resulting in an increase in the number of families known to include social species. Kullmann (1972) listed three attributes that must be present for a spider species to be considered as social: individuals must tolerate the presence of conspecifics, there must be an “urge to aggregate”, and individuals must show some form of co-operation. Here we report, what is to our knowledge, the first example of social behaviour in the Filistatidae. We found that, when juvenile, *Kukulcania hibernalis* (Hentz) displays behaviours consistent with Kullmann's criteria. In addition, we describe the behavioural interactions of the maternal female with her offspring.