

On the identity of *Arctosa variana* C. L. Koch and *Arctosa similis* Schenkel, with notes on related species (Araneae: Lycosidae)*

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Summary

After reconsideration of the four species of the *Arctosa cinerea* group in Europe the following new interpretations and two new synonymys can be given: *A. perita latithorax* Lugetti & Tongiorgi, 1965 = *A. variana* C. L. Koch, 1847 (**new synonymy**); *A. variana* in sense of recent authors (Knülle, 1959; Lugetti & Tongiorgi, 1965) = *A. similis* Schenkel, 1938, which is removed from synonymy with *A. cinerea* (Fabricius, 1777); *A. cinerea minor* Guy, 1966 = *A. similis* Schenkel (**new synonymy**). These species, together with *A. cinerea* and *A. perita* (Latreille, 1799), are briefly discussed and keyed and characters of taxonomic importance illustrated.

Introduction

The separation of species in the genus *Arctosa* has often presented problems, e.g. see the synonymies proposed in Thorell (1872) and Simon (1937), but it was made considerably easier by the revisionary studies of Knülle (1959) and Lugetti & Tongiorgi (1965, 1967). However, not all the pitfalls originating from too short descriptions and later incorrect identifications have been discovered. The four species discussed below stand close to each other in genitalic and somatic characters. They often inhabit open habitats, riverbanks and shores with sand and gravel. Three of them were described in the early days of arachnology, when genitalic characters were not considered in diagnoses. Consequently, differences in interpretation arose between authors. When Knülle (1959) and Lugetti & Tongiorgi (1965) discovered that *A. cinerea* (Fabricius, 1777) in the northern Mediterranean includes two distinct taxa, the situation became even more complicated. Schenkel (1938) differentiated a new sibling species from Portugal, *A. similis*, which was soon synonymised with *A. cinerea* by Machado (1941). Its re-establishment as a distinct species is here confirmed. Moreover, *A. perita latithorax* Lugetti & Tongiorgi, 1965 was added as a further subspecies. Guy (1966) independently investigated these species in the western Mediterranean, but with different results concerning *A. cinerea* and *A. variana* C. L. Koch, 1847. We fully agree with the distinction given by Lugetti & Tongiorgi (1965), but hesitate to accept either the identification given for the sibling species or the status of *A. p. latithorax* as a “new” discovery. Because of inherent problems involved with each species, they

will be discussed in the following order: *A. variana*, *A. perita*, *A. cinerea*, *A. similis*.

Abbreviations used: CB=Buchar collection; CTh=Thaler & Knoflach collection; MNHN=Muséum National d’Histoire Naturelle, Paris; NHRS=Naturhistoriska Riksmuseet, Stockholm; NMW=Naturhistorisches Museum Wien. All measurements are in mm.

Taxonomic part

***Arctosa variana* C. L. Koch, 1847** (Figs. 6, 7, 13–14, 21–22, 31)

Arctosa variana C. L. Koch, 1847: 125–126, fig. 1359; n. sp., ♀, type locality “Nauplia” (now Nafplio, Peloponnese), leg. Dr Schuch.

Trochosa variana: Chyzer & Kulczyński, 1891: 65, 68, 74, pl. 3, figs. 11a (palp, ventral), 11b (epigynum).

Arctosa variana: Giltay, 1932: 21, figs. 15–16, ♂ (palp, retrolateral), ♀ (epigynum/vulva).

Lycosa variana: Simon, 1937: 1114, ♀, fig. 1753 (epigynum). Non ♂, fig. 1752 (= *A. similis*).

Arctosa perita latithorax Lugetti & Tongiorgi, 1965: 180–182, fig. V 1–4; n. ssp., ♂♀, type locality Italy, Pisa, S. Rossore. **New synonymy** (contra Dondale & Redner, 1983: 19).

Non *A. variana*: Lugetti & Tongiorgi, 1965: 183–186, ♂♀ (= *A. similis*).

Material examined: GREECE: *Peloponnese*: Olympia, 1♂ (CTh), 15–20 May 1965, leg. Pruscha; Tripiti, 1♂ (CB), 16 March 1998, leg. Stahlavsky. *Thessalia*: Chalkidiki, Nikiti, in hotel garden, 1♂ (NMW), 27 April–4 May 2000, leg. Thaler & Knoflach. *Rhodes*: Kolymbia, 1♂ (CB), 4 June 2002, leg. Dolanský. TURKEY: Iskanderum, 1♂ (CB), 17 April 2002, leg. Rezac. ITALY: *Emilia-Romagna*: Forli, 1♂ 1♀ (CTh), 1992, leg. Paoletti & Celano. *Sardinia*: Giardi di Gestury, 300 m, on muddy shore, 5♂ 5♀ (CB), 30 April 2003, leg. Buchar.

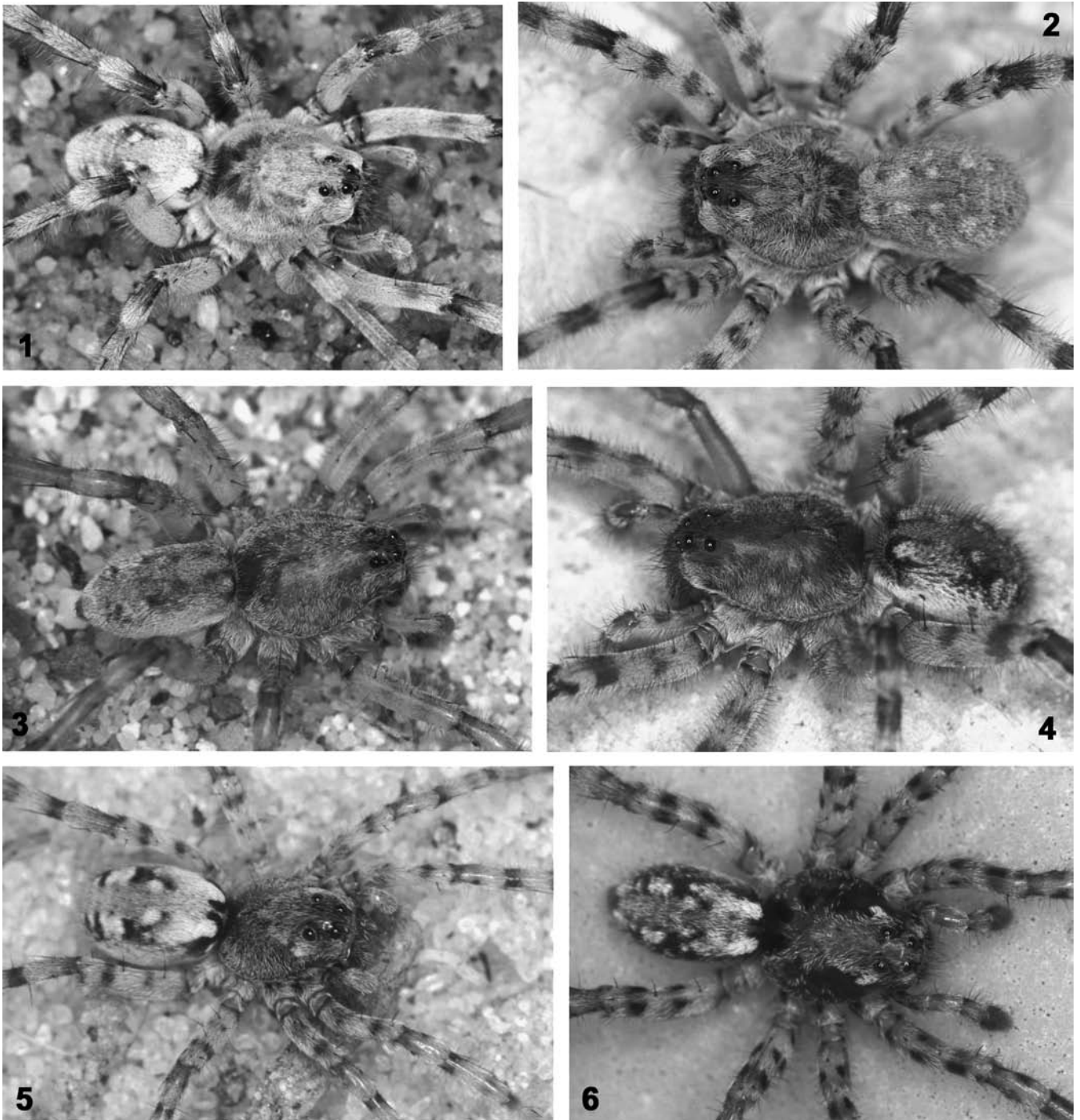
Description (♂♀): Small species, total length ♂ 5.0–6.8 (n=8), ♀ 6.0–7.1 mm. Dimensions of our specimens equal the range given by Lugetti & Tongiorgi (1965) for a population from Tuscany, prosoma length ♂ (n=9)/♀ (n=2) 2.5–3.5/3.1, width 1.9–2.6/2.1. Pattern contrasting (Fig. 6), legs yellowish, distinctly annulated. Male palpal tibia c. 1.5 × longer than broad; cymbium not elongate; tegular apophysis (Figs. 13–14), with ventral tooth (arrow) rather short, with inner margin oblique and concave and base widely visible; embolic division (Fig. 7). Epigynum/vulva (Figs. 21–22), similar to *A. cinerea*, 1.9 × wider than long; margins sclerotised, anteriorly converging, lateral margins slightly convex, anterior margin strongly biconcave; median septum triangular, separating two oblique pockets; posterior margin broad, copulatory orifices at posterior angles; receptacles project far beyond anterior margin of epigynum.

Lugetti & Tongiorgi (1965) separated *A. variana* from *A. perita* also according to length/width ratio of prosoma, values reported for *A. perita* 1.44 ± 0.6 [1.30–1.45 (n=11)], and for *A. variana* (= *A. p. latithorax*) 1.37 ± 0.6 [♂ 1.19–1.40 (n=9)], measurements from our material in square brackets. It is therefore not possible to assign these specimens unequivocally to species from this character.

*We dedicate this work to Dr Peter Merrett on the occasion of his 70th birthday with special thanks for his constant editorial care.

Taxonomy: The original description of *Arctosa variana* of course lacks information about genitalic characters, but shows a colour illustration of its dorsal habitus: female greyish, with pattern full of contrast, prosoma midband and legs yellowish, legs distinctly annulated. Total length was given as 4 lines (=8.5 mm). Size values for females of related species were given as follows: *A. cinerea* (from Gdansk/Danzig) 6.5 lines (=13.8 mm), from S. Germany 6–8 lines (=12.7–16.9 mm, sub *Licosa allodroma* C. L. Koch, 1838), *A. perita* (sub *A. picta*) 3.5 lines (=7.4 mm) [1 line equals 2.12 mm]. Therefore, according to its first description *Arctosa variana* is a

rather small species, as also is *A. perita*. Subsequently, *A. variana* was mainly identified from the eastern Mediterranean and from Italy (Bonnet, 1955: 662). Simon (1884: 318) compared his specimens from Euboea and Naxos with *A. perita*, and Chyzer & Kulczyński (1891), again, in their key separated *A. cinerea* from *A. variana* by dimensions, females also by a ratio (length prosoma/length tibia+patella IV), and provided the first figures of the epigynum and male palp. The epigynum drawn by Giltay (1932) corresponds well to their figure, as do our specimens. Surprisingly, *A. perita latithorax*, which was given species rank by later



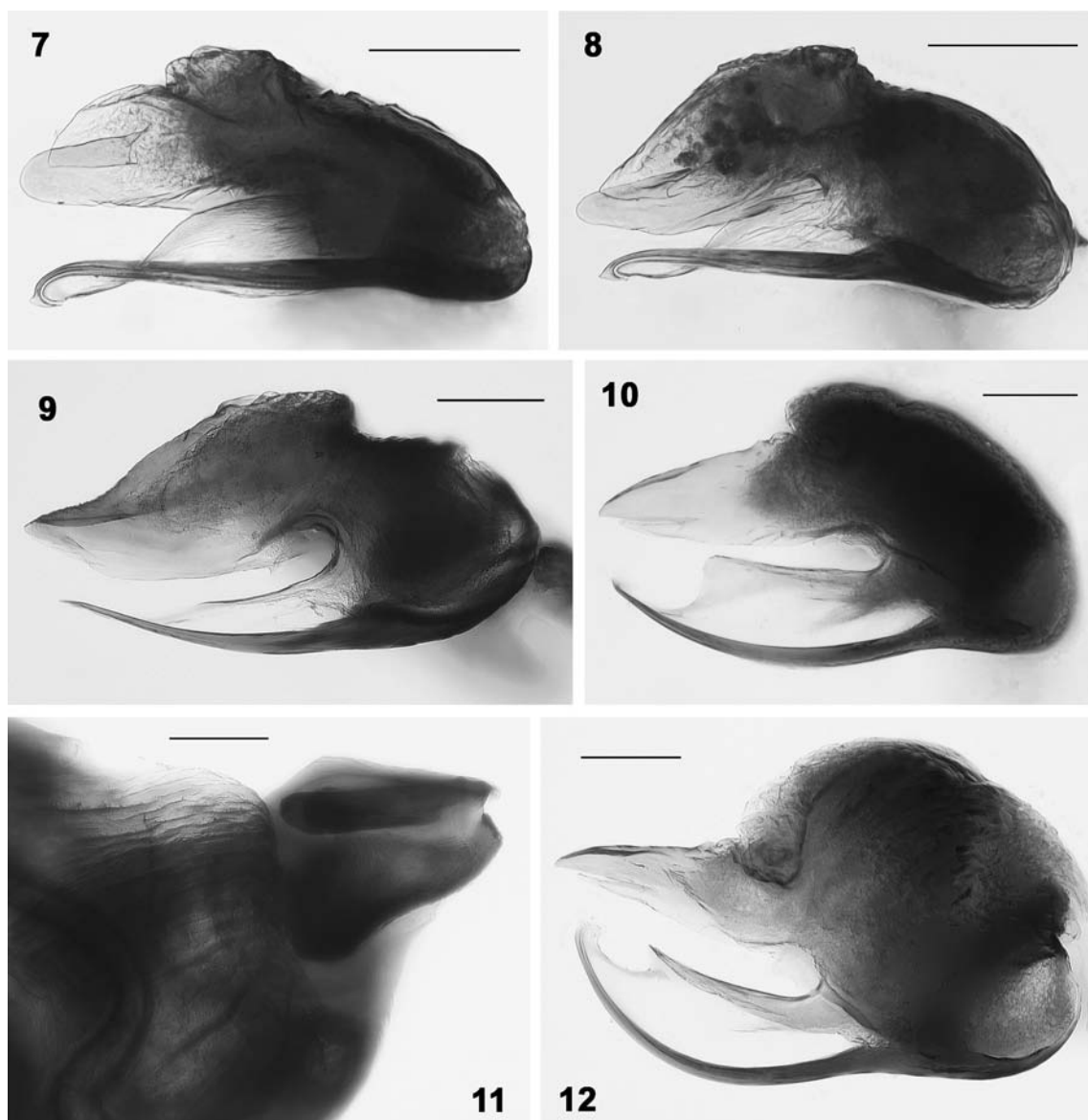
Figs. 1–6: **1–2** *Arctosa cinerea* ♂ (**1** GR: Chalkidiki, 2000; **2** A: N. Tyrol, Lechtal, 21 September 1994); **3–4** *A. similis* ♂ (**3** F: Corsica, Calvi, 2001; **4** E: Gran Canaria, 2001); **5** *A. perita* subad. (GB: Edinburgh, 16 July 1997); **6** *A. variana* ♂ (GR: Chalkidiki, 2000). All photographs B. Knoflach.

authors (Wunderlich, 1984), corresponds perfectly with *A. variana* as characterised above and must be accepted as a new synonym. The present synonymisation is proposed from the literature and from recently collected material not too far from the type region in Italy; the types were not examined. Lugetti & Tongiorgi (1965) even placed *A. variana* sensu Giltay tentatively in the synonymy list of their new subspecies.

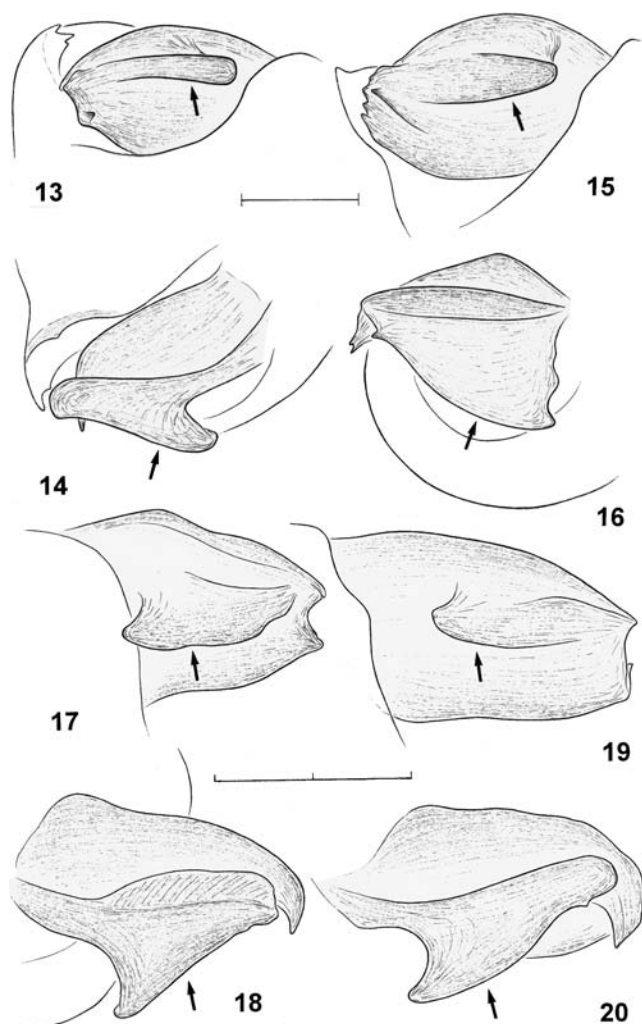
The species diagnosed by Knülle (1959) and Lugetti & Tongiorgi (1965) as “*A. variana*” differs clearly from the characters given by Giltay and by Chyzer & Kulczyński (1891). Above all, it is characterised like *A. cinerea* as a large species, “di grosse dimensioni”. These authors realised, quite correctly, that in Italy two large species of *Arctosa* exist, *A. cinerea* on seashores, the other on riverbanks. Apparently they followed the key of Simon (1937: 1113). Admittedly, *A. cinerea* stands there as the only species of its group with “*taille grande*”, but the

figures of genitalia for *A. cinerea* and *A. variana* are confusing and refer at least partially to the species named here as *A. similis* (figs. 1749 and 1752, see below). The conception of Lugetti & Tongiorgi (1965) was widely followed by later authors.

Distribution: Owing to taxonomic confusion, peripheral records cannot be safely accepted. *Arctosa variana* is known from the eastern and central Mediterranean: Greece (Hadjissarantos, 1940), Turkey and peninsular Italy, from Campania to the Po plain (Forli), and islands: Sicily, Sardinia (Lugetti & Tongiorgi, 1965, sub *A. p. latithorax*). It is known from Dalmatia (Chyzer & Kulczyński, 1891). For further records from the Balkan peninsula see Drensky (1936) and Deltshv & Blagoev (1995). At least some of the “old” records should be revised or corroborated by recent findings. This holds especially for records from N. Africa, the Iberian peninsula, Central Europe and Russia (Bonnet, 1955; Mikhailov, 1997).



Figs. 7–12: Embolic division, ventral views (7–10, 12) and tegular apophysis, inclined retrolateral view (11) of *Arctosa* spp. **7** *A. variana* (see Fig. 6); **8** *A. perita* (CZ: Slepíči vršek, 30 May 1973); **9**, **11** *A. cinerea* (see Fig. 2); **10**, **12** *A. similis*, different views (see Fig. 3). Auto-Montage digital photos. Scale lines=0.1 mm.



Figs. 13–20: Tegular apophysis of *Arctosa* spp., ventral views (13, 15, 17, 19), anterior views (14, 16, 18, 20). **13–14** *A. variana* (see Fig. 6); **15–16** *A. perita* (see Fig. 8); **17–18** *A. cinerea* (see Fig. 2); **19–20** *A. similis* (see Fig. 3). Scale lines=0.1 mm (13–16), 0.2 mm (17–20). Arrows point to ventral tooth.

***Arctosa perita* (Latreille, 1799)** (Figs. 5, 8, 15–16, 23–24, 31)

Identification: Knülle (1959), Wiebes (1959), Lugetti & Tongiorgi (1965), Fuhn & Niculescu-Burlacu (1971), Miller (1971), Loksa (1972), Dondale & Redner (1983), Roberts (1985). This species has been characterised unambiguously in recent literature.

Material examined: CZECH REPUBLIC: *Bohemia*: Lužnice nad Lužnicí, dune Slepíčí vršek, 1♂ 3 subad., 30 May 1973; Veselí nad Lužnicí, Vlkov dune, 3♂ 1♀, 11 April 1963; Kozly near Neratovice, dune, 1♂, 28 April 1962; Písty near Nymburk, dune, 4♂ 1♀, 11 April 1969 (all CB, leg. Buchar). ITALY: *Toscana*: Pisa, S. Rossore, dunes by seashore, 4♂ 4♀ (CB), 19 May 1963, leg. Tongiorgi. *Calabria*: Sibari, on seashore, 2♀ (CTh), 1+17 June 1977, leg. Meyer. *Sardinia*: Golfo Aranci, 2♂ (CB), 4 April 1999, leg. Hula & Holá.

Description (♂♀): Small species, total length 6–8 mm. Dimensions of our specimens fall within the range given by Lugetti & Tongiorgi (1965) for a population from Tuscany: prosoma length ♂♀ 2.7–4.0/3.0–3.9, width 1.9–2.9/2.0–2.8. The males reported above from Sardinia are

smaller, total length 4.8, 5.1, prosoma length 2.4, width 1.7. Pattern contrasting (Fig. 5), legs brownish, distinctly annulated. Male palpal tibia *c.* 1.5 × longer than broad; cymbium not elongate; tegular apophysis (Figs. 15–16) with ventral tooth (arrow) strong, with inner margin straight, its base hardly visible; embolic division (Fig. 8) with terminal apophysis blade-like, embolus similar to *A. variana*. Epigynum/vulva (Figs. 23–24) 1.3 × wider than long, trapezoid, median septum triangular with posterior margin narrow, copulatory orifices small, receptacles at anterior margin of epigynum.

Taxonomy: Recent descriptions of *A. perita* correspond well with each other and also with classical figures in Simon (1937) and Chyzer & Kulczyński (1891). In our opinion, however, the true identity of populations in northern Africa should be re-investigated.

Distribution: Europe and Azerbaijan (Mikhailov, 1997), introduced to N. America, British Columbia (Dondale & Redner, 1983). As this species is “strongly associated with sandy coast and heathland habitats”, it is probably widespread along the seashore in all Europe, “but inland records are patchy and scattered, restricted to suitable habitat” (Harvey *et al.*, 2002). We cannot indicate safely the eastern limits of its distribution and are uncertain about its presence in northern Africa.

***Arctosa cinerea* (Fabricius, 1777)** (Figs. 1–2, 9, 11, 17–18, 25–26, 31)

For synonyms see Platnick (2005).

Identification: Knülle (1959), Lugetti & Tongiorgi (1965), Fuhn & Niculescu-Burlacu (1971), Miller (1971), Loksa (1972), Roberts (1985). Non *L. cinerea*: Simon, 1937: 1113, fig. 1749, ♀ (= *A. similis*).

Material examined: GERMANY: Schleswig-Holstein: Kiel, seashore, 1♂ (CB), September 1966, leg. Hürka. CZECH REPUBLIC: *Bohemia*: Friedland, Smědá river, sandy riverbank, 2♀ (CB), 19 April 1976, leg. Nevrlý; Iser mts., Polubný, Velká Jizerská louka, sandy riverbank, 2♂ 2♀ (CB), 6 September 1975, leg. Buchar; Opatovice, depository near river Labe/Elbe; 1♂ (CB), 18 August 1992, leg. M. Růžičková; Tuš' near Třeboň, sandpit, 1♂ (CB), 15 May 2004, leg. J. Král. SLOVAKIA: Ulič, bank of Ulička river, 1♀ (CB), 31 July 2003, leg. D. Král; Snina river, near Snina, 3♀ (CB), July 1962, leg. Buchar. AUSTRIA: see Buchar & Thaler (1995). CROATIA: Dalmatia: Split region, without exact locality, 2♀ (CB), July 1975, leg. Bílek (together with 1♂ *A. similis*). ITALY: *Tuscany*: Pisa, Fiume Arno, 1♀ (CB), 17 May 1963, leg. Tongiorgi (together with *A. similis*); Pisa, S. Rossore Gombo, seashore, 2♂ 2♀ (CB), 2 May 1963, leg. Tongiorgi. BULGARIA: see Buchar (1968). GREECE: Chalkidiki, Kolpos Ag. Oros, 1♂ 1♀ (CTh), adult moult June 2000 (Thaler *et al.*, 2000). TURKEY: Balıkesir, artificial lake Caygocen, 300 m, E. of Sındırgı, 1♂ (NMW), 16 May 1983, leg. Aspöck & Rausch. SPAIN: *Andalusia*: Almunecar, 1♂ 2♀ (CB), 3 May 1992, leg. Hürka.

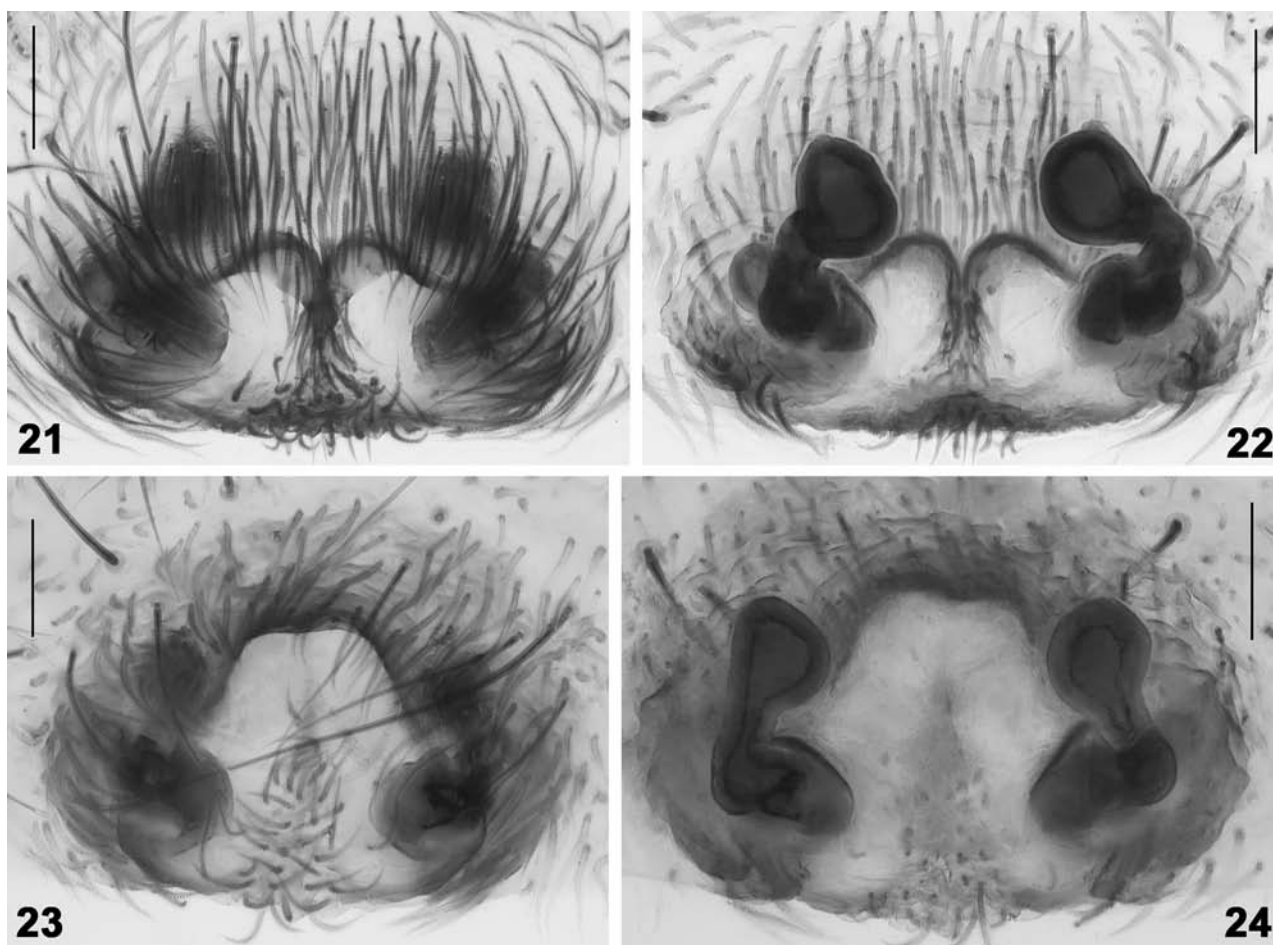
Description (♂♀): Dimensions very variable, as already stated by C. L. Koch (1838: 107, sub *Licosa allodroma*), see also Fig. 31. Total length ♂ 8.0–13.5, ♀ 11–18, prosoma length ♂ (*n*=5)/♀ (*n*=13) 4.6–7.1/5.8–9.5, width

3.4–5.8/4.5–7.5. Values for prosoma length (width) of females were given by Lugetti & Tongiorgi (1965) as 4.7–5.7 (3.6–4.6) ($n=11$) for a population from Pisa, so the females from Central Europe examined here are larger. Greyish to yellowish, pattern and leg annulation indistinct (Figs. 1–2). Male palpal tibia $2.5\times$ longer than broad; cymbium slender; tegular apophysis (Figs. 11, 17–18) shorter than in *A. similis*; embolic division (Fig. 9) with terminal apophysis beak-shaped, shorter than in *A. similis*, with anterior margin concave, inner flange of embolus less truncate than in *A. similis*. Epigynum/vulva (Figs. 25–26) broader than long, anterior margins sclerotised, lateral margins interrupted close to copulatory orifices, anterior margin biconcave, connected by narrow median crest with median septum, septum broadly triangular; copulatory orifices small, copulatory ducts comparatively short, scarcely bent, receptacles large and globular, extending beyond anterior margin of epigynum.

Taxonomy: We now consider that the specimens of *A. cinerea* examined here, coming from the Baltic Sea, its terra typica, from Central Europe, the type region for *A. allodroma* Walckenaer, 1802, and from the Mediterranean, belong to a single species. This opinion was also shared by Thorell (1872: 332) and by Knülle (1959). For *L. pilipes* Lucas, 1846, see below. According to somatic

characters *A. cinerea* is close to *A. similis*, which therefore has remained undiscovered for many years, but they can be separated by the genital organs. Apparently Simon (1937) was not aware of this distinction: in males of both species patella+tibia IV is longer than the prosoma (Fig. 31), and the epigyne figured by Simon (fig. 1749) probably belongs to *A. similis*.

Distribution: Probably Trans-Palaeartic (Tanaka, 1991; Marusik, 1994). *Arctosa cinerea* is known to occur on the shores of the Baltic and of the North Sea, on riverbanks in Central Europe, and on the shores of the Mediterranean (Thorell, 1872; Knülle, 1959; Lugetti & Tongiorgi, 1965). Interestingly, in Great Britain it has been recorded only from shingle beds of fast flowing rivers and lakeshores (Harvey *et al.*, 2002). Relationships with *A. similis* need to be investigated more closely. In Tuscany the two species appear to be separated ecologically, *A. similis* preferring riverbanks. In our records there are two other cases of sympatric occurrence, in Dalmatia and in Andalusia. Simon (1937: 1138) gives its range as extending to western Africa, Senegal. Considering the discovery of *A. similis* in the Mediterranean we feel sure that the true identity of *Arctosa* populations on riverbanks and shores in North and West Africa should be reconsidered, as also the status of *L. pilipes* from Algeria.



Figs. 21–24: Epigynum/vulva of *Arctosa* spp., ventral (21, 23), dorsal (22, 24). **21–22** *A. variana* (I: Sardinia, 2003); **23–24** *A. perita* (CZ: Vlkov dune, 1963). Auto-Montage digital photos. Scale lines=0.1 mm.

Arctosa similis Schenkel, 1938 (Figs. 3–4, 10, 12, 19–20, 27–31)

Arctosa similis Schenkel, 1938: 13–15, fig. 5; n. sp., ♀, type locality Odivelas, Portugal (removed from synonymy with *A. cinerea* (Fabricius, 1777), contra Machado (1941)).

Arctosa cinerea: Simon, 1937: 1114, fig. 1749, ♀.

Arctosa variana: Simon, 1937: 1114, fig. 1752, ♂.

Bonacosa similis: Roewer, 1955: 237.

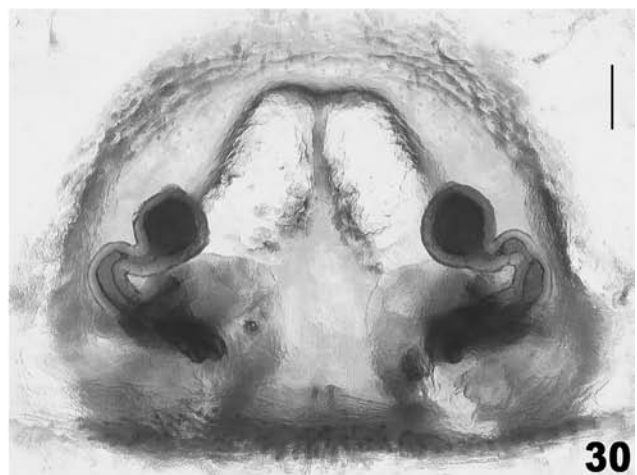
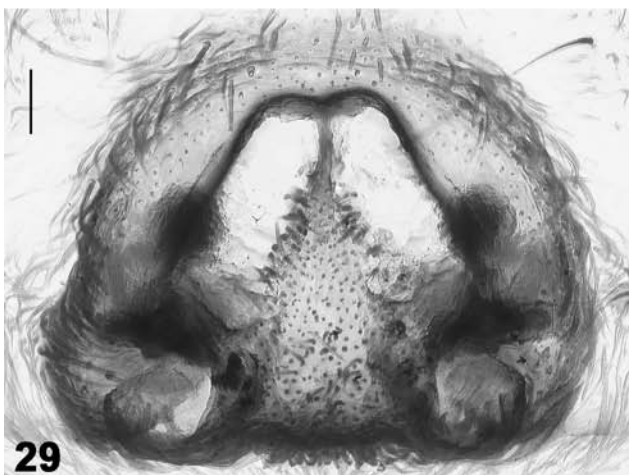
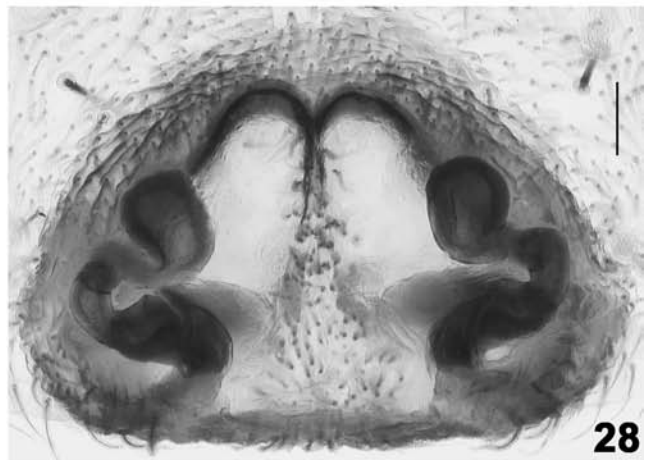
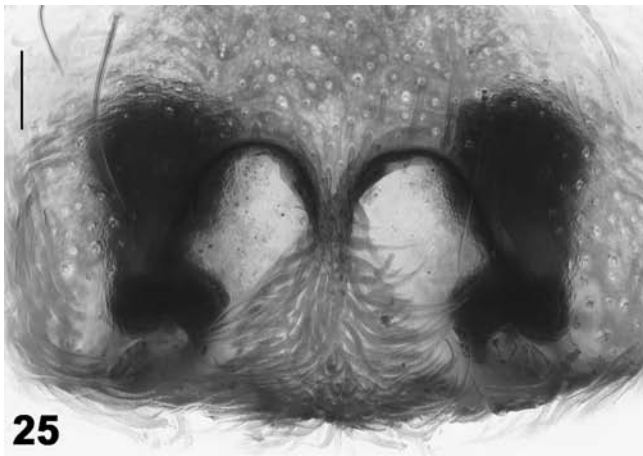
Arctosa similis: Bonnet, 1955: 661.

Arctosa variana: Knülle, 1959: 252–253, figs. 2, 8, ♂♀.

Arctosa variana: Lugetti & Tongiorgi, 1965: 183–186, fig. VI 1–4, ♂♀.

Arctosa cinerea minor Guy, 1966: 130, figs. 89–90; n. ssp., ♂♀, terra typica Corsica. **New synonymy.**

Material examined: PORTUGAL: Odivelas, 1♀, type (NHRS), 24 June 1935, leg. Lundblad (Schenkel, 1938). ITALY: *Toscana*: Pisa, Fiume Arno, riverbanks with sand and gravel, 2♂ 2♀ (CB), 17 May 1963, leg. Tongiorgi. *Sardinia*: Muravera, Tintinau, riverbank with gravel, 2♂ (CB), 27 April 2003, leg. Buchar. CROATIA: *Dalmatia*: Split region, without exact locality, 1♂ (CB), July 1975, leg. Bílek. FRANCE: *Corsica*: Ostriconi estuary near Calvi, 2♂ (CTh), 3 May 2001, 2♀ (CTh), adult moults in captivity November/December 2001, leg. Thaler & Knoflach. SPAIN: Pyrenees, artificial lake El Grade, 1♀ (CTh), 16 July 1975, leg. Prem. *Catalania*: Costa



Figs. 25–30: Epigynum/vulva of *Arctosa* spp., ventral (25, 27, 29), dorsal (26, 28, 30). **25–26** *A. cinerea* (E: Almunecar, 1992); **27–30** *A. similis* (27–28 F: Corsica, adult 2001; 29–30 type from Portugal, Odivelas). Auto-Montage digital photos. Scale lines=0.1 mm.

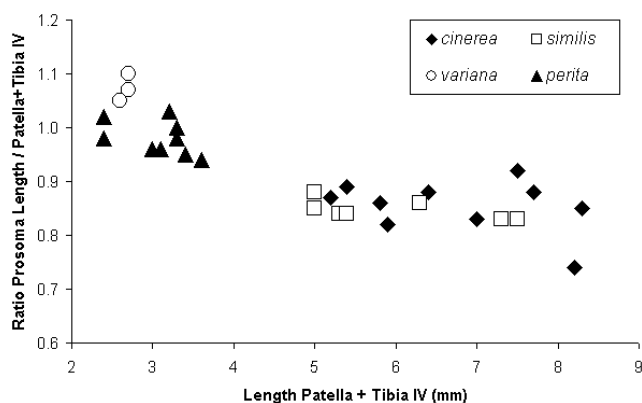


Fig. 31: Scatter diagram: length patella+tibia IV (δ) vs. ratio prosoma length/length patella+tibia IV in *A. cinerea*, *A. similis*, *A. perita* and *A. variana* (see Simon, 1937: 1113).

Brava, Blanes, La Todera, on riverbank, 1♀ (CB), 11 July 1996, leg. Hürka; Ebro, delta, La Taucada, 1♀ (CB), 11 June 1999, leg. Dolanský. *Andalusia*: Ardales, on riverbank, 2♂ (CB), 13 June 1997, leg. Buchar. *Mallorca*: Torrent de Pareis, 2♂ (NMW), 5 February 1998, leg. Paulus. *Gran Canaria*: Embalse de Chira, 825 m, shore of lake, 1♂ 2♀ (CTh), 14 February 2001, leg. Thaler & Knoflach. *LIBYA*: prov. Garianem, river Nefusa, 1♀ (CB), 6 May 1980, leg. Hürka. *TCHAD*: Tibesti, label “Emi Koussi, Sugzagan [375 bis]”, 1♂ 1♀ (MNHN) (sub *A. cinerea*), coll. de Miré (Entrée No 20, 1960) (see Denis, 1955).

Description (δ ♀): Large species, dimensions variable as in *A. cinerea*, see Fig. 31. Total length δ ($n=11$)/♀ ($n=11$) 7.5–11.9/7–17, prosoma length δ 4.2–6.3/♀ 3.4–7.1, width 3.0–4.8/2.9–5.6. In type female prosoma 7.1 long and 5.6 wide. Lowest values refer to specimens from Dalmatia, Corsica and Ebro, δ ♀ ($n=3/3$) prosoma length 4.2–4.6/3.4–4.6, width 3.0–3.5/2.9–3.7. Compared with the population from Tuscany measured by Lugetti & Tongiorgi (1965), the total range of dimensions reported above is greater, whereas specimens from Corsica and Dalmatia are smaller. Greyish to yellowish, pattern and leg annulation indistinct (Figs. 3–4). Male palpal tibia 1.8 × longer than broad; cymbium not elongate; tegular apophysis (Figs. 19–20) strongly developed, ventral tooth (arrow) long and conspicuous. Embolic division (Figs. 10, 12) with terminal apophysis long and slender, with anterior margin almost straight, inner flange of embolus broad, truncate. Epigynum/vulva (Figs. 27–30) triangular, margins sclerotised, lateral margins entire, anterior margin truncate, forming a bilobed hood, median septum triangular, apex narrow; copulatory orifices wide, copulatory ducts strongly bent; receptacles do not reach anterior margin of epigynum. Epigynal dimensions vary considerably, being 1.2–1.5 times wider than long, cf. Figs. 27 and 29. The figure and description given in Schenkel (1938) correspond well to the type female available.

Taxonomy: *Arctosa similis* is very similar to *A. cinerea* and apparently therefore was synonymised by Machado (1941) shortly after its description. Only the work of Knülle (1959) and Lugetti & Tongiorgi (1965) separated the sibling species. According to the arguments pre-

sented above (under *A. variana*), *A. similis* can no longer be identified with *A. variana* C. L. Koch. However, we cannot consider now *Lycosa pilipes* Lucas, 1846 from Algeria, for lack of experience with African lycosids. As Guy (1966) based his revision of the Lycosinae of Morocco largely on material from the Simon collection, it is not surprising that most figures given as varieties of *A. cinerea* almost certainly refer to *A. similis* (see Guy, 1966: 95). This also holds for Barrientos *et al.* (1985). However, Guy (1966) re-examined in his thesis material available in the Simon collection, and described *A. cinerea minor* from Corsica as a new subspecies. This type material is no longer traceable according to C. Rollard. Specimens from the type region closely resemble *A. similis* in general appearance and epigynal features (cf. Figs. 27–28 and 29–30), being within the overall variation of this species. This justifies the incorporation of *A. cinerea minor* into the synonymy of *A. similis*.

Distribution: *Arctosa similis* apparently is widely distributed in the central and western Mediterranean regions, from Dalmatia to the Canary Islands, and probably also in North Africa, see comments for *A. cinerea*. In Tuscany *A. similis* lives along riverbanks without vegetation, on sand and gravel, at low altitude, apparently not on the seashore (Knülle, 1959; Lugetti & Tongiorgi, 1965).

Discussion

Among the four species discussed here as the *cinerea* species group of *Arctosa*, there are two large, albeit rather variable species, *A. cinerea* and *A. similis*, and another two of medium size, *A. variana* and *A. perita*. Ecologically, three species are confined to open habitats with sparse vegetation, with sand and gravel, *A. cinerea* and *A. similis* on the seashore and along riverbanks, and *A. perita* on dunes. The habitat requirements of *A. variana* are less well known. The species is said to occur (Lugetti & Tongiorgi, 1965) at dry and insolated sites, in meadows and cultivated areas, but also on muddy shores in Sardinia. So for this species neither a sandy substrate nor proximity to a water body seem to be essential.

The exact distribution pattern and range still need further investigation for each species. Generally, the ranges of *A. cinerea* and *A. similis* appear to be vast and largely allopatric, *A. cinerea* extending across the whole Palaearctic, while *A. similis* is confined to the western Mediterranean and North Africa. The other two species are probably confined to Europe, *A. perita* occurring from the Mediterranean to the temperate and south boreal zones, and *A. variana* in the eastern and central Mediterranean.

Phylogenetic relations within *Arctosa* and related genera are still obscure. The four species investigated here can be separated best by their epigynum. Characters of the male palp used for discrimination are the tegular apophysis and terminal apophysis, but these are less obvious. The species may be separated by the following key:

1. ♂♀ large, prosoma length/width >4.5/3.4 mm, pattern indistinct.2
— Smaller, pattern contrasting or indistinct.....5
2. ♂.....3
— ♀.....4
3. Embolic division (Fig. 9) with terminal apophysis broad, anterior margin concave; tegular apophysis short (Figs. 11, 17–18)
.....*A. cinerea*
— Embolic division (Fig. 10), with terminal apophysis narrower, straight, blade-like; tegular apophysis longer (Figs. 19–20)
.....*A. similis*
4. Epigynum/vulva (Figs. 25–26) rather broad, 1.6 × wider than long, copulatory orifices small, receptacles large and globular, extending beyond anterior margin of epigynum, copulatory ducts comparatively short, scarcely bent.....*A. cinerea*
— Epigynum/vulva (Figs. 27–30) triangular, 1.2–1.5 × wider than long, copulatory orifices large, receptacles not reaching anterior margin, copulatory ducts strongly bent.....*A. similis*
5. Pattern indistinct. ♂ embolic division (Figs. 10, 12) with terminal apophysis straight, blade-like, distal process slender. ♀ epigynum/vulva (Figs. 27–28) 1.2–1.5 × wider than long, copulatory orifices large, receptacles not reaching anterior margin.....*A. similis*
— Pattern contrasting6
6. ♂.....7
— ♀.....8
7. Embolic division (Fig. 7); ventral tooth of tegular apophysis narrow, short, inner margin oblique, concave (Figs. 13–14)*A. variana*
— Embolic division (Fig. 8); ventral tooth of tegular apophysis broad, blade-like, inner margin almost straight (Figs. 15–16)*A. perita*
8. Epigynum/vulva (Figs. 21–22) 1.9 × wider than long...*A. variana*
— Epigynum/vulva (Figs. 23–24) 1.3 × wider than long, trapezoid*A. perita*

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