New and little-known species of the Lycosidae from Azerbaijan, the Caucasus (Araneae, Lycosidae)

Alexei A. Zyuzin
Institute of Zoology,
National Academy of Sciences,
Almaty, 480032,
Kazakhstan Republic

and

Dmitri V. Logunov
Siberian Zoological Museum,
Institute for Systematics and Ecology of Animals,
Siberian Division of the Russian Academy of Sciences,
Frunze Street 11, Novosibirsk, 630091, Russia

Summary

The genus *Lycosa* Latreille, 1804 (*s.str.*) is redefined. *Lycosa praegrandis* C. L. Koch, 1836 is redescribed on the basis of newly collected specimens. Three new lycosid species, *Geolycosa dunini* sp. n., *Pardosa pirkuliensis* sp. n. and *Pardosa paracolchica* sp. n., from Azerbaijan are diagnosed, figured and described. *Tarentula nordmanni* Thorell, 1875 is synonymised with *Lycosa praegrandis* C. L. Koch, 1836, and *Pardosa caraiensis* Mcheidze, 1947 is synonymised with *Lycosa pontica* Thorell, 1875. A new combination, *Geolycosa vultuosa* (C. L. Koch, 1839), comb. n., is proposed. The name *Lycosa infernalis* Motchoulsky, 1849 is considered a *nomen dubium*. The male of *Pardosa colchica* Mcheidze, 1947 is described for the first time.

Introduction

At present, little is known about the lycosid spiders of Azerbaijan. However, the south-eastern macroslope of the Caucasus Major is probably one of the best explored areas in Azerbaijan, where 39 lycosid species have been recorded (Dunin, 1989). Twenty species have also been reported from the Apsheron Peninsula (Koch, 1878; Schmidt, 1895; Charitonov, 1932; Dunin, 1979, 1984). Also, three new species have recently been described by Buchar & Thaler (1998) from neighbouring areas of Daghestan. The present study adds to the knowledge of the lycosid fauna not only of Azerbaijan but also of the whole Caucasian region. Three new lycosid species are described and figured, together with taxonomic notes on some allied or poorly known species.

The work is based on lycosid material newly collected from the Caucasus and Middle Asia. Specimens for this study were borrowed from or are distributed among the following museums and personal collections: AAZ=personal collection of Dr A. A. Zyuzin (Almaty, Kazakhstan); ISEA=Siberian Zoological Museum of the Institute for Systematics and Ecology of Animals, Novosibirsk, Russia; SMNH=Swedish Museum of Natural History, Stockholm, Sweden; ZISP=Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia; ZMMU=Zoological Museum of Moscow State University, Moscow, Russia. Some comparative/type specimens were borrowed from: AMNH=American Museum of Natural History, New York, USA; BMNH=Natural History Museum, London, UK; MNHN=Muséum National d'Histoire Naturelle, Paris, France; MRAC=Musée Royal de l'Afrique Centrale, Tervuren, Belgium; SMFM=Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt a. Main, Germany; SMGT=State Museum of Georgia, Tbilisi, Georgia; ZMHU=Zoological Museum of Helsinki University, Helsinki, Finland.

Abbreviations used in the text and figures: AE=anterior elevation, AEP=anterior epigynal pocket, AER=anterior row of eyes, ALE=anterior lateral eye, AME=anterior median eye, CO=copulatory opening, LA=lateral angle of septum, LP=lateral protrusion of septum, MSG=median septal groove, PE=pocket edge, PLE=posterior lateral eye, PME=posterior median eye, PMER=posterior row of eyes, St=subtegulum, Tg=tegulum, TgA=tegular apophysis, TmA=terminal apophysis. The terminology used for descriptions of genitalia follows Zyuzin (1979, 1993) and is shown in Figs. 2, 3a, 39, 41. The sequence of leg segments in measurement data is as follows: femur+patella+tibia+metatarsus+tarsus (total length). All measurements are in mm. Copulatory organs and their parts for scanning electron microscopy were preserved in 96% ethanol, air-dried, mounted on stubs, gold-coated and examined in a "Jeol JSM-T200" at 15 kv.

Subfamily Lycosinae (Simon, 1898)

The first species considered here is *Lycosa praegrandis* C. L. Koch. However, taking into account certain difficulties which existed hitherto in the definition and delimitation of the genus *Lycosa* (*s.str.*), we consider it is necessary to give a comprehensive and up-to-date definition of this genus.

Genus *Lycosa* Latreille, 1804 (*s.str.*)

Type species: Aranea tarantula Rossi, 1790.

Definition: Large to very large burrowing species. *Carapace:* low and flat, unlike other true burrowers; elevation towards ocular area in females poorly marked but distinct (Zyuzin, 1990: fig. 3). Male carapace more or less uniform in height, lateral margins covered with very distinct dense pubescence characteristic of lycosid burrowers (Zyuzin, 1990). *Chelicerae*: three large retromarginal teeth. *Eyes*: AER recurved, clearly shorter than PMER; AME equal to ALE (Zyuzin, 1985: fig. 1) or slightly larger, sometimes (e.g. *Lycosa narbonensis* Walckenaer) smaller. *Abdomen*: venter in females with more or less large black spot/area (often occupying almost whole ventral surface) bordered with sharply contrasting yellow, orange or reddish area (see C. L. Koch, 1839 and Simon, 1876). In males reddish colour may be replaced by whitish. *Copulatory organs*: Only proximal (posterior) part of epigyne with more or less widened genital part of septum lying in genital depression distinctly outlined, while septal pedicle usually fused with epigynal grooves; in some species (*tarantula, narbonensis* and *fasciiventris* Dufour, included by us in the *Lycosa narbonensis* group) proximal part of epigyne

clearly shortened as compared with long distal part swollen anteriorly (Fig. 3a); in other species (*praegrandis, olivieri* Simon and others, forming the *Lycosa praegrandis* group) proximal part of epigyne very long, genital part of septum becomes tongue-shaped or elongate-rhomboid, while distal part of epigyne is reduced, with anterior elevation situated just above genital openings, with no traces of septal pedicle or epigynal grooves remaining (Fig. 2). Male palpus large and broad, with characteristic cymbium asymmetry and subtegulum dislocation (Figs. 1, 3). Tegular apophysis in all *Lycosa* species a wide plate distinctly depressed basally and supplied with comparatively long, strong distal process (terminal apophysis, TmA) directed posteriorly or obliquely posteriorly (Figs. 1, 3) and slightly ventrally. Embolus very long and thin; epiconductor narrow, completely concealed by TmA. *Mating mechanism*: As in all other genera of the subfamily Lycosinae, the TmA is deeply channelled on its inner side and serves as a functional conductor for the embolus (see Zyuzin, 1993). During copulation the TmA covers the anterior elevation of the epigyne with its depression and thus is located in this position, while the strong distal process of the TmA with the channel opening on its end (a functional terminal apophysis) penetrates into the copulatory opening of the epigyne, thus precisely directing the embolus.

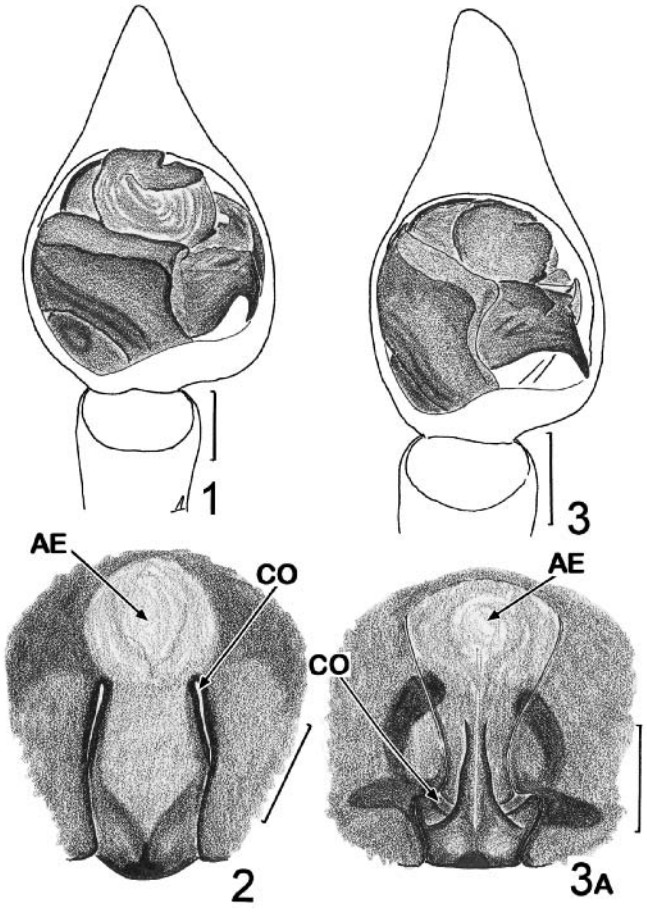
Comments: Most of the true *Lycosa* species were artificially assigned by Roewer (1955a, 1959) to the non-burrowing genus *Allocosa* Banks, 1904 (e.g. *fasciiventris, olivieri, sefrana* Schenkel, etc.) mainly on the basis of slight variations in the relative sizes of AME and ALE, without any analysis of the genital characters (cf. Dondale & Redner, 1983); two species were also assigned to the non-burrowing genus *Hogna* Simon, 1885. Thus, the greatest confusion concerning delimitation of the lycosid genera was introduced by Roewer (1955a, 1959, 1960), including his lumping together burrowing and non-burrowing species, which still makes difficult a worldwide revision of the genus *Lycosa* (*s.lat.*).

The species *Alopecosa pictilis* (Emerton, 1885), *A. sibirica* (Kulczyński, 1908), *A. solivaga* (Kulczyński, 1901), *A. hirtipes* (Kulczyński, 1908) and their relatives (e.g. *A. osellai* Lugetti & Tongiorgi, 1966), forming the so-called *Alopecosa pictilis* group (see Dondale & Redner, 1979), show a clear phylogenetic affinity to the *Lycosa* spp. (*s.str.*) in having a similar type of copulatory organs and mating mechanism (see above); thus, an apparent prototype of the *Lycosa praegrandis* group seems to be *Alopecosa hirtipes*, whereas the complex *Alopecosa pictilis–A. osellai* could be the prototype of the *Lycosa narbonensis* group. The species *Alopecosa schmidti* (Hahn, 1835), *A. sulzeri* (Pavesi, 1873), *A. exasperans* (O.P.-Cambridge, 1877), *A. mutabilis* (Kulczyński, 1908) and *A. accentuata* (Latreille, 1817) also represent related, though somewhat diverging forms (cf. Lugetti & Tongiorgi, 1969). All this is a quite forcible argument for splitting the clearly polyphyletic genus *Alopecosa* Simon, 1885 (*s.lat.*) as a further step in creating a natural system of the family Lycosidae on a phylogenetic basis.

Distribution: The Mediterranean region, with the centre of the recent species diversity being in N. Africa. Only two species have been found outside the limits of this area: *Lycosa praegrandis* (see below) and *L. pia* (Bösenberg & Strand, 1906), so far known only from the male holotype from S. Japan (Tanaka, 1990).

Lycosa praegrandis C. L. Koch, 1836 (Figs. 1, 2, 4)

Lycosa praegrandis C. L. Koch, 1836: 22 (♀ holotype, depository unknown, not examined).
Lycosa praegrandis: Roewer, 1955a: 269; Bonnet, 1957: 2616.
Hogna praegrantis [sic!]: Hadjissarantos, 1940: 37.
Tarentula Nordmanni Thorell, 1875a: 105 (♀ holotype from ZMHU, examined). **New synonymy.**
Tarentula Nordmanni: Thorell, 1875b: 161.
Lycosa nordmanni: Bonnet, 1957: 2614; Charitonov, 1969: 88–89, fig. 4 (in part, ♀); Tyshchenko, 1971: 173; Zyuzin, 1990: 421; 1993: 693, 696.
Allocosa nordmanni: Roewer, 1955a: 202.
Tarentula narbonensis (*nec* Walckenaer, 1806): Thorell, 1875a: 106; 1875b: 162; Kroneberg, 1875: 40.
Lycosa narbonensis (*nec* Walckenaer, 1806): Tyshchenko, 1971: 173.
Lycosa piochardi: L. Koch, 1878: 38; Schmidt, 1895: 449 (misidentifications).
For a complete set of references for *Tarentula nordmanni* see Charitonov (1932) and Roewer (1955a).



Figs. 1–3a: **1–2** *Lycosa praegrandis* C. L. Koch, 1836 (♂ from Azerbaijan, Talysh Mts; ♀ from Greece). **1** Male palp, ventral view; **2** Epigyne. **3–3a** *Lycosa narbonensis* Walckenaer in Latreille, 1806 (Spain). **3** Male palp, ventral view; **3a** Epigyne. Scale lines = 1.0 mm (1, 3), 0.5 mm (2, 3a).

Distribution: Lycosa praegrandis is distributed from Greece in the west throughout Asia Minor, the Caucasus and Iran to Kyrghyzstan and SE Kazakhstan in the east (Fig. 4).

Comments: A re-examination of the female holotype of *Tarentula nordmanni* and comparison with a female specimen of *Lycosa praegrandis* from Greece has proved their conspecificity, both in the genital structure (Fig. 2; cf. Hadjissarantos, 1940: fig. 9) and identical ventral coloration of the abdomen (see C. L. Koch, 1839: fig. 414a). Further examination of numerous specimens from different parts of the former USSR deposited in the ZISP and determined as "*Lycosa narbonensis*" (including Spassky's material), as well as (re)examination of P. M. Dunin's private collection and our own newly collected material, made us sure that all the records of "*Lycosa narbonensis*" from within the range extending from the Odessa area to SE Kazakhstan (Schmidt, 1895; Charitonov, 1932; Spassky & Shnitnikov, 1937; Spassky, 1952; Dunin, 1984, 1989) in fact refer to *Lycosa praegrandis*, whereas the true *Lycosa narbonensis* Walckenaer, 1806 is distributed in the W. Mediterranean only and does not occur in the former USSR (we examined 1♂ 1♀ from Spain deposited in MNHN and SMFM). The initiators of this confusion were Thorell (1875a,b) and Kroneberg (1875), who recorded *Tarentula narbonensis* in the Crimea and Uzbekistan, respectively. Schmidt's (1895) "*Lycosa narbonensis*" from E. Siberia in reality is a species closely related to *Hogna radiata* (Latreille, 1817) (we re-examined Schmidt's male specimen deposited in ZISP, No. 779); the recent records of *Lycosa narbonensis* from the Amur area (Azheganova & Stenchenko, 1977; Lobanova, 1985) probably also refer to the above-mentioned species. L. Koch's (1878) and Schmidt's (1895) records of *Lycosa piochardi* Simon, 1876 in Georgia, Armenia and Azerbaijan undoubtedly should be referred to *Lycosa praegrandis*.

Habitat: *Lycosa praegrandis* clearly prefers dry plains with steppe associations and dry stony foothills; however, in SW Turkmenistan it inhabits even the dry tops of the Kopetdagh Mts covered with shrubby-steppe vegetation. Subadults and adult females dig burrows up to 20 cm deep and 2.5 cm in diameter, distinctly bordered and webbed around. Mating occurs in July (at least in SE Kazakhstan).

Description: *Male* (Azerbaijan, Avash): Total length 17.80. Carapace length 8.80, length/width ratio 1.17. Eye sizes and interdistances: AME 0.33, ALE 0.33, PME 0.98, PLE 0.68; AME-AME 0.15, AME-ALE 0.10, PME-PME 0.65. Width of anterior eye row 1.80, second row 2.40, third row 2.85. Clypeal height equal to AME diameter. Length of leg segments: I 8.2+3.7+6.6+6.8+3.9 (29.2); II 7.6+3.5+5.6+6.7+3.9 (27.3); III 7.0+2.9+5.3+6.8+3.8 (25.8); IV 9.0+3.5+7.1+9.8+4.5 (33.9). AER shorter than PMER and distinctly procurved (cf. Zyuzin, 1985: fig. 1). Chelicerae with 3 large retromarginal teeth. Whole body dorsally covered with light grey pubescence. Carapace: lateral bands light and distinct, continuous and rather narrow, dentate and edged with black line on inner margin, extending to clypeus; median band fuscous, dilated in cephalic region and at level of fovea where it is strongly branched. Legs: basal and distal parts of tibiae ventrally, and entire metatarsi and tarsi (sometimes also fore femora basally) distinctly darkened, remaining parts of segments covered with dense white pubescence. Abdomen dorsally with distinct anterior fuscous lanceolate stripe bordered with triangular black markings; a series of dark transverse spots in shape of inverted chevrons below. Venter very contrasting: sternum, coxae, labium, maxillae and chelicerae dark; abdomen almost entirely black except adjacent lateral sides and especially its posterior part where large intense black area contrasts sharply with whitish pubescence. Palpal structure as in Fig. 1.

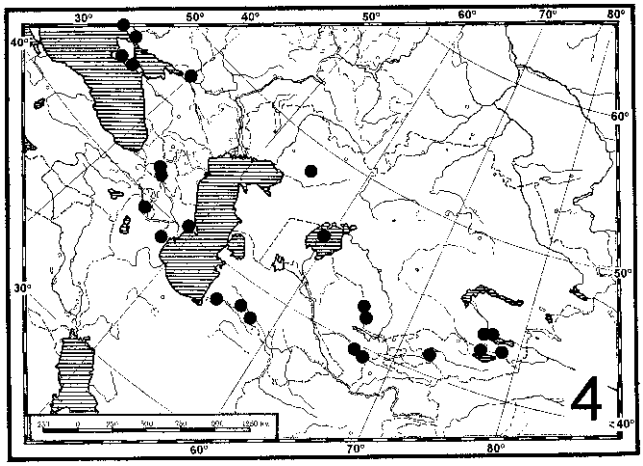


Fig. 4: Distribution of *Lycosa praegrandis* C. L. Koch, 1836 in the Crimea, the Caucasus and Middle Asia. One dot may represent more than one close locality.

Female (Azerbaijan, Avash): Total length 28.70. Carapace length 13.20, length/width ratio 1.32. Eye sizes and interdistances: AME 0.45, ALE 0.43, PME 1.25, PLE 0.95; AME-AME 0.30, AME-ALE 0.20, PME-PME 1.00. Width of anterior eye row 2.30, second row 3.15, third row 3.75. Clypeal height equal to AME diameter. Length of leg segments: I 9.3+4.4+6.7+7.1+4.0 (31.5); II 9.0+4.2+6.2+6.7+3.9 (30.0); III 7.8+4.1+5.9+7.2+3.8 (28.8); IV 10.1+4.6+8.0+11.5+4.3 (38.5). Carapace low and flat, profile as in Zyuzin (1990: fig. 3). Coloration as in male, but whole body dorsally covered with grey pubescence and whitish abdominal pubescence usually replaced by reddish and reddish-orange dense pubescence. Epigyne as in Fig. 2.

Material examined: GREECE: 1♀ (SMFM, RII/2196), Attika, Penteli Spileo, May 1926, Roewer. AZERBAIJAN: 2♂ 1♀ (AAZ), Lerik Distr., Talysh Mts, environs of Gosmalyan, 1400–1500 m a.s.l., 21 July 1983, D. V. Logunov; 1♂ 1♀ (ISEA), Yardymly Distr., Avash, 8 July 1985, P. M. Dunin; 1♂ 1♀ (AAZ), Shirvanski Reserve, 15 August 1980, P. M. Dunin. UKRAINE: 1♀ (ZMHU, No. 300 (278), holotype of *Tarentula Nordmanni*), Odessa, Coll. Thorell, A. v. Nordmann leg. GEORGIA: 1♂ (ZISP), Rustavi, 11 August 1982, Y. M. Marusik. TURKMENISTAN: 2♀ (AAZ), SW Kopetdagh Mts, environs of Garry-Gala [=Kara-Kala] and Aidere, 20–30 April 1987, A. A. Zyuzin; 1♀ (AAZ), C. Kopetdagh Mts, 10 km SW of Bakharden, 3 April 1993, A. A. Zyuzin; 1♀ (ISEA), vicinity of Ashghabat, Firyuza, 15 July 1987, S. L. Kalabin. UZBEKISTAN: 2♀ (AAZ), Samarkand Area, Sovetabad Distr., near Dzham, 30 April 1986 and 8 May 1990, A. A. Zyuzin; 1♀ (AAZ), same area and district, near Ulus,

6–7 May 1990, A. A. Zyuzin. KYRGHYZSTAN: 1♀ (AAZ), Issyk-Kul' Area, near Chon-Uryukty, 19 July 1982, A. Kharadov; 1♀ (AAZ), Dzhalal-Abad Area, near Suzak, October 1992, Y. Y. Kopdykbaev. KAZAKHSTAN: 2♂ 2♀ (AAZ), Aktyubinsk Area, Baiganin Distr., *c.* 250 km SE of Baiganin, July 1989, A. A. Zyuzin; 1♀ (ZISP), Kyzylorda Area, Aral Sea, Barsakel'mes Island, 5 July 1984, T. V. Pavlenko; 1♂ 3♀ (AAZ), Almaty Area, Kurty Distr., *c.* 7 km SE of Aidarly, 3–8 July 1987, A. A. Zyuzin; 1♀ (ISEA), South Kazakhstan Area, Zhilga, 11 August 1985, D. V. Logunov; 3♀ (AAZ), same area, *c.* 45 km SW of Bairkum, Kyzylkum Desert, 11–12 April 1990, A. A. Zyuzin; 1♂ (ISEA), same area, environs of Tabakbulak, Kyzylkum Desert, 25 July 1991, A. A. Zyuzin.

Comparative material: *Lycosa narbonensis* Walckenaer in Latreille, 1806 (Figs. 3, 3a): 1♂ (MNHN, No. B.2049), Spain; 1♀ (SMFM, No. 12927/1), Spain, 10 km W of Marbella, Franz leg., 5–20 August 1962, Grasshoff det.

Genus *Geolycosa* Montgomery, 1904

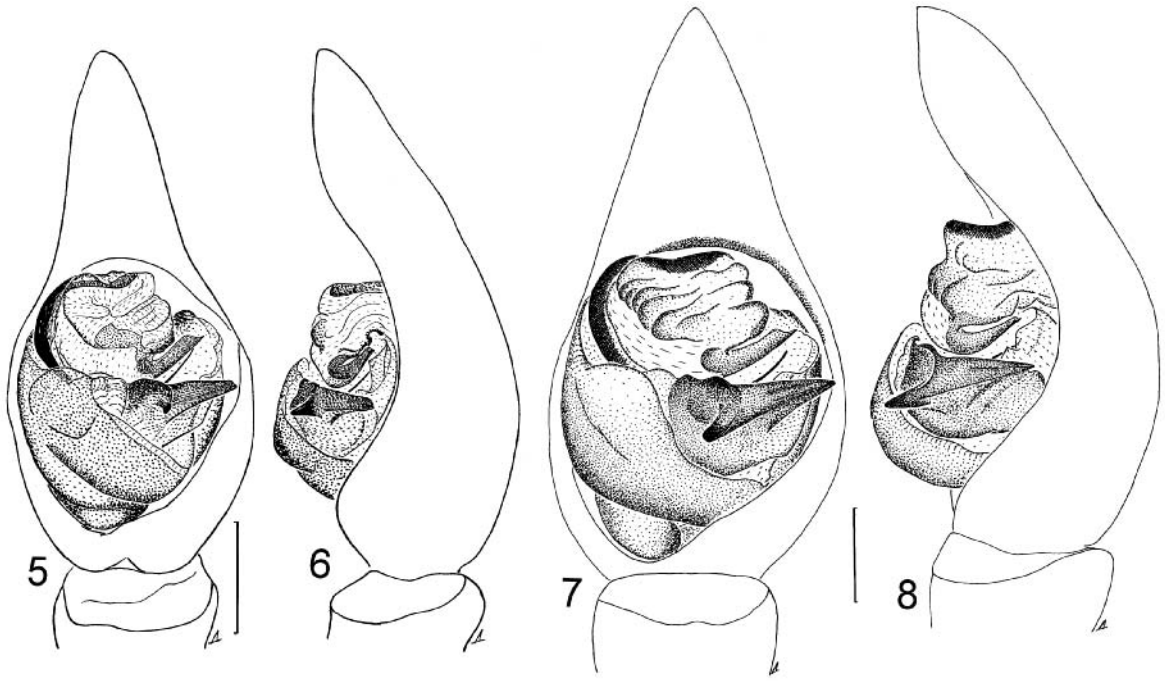
Type species: Geolycosa latifrons Montgomery, 1904.

Remarks: The genus *Geolycosa* (=*Scaptocosa* Banks, 1904) was originally erected for the Nearctic burrowing lycosids. Later, Roewer (1955a) expanded the range of *Geolycosa* (*s.lat.*) to be worldwide and revalidated (1955a, 1959) the genus *Scaptocosa*. However, as this author lumped together burrowing and non-burrowing lycosids based mainly on the eye pattern, the inclusion of all the non-Nearctic species in *Geolycosa* (or *Scaptocosa*) *sensu* Roewer is very controversial and requires extensive revision.

It seems obvious that the newly described burrowing species *dunini* (see below) and "*Mimohogna*" *vultuosa* (C. L. Koch, 1838) belong neither to the genus *Lycosa* Latreille, 1804 (*s.str.*) (Figs. 1, 3, 5–10), nor to the genus *Allohogna* Roewer, 1955 (see below under "Diagnosis" of *Geolycosa dunini*). We have compared specimens of both species with the type species of the burrowing genus *Geolycosa*, i.e. *G. latifrons*, and found their close affinity in details characteristic of *Geolycosa*: viz. carapace clearly elevated anteriorly (see Zyuzin, 1990: fig. 1); width of PMER and AER approximately equal; epigyne with long to very long septal pedicle; and large to very large ventral spur on TmA (see also Wallace, 1942; Dondale & Redner, 1990). This led us to the conclusion that both *dunini* and *vultuosa* should be included in the genus *Geolycosa* (*s.str.*).

However, the following problem also needs a solution. Roewer (1955a, 1960) erected the new genus *Mimohogna* (type species *Lycosa pachana* Pocock, 1898), in which he also included "*Lycosa" vultuosa*. We have restudied the female holotype of *Lycosa pachana* from E. Africa and found it to be closely related to *Trochosa* spp., with the comparatively high cephalothorax approximately uniform in height, as in all non-burrowing lycosids belonging to the subtribe Trochosaina (=Trochosina: see Zyuzin, 1993, laps.), and the clearly trochosoid epigyne (Roewer, 1960: fig. 425); the carapace pattern in *Mimohogna pachana* is also characteristic of *Trochosa*. Thus, having all the above-mentioned differences from the non-burrowing species *Mimohogna pachana*, especially in the carapace profile, the true burrowers *vultuosa* and *dunini* belonging to the subtribe Geolycosina certainly cannot be included in the genus *Mimohogna*. Therefore, a new combination *Geolycosa vultuosa* (C. L. Koch, 1839) **comb.n.** (ex *Mimohogna vultuosa; sensu* Roewer, 1955a, 1960) is first proposed here.

As in members of the tribe Trochosini, the length of the epigynal grooves and septal pedicle in *Geolycosa dunini* sp.n. is correlated with the size of the TmA ventral spur, which functions as a fixing apparatus during copulation precisely directing the distal part of the TmA with its channel opening for the embolus (a functional terminal apophysis) towards the copulatory



Figs. 5–8: Male palps. **5–6** *Geolycosa vultuosa* (C. L. Koch, 1839) from Crimea. **5** Ventral view; **6** Lateral view. **7–8** *Geolycosa dunini* sp. n. from Azerbaijan, Pirkuli Reserve (paratype). **7** Ventral view; **8** Lateral view. Scale lines=0.5 mm.

opening of the epigyne: this mechanism was first discovered and described by Sadana (1981) and restudied by Zyuzin (1993).

The main character distinguishing the epigyne of the *Geolycosa* type from all others in the tribe Trochosini is that the entire very long septal pedicle lies in the relatively deep longitudinal depression, often fusing with its bottom/epigynal grooves (Figs. 9, 10) and following the relief of this depression; by this feature both *Geolycosa dunini* sp.n. and *G. vultuosa* seem to be most closely related to the Nearctic species *Geolycosa missouriensis* (Banks, 1895).

Motschoulsky (1849) described *Lycosa infernalis* from Sarepta (=Volgograd) and Kalmykia. His quite obscure drawings and short description of the male seem to correspond more to *Allohogna singoriensis* (Laxmann, 1770), but do not correspond to *Geolycosa vultuosa* as was assumed by Schmidt (1895: sub *Lycosa v.*), Simon (1899: sub *Lycosa v.*) and later accepted by Charitonov (1932), Roewer (1955a) and Bonnet (1957). Thorell (1875a, b) also applied the name *Trochosa infernalis* to specimens of *Geolycosa vultuosa* (Thorell's material re-examined). The type of *Lycosa infernalis* has not been found in the ZMMU and is probably lost, if it ever existed (K. Mikhailov, pers. comm.). Therefore, contrary to the opinions of Schmidt (1895) and subsequent authors, we regard the name *Lycosa infernalis* as a *nomen dubium*.

Thus, contrary to Roewer's (1955a, 1959) opinion we consider that only two Palaearctic species belong to *Geolycosa*, of which one is newly described below.

Geolycosa dunini sp.n. (Figs. 7–9, 11)

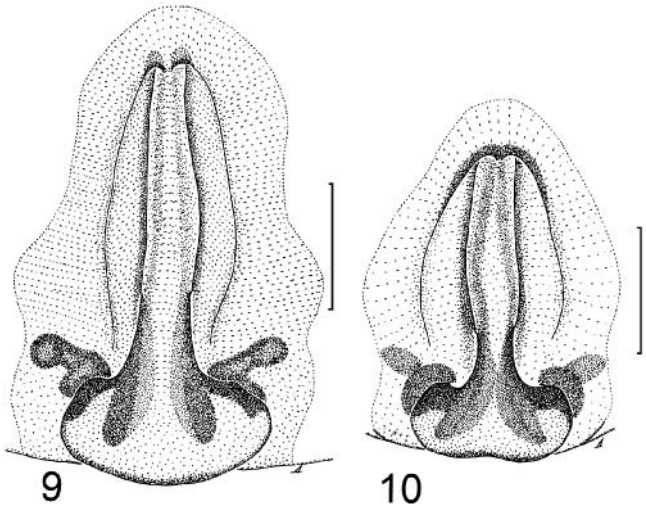
Lycosa vultuosa: Dunin, 1989: 36 (misidentification).

Types: Holotype ♂ (ISEA) from Azerbaijan, 25–30 km NE of Shemakha, Pirkuli Reserve, 1000 m a.s.l., 9 September 1984, D. V. Logunov. Paratypes: 1♂ ♀ (ISEA), 1♂ 20♀ (AAZ), together with holotype.

Etymology: The species is dedicated to our friend, the late Russian arachnologist Dr Peter M. Dunin, who fruitfully studied the Caucasian spider fauna for many years until his untimely decease in 1998.

Diagnosis: *Geolycosa dunini* is most closely related to *G. vultuosa*, but differs in having a stronger ventral spur on the tegular apophysis (Fig. 7 cf. Fig. 5) and a much longer septum in the epigyne (Fig. 9 cf. Fig. 10). *Geolycosa dunini* differs from another burrowing species, *Allohogna singoriensis*, in having a considerably smaller body size, more distinct carapace elevation in females, relatively larger posterior eyes with PMER on average equal to AER, relatively small difference in AME/ALE diameter (see description below; in *A. singoriensis* PMER is always less than AER, PME are relatively small, AME considerably larger than ALE; see Zyuzin, 1985), distinctly different male and female copulatory organs (similar to the trochosoid type in *A. singoriensis*), and light leg patellae ventrally (black in *A. singoriensis*).

Distribution: *Geolycosa dunini* is very common in the Transcaucasian region (Fig. 11) and seems to be a regional endemic, whose populations are well separated by the Caucasus Major from those of *G. vultuosa* occurring in the Cis-Caucasian region. Thus, all records of *Lycosa vultuosa/infernalis* to the south of the Caucasus Major (see Charitonov, 1932) should apparently be referred to *G. dunini*. However, Spassky's (1937: sub *Lycosa v.*) record of *G. vultuosa* from the Azov Sea region seems to be correct. Thorell's (1875a,b) *infernalis* specimens from Daghestan (Ishkarty, N. foothills of the Caucasus Major, probably in SMNH) are also likely to belong to *G. vultuosa* (Fig. 11). Additional studies are required to separate the ranges of both species.



Figs. 9–10: Epigynes. **9** *Geolycosa dunini* sp. n. from Azerbaijan, Pirkuli Reserve (paratype). **10** *Geolycosa vultuosa* (C. L. Koch, 1839) from Ukraine, Odessa. Scale lines=0.5 mm.

Habitat: *Geolycosa dunini* occurs at altitudes of 200–1200 m (Dunin, 1989: sub *Lycosa vultuosa*) in grassland; females dig deep vertical burrows (*c.* 20 cm in depth), and sometimes it is possible to find 25–30 burrows in a relatively small plot, *c.* 10–15 m^2 (D.L., pers. obs.).

Description: *Male* (holotype): Total length 17.10. Carapace length 8.60, length/width ratio 1.46. Eye sizes and interdistances: AME 0.30, ALE 0.28, PME 0.60, PLE 0.55; AME-AME 0.18, AME-ALE 0.14, PME-PME 0.53. Width of anterior eye row 1.60, second row 1.68, third row 2.28. Clypeal height 1.1 times greater than AME diameter. Length of leg segments: I 6.50+3.10+5.80+6.60+3.45 (25.45); II 6.10+3.00+5.30+6.60+3.50 (24.50); III 5.50+2.50+4.30+6.00+3.30 (21.60); IV 7.20+2.70+5.80+8.60+4.10 (28.40). Carapace bright brown, with white marginal stripes of hairs and elongated yellow patch in foveal area with radial yellow lines (both patch and lines covered with appressed white hairs). Carapace densely covered with short appressed black hairs. Eye field densely white haired. Clypeus with white fringe on anterior margin. Sternum brown, densely covered with dark hairs. Maxillae and labium brown with yellow apexes. Chelicerae brown, but basal half densely white haired anteriorly. Abdomen: dorsum brownish, with dark brown cardial spot bordered from both sides with yellow stripes; sides yellow; venter dark brown. Book-lung covers and spinnerets yellow. All legs yellow-brownish, with dark

brown ventral semi-rings on segment articulations. Palpal structure as in Figs. 7, 8.

Female (paratype): Total length 22.40. Carapace length 10.20, length/width ratio 1.36. Eye sizes and interdistances: AME 0.38, ALE 0.33, PME 0.65, PLE 0.65; AME-AME 0.25, AME-ALE 0.25, PME-PME 0.75. Width of anterior eye row 2.15, second row 2.13, third row 2.90. Clypeal height 1.05 times greater than AME diameter. Length of leg segments: I 7.60+3.50+5.40+5.70+3.00 (25.20); II 6.95+3.80+4.80+5.20+3.20 (23.95); III 5.90+3.10+3.50+5.20+3.20 (20.9); IV 7.80+3.30+5.90+7.80+3.80 (28.60). Coloration as in male, but dorsum lacks longitudinal yellow stripes bordering the cardial spot, instead there is a paired row of small yellow spots. Hair coverage of chelicerae and clypeal fringe slightly yellow rather than white as in male. Epigyne as in Fig. 9.

Other material examined: GEORGIA: 1♀ (AAZ), Mayakovski (S. of Kutaisi), I. Belousov. ARMENIA: 1♀ (AAZ), Sevan Lake, date and collector unknown. AZERBAIJAN: Numerous ♀♀ (AAZ) from various localities: vicinities of Kuba, Khanlar, Agdash, Sheki, Leninavan, Terter River, 1981–1988, P. M. Dunin.

Comparative material: Lycosa pachana Pocock, 1898: ♀ holotype (BMNH), East Africa, "Karagesi"; 5♀ (MRAC), Zaire, Upemba-Park 374: Mabwe, rive est du Lac Upemba, 585 m, 28 January 1949, collector unknown. *Geolycosa vultuosa* (C. L. Koch, 1839) (Figs. 5, 6, 10): 1♂ 3♀ (ZMHU, No. 322/325; det. Thorell as *Trochosa infernalis*), Coll. Thorell, Crimea ("Tauria"), Sudagh, Sympheropol, Alma, 1860, A.v.Nordmann leg.; 2♀ (AAZ), Ukraine, environs of Odessa, date ?, G. A. Sekirova. *Geolycosa latifrons* Montgomery, 1904: 1♂ ♀ (AMNH, syntypes), USA, Texas, vicinity of Austin. *Geolycosa missouriensis* (Banks, 1895): 2♀ (AMNH), Camp Mary White, Ottero Co., N. M., August 1934, S. Mulaik, H. K. Wallace det. *Geolycosa fatifera* (Hentz, 1842): 1♂ (AMNH), Fla., Alachua C., 13 September 1938, HKW 1046; 1♀ (AMNH), same locality, 7 April 1937, HKW 588, H. K. Wallace det.

Subfamily Pardosinae (Simon, 1898)

Pardosa monticola species group

Remarks: According to Zyuzin (1979), this species group comprises 21 species. Three probably endemic species related to *Pardosa monticola* (Clerck, 1758), viz. *P. buchari* Ovtsharenko, 1979, *P. dagestana* Buchar & Thaler, 1998 and *P. pirkuliensis* sp. n., have been described from the high mountain zone of the Caucasian region during the last 20 years. Taking into account the existence of two additional species, *P. colchica* Mcheidze, 1947 and *P. paracolchica* sp. n., so far found only in this region, and the occurrence here of four species known also from adjacent regions, i.e. *P. agrestis* (Westring, 1861), *P. pontica* (Thorell, 1875), *P. incerta* Nosek, 1905 (cf. Zyuzin & Ovtsharenko, 1979) and *P. consimilis* Nosek, 1905 (AZ, pers. data), as well as at least one high mountain species still awaiting description, we are inclined to consider the whole Caucasian region as a possible centre of present-day species diversity of the *Pardosa monticola* group. However, it should be noted that the Caucasian biodiversity is a probable derivative of the still unexplored Iran–Asia Minor regional lycosid fauna. For instance, three species (*P. consimilis, P. ilguenensis* Nosek, 1905 and *P. incerta*) were described from Central Turkey on the basis of material from a single expedition to this region (Nosek, 1905; Tongiorgi, 1966b); of these only one species, *P. ilguenensis*, has not yet been reliably found in the Caucasian fauna (Minoranski *et al.*'s (1980) record of this species should in fact be referred to *P. agrestis*).

In the present contribution, we treat only four (either new or poorly known) species from the *P. monticola* species group.

Pardosa colchica Mcheidze, 1947 (Figs. 12, 17–23)

Pardosa colchica Mcheidze, 1947: 290, figs. 6–7 (♀♀; 1♀ syntype from SMGT examined).
Pardosa colchica: Zyuzin, 1979: 434; Brignoli, 1983: 452; Mcheidze, 1992: 238.

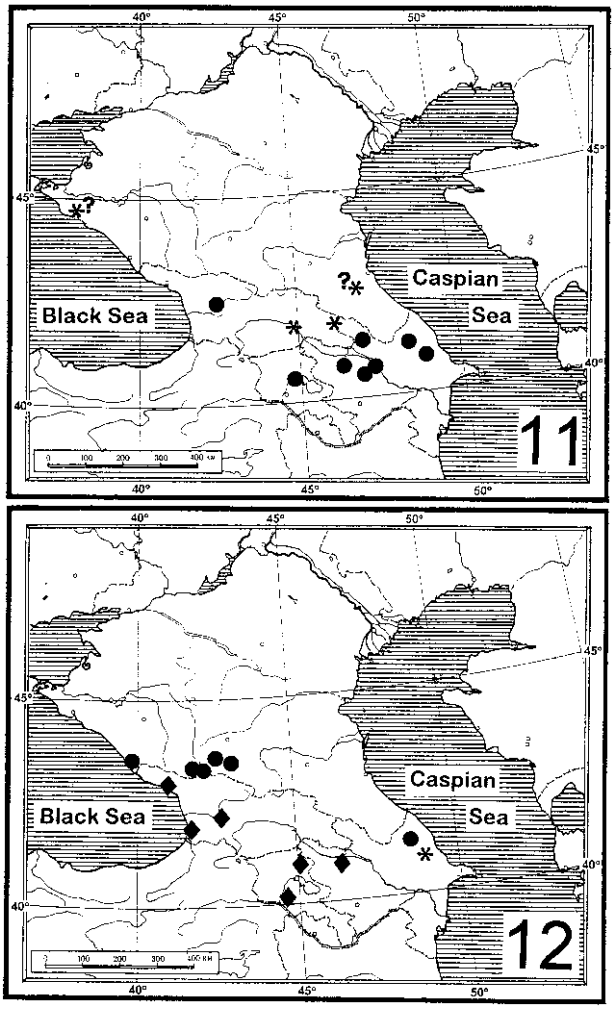
Diagnosis: Pardosa colchica belongs to the *monticola* species group and the *pontica* subgroup (*sensu* Zyuzin, 1979). By the genital structure and carapace colour pattern, *P. colchica* is very close to the West European species *P. torrentum* Simon, 1876 (see Tongiorgi, 1966a: figs. 86–87, 109–110), from which males can be easily separated by the wider and blunt distal branch of the tegular apophysis (Figs. 17, 21) and by the anteriorly directed terminal apophysis (Figs. 18, 22). Females of *P. colchica* differ from both *P. torrentum* and *P. agrestis* (var. *pseudagricola* Dahl) by the relatively small and rounded edges of the anterior epigynal pockets (Fig. 19) and by the uniform light grey body coloration. By the last character and carapace pattern, as well as by its preferred biotope, *P. colchica* is also very similar to *P. agricola* (Thorell, 1856); however, the latter species differs reliably from *P. colchica* by its bidentate terminal apophysis, long distal branch of the TmA, and very distinct median septal groove. *Pardosa colchica* differs from *P. dagestana* in the shape of the tegular and terminal apophyses and by the carapace pattern (cf. Buchar & Thaler, 1998: fig. 10). See also comments below under "Diagnosis" of *P. paracholchica*.

Remarks: The type series of *P. colchica* consists of two females from Georgia: Dzhapana (near Batumi) and Ordzhonikidze (Kharagouli; *c.* 50 km SE of Kutaisi) (Mcheidze, 1947, 1992). Of these females, we re-examined only the one lacking the epigyne (its preparation was lost; T. S. Mcheidze, pers. comm.). However, the characteristic carapace pattern, as well as the outlines of the septum given in Mcheidze (1992: figs. 508, 509) allow us to identify our specimens collected in the environs of Chakva (near Batumi) as *P. colchica*. We use these specimens as topotypes for further consideration, description and comparisons.

Distribution: *Pardosa colchica* has so far been recorded from Georgia, Armenia and Azerbaijan (Fig. 12), i.e. to the south of the Caucasus Major. Its occurrence in Turkey and Iran is also possible.

Habitat: *Pardosa colchica* inhabits plains, foothills and mountains at low and moderate altitudes up to 1050 m (and probably higher), where it occurs on stony/pebbly banks of rivers and streams. See also comments below under "Habitat" of *P. paracholchica*.

Description (topotypes from Chakva, Georgia). *Male*: Total length 4.23. Carapace length 2.23, length/width ratio 1.33. Eye sizes and interdistances: AME 0.08, ALE 0.08, PME 0.24, PLE 0.19; AME-AME 0.09, AME-ALE 0.05, PME-PME 0.24. Width of anterior eye row 0.43, second row 0.66, third row 0.87. Clypeal height 1.75 times greater than AME diameter. Length of leg segments: I 1.48+0.63+1.28+1.35+0.96 (5.70); II 1.45+0.63+1.18+1.30+0.88 (5.44); III 1.43+0.54+1.08+1.50+0.83 (5.38); IV 1.90+0.73+1.58+2.40+1.13 (7.74). Carapace brown, with wide median longitudinal yellow band and two pale lateral bands. Eye field dark brown (almost black). Entire carapace covered with light long appressed hairs. Sternum yellow, with wide brown radial stripes. Maxillae and labium brown with white apexes. Chelicerae yellow-brown. Abdomen: dorsum brown, with white cardial spot and two longitudinal yellow stripes touching each other in posterior half; sides brown; venter yellow-grey. Book-lung covers yellow, covered with white hairs and with a dark brown patch between them. Spinnerets brownish. All legs yellow, with numerous brown rings. Palpi: femur and patella yellow; tibia dark brown; cymbium dark brown basally, yellow apically. Palpal structure as in Figs. 17, 18, 21, 22: distal branch of tegular apophysis rather short, wide and blunt; terminal apophysis relatively long, directed anteriorly.



Figs. 11–12: Distribution of lycosid species. **11** *Geolycosa dunini* sp. n. (closed dots=examined material, asterisks=literature data, see Charitonov, 1932; Spassky, 1937). **12** *Pardosa colchica* Mcheidze, 1947 (closed rhombi), *P. paracolchica* sp. n. (closed dots), *P. pirkuliensis* sp. n. (asterisk). One dot may represent more than one close locality.

Female: Total length 4.73. Carapace length 2.45, length/width ratio 1.25. Eye sizes and interdistances: AME 0.09, ALE 0.09, PME 0.26, PLE 0.20; AME-AME 0.10, AME-ALE 0.06, PME-PME 0.29. Width of anterior eye row 0.53, second row 0.73, third row 0.93. Clypeal height 1.77 times greater than AME diameter. Length of leg segments: I 1.85+0.85+1.53+1.45+1.05 (6.73); II 1.78+0.80+1.43+1.45+1.00 (6.46); III 1.78+0.70+1.33+1.70+0.95 (6.46); IV 2.38+0.90+2.13+3.08+1.35 (9.84). Coloration as in male, but lighter and differs as follows: median band on carapace wider, lateral bands bright yellow, venter yellow, palpi yellow with brown rings. Epigyne and spermathecae as in Figs. 19, 20, 23: anterior epigynal pockets relatively small, with distinctly rounded edges, septum usually rather weakly sclerotised, its shape slightly variable; however, lateral edges of septal pedicle often subparallel.

Material examined: AZERBAIJAN: 8♂ 10♀ (AAZ), 3♂ 3♀ (SMNH), Khanlar Distr., Geigel' Reserve, side of Kyurekchai River, 1050 m a.s.l., 8 June 1981, A. A. Zyuzin. GEORGIA: 1♀ (SMGT, No. 122, syntype), no precise locality given, T. S. Mcheidze; 1♂ 1♀ (AAZ, topotypes), Adzharia, *c.* 10 km NE of Batumi, near Chakva, Black Sea shore, 27 August 1972, A. A. Zyuzin; 2♀ (AAZ), same locality, 23 October 1979, A. A. Zyuzin; 4♂ 16♀ (AAZ), 1♂ 2♀ (ISEA), same locality, 27–30 October 1979, A. A. Zyuzin; 4♀ (AAZ), same locality, 1 November 1979, A. A. Zyuzin; 1♂ 14♀ (AAZ), Abkhazia, Gentsvishi (E of Sukhumi), 17 August 1974, N. S. Yegorova; 5♀ (AAZ), N. Abkhazia, descending path from Klukhor Pass, August 1974, N. S. Yegorova. ARMENIA: 2♂ 5♀ (AAZ), Garni, 19 June 1966, M. T. Shternbergs; 9♂ 12♀ (AAZ), side of Agstev (Akstafachai) River near Azatamut, 30 May 1981, A. A. Zyuzin.

Pardosa paracolchica sp. n. (Figs. 12–16, 24–27)

Pardosa colchica: Ovtsharenko, 1979: 52 (misidentification).

Types: Holotype ♂ (ISEA) from Azerbaijan, 7 km SE of Kuba, Nyugedi, Karachai riverside, 12 June 1981, A. A. Zyuzin. Paratypes: 1♀ (ISEA), 18♂ 39♀ (AAZ), together with holotype.

Etymology: The specific epithet reflects the similarity of *Pardosa paracolchica* to *P. colchica*.

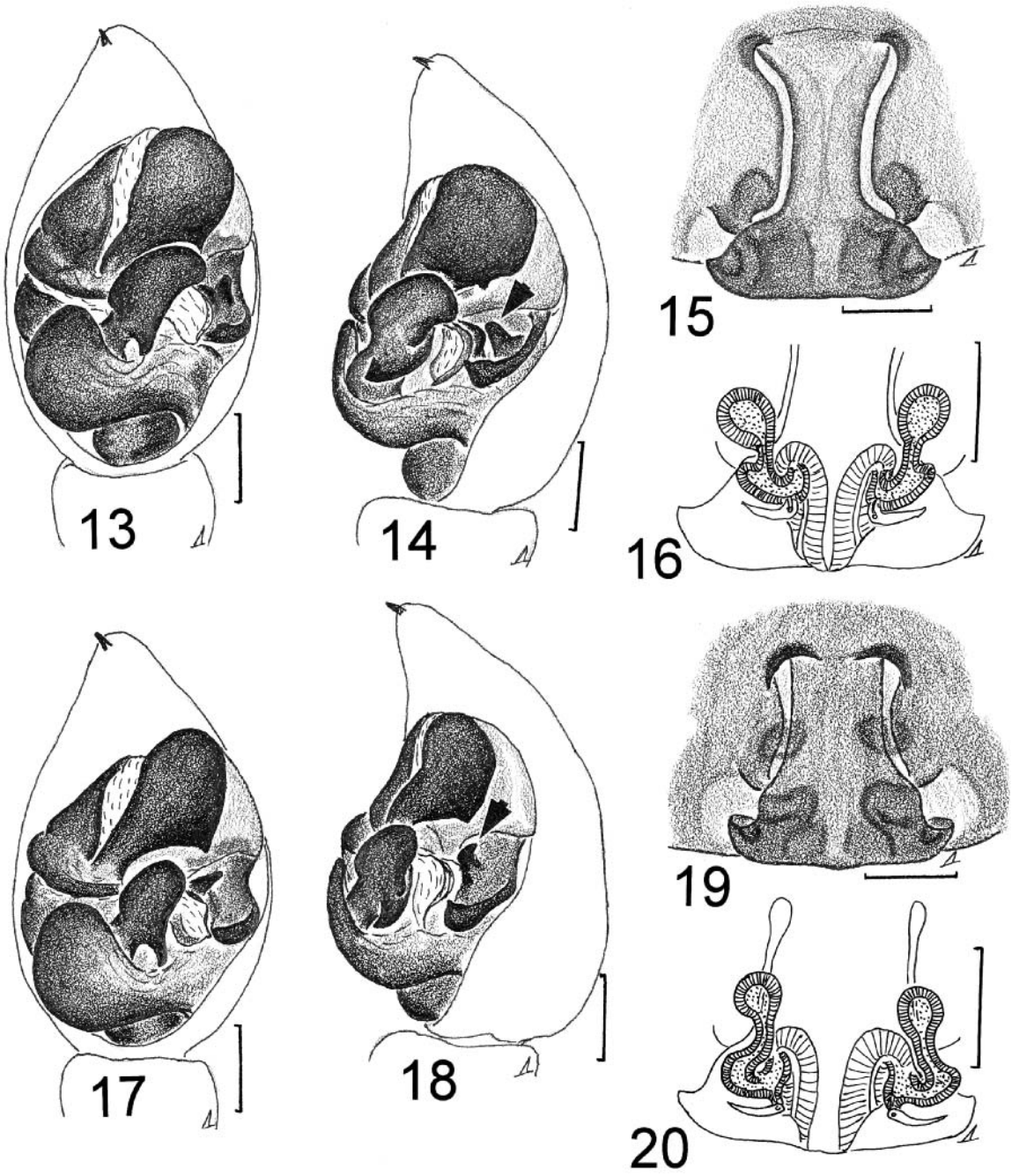
Diagnosis: *Pardosa paracolchica* belongs to the *monticola* species group and the *pontica* subgroup (*sensu* Zyuzin, 1979) and is closest to *P. colchica*. Females of both species are indistinguishable by their coloration and light grey/golden body pubescence, but *P. paracolchica* can be easily separated by the narrower and longer septal pedicel of the epigyne and by the absence of a median groove (Figs. 15, 26, cf. Figs. 19, 23). Males of *P. paracolchica* can be readily distinguished by the shape of the tegular apophysis (Figs. 13, 24, cf. Figs. 17, 23), and the position and shape of the relatively long terminal apophysis directed diagonally anteriorly and ventrally (arrowed in Fig. 14 cf. 18; see also Figs. 22, 25, 27). Sometimes the epigynal septum of *P. paracolchica* lacks the lateral protrusions and hence is very similar to that of *P. pontica*, but *P. paracolchica* can be readily

distinguished by the smaller anterior epigynal pockets with rounded edges and the narrower septal pedicel (Fig. 26 cf. Fig. 40). *Pardosa paracolchica* differs from *P. dagestana* in the shape of the tegular and terminal apophyses and by the carapace pattern (cf. Buchar & Thaler, 1998: fig. 10).

Distribution: *Pardosa paracolchica* occurs on the northern slopes of the Caucasus Major, as well as in the foothills and adjacent plains, and has so far been found in Krasnodar and Stavropol' Provinces, Kabardino-Balkaria and NE Azerbaijan (Fig. 12).

Habitat: This species clearly prefers the stony/pebbly banks of Caucasian rivers and streams (at altitudes up to 1800 m) and seems to be a North Caucasian geographical and ecological vicariant of *P. colchica*. Both *P. paracolchica* (Azerbaijanian populations) and *P. colchica* usually co-exist with *P. pontica* when the stony/pebbly river banks come into contact with the meadows which are preferred by the latter species.

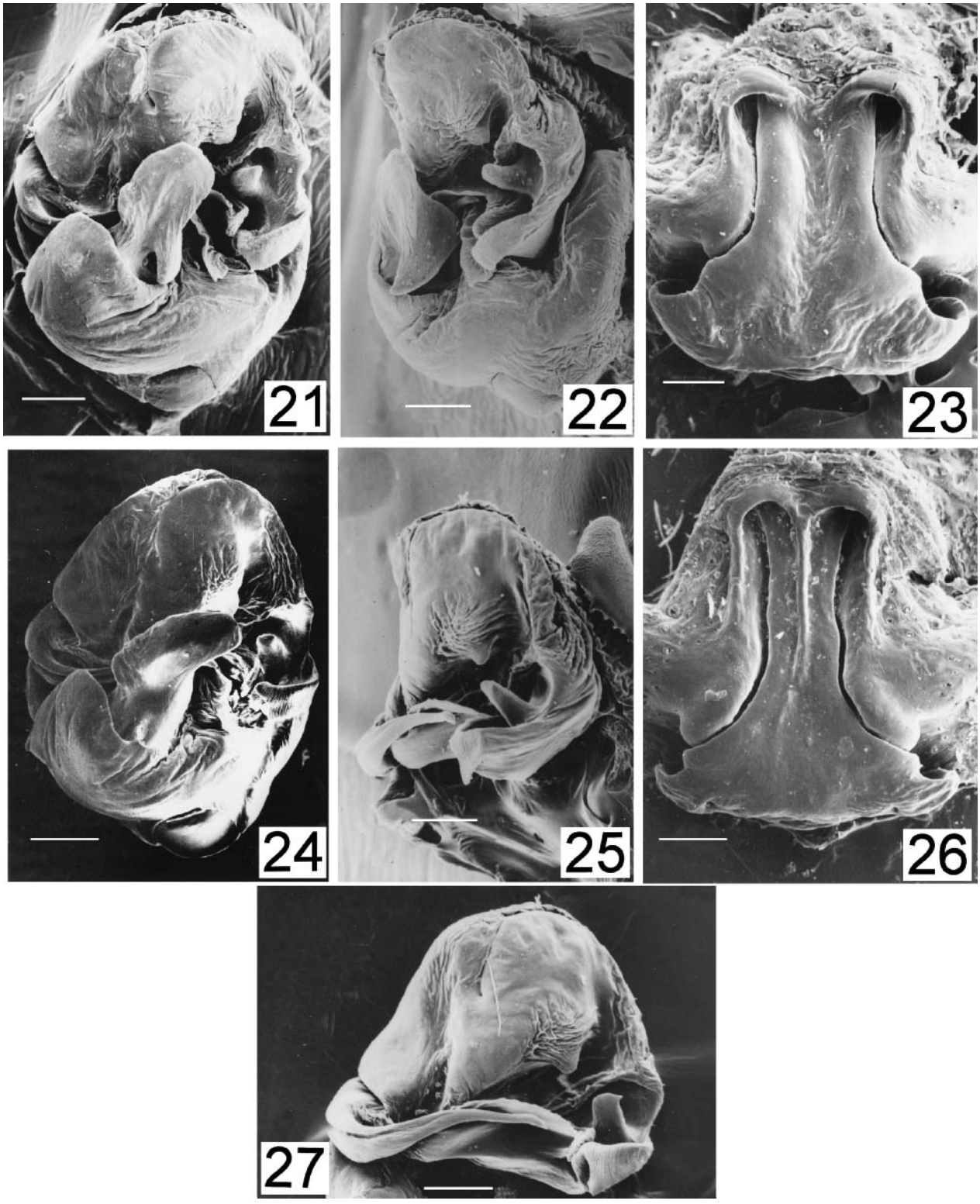
Description: *Male* (holotype): Total length 4.98. Carapace length 2.55, length/width ratio 1.36. Eye sizes and interdistances: AME 0.09, ALE 0.08, PME 0.21, PLE 0.20; AME-AME 0.11, AME-ALE 0.04, PME-PME 0.30. Width of anterior eye row 0.52, second row 0.70, third row 0.93. Clypeal height 1.56 times greater than AME diameter. Length of leg segments: I 1.60+0.75+1.33+1.38+0.98 (6.04); II 1.53+0.73+1.23+1.28+0.98 (5.75); III 1.55+0.68+1.15+1.58+0.93 (5.89); IV 2.03+0.80+1.68+2.33+1.25 (8.09). Carapace yellowish brown, with black radial veins and yellow



Figs. 13–20: **13–16** *Pardosa paracolchica* sp. n. (♂ holotype and ♀ paratype from Azerbaijan, Nyugedi). **13** Male palp, ventral view; **14** Ditto, lateral view; **15** Epigyne; **16** Spermathecae. **17–20** *Pardosa colchica* Mcheidze, 1947 (from Azerbaijan, Geigel' Reserve). **17** Male palp, ventral view; **18** Ditto, lateral view; **19** Epigyne; **20** Spermathecae. Scale lines=0.2 mm.

elongated spot in foveal area. Eye field black. Area between AMEs clearly swollen. Sternum and labium brown. Maxillae yellow. Chelicerae yellow-brown. Abdomen: dorsum and sides dark grey-brownish, with yellowish cardial spot; venter yellowish-brown. Book-lung covers and spinnerets yellow. All legs yellow with brown rings. Palpi yellow-brown, but cymbium dark brown with yellow tip. Bulbus brown. Palpal structure as in Figs. 13, 14, 24, 25, 27.

Female (paratype): Total length 5.40. Carapace length 2.65, length/width ratio 1.39. Eye sizes and inter-distances: AME 0.11, ALE 0.09, PME 0.24, PLE 0.21; AME-AME 0.11, AME-ALE 0.06, PME-PME 0.30. Width of anterior eye row 0.56, second row 0.74, third row 0.94. Clypeal height 1.9 times greater than AME diameter. Length of leg segments: I 1.93+0.98+1.50+1.50+1.03 (6.94); II 1.93+0.88+1.43+1.50+1.03 (6.77); III 1.88+0.80+1.40+1.78+1.03 (6.89); IV



Figs. 21–27: **21–23** *Pardosa colchica* Mcheidze, 1947 (from Georgia, Chakva). **21** Male bulbus, ventral view; **22** Ditto, lateral view; **23** Epigyne. **24–27** *Pardosa paracolchica* sp. n. (from Kabardino-Balkaria). **24** Male bulbus, ventral view; **25** Ditto, lateral view; **26** Epigyne; **27** Male bulbus, apical view. Scale lines=0.1 mm.

2.48+0.95+2.10+3.05+1.38 (9.96). Carapace yellow-brown, with black radial veins, median longitudinal yellow band and a pair of interrupted yellow lateral bands. Eye field black, densely white haired. Sternum and labium yellow-brown. Maxillae yellow. Chelicerae yellow-brown. Abdomen: dorsum and sides dark grey-brown, with yellow cardial spot and longitudinal interrupted yellow band; venter brownish yellow. Book-lung covers and spinnerets yellow. All legs and palpi yellow with brown rings. Epigyne and spermathecae as in Figs. 15, 16, 26.

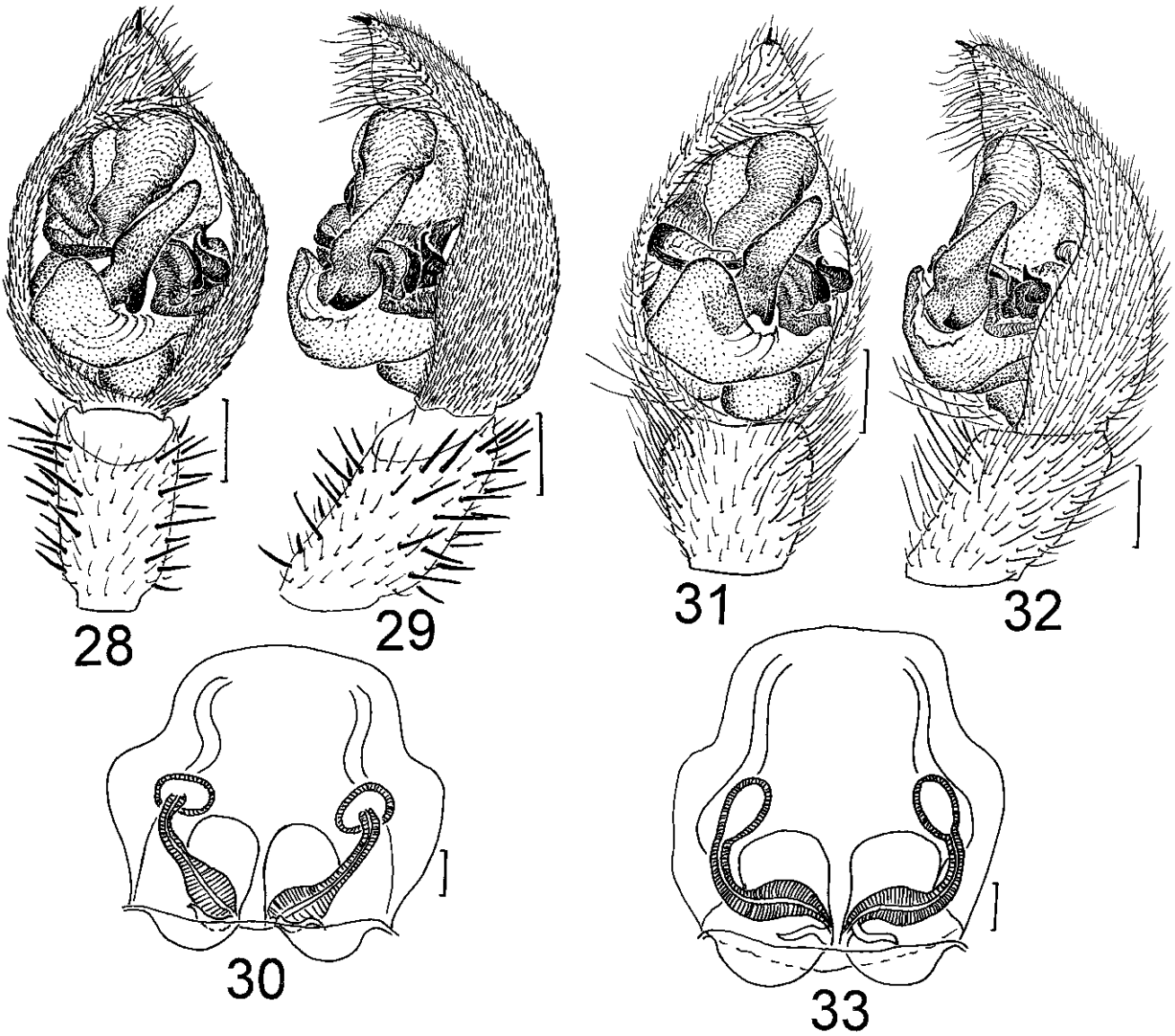
Other material examined: RUSSIA: Stavropol' Province: 1♂ 14♀ (AAZ), vicinity of Kislovodsk, Podkumok River, 22 June 1981, L. Ya. Khodyush & A. S. Zyuzin. Kabardino-Balkaria: 6♂ 24 ♀ (AAZ), Malka River near Malka, 24 June 1981, L. Ya. Khodyush & A. S. Zyuzin; 1♂ (AAZ), Baksan River near Baksan, 24 June 1981, L. Ya. Khodyush & A. S. Zyuzin; 1♂ 12♀ (AAZ), Elbrus Distr., confluence of Adylsu and Baksan Rivers, 1800 m a.s.l., 4–5 July 1980, L. Ya. Khodyush & A. S. Zyuzin; 2♀ (AAZ), same locality, 23 July 1980, L. Ya. Khodyush & A. S. Zyuzin. Krasnodar Province: 2♂ 13♀ (AAZ), Caucasian Reserve, Pslukh Cordon, 1200 m a.s.l., 20 July 1979, V. I. Ovtsharenko; 1♀ (AAZ), environs of Great Sochi, *c*. 15 km from Adler along Mzymta River, 28 September 1993, O. V. Lyakhov.

***Pardosa pirkuliensis* sp. n.** (Figs. 12, 28–30, 34–36)

Types: Holotype ♂ (ISEA) from Azerbaijan, 25–30 km NE of Shemakha, Pirkuli Reserve, 1500–1700 m a.s.l., 30 May 1984, D. V. Logunov. Paratypes: Same locality as holotype: 1♂ 3♀ (ZMMU), 1♀ (SMNH), 21♂ 7♀ (ISEA), 18–30 May 1984, D. V. Logunov; 3♂ 1♀ (SMNH), 1400 m a.s.l., 2 June 1984, D. V. Logunov; 8♀ (ISEA), 13♀ (ZMMU), 2♀ (SMNH), 1300–1600 m a.s.l., 8–21 September 1984, D. V. Logunov.

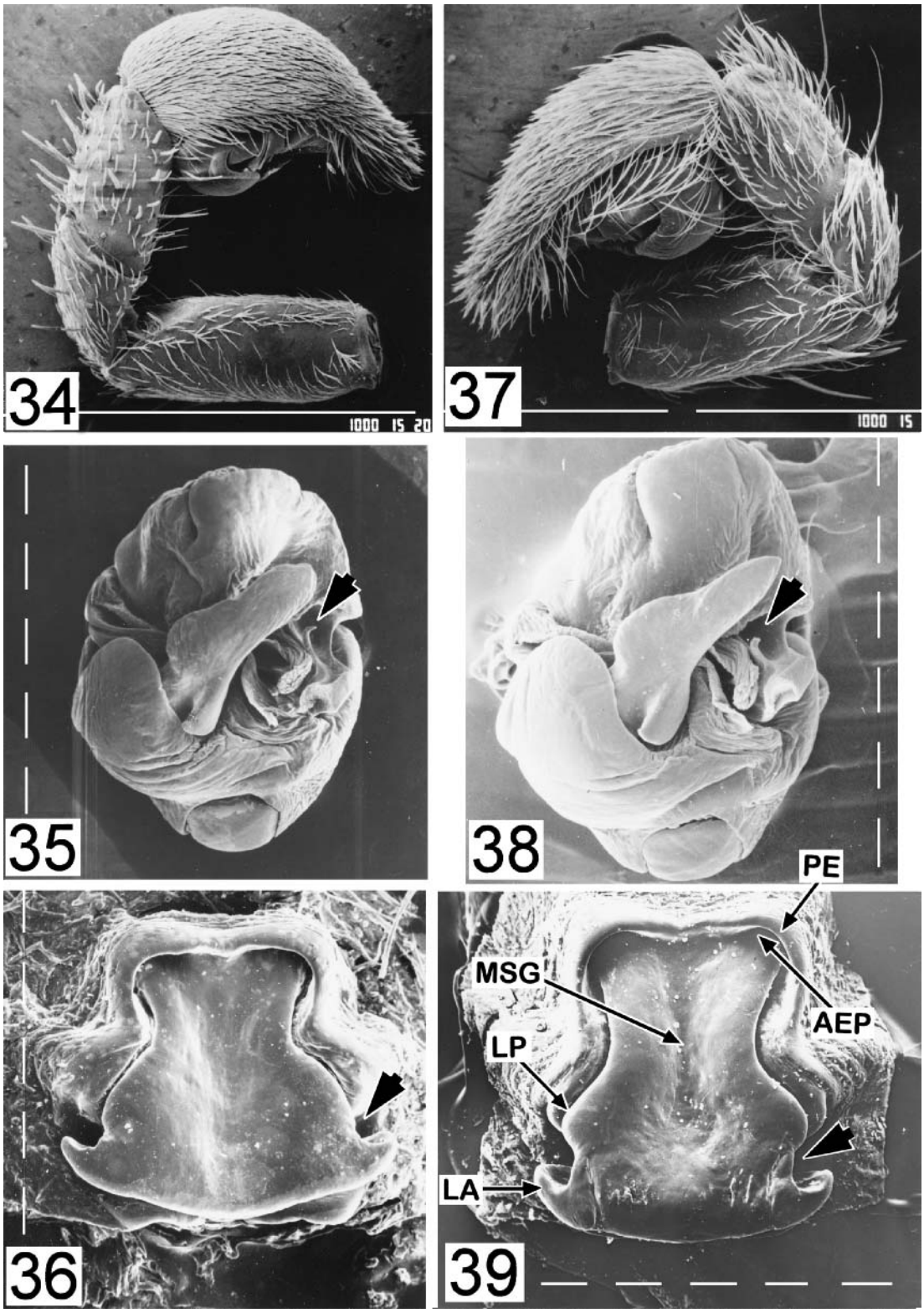
Etymology: The species is named after the type locality, the Pirkuli Reserve.

Diagnosis: This species belongs to the *monticola* species group and the *pontica* subgroup (*sensu* Zyuzin, 1979; =*blanda* subgroup *sensu* Buchar & Thaler, 1998). By the presence of the thin, apically curved and



Figs. 28–33: **28–30** *Pardosa pirkuliensis* sp. n. (paratypes from Azerbaijan, Pirkuli Reserve). **28** Male palp, ventral view; **29** Ditto, lateral view; **30** Spermathecae. **31–33** *Pardosa buchari* Ovtsharenko, 1979 (from Azerbaijan, Pirkuli Reserve). **31** Male palp, ventral view; **32** Ditto, lateral view; **33** Spermathecae. Scale lines=0.1 mm.

anteriorly directed terminal apophysis (arrowed in Fig. 35), *P. pirkuliensis* is most closely related to *P. buchari*. Males can be easily separated by the numerous erect spiniform setae on the palpal patellae and tibiae (Figs. 28, 29, 34) and on the anterior surfaces of the chelicerae and ventral sides of femora I and II. Females are more difficult to distinguish. The most useful diagnostic characters are: the septum of the epigyne lacks the median groove and a pronounced lateral incision (Fig. 36) (with a deep groove and incision in *P. buchari*, arrowed in Fig. 39), the maximal width of the septum distinctly exceeds its length (septum slightly wider or equal to septum length in *P. buchari*; cf. Figs. 36 and 39), situation of receptacles different (cf. Figs. 30 and 33), lateral bands of carapace continuous and narrower than median band (interrupted and as wide as median band in *P. buchari*),



Figs. 34–39: **34–36** *Pardosa pirkuliensis* sp. n. (paratypes from Azerbaijan, Pirkuli Reserve). **34** Male palp, lateral view; **35** Male bulbus, ventral view; **36** Epigyne. **37–39** *Pardosa buchari* Ovtsharenko, 1979 (from Kabardino-Balkaria). **37** Male palp, lateral view; **38** Male bulbus, ventral view; **39** Epigyne. Scale lines = 1.0 mm (34, 37), 0.1 mm (35–36, 38–39).

and femora I with pale brown bands (with black spots on a light ground in *P. buchari*).

Distribution: The type locality only (Fig. 12).

Habitat: *Pardosa pirkuliensis* was collected from about 1200 to 1600 m a.s.l.; it occurs on dry open slopes (among stones and on dry grass). It can be found together with *P. buchari* in mixed populations from about 1400 to 1600 m.

Description (paratypes): *Male*: Total length 6.20–6.40 ($n=10$). Carapace length 3.10–3.30 ($n=10$), length/width ratio 1.28. Eye sizes and interdistances: AME 0.14, ALE 0.10, PME 0.30, PLE 0.26; AME-AME 0.13, AME-ALE 0.05, PME-PME 0.36. Width of anterior eye row 0.61, second row 0.86, third row 1.15. Clypeal height 1.5 times greater than AME diameter. Length of leg segments (carapace length 3.30): I 2.55+1.10+1.90+2.20+1.55 (9.30); II 2.50+1.05+1.80+2.20+1.40 (8.95); III 2.50+1.00+1.70+2.50+1.30 (9.00); IV 3.00+1.15+2.65+3.70+1.65 (12.15). Carapace dark brown, with bright yellow medial band. Lateral bands poorly visible or absent. Eye field black. Clypeus yellow. Chelicerae bright yellow, anterior sides densely covered with uniform erect spiniform setae. Sternum dark, with light streak anteriorly. Abdomen: dorsum and sides with black markings usual for *Pardosa*. Legs: femora and patellae brownish, remaining segments yellowish; femora I and II covered ventrally with numerous erect spiniform setae. Palp bright yellow with brown cymbium; patella and tibia dorsally densely covered with numerous erect spiniform setae (Figs. 28, 29, 34). Palpal structure as in Figs. 28, 29, 35.

Female: Total length 6.20–7.00 ($n=10$). Carapace length 3.00–3.30 ($n=10$), length/width ratio 1.29. Eye sizes and interdistances: AME 0.11, ALE 0.11, PME 0.31, PLE 0.24; AME-AME 0.11, AME-ALE 0.09, PME-PME 0.36. Width of anterior eye row 0.64, second row 0.90, third row 1.13. Clypeal height 1.9 times greater than AME diameter. Length of leg segments: I 2.70+1.20+2.30+2.20+1.50 (9.90); II 2.60+1.20+2.15+2.20+1.45 (9.60); III 2.50+1.15+1.70+2.50+1.40 (9.25); IV 3.50+1.50+3.00+4.30+1.95 (14.25). Carapace brown, with yellow or orange-yellow stripes. Lateral bands usually less than half as wide as median band. Eye field black. Clypeus yellowish. Sternum dark, with light streak anteriorly. Abdomen: dorsum black with usual *Pardosa* brown-yellow or red-brown markings, venter and sides bright yellow. Legs with brown and yellow rings. Epigyne and spermathecae as in Figs. 30, 36.

Comparative material: *Pardosa buchari* Ovtsharenko, 1979 (Figs. 31–33, 37–39): 26♂ 28♀ (ISEA), 2♂ 6♀ (ZMMU), 4♂ 5♀ (SMNH), Azerbaijan, 25–30 km NE of Shemakha, Pirkuli Reserve, 1400–1700 m a.s.l., 18 May–21 September 1984, D. V. Logunov; 28♂ 16♀ (AAZ), near Dashkesan, 1700 m a.s.l., 7 June 1981, A. A. Zyuzin.

Pardosa pontica (Thorell, 1875) (Figs. 40–42, 45)

Lycosa Pontica Thorell, 1875a: 100 (♂ lectotype and 2♀ paralectotypes from ZMHU, examined).
Lycosa pontica: Thorell, 1875b: 142.
Pardosa pontica: Bonnet, 1958: 3407; Tongiorgi, 1966b: 351–352, figs. 10, 11, 24; Zyuzin, 1979: 434, 438; Dunin, 1984: 56; 1989: 36; Minoranski & Ponomarjov, 1984: 86.
Pardosa caraiensis: Mcheidze, 1947: 288, figs. 4–5 (♂ ♀; female syntype from SMGT examined). **New synonymy**.
Pardosa caraiensis: Mcheidze, 1992: 239, figs. 511–512.
Pardosops pontica: Roewer, 1955a: 197; 1955b: 756; 1959: 150.
Pardosa agrestis: Dunin, 1984: 55; 1989: 36 (misidentifications).
Pardosa saltuaria: Minoranski *et al*., 1980: 33 (misidentification).

Diagnosis: By its body coloration and size, *Pardosa pontica* is very close to *P. agrestis* (Westring, 1861) (var. *pseudomonticola* Simon), with which it sometimes co-exists in mixed populations. As in *P. agrestis*, the distal end of the male tarsus I in *P. pontica* is dark brown, the median carapace band is spindle-shaped, or with a slight rhomboid dilation behind the ocular area, and the lateral bands are continuous. However, the male palp in *P. pontica* is light yellow except for the dark brown tarsus (entirely brown in *P. agrestis*). Also, the male of *P. pontica* is clearly distinguished from *P. agrestis* by the presence of a relatively short and broad, thumb-shaped tegular apophysis, in combination with a comparatively short and wide, uniformly rounded distal branch of the TmA, whereas in *P. agrestis* the TmA is somewhat tapering (Figs. 41, 42 cf. Fig. 44). The epigynal septum in *P. pontica* differs from other members of the *P. monticola* group by lacking lateral protrusions, in combination with having a comparatively long septal pedicle which smoothly widens posteriorly towards the lateral angles of the septum (Fig. 40; cf. also Zyuzin, 1979: fig. 17). By the last character and by the thick anteriorly directed terminal apophysis *P. pontica* differs reliably from *P. dagestana*, in which the terminal apophysis is distinctly inclined mesally (cf. Buchar & Thaler, 1998: fig. 10); also, unlike that in *P. pontica*, the basal part of the cymbium in *P. dagestana* is yellowish, compared with its dark distal part.

Remarks: The peculiar shape of the septum in *P. pontica* (very unusual for the *P. monticola* group) made it possible for Tongiorgi (1966b: 351) to confuse one female of Thorell's type series of *P. pontica* with *P. saltuaria* (L. Koch, 1870) (cf. also Minoranski *et al*., 1980: sub *P. saltuaria*) and designate it as "*Pardosa* not *pontica*". Also, the terminal apophysis of the male palpus is shown (Tongiorgi, 1966b: fig. 10) rather longer in relation to its width than it is in reality (cf. Fig. 41; also Zyuzin, 1979: fig. 20), and this is an additional source of confusion. Moreover, in Fuhn & Niculescu-Burlacu's (1971: fig. 53b) copy of Tongiorgi's fig. 10 the terminal apophysis in *P. pontica* is shown enormously long, even considerably longer than in the original. Owing to these inaccuracies, all records of *P. pontica* from outside the former USSR require confirmation.

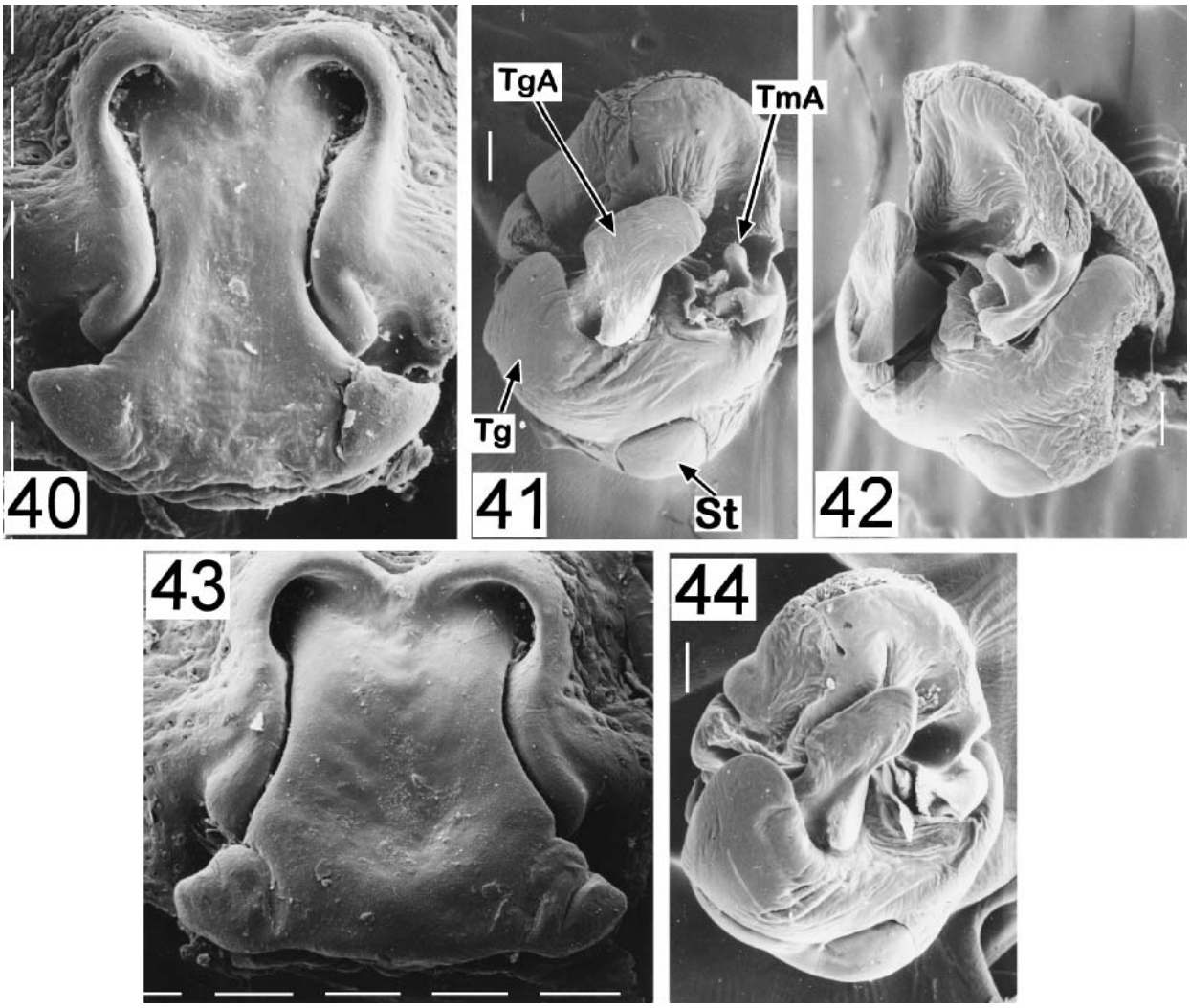
Mcheidze (1947) described *Pardosa caraiensis* from three females from Karayazy (near Tbilisi) and one male from Telavi; both localities are in Georgia. We have re-examined the only female existing from the type series. Unfortunately, the epigyne was dissected from the abdomen and its preparation is known (T. S. Mcheidze, pers. comm.) to be lost. The carapace colour pattern in *P. caraiensis* is similar to both *P. pontica* and *P. agrestis*, but the outlines of the epigynal septum (see Mcheidze, 1992: fig. 512) seem to be much closer to that of *P. pontica*. Taking into account also that the latter species

has been found in areas close to the terra typica of *P. caraiensis* (see below under "Material examined" and Fig. 45), and that we have failed to record any specimen of *P. agrestis* collected from river valleys or foothills in either Georgia or Azerbaijan, we conclude that *P. caraiensis* is a junior synonym of *P. pontica*.

Roewer (1955a,b, 1959) selected *Lycosa pontica* Thorell, 1875 as the type species of his genus *Pardosops*, erroneously considering this species to have 2 teeth on its cheliceral retromargin instead of 3 as in the genus *Pardosa*. Roewer's action was discussed by Tongiorgi (1966b); this author and then Brignoli (1983) synonymised the names *Pardosa* and *Pardosops*. However, the problem connected with the name *Pardosops* and its validity, not in the sense of Roewer, still awaits a solution. On the one hand, the so-called highly homogeneous *Pardosa monticola* group, at present comprising more than 20 valid species, cannot be derived immediately by genital structures from the true *Pardosa* species [*P. alacris* (C. L. Koch, 1833), *P. lugubris* (Walckenaer, 1802), *P. caucasica* Ovtsharenko, 1979], and therefore deserves at least subgeneric rank. On the other hand, a detailed study of the copulatory organs and other characters in some little-known species included in the genus *Pardosops* (see Roewer, 1955a) and really having two retromarginal teeth, e.g. *P. ricta* (Odenwall, 1901), is required. In other words, the splitting of the unnaturally enormous, clearly polyphyletic genus *Pardosa* (*s. lat.*) seems to be justified, as the genital structures of its members are so heterogeneous that the limits of *Pardosa* remain obscure (cf. Zyuzin, 1979). As a result, taxonomists still unite the species having three retromarginal teeth, in which "the distance between AME/ALE is less or equal to that between the AMEs" and "the width of the labium always exceeds its length", in a single genus (cf. Roewer, 1959: p. 17, 18) and then subdivide this genus into highly divergent monophyletic "groups" (cf. Zyuzin, 1979).

Distribution: The range of *P. pontica* covers all the territory between the Black and Caspian Seas to the south of 47°N from Kherson Area through the Crimea, Krasnodar Province and Kalmykia to Astrakhan' Area including the Caucasus; also SW Turkmenistan (Fig. 45). Its occurrence in N. Iran is also likely. However, the record of *P. pontica* in Bulgaria (see Bonnet, 1958) still remains highly doubtful and requires confirmation (cf. Tongiorgi, 1966b).

Habitat: *Pardosa pontica* is a clearly thermophilous species, preferring open warm and sunlit meadows in the immediate vicinity of rivers and other water sources (up



Figs. 40–44: **40–42** *Pardosa pontica* (Thorell, 1875) (from Azerbaijan, Baky). **40** Epigyne; **41** Male bulbus, ventral view; **42** Ditto, lateral view. **43–44** *Pardosa agrestis* (Westring, 1861) (from Leningrad area). **43** Epigyne; **44** Male bulbus, ventral view. Scale lines=0.1 mm.

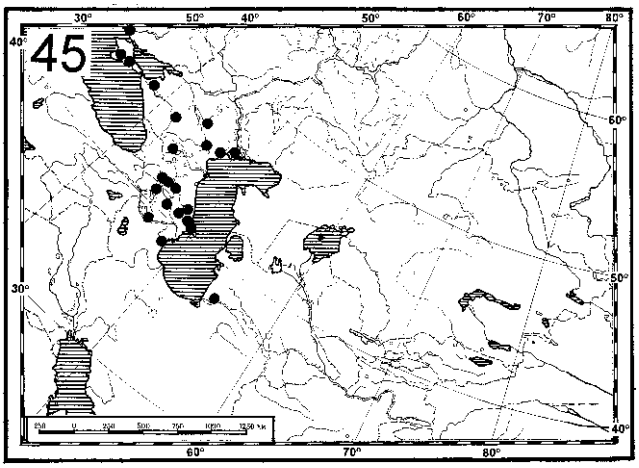


Fig. 45: Distribution of *Pardosa pontica* (Thorell, 1875); localities in Italy (Tongiorgi, 1966b) and Romania (Fuhn & Niculescu-Burlacu, 1971) are not shown. One dot may represent more than one close locality.

to 1600–2100 m a.s.l.); it also often occurs on saline plots, barren areas, cultivated fields or meadows. In Cis-Caucasia, *P. pontica* sometimes forms mixed populations with *P. agrestis*; however, close to the northern macroslope of the Caucasus Major populations of both species seem to be well separated. Unlike the latter species, *P. pontica* prefers open well-warmed sites at relatively low altitudes (Ovtsharenko, 1979), whereas *P. agrestis* inhabits shortgrass meadows/pastures with dense vegetation and sufficient moisture up to the subalpine belt (1800–1900 m a.s.l.) (see below, under "Material examined"). The distribution of *P. pontica* and *P. agrestis* on the southern macroslope of the Caucasus Major still remains rather obscure, as Dunin (1989) apparently confused both species. In that region *P. agrestis* occurs at altitudes up to 2000 m and higher (Buchar & Thaler, 1998) and supposedly never occurs below 1300 m, while *P. pontica* is abundant and widespread over the whole trans-Caucasian region at low and moderate altitudes (Fig. 45). However, in the Caucasus Minor where *P. agrestis* is not found, *P. pontica* is present up to 1600–2100 m, completely replacing there the former species.

Material examined: AZERBAIJAN: Kuba Distr.: 18♂ 10♀ (AAZ), 1♂ 1♀ (ISEA), 6♂ 6♀ (SMNH), environs of Nyugedi, 12–13 June 1981, A. A. Zyuzin. Khanlar Dist.: 3♂ 1♀ (AAZ), Geigel' Reserve, side of Kyurekchai River, 8 June 1981, A. A. Zyuzin; 1♀ (AAZ), same locality, 1050 m a.s.l., 9 June 1981, A. A. Zyuzin; 1♂ 1♀ (AAZ), same locality, Geigel' Lake, 1600 m a.s.l., 9 June 1981, A. A. Zyuzin. Apsheron Peninsula: 1♂ 1♀ (AAZ), Baky, 24 June 1976, P. M. Dunin. Lenkoran Distr.: 3♂ 7♀ (AAZ), Lenkoran', Caspian Sea coast, in rush (*Juncus* sp.), 19 July 1983, D. V. Logunov; 3♂ 8♀ (ISEA), 10–15 km SW of Lenkoran', Hyrkan Reserve, 0–200 m a.s.l., 28 June–13 July 1983, D. V. Logunov. Shemakha Distr.: 1♂ 6♀ (ISEA), 25–30 km NE of Shemakha, Pirkuli Reserve, 1000–1400 m a.s.l., 18 May–21 September 1984, D. V. Logunov. UKRAINE: Kherson Area: 2♂ 50♀ (AAZ), Black Sea Reserve, May 1977, V. F. Mikityuk. Crimea: 1♂ 2♀ (ZMHU, No. 240, ♂ lectotype and 2♀ paralectotypes), "Cherson. Taurica", Alma, Bujuklambatt, Sympheropol, A. v. Nordmann leg., Coll. Thorell; 20♂ 15♀ (AAZ), Al'ma River near Novopavlovka, 7 May 1977, A. A. Zyuzin; 10♂ 11♀ (AAZ), same area, near Saki, 8 May 1977, A. A. Zyuzin. RUSSIA: Krasnodar Prov.: 3♂ 9♀ (AAZ), near Slavyansk-na-Kubani, 24 July 1971, N. S. Yegorova. Stavropol' Prov.: 1♀ (AAZ), Stavropol', 10 August 1982, D. V. Logunov; 1♀ (AAZ), Kabardino-Balkaria, near Nal'chik, 24 August 1970, V. I. Ovtsharenko; Kabardino-Balkaria, Elbrus Distr., near confluence of Adylsu & Baksan Rivers, 1800–1900 m a.s.l., 5 June 1980, L. Ya. Khodyush & A. S. Zyuzin. Kalmykia: 4♂ 4♀ (AAZ), near Kaspiyskiy, 15 May–1 June 1974, A. V. Ponomarjov; 7♀ (AAZ), same locality, Chograi water reservoir, July 1980, N. O. Basangova. Astrakhan' Area: 1♂ 1♀ (AAZ), Astrakhan' Reserve, Damchik Cordon, 10–13 July 1977, A. V. Ponomarjov. GEORGIA: 1♀ (SMGT, No. 95, syntype of *Pardosa caraiensis*), "no precise locality given", T. S. Mcheidze; 2♀ (AAZ), Lagodekhi Reserve, 29–30 June 1982, Yu. M. Marusik; 1♂ (AAZ), Lagodekhi Distr., Alazani River valley, 12 July 1982, Yu. M. Marusik. ARMENIA: 3♂ 3♀ (AAZ), side of Agstev (Akstafachai) River near Azatamut, 30 May 1981, A. A. Zyuzin; 1♂ 9♀ (AAZ), Sevan Lake, environs of Sevan, 2000–2100 m a.s.l., 28–29 July 1983, D. V. Logunov; 1♂ 4♀ (AAZ), Megri, 16 August 1979, V. P. Tyshchenko. TURKMENISTAN: 4♂ 1♀ (AAZ), SW Kopetdagh Mts., environs of Garry-Gala (=Kara-Kala), Sumbar River valley, 21–23 April 1987, A. A. Zyuzin; 6♂ 2♀ (AAZ), same locality, Syunt-Khasardagh Reserve, Parkhai Cardon, 3–4 May 1987, A. A. Zyuzin.

Comparative material: *Pardosa agrestis* (Westring, 1961) (Figs. 43–44): Azerbaijan, Shemakha Distr.: 5♂ 12♀ (ISEA), 25–30 km NE of Shemakha, Pirkuli Reserve, 1300–2000 m a.s.l., 18 May–18 September 1984, D. V. Logunov.

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