

## Members of *Pardosa amentata* and *P. lugubris* species groups in Crimea and Caucasus with notes on *P. abagensis* (Aranei: Lycosidae)

### Представители групп видов *Pardosa amentata* и *P. lugubris* Крыма и Кавказа с замечаниями о виде *P. abagensis* (Aranei: Lycosidae)

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KEY WORDS: spiders, *Pardosa*, redescriptions, Crimea, Caucasus, phenology.

КЛЮЧЕВЫЕ СЛОВА: пауки, *Pardosa*, переописания, Крым, Кавказ, фенология.

**ABSTRACT.** Illustrated redescriptions of *Pardosa abagensis* Ovtsharenko, 1979, *P. amentata* (Clerck, 1757), *P. caucasica* Ovtsharenko, 1979, and *P. lugubris* (Walckenaer, 1802) are provided on the basis of specimens from Crimea and Caucasus. Expanded diagnosis for *P. amentata* and *P. lugubris* groups are suggested. *P. abagensis* is placed to separate species group; diagnosis for this group is provided. Phenology in Crimea is given for *P. lugubris*. The record of *P. alacris* (C.L. Koch, 1833) from Crimea was based on misidentification of *P. lugubris*.

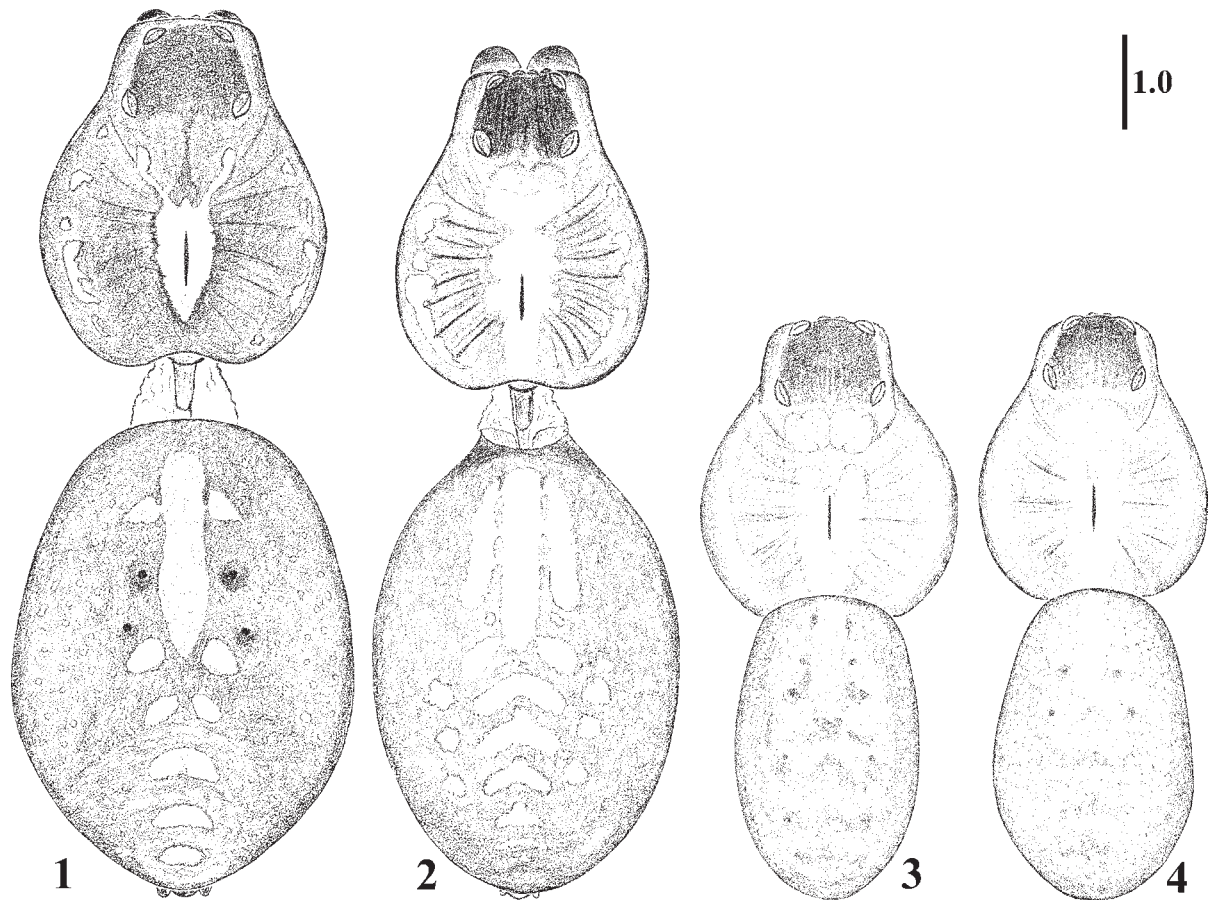
**РЕЗЮМЕ.** По экземплярам из Крыма и Кавказа выполнено иллюстрированное переписание *Pardosa abagensis* Ovtsharenko, 1979, *P. amentata* (Clerck, 1757), *P. caucasica* Ovtsharenko, 1979 и *P. lugubris* (Walckenaer, 1802). Дополнен диагноз для групп видов *P. amentata* и *P. lugubris*. Вид *P. abagensis* выделен в отдельную группу видов, дан диагноз этой группы. Для *P. lugubris* выяснена фенология в Крыму. Исправлено ошибочное определение: указание *P. alacris* (C.L. Koch, 1833) из Крыма относится к *P. lugubris*.

#### Introduction

The genus *Pardosa* C.L. Koch, 1847, contains more than 500 species, and has almost worldwide distribution (absent in Australia only). Most of the species (280) are known in the Palearctic [cf. Platnick, 2011]. In the Caucasus and Crimea, 47 and 13 species were reported, respectively [Mikhailov, 1997, 1998, 1999; Kovblyuk, 2004; Otto & Dietzold, 2006; Kovblyuk et al., 2008]. However, a record of *P. alacris* (C.L. Koch, 1833) from Crimea [Apostolov & Onchurov, 1998; Onchurov, 1998] is the misidentification of *P. lugubris* (Walckenaer, 1802) (the material is examined).

*Pardosa* has a large number of unrelated species. Zyuzin [1979] subdivided the Palearctic *Pardosa* into 22 species groups. This subdivision was changed later. The *P. venatrix* species group was transferred from *Pardosa* to a new subfamily, Wadicossinae Zyuzin, 1985, with the type species *Lycosa fidelis* O. Pickard-Cambridge, 1872 [Zyuzin, 1985; Kronstedt & Zyuzin, 2009]. The genus *Draposa* Kronstedt, 2010, was proposed for several species from the Indomalayan Region. These were previously placed in the genus *Pardosa* [Kronstedt, 2010]. Possibly, the taxonomic structure of *Pardosa* will be revised in the future. Some species groups should gain a status of separate genera. Three generic names are considered as junior synonyms of *Pardosa*; they are as follows: *Acroniops* Simon, 1898, *Chorilycosa* Roewer, 1960, and *Pardosops* Roewer, 1955. The type species of *Acroniops* is *A. heterophthalmus* Simon, 1898 (from Java), and the type species of *Chorilycosa* is *Lycosa arorari* Dyal, 1935 (from Pakistan) — junior synonym of *Pardosa sumatrana* (Thorell, 1890). Both of them are members of *Pardosa nebulosa* species group. Marusik & Ballarin [2011] noted that the *P. nebulosa*-group can be considered as a separate genus. *Pardosa pontica* (Thorell, 1875) (from Crimea) is the type species of *Pardosops*. It belongs to the *Pardosa monticola*-group, which can also be considered as a separate genus. The situation is complicated by the following facts: (1) some species were described without detailed illustrations; (2) for more than 160 *Pardosa* species, one sex only is known [Platnick, 2011]; (3) *Pardosa* contained a few cryptic species with little differences in morphology (for example, species of *P. lugubris* group); (4) some species are still ungrouped.

Recently Töpfer-Hofmann et al. [2000] distinguished a new species group *P. lugubris* from Zyuzin's *P. amentata* group by differences of courtship behav-



Figs 1–4. Females of *Pardosa* species: 1 — *P. abagensis* (from Abkhazia); 2 — *P. amentata* (from Crimea); 3 — *P. caucasica* (from Adygeya); 4 — *P. lugubris* (from Crimea). Scale bars: 1 mm.

Рис. 1–4. Самки видов рода *Pardosa*: 1 — *P. abagensis* (из Абхазии); 2 — *P. amentata* (из Крыма); 3 — *P. caucasica* (из Адыгеи); 4 — *P. lugubris* (из Крыма). Масштаб: 1 мм.

our, carapace pattern and female genitalia, but without detailed information about male copulatory organs. For distinguishing species of the *P. lugubris* group, detailed illustrated descriptions of copulatory organs are necessary. Illustrations of general appearance and some parts of copulatory organs can be found in several works, but they are fragmentary [Tongiorgi, 1966; Ovtsharenko, 1979; Zyuzin, 1979; Wunderlich, 1984; Kronstedt, 1999; Töpfer-Hofmann et al., 2000; Almquist, 2005].

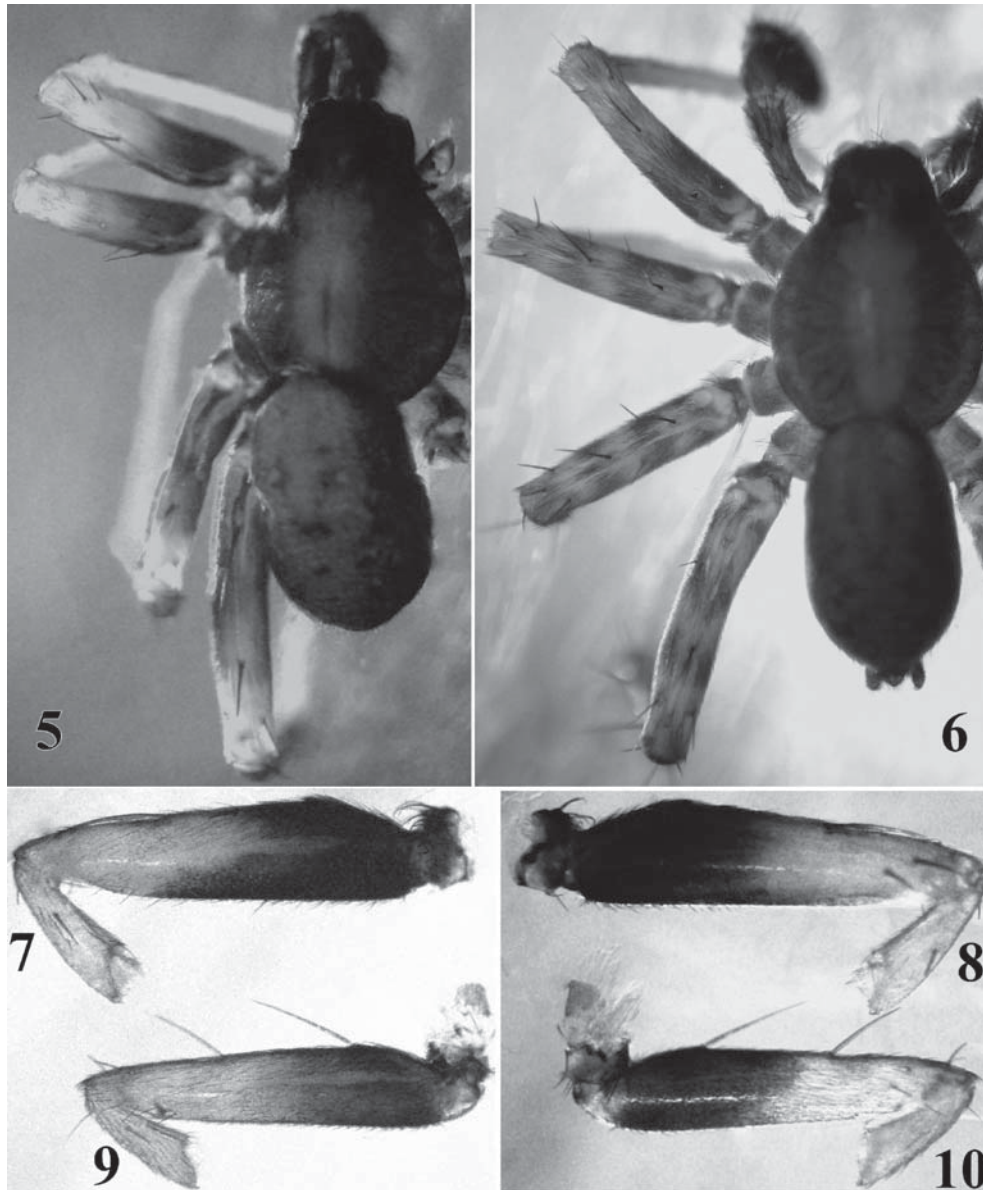
The aim of this paper is to provide detailed, illustrated redescriptions of *P. abagensis* Ovtsharenko, 1979, *P. amentata* (Clerck, 1757), *P. caucasica* Ovtsharenko, 1979, and *P. lugubris* (Walckenaer, 1802) from Caucasus and Crimea. In addition, complete diagnosis for *P. amentata* and *P. lugubris* groups by copulatory organs are presented; for *P. abagensis*, a new species group is proposed.

## Material and Methods

Specimens for this study were recently collected in the Crimea, Adygeya and Abkhazia by M.M. Kovblyuk. All specimens are deposited in Zoology Department, V.I. Vernadsky Taurida National University, Simferopol, Ukraine, curator of collection M.M. Kovblyuk (TNU).

Following abbreviations are used in the text: a — apical; d — dorsal; pl — prolateral; rl — retrolateral; v — ventral. Abbreviations on figures: *AEP* — anterior epigynal pocket; *C* — conductor; *E* — embolus; *S* — septum; *TgA* — tegular apophysis; *TmA* — terminal apophysis.

Illustrations were made using both reflected and transmitted light microscopes. Illustrations of epigynes and bulbuses made after maceration in 20% KOH solution. Coloration was described from specimens preserved in 75% ethanol with added glycerin (9:1 by



Figs 5–10. Males of *Pardosa caucasica* (5, 7–8 — from Abkhazia) and *P. lugubris* (6, 9–10 — from Crimea): 5–6 — general appearance, ventral view; 7, 9 — femur I, prolateral view; 8, 10 — femur I, retrolateral view.

Рис. 5–10. Самцы *Pardosa caucasica* (5, 7–8 — из Абхазии) and *P. lugubris* (6, 9–10 — из Крыма): 5–6 — габитус, вентрально; 7, 9 — бедро I, пролатерально; 8, 10 — бедро I, ретролатерально.

volume). Leg and palp segments were measured after their separation from the cephalothorax. All measurements are in mm. All scale bars are equal 0.1 mm if not otherwise indicated.

Distribution range names were given mainly after the system proposed by K.B. Gorodkov [1984].

### Species survey

*Pardosa abagensis* Ovtsharenko, 1979

Figs 1, 11, 15, 19–20, 23, 27, 31, 33, 39–41.

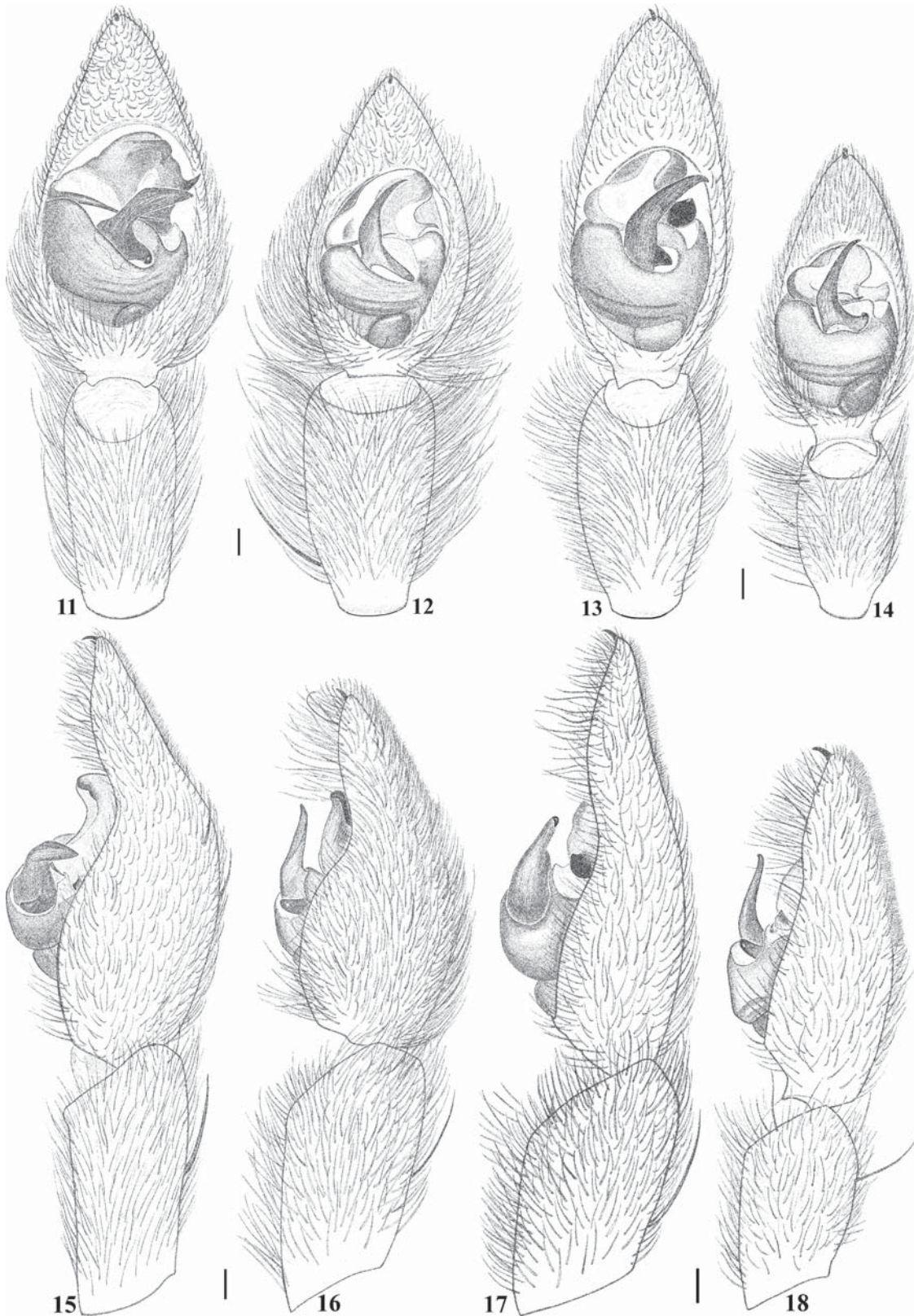
*P. a.* Ovtsharenko, 1979: 46, f. 12–13, 22–23 (♂♀).

MATERIAL EXAMINED. ABKHAZIA. Sukhum Distr.: 2 ♂♂, 3 ♀♀, Buru Range, Dzykhva Mt., Kot-Kot River, alpine zone, N43°13'35", E41°07'39", 2200–2300 m, 19–26.07.2008, M.M. Kovblyuk.

DIAGNOSIS. Males are distinguished from other species of *Pardosa* by the shape of the tegular apophysis (cf. Figs 11, 19–20, 23) and conductor, structured with two lobes (cf. Figs 31, 33). Females are distinguished by the shape of epigyne: the anterior pocket of *P. abagensis* is very small, while the septum is very massive (cf. Figs 39–40).

DESCRIPTION. Male and female from Abkhazia. Measurements (♂/♀): total length 5.9 / 8.4; carapace 3.2 / 3.8 long, 2.5 / 3.2 wide. Length of palp segments





Figs 11–18. Male palps of *P. abagensis* (11, 15 — from Abkhazia), *P. amentata* (12, 16 — from Crimea), *P. caucasica* (13, 17 — from Abkhazia) and *P. lugubris* (14, 18 — from Crimea): 11–14 — ventral view; 15–18 — retrolateral view. Scale bars: 0.1 mm.

Рис. 11–18. Пальпы самцов *P. abagensis* (11, 15 — из Абхазии), *P. amentata* (12, 16 — из Крыма), *P. caucasica* (13, 17 — из Абхазии) и *P. lugubris* (14, 18 — из Крыма): 11–14 — вентрально; 15–18 — ретролатерально. Масштаб: 0,1 мм.

(male/female): femur 1.3 / 1.4, patella 0.8 / 0.8, tibia 1.0 / 1.0, tarsus 1.4 / 1.4. Length of leg segments (male/female):

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
I	2.3 / 2.8	1.2 / 1.4	2.0 / 2.4	2.3 / 2.4	1.4 / 1.5
II	2.4 / 2.9	1.1 / 1.4	1.9 / 2.2	2.3 / 2.4	1.4 / 1.5
III	2.4 / 2.8	1.0 / 1.3	1.9 / 2.3	2.6 / 3.0	1.3 / 1.5
IV	3.0 / 3.6	1.2 / 1.5	2.5 / 3.2	3.9 / 4.6	1.7 / 2.0

Male leg spination.

	Femur	Patella	Tibia	Metatarsus
Leg I	d 1-1-1 (a), pl 2, rl 1-1	pl 1, rl 1	pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg II	d 1-1-1 (a), pl 1-1, rl 1-1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg III	d 1-1-1 (a), pl 1-1, rl 1-1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg IV	d 1-1-1 (a), pl 1-1, rl 1-1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 1-2-2-3 (a)

Female leg spination.

	Femur	Patella	Tibia	Metatarsus
Leg I	d 1-1-1 (a), pl 2, rl 1-1	0	pl 1-1, rl 1, v 2-2-2 (a)	pl 1-1 (a), rl 1-1 (a), v 2-2-3 (a)
Leg II	d 1-1-1 (a), pl 1-1, rl 1-1	0	pl 1-1, rl 1, v 2-2-2 (a)	pl 1-1 (a), rl 1-1 (a), v 2-2-3 (a)
Leg III	d 1-1-1 (a), pl 1-1, rl 1-1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg IV	d 1-1-1 (a), pl 1-1, rl 1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 1-2-2-3 (a)

Cheliceral teeth (♂♀): anterior — 2, posterior — 3.

General appearance: female — Fig. 1; males have the same coloration with darker carapace.

Male palp: Figs 11, 15, 19–20, 23, 27, 31, 33; epigyne: Figs 39–41.

VARIATION. Males (n = 2): carapace 3.2 long and 2.5 wide. Tegular apophysis variable in shape (Figs 19–20). Females (n = 3): carapace 3.2–3.8 long, 2.7–3.2 wide.

TYPE LOCALITY. Pastbishe Abago Mt. Range, Adygeya Republic, Russia [Ovtsharenko, 1979].

DISTRIBUTION. West and North Caucasus Major: Russia (Adygeya and Northern Ossetia) and Abkhazia [Ovtsharenko, 1979; Ponomarev & Mikhailov, 2007; Kovblyuk et al., 2011].

*Pardosa amentata* (Clerck, 1757)

Figs 2, 12, 16, 24, 28, 32, 34, 42–44.

MATERIAL EXAMINED. UKRAINE, *Crimea*: Bakhchisaray Distr.: 1 ♀, Crimean State Nature Reserve, environs of kordon Sosnovyi, Alma River, 1.07.2001, M.M. Kovblyuk. Belogorsk Distr.: 1 ♂, 1 ♀, Zuya River, 3.05.1996, M.M. Kovblyuk; 1 ♀, 6 km S from Belogorsk, Karasevka Vil., 24.06.1999, M.M. Kovblyuk; 1 ♀, Burultcha River, 8.05.2003, Yu. Tarasov. Simferopol Distr.: 1 ♀, environs of Perevalnoe Vil., Dolgorukovskaya Yaila Mt., SW slope, 26–27.04.2003, E.Yu. Sviridenko.

DIAGNOSIS. Males are distinguished from other species of *Pardosa* by the shape of the tegular apophysis

(cf. Figs 12, 24) and terminal part of bulb. Females have the anterior epigynal pocket wider than the septum (cf. Figs 42–43). This seems to be a unique example of such a structure in the genitalia of *Pardosa*.

DESCRIPTION. Male and female from Crimea. Measurements (♂/♀): total length 6.6 / 6.9; carapace 3.2 / 3.1 long, 2.5 / 2.5 wide. Length of palp segments (male/female): femur 1.2 / 1.2, patella 0.7 / 0.7, tibia 0.8 / 0.8, tarsus 1.3 / 1.0. Length of leg segments (male/female):

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
I	2.2 / 2.4	1.0 / 1.1	1.9 / 1.9	2.0 / 2.0	1.4 / 1.3
II	2.2 / 2.3	1.0 / 1.1	1.8 / 1.9	2.0 / 2.0	1.3 / 1.3
III	2.2 / 2.3	1.0 / 1.1	1.7 / 1.8	2.3 / 2.3	1.2 / 1.2
IV	2.9 / 3.1	1.2 / 1.2	2.5 / 2.7	3.8 / 4.0	1.6 / 1.6

Male leg spination.

	Femur	Patella	Tibia	Metatarsus
Leg I	d 1-1-1 (a), pl 2, rl 1-1-1	pl 1, rl 1; II – pl 1, rl 1	pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg II	d 1-1-1 (a), pl 1-1, rl 1-1	0	pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg III	d 1-1-1 (a), pl 1-1, rl 1-1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg IV	d 1-1-1 (a), pl 1-1, rl 1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)

Female leg spination.

	Femur	Patella	Tibia	Metatarsus
Leg I	d 1-1-1 (a), pl 2-1, rl 1-1	pl 1; II – pl 1, rl 1	pl 1-1-1, rl 1, v 2-2-2 (a)	pl 1-1 (a), rl 1-1 (a), v 2-2-3 (a)
Leg II	d 1-1-1 (a), pl 1-1, rl 1-1	0	pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg III	d 1-1-1 (a), pl 1-1, rl 1-1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg IV	d 1-1-1 (a), pl 1-1, rl 1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)

Cheliceral teeth (♂♀): anterior — 2, posterior — 3.

General appearance: female — Fig. 2; males have same coloration with darker carapace.

Male palp: Figs 12, 16, 24, 28, 32, 34; epigyne: Figs 42–44.

VARIATION. Females (n = 4): carapace 2.6–3.6 long and 2.0–2.6 wide.

TYPE LOCALITY. Clerck [1757] described this species from Sweden without an exact locality.

DISTRIBUTION. West and Central Palaearctic, south to North Africa and Turkmenistan [Tongiorgi, 1966; Mikhailov, 1999; Helsdingen, 2010].

*Pardosa caucasica* Ovtsharenko, 1979

Figs 3, 5, 7–8, 13, 17, 21, 25, 29, 35, 37, 45–50.

*P. c.* Ovtsharenko, 1979: 48, f. 10–11, 24–25 (♂♀).

*P. c.*: Töpfer-Hofmann et al., 2000: 271, f. 32–33 (♂).

MATERIAL EXAMINED. ABKHAZIA. Gagra Distr.: 2 ♂♂, 4 ♀♀, Gagra Range, Mamdzyshkha Mt. (1866 m), from the border of the forest (N43°18', E40°19', 1705 m) to the peak, alpine meadows, 7–15.07.2009, M.M. Kovblyuk. RUSSIA. *Adygeya*: 7 ♀♀, environs of Dakhovskaya Vil., Belaya River, forest and meadows,



N44°15', E40°12', 400–582 m, 17–20.06.2009, M.M. Kovblyuk; 9 ♀♀, Caucasian State Biosphere Reserve, 11–21 km SE kordon Guseripl, Pastbishe Abago Mt. Range, border of the forest and sub-alpine zone, N43°53.56', E40°12.16', 1727–2010 m, 18–23.08.2009, M.M. Kovblyuk.

**DIAGNOSIS.** Males of *P. caucasica* have a robust regular apophysis, with the distal branch being twice as wide as those in other species of the *P. lugubris* group (Figs 13, 25) [cf. Kronstedt, 1999: f. 2a; Töpfer-Hofmann et al., 2000: f. 20, 24, 26, 28, 30; Almquist, 2005: 214b, 215b, 216a]. Proximal part of all femora in males of *P. caucasica* is dark, while in *P. lugubris* males, only femur I is dark in the proximal part; the other femora have four gray annulations (Figs 5–6). *P. caucasica* has a dark-brown coloration on the front edge of anterior epigynal pocket (Figs 45, 48); this is lacking in the other species.

**DESCRIPTION.** Male and female from Abkhazia and Adygeya respectively. Measurements (♂/♀): total length 4.9 / 6.0; carapace 2.8 / 3.1 long, 2.2 / 2.5 wide. Length of palp segments (male/female): femur 1.2 / 1.1, patella 0.6 / 0.7, tibia 0.6 / 0.8, tarsus 1.2 / 1.1. Length of leg segments (male/female):

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
I	2.3 / 2.5	1.0 / 1.2	2.3 / 2.2	2.5 / 2.2	1.7 / 1.4
II	2.2 / 2.4	1.0 / 1.1	2.0 / 2.0	2.4 / 2.2	1.5 / 1.4
III	2.1 / 2.3	0.9 / 1.0	1.8 / 1.9	2.6 / 2.5	1.3 / 1.3
IV	2.7 / 2.4	1.1 / 0.9	2.6 / 2.1	3.9 / 2.8	1.8 / 1.5

#### Male leg spination.

	Femur	Patella	Tibia	Metatarsus
Leg I	d 1-1-1 (a), pl 2, rl 1-1-1	pl 1, rl 1; II –pl 1, rl 1	pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg II	d 1-1-1 (a), pl 1-1, rl 1-1-1	0	pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg III	d 1-1-1 (a), pl 1-1, rl 1-1-1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg IV	d 1-1-1 (a), pl 1-1, rl 1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)

#### Female leg spination.

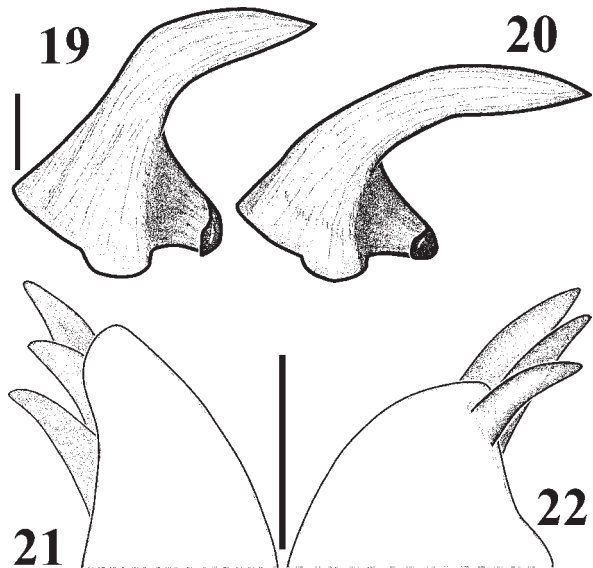
	Femur	Patella	Tibia	Metatarsus
Leg I	d 1-1-1 (a), pl 2, rl 1-1	0	pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1 (a), rl 1-1 (a), v 2-2-3 (a)
Leg II	d 1-1-1 (a), pl 1-1, rl 1-1	pl 1, rl 1	pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1 (a), v 2-2-3 (a)
Leg III	d 1-1-1 (a), pl 1-1, rl 1-1	d 1-1 (a), pl 1, rl 1	pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg IV	d 1-1-1 (a), pl 1-1, rl 1-1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)

Cheliceral teeth (♂♀): anterior — 2, posterior — 3.

General appearance: female — Fig. 3; males have the same coloration with darker carapace — Fig. 5.

Male palp: Figs 13, 17, 21, 25, 29, 35, 37; epigyne: Figs 45–50.

**VARIATION.** Males (n = 2): carapace 2.8 long and 2.1–2.2 wide. Cymbium with 1–3 claws (Fig. 21). Females (n = 10): carapace 2.8–3.3 long and 2.2–2.5



Figs 19–22. Variation in shape of tegular apophysis of *P. abagensis* (19–20 — ventral view, from Abkhazia) and apical part of cymbium of *P. caucasica* (21 — retrolateral view, from Abkhazia) and *P. lugubris* (22 — prolateral view, from Crimea). Scale bars: 0.1 mm.

Рис. 19–22. Вариации формы тегулярного отростка *P. abagensis* (19–20 — вентрально, Абхазия) и апикальная часть цимбиума *P. caucasica* (21 — ретролатерально, из Абхазии) и *P. lugubris* (22 — пролатерально, из Крыма). Масштаб: 0,1 мм.

wide. Epigyne with narrow or wide septum and with two types of anterior pockets (Figs 45–46, 48–49).

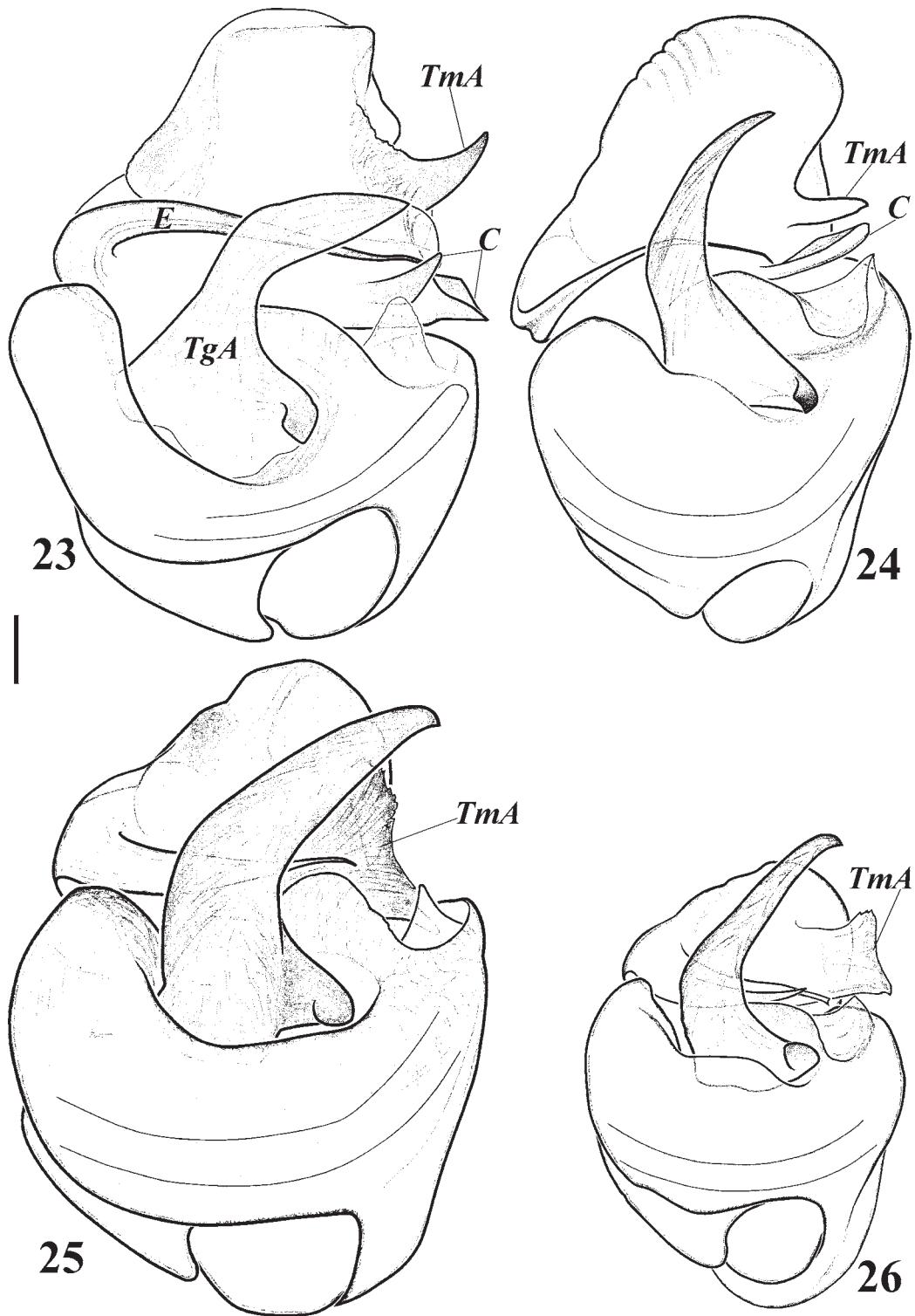
**TYPE LOCALITY.** Guzerypl Vil., Adygeya, Russia [Ovtsharenko, 1979].

**DISTRIBUTION.** Caucasus: Russia (Adygeya, Ingushetiya, Kabardino-Balkariya, Karachaevo-Cherkesiya, Northern Ossetia and Krasnodar Area), Abkhazia, Azerbaijan [Ovtsharenko, 1979; Marusik et al. 2003; Ponomarev & Mikhailov, 2007; Kovblyuk et al., 2011].

#### *Pardosa lugubris* (Walckenaer, 1802)

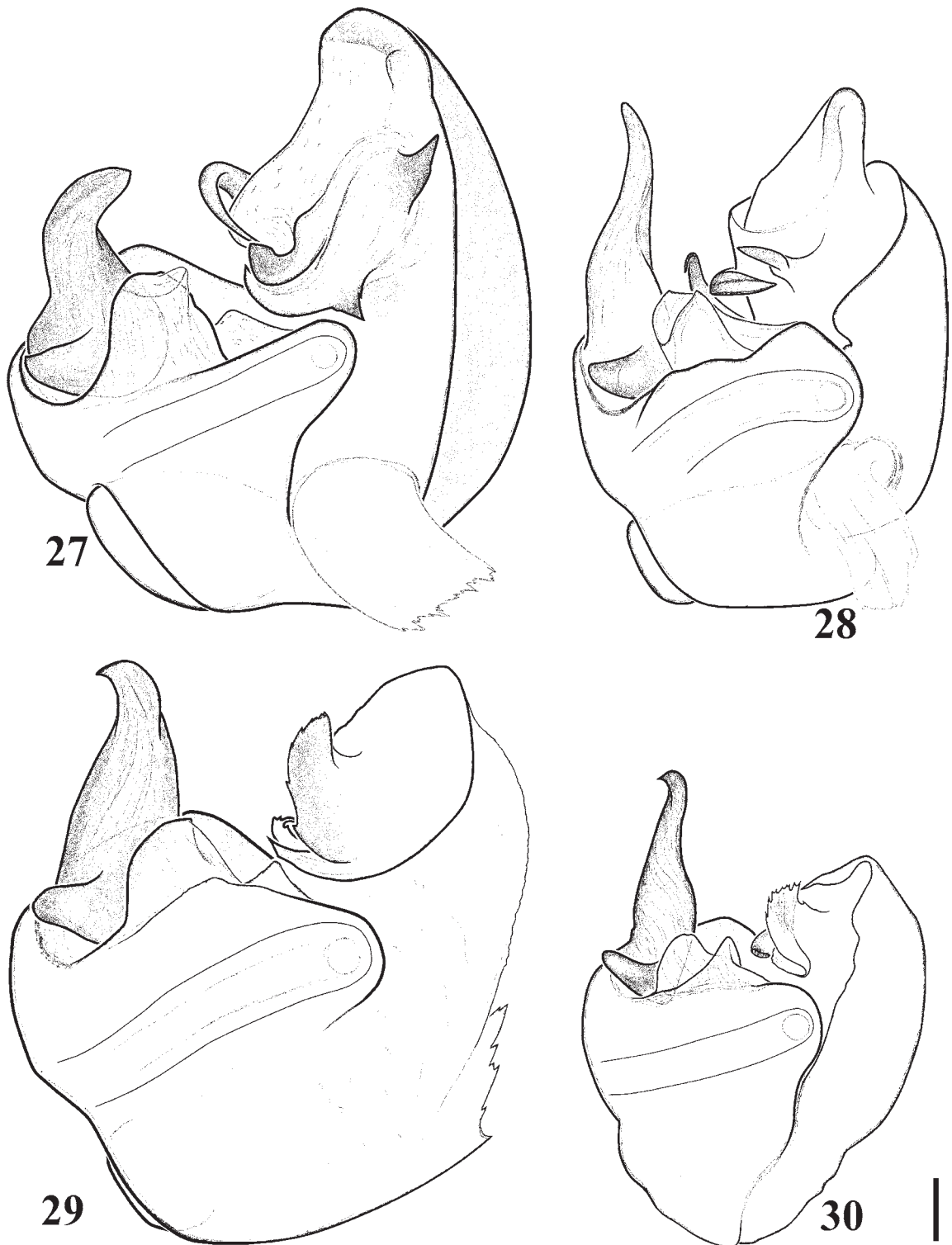
Figs 4, 6, 9–10, 14, 18, 22, 26, 30, 36, 38, 51–59.

**MATERIAL EXAMINED.** ABKHAZIA. *Gudauta Distr.*: 4 ♀♀, environs Pitsunda, Pitsundo-Myusser Reserve, left bank of Ryapsh River, N43°10', E40°25', 23 m, kolkhida wood, 15–24.07.2009, M.M. Kovblyuk. RUSSIA. *Adygeya*: 12 ♀♀, environs of Dakhovskaya Vil., Belaya River, forest and meadows, N44°15', E40°12', 400–582 m, 17–20.06.2009, M.M. Kovblyuk. UKRAINE. *Crimea*: *Alushta Distr.*: 1 ♀, environs of Luchistoe Vil., 10–13.07.1999, A.A. Bezbrazhny. *Bakhchisaray Distr.*: 28 ♀♀, Crimean State Nature Reserve, environs of kordons Asport, Bukovskogo, Sosnoviy, Taryer and Zeleniy Gai, *Fagus*, *Carpinus*, *Quercus petraea*, *Fraxinus*, *Crataegus*, 12.06–21.08.2000, 1.07.2001, M.M. Kovblyuk. *Sevastopol Distr.*: 1 ♀, environs of Kolkhoznoe Vil. (=Uzundzha), Uzundzha River bank, 6.06.2005, O.V. Kukushkin. *Simferopol Distr.*: 259 ♂♂, 15 ♀♀, 500 m S from Lozovoe Vil., pitfalls, 18.04–13.07.2000, M.M. Kovblyuk; 502 ♂♂, 147 ♀♀, environs of Lozovoe Vil., Kessler's Forest, *Quercus petraea*, pitfalls, 18.04–26.08.2000, M.M. Kovblyuk; 40 ♂♂, 26 ♀♀, 3 km NE from Lozovoe Vil., Bairakly Mt., meadows in *Pinus pallasiiana* plantation, pitfalls, 18.04–26.08.2000, M.M. Kovblyuk; 123 ♂♂, 35 ♀♀, Chatyr-Dag Mt., *Quercus*



Figs 23–26. Bulbus of *P. abagensis* — 23, *P. amentata* — 24, *P. caucasica* — 25 and *P. lugubris* — 26 (23, 25 — from Abkhazia; 24, 26 — from Crimea), ventral view. Scale bars: 0.1 mm. *C* — conductor, *E* — embolus, *TgA* — tegular apophysis, *TmA* — terminal apophysis.

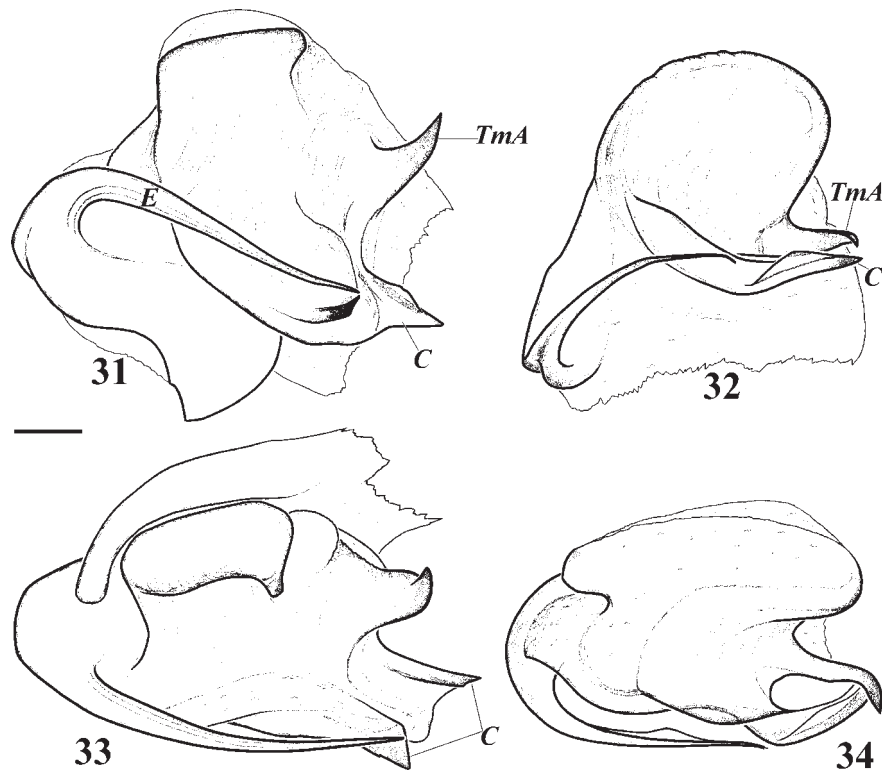
Рис. 23–26. Бульбус *P. abagensis* — 23, *P. amentata* — 24, *P. caucasica* — 25 и *P. lugubris* — 26 (23, 25 — из Абхазии; 24, 26 — из Крыма), вентрально. Масштаб: 0,1 мм. *C* — кондуктор, *E* — эмболус, *TgA* — тегулярный отросток, *TmA* — терминальный отросток.



Figs 27–30. Bulbus of *P. abagensis* — 27, *P. amentata* — 28, *P. caucasica* — 29 and *P. lugubris* — 30 (27, 29 — from Abkhazia; 28, 30 — from Crimea), retrolateral view. Scale bars: 0.1 mm.

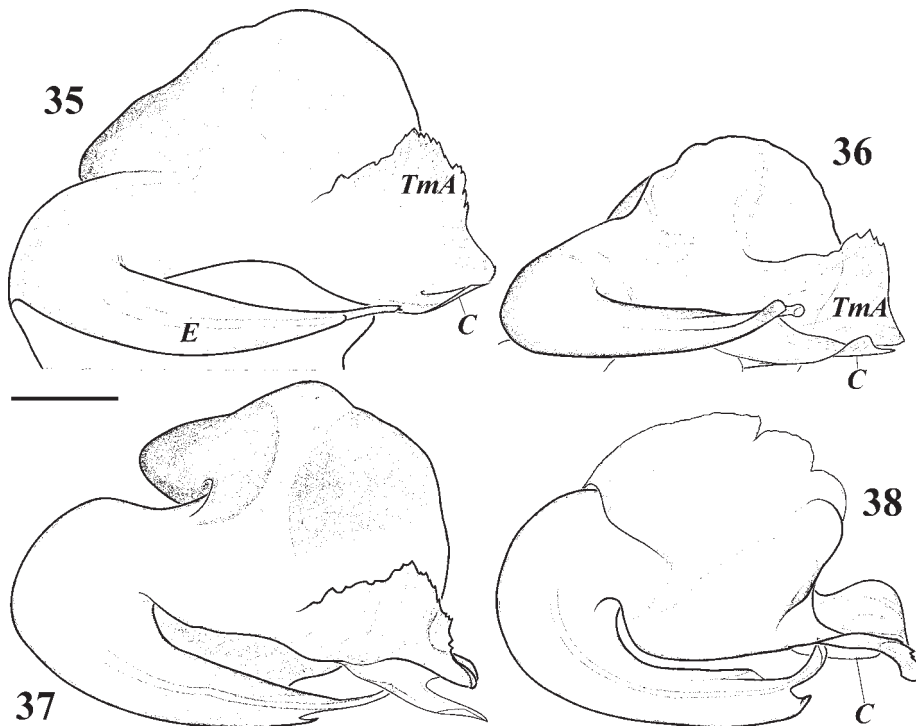
Рис. 27–30. Бульбус *P. abagensis* — 27, *P. amentata* — 28, *P. caucasica* — 29 и *P. lugubris* — 30 (27, 29 — из Абхазии; 28, 30 — из Крыма), ретролатерально. Масштаб: 0,1 мм.





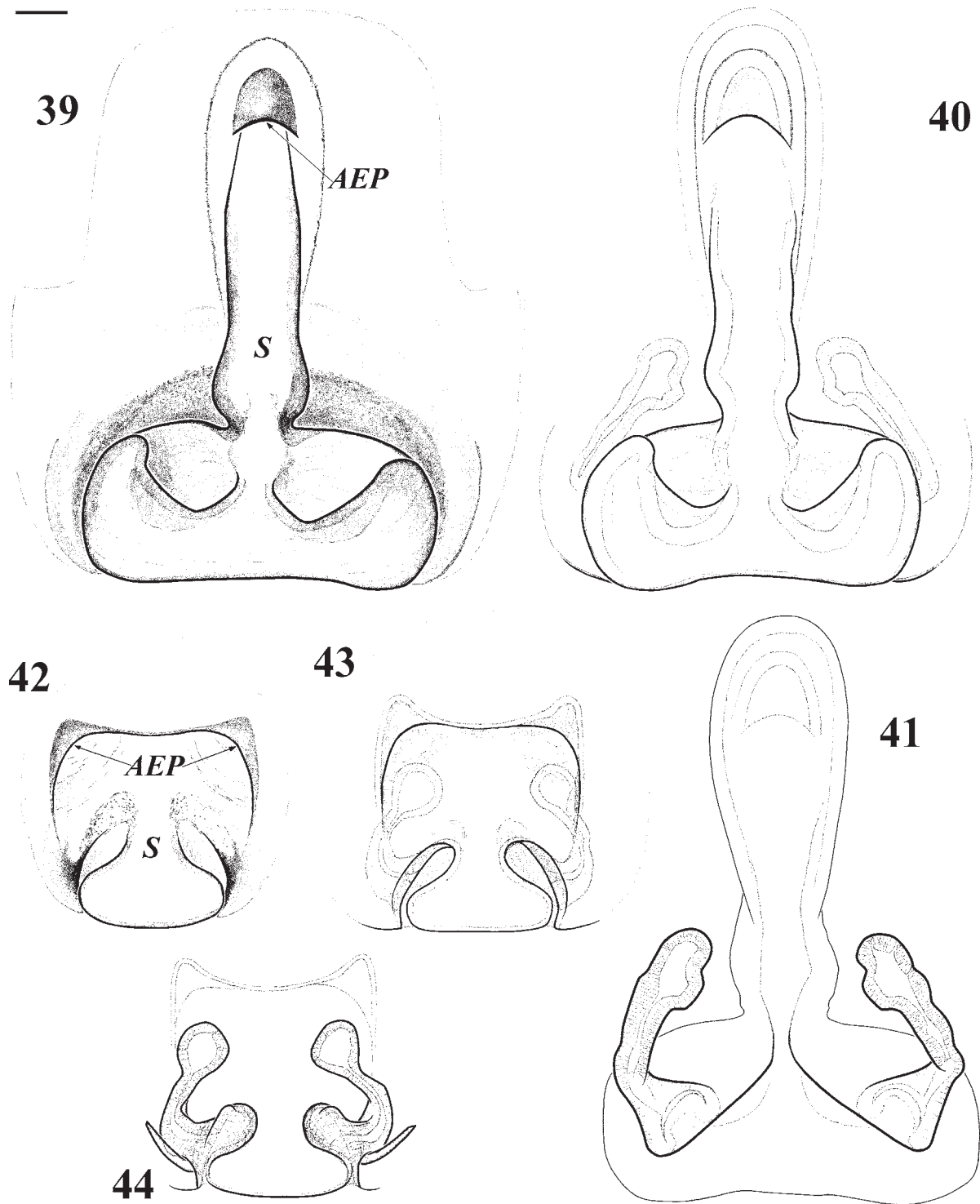
Figs 31–34. Terminal part of bulbus of *P. abagensis* (31, 33 — from Abkhazia) and *P. amentata* (32, 34 — from Crimea): 31–32 — ventral view; 33–34 — frontal view. Scale bars: 0.1 mm. *C* — conductor, *E* — embolus, *TmA* — terminal apophysis.

Рис. 31–34. Терминальная часть бульбуса *P. abagensis* (31, 33 — из Абхазии) и *P. amentata* (32, 34 — из Крыма): 31–32 — вентрально; 33–34 — спереди. Масштаб: 0,1 мм. *C* — кондуктор, *E* — эмболос, *TmA* — терминальный отросток.



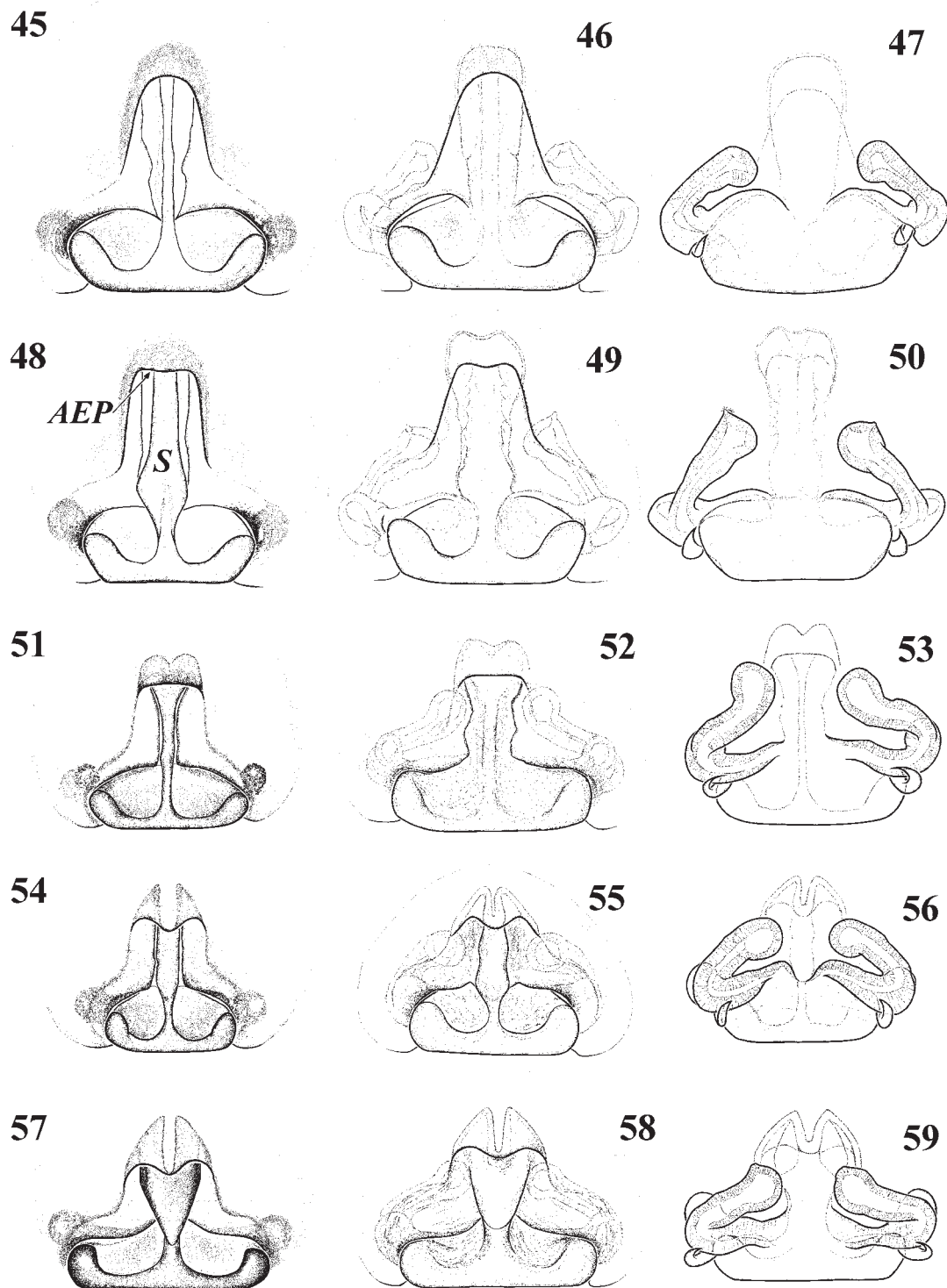
Figs 35–38. Terminal part of bulbus of *P. caucasica* (35, 37 — from Abkhazia) and *P. lugubris* (36, 38 — from Crimea): 35–36 — ventral view; 37–38 — frontal view. Scale bars: 0.1 mm. *C* — conductor, *E* — embolus, *TmA* — terminal apophysis.

Рис. 35–38. Терминальная часть бульбуса *P. caucasica* (35, 37 — из Абхазии) и *P. lugubris* (36, 38 — из Крыма): 35–36 — вентрально; 37–38 — спереди. Масштаб: 0,1 мм. *C* — кондуктор, *E* — эмболос, *TmA* — терминальный отросток.



Figs 39–44. Epigynes of *P. abagensis* (39–41 — from Abkhazia) and *P. amentata* (42–44 — from Crimea): 39–40, 42–43 — ventral view; 41, 44 — dorsal view. Scale bars: 0.1 mm. *AEP* — anterior epigynal pocket; *S* — septum.

Рис. 39–44. Эпигины *P. abagensis* (39–41 — из Абхазии) и *P. amentata* (42–44 — из Крыма): 39–40, 42–43 — вентрально; 41, 44 — дорсально. Масштаб: 0,1 мм. *AEP* — передний карман эпигины; *S* — септум.



Figs 45–59. Epigynes of *P. caucasica* (45–47 — from Abkhazia, 48–50 — from Adygeya) and *P. lugubris* (51–59 — from Crimea): 45–46, 48–49, 51–52, 54–55, 57–58 — ventral view; 47, 50, 53, 56, 59 — dorsal view. Scale bars: 0.1 mm. *AEP* — anterior epigynal pocket; *S* — septum.

Рис. 45–59. Эпигины *P. caucasica* (45–47 — из Абхазии, 48–50 — из Адигеи) и *P. lugubris* (51–59 — из Крыма): 45–46, 48–49, 51–52, 54–55, 57–58 — вентрально; 47, 50, 53, 56, 59 — дорсально. Масштаб: 0,1 мм. *AEP* — передний карман эпигины; *S* — септум.



*petraea*, *Cornus mas*, *Pyrus elaeagnifolia*, mountain meadows, pitfalls, 21.04–2.09.2000, 23.04.2001, M.M. Kovblyuk; 1 ♀, environs of Perevalnoe Vil., Angara River bank, 23–25.05.2002, G.A. Prokopov; 41 ♂♂, 14 ♀♀, Simferopol water reservoir, east bank, pitfalls, 18.04–26.08.2000, 29.06.2003, M.M. Kovblyuk; 15 ♀♀, environs Krasnolesye Vil., *Fagus* & *Carpinus* forest, meadows, 21–30.06.2001, 18–20.06.2002, 27.06–7.07.2003, 1–11.06.2004, N. Azarova, E. Barkova, Yu. Grab, M.M. Kovblyuk, E.Yu. Sviridenko. **Sudak Distr.:** 1 ♂, 4 ♀♀, between Shelkovichnoe and Veseloe Vil., 30.05.1998, M.V. Onchurov; 1 ♀, 10 km W from Sudak, Voron River, 4.06.2000, M.M. Kovblyuk; 1 ♀, environs of Zelenoe Vil., 28.05.2005, O.V. Kukushkin.

**DIAGNOSIS.** *P. lugubris* has distal branch of the tegular apophysis half as wide as in *P. caucasica* (cf. Figs 13–14, 25–26). Two species also differ by the shape of embolus (*E*) (cf. Figs 35–38).

*P. lugubris*, *P. alacris*, *P. baehrorum* and *P. saltans* are very similar in proportions of epigyne and difficult to distinguish. Only *P. caucasica* and *P. lugubris* can be easily distinguished (see diagnosis in *P. caucasica*).

**DESCRIPTION.** Male and female from Crimea. Measurements (♂/♀): total length 4.9 / 5.2; carapace 2.6 / 2.6 long, 1.8 / 2.0 wide. Length of palp segments (male/female): femur 0.9 / 0.9, patella 0.5 / 0.5, tibia 0.5 / 0.6, tarsus 1.0 / 1.0. Length of leg segments (male/female):

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
I	2.2 / 2.2	0.9 / 1.0	2.2 / 2.0	2.2 / 1.9	1.3 / 1.1
II	2.0 / 2.0	0.8 / 0.9	1.8 / 1.7	2.0 / 1.8	1.2 / 1.1
III	1.9 / 2.0	0.8 / 0.9	1.6 / 1.6	2.2 / 2.2	1.2 / 1.0
IV	2.5 / 2.8	0.9 / 1.0	2.3 / 2.5	3.4 / 3.7	1.6 / 1.6

#### Male leg spination.

	Femur	Patella	Tibia	Metatarsus
Leg I	d 1-1-1 (a), pl 2, rl 1-1	0	pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg II	d 1-1-1 (a), pl 1-1, rl 1-1	pl 1, rl 1	pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1 (a), v 2-2-3 (a)
Leg III	d 1-1-1 (a), pl 1-1, rl 1-1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg IV	d 1-1-1 (a), pl 1-1, rl 1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 1-2-2-3 (a)

#### Female leg spination.

	Femur	Patella	Tibia	Metatarsus
Leg I	d 1-1-1 (a), pl 2, rl 1-1	pl 1, rl 1; II – pl 1, rl 1	pl 1, rl 1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg II	d 1-1-1 (a), pl 1-1, rl 1-1	0	pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1 (a), v 2-2-3 (a)
Leg III	d 1-1-1 (a), pl 1-1, rl 1-1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 2-2-3 (a)
Leg IV	d 1-1-1 (a), pl 1-1, rl 1	d 1-1 (a), pl 1, rl 1	d 1-1, pl 1-1, rl 1-1, v 2-2-2 (a)	pl 1-1-1 (a), rl 1-1-1 (a), v 1-2-2-3 (a)

Cheliceral teeth (♂♀): anterior — 2, posterior — 3.

General appearance: female — Fig. 4; males have the same coloration with darker carapace — Fig. 6.

Male palp: Figs 14, 18, 22, 26, 30, 36, 38; epigyne: Figs 51–59.

**VARIATION.** Males (n = 10): carapace 2.4–2.6 long and 1.8–1.9 wide. Cymbium with 1–3 claws (Fig.

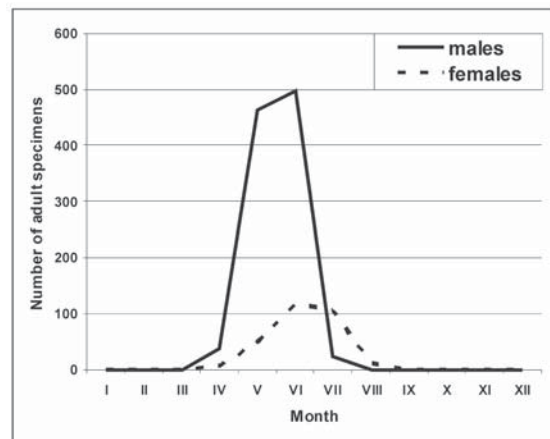


Fig. 60. Phenology of *Pardosa lugubris* in the Crimea, based on the specimens collected.

Рис. 60. Фенология *Pardosa lugubris* в Крыму по материалам нашей коллекции.

22). Females (n = 10): carapace 2.5–3.1 long and 1.9–2.5 wide. Epigyne with narrow or wide septum and two types of anterior pockets (Figs 51–52, 54–55, 57–58).

**TYPE LOCALITY.** Abbaye de Chalis, near Paris, France [Töpfer-Hofmann et al., 2000].

**DISTRIBUTION.** West Palaearctic nemoral range [Mikhailov, 1997; Marusik et al., 2000; Helsdingen, 2010]. In spite of records of this species in Central and East Palaearctic [Mikhailov, 1997], these data probably refer to a closely related undescribed species [Marusik et al., 2000 and personal communication].

**PHENOLOGY.** In Crimea ♂♂ — IV–VII (peak in V–VI), ♀♀ — IV–VIII (peak in VI–VII). Seasonal dynamic of adult's activity in the Crimea show in a Fig. 60. In Europe ♂♀ — III–IX [Fuhn & Niculescu-Burlacu, 1971; Heimer & Nentwig, 1991].

## Discussion

***Pardosa amentata* & *Pardosa lugubris* species groups.** *P. alacris* is the type species of *Pardosa* and a member of the *P. lugubris* group. It is possible that the genus *Pardosa* sensu stricto is limited only by members of the *P. lugubris* group. After separation from the *P. lugubris* group [Töpfer-Hofmann et al., 2000], the *P. amentata* group includes only one species. *P. lugubris* group includes 6 species: *P. alacris* (C.L. Koch, 1833); *P. baehrorum* Kronstedt, 1999; *P. caucasica* Ovtsharenko, 1979; *P. lugubris* (Walckenaer, 1802); *P. pertinax* von Helversen, 2000 and *P. saltans* Töpfer-Hofmann, 2000.

The members of these groups are distinguished by terminal part of bulbus, size proportions of epigynal septum and anterior epigynal pocket. Diagnosis for *P. amentata* and *P. lugubris* groups is given in Table 1.

***P. abagensis* group.** Despite that *P. abagensis* are similar to members of *P. amentata* and *P. lugubris* groups, this species has a unique morphology of the conductor and shape of the epigyne (see Table 1). The fact that *P. amentata* and *P. lugubris* groups differ only

Table 1. Comparative characters of *P. abagensis*, *P. amentata* and *P. lugubris* species groups.  
Таблица 1. Сравнительные признаки групп видов *P. abagensis*, *P. amentata* и *P. lugubris*.

	<i>P. abagensis</i> group	<i>P. amentata</i> group	<i>P. lugubris</i> group
Median band of carapace	no parallel margins (Fig. 1)	no parallel margins (Fig. 2)	wide, with parallel margins (Figs 3-4)
Embolus modified	no (Figs 31, 33)	no (Figs 32, 34)	yes (Figs 35-38)
Shape of terminal apophysis ( <i>TmA</i> )	claw-like (Figs 31, 33)	claw-like (Figs 32, 34)	flat and wide (Figs 35-38)
Shape of conductor ( <i>C</i> )	with two lobes (Figs 31, 33)	claw-like (Figs 32, 34)	flat (Figs 35-38)
Width of anterior epigynal pocket ( <i>AEP</i> ) relatively to the width of septum	5 times less (Figs 39-40)	subequal (Figs 42-43)	two or three times less (Figs 45-59)

by terminal part of bulbous and epigyne allow us to place *P. abagensis* into separate group. The new species group *P. abagensis* differs from others by the conductor, structured with two lobes, and epigyne, which has anterior epigynal pockets that are 5 times narrower than the septum.

**Distribution of species of *P. abagensis*, *P. amentata* and *P. lugubris* groups.** Most of described species of these groups are distributed in Europe (*P. alacris*, *P. amentata*, *P. baehrorum*, *P. lugubris*, *P. pertinax*, *P. saltans*). *P. amentata* and *P. lugubris* are the most widespread species, and occur in the West and Central Palaeartic. *P. abagensis* and *P. caucasica* are known only from the Caucasus. Comparison of distribution and habitats of species from *P. abagensis*, *P. amentata* and *P. lugubris* groups is given in Table 2. These data are compiled according to Ovtsharenko [1979], Dunin [1979], Mikhailov [1997, 1998, 1999], Kronstedt [1999], Weiss & Petrisor [1999], Töpfer-Hofmann et al. [2000], Marusik et al. [2003], Otto & Dietzold [2006], Helsdingen [2010] and present data.

The majority of species have a wide distribution and occur in woods and the edges of woods below 2000 m. Exception is only one species, *P. abagensis*, which is distributed in alpine and subalpine zones of West Caucasus (2200-3000 m). It is also the argument to place this species in the separate species group. Possibly, *P. abagensis* was evolved from *P. amentata* in alpine zone in West Caucasus.

Species of *P. lugubris* group can be found syntopically: *P. alacris* – *P. lugubris* – *P. saltans* in Europe; *P. baehrorum* – *P. lugubris* in Bavaria (Germany); *P. alacris* – *P. pertinax* in Greece [Töpfer-Hofmann et al., 2000]. According to Ovtsharenko [1979] *P. caucasica* is most common on elevations from 700 to 1800 m on northern macroslope and from 500 to 1900 m on southern macroslope of the Caucasus Major; *P. lugubris* spreads up to 700 m on northern slope and up to 500 m on southern slopes. In Adygeya (Russia) we found syntopically *P. caucasica* and *P. lugubris* between 400 and 580 m. So, *P. caucasica* (occurring in mountain meadows) possibly evolved from *P. lugubris* (occurring at forest edges) in Caucasian mountains.

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Table 2. Comparison of distribution and habitats of *P. abagensis*, *P. amentata* and *P. lugubris* groups.  
Таблица 2. Сравнение распространения и биотопической приуроченности видов групп *P. abagensis*, *P. amentata* и *P. lugubris*.

	Distribution	Habitats	Elevation
<i>P. abagensis</i>	West and North Caucasus (alpine and subalpine zones)	stony landslides	from 2200 to 3000 m
<i>P. amentata</i>	West and Central Palaeartic	eurytopic	to 1800 m
<i>P. alacris</i>	West Palaeartic	<i>Quercus</i> & <i>Fagus</i> woods	to 1400 m
<i>P. baehrorum</i>	Austria, Germany, Romania	bottomland forests	to 600 m
<i>P. caucasica</i>	All Caucasus Major	meadows	from 500 to 1900 m
<i>P. lugubris</i>	West Palaeartic	edges of deciduous and <i>Pinus</i> woods	up to 2000 m
<i>P. pertinax</i>	Greece	edges of <i>Fagus</i> & <i>Quercus</i> woods	from 1300 to 1700 m
<i>P. saltans</i>	Europe: Austria, Belgium, Czech Republic, Denmark, France, Germany, Great Britain, Italy, Netherlands, Poland, Romania, Sweden, Switzerland	<i>Fagus</i> , <i>Quercus</i> , <i>Castanea</i> and <i>Pinus</i> woods	up to 1400 m

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