

A review of the spider genus *Thanatus* C.L. Koch, 1837 in Crimea (Aranei: Philodromidae)

Обзор пауков рода *Thanatus* C.L. Koch, 1837 Крыма (Aranei: Philodromidae)

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KEY WORDS: spiders, *Thanatus*, Crimea, key to species, annotated checklist.

КЛЮЧЕВЫЕ СЛОВА: пауки, *Thanatus*, Крым, определительный ключ, аннотированный список.

ABSTRACT. Nine *Thanatus* species are recorded from Crimea: *T. arenarius* L. Koch, 1872; *T. atratus* Simon, 1875; *T. formicinus* (Clerck, 1757); *T. imbecillus* L. Koch, 1878; *T. mongolicus* (Schenkel, 1936); *T. oblongiusculus* (Lucas, 1846); *T. pictus* L. Koch, 1881; *T. striatus* C. L. Koch, 1845 and *T. vulgaris* Simon, 1870. *T. mongolicus* is recorded from Crimea and Ukraine for the first time; three other species (*T. oblongiusculus*, *T. pictus* and *T. striatus*) are recorded from Crimea for the first time. The record of *T. mongolicus* from Crimea lies at the westernmost limit of species' range. The earlier record of *T. coloradensis* from Crimea was based on misidentification and actually belongs to *T. formicinus*. An identification key, diagnostic drawings, distributional maps, spatial distribution in Crimea and phenology are provided for all species.

РЕЗЮМЕ. В Крыму зарегистрированы 9 видов рода *Thanatus*: *T. arenarius* L. Koch, 1872; *T. atratus* Simon, 1875; *T. formicinus* (Clerck, 1757); *T. imbecillus* L. Koch, 1878; *T. mongolicus* (Schenkel, 1936); *T. oblongiusculus* (Lucas, 1846); *T. pictus* L. Koch, 1881; *T. striatus* C. L. Koch, 1845 и *T. vulgaris* Simon, 1870. *T. mongolicus* обнаружен впервые в Крыму и на Украине; три других вида (*T. oblongiusculus*, *T. pictus* и *T. striatus*) — впервые в Крыму. Находка *T. mongolicus* в Крыму — самая западная для этого вида. Установлено, что раннее указание *T. coloradensis* из Крыма основано на ошибочном определении и на самом деле относится к *T. formicinus*. Для всех видов приводятся определительный ключ, диагностические рисунки, карты распространения, ландшафтно-биотопическое распространение в Крыму и фенология.

Introduction

Thanatus C.L. Koch, 1837 is the second largest genus of the family Philodromidae, after *Philodromus*

Walckenaer, 1826 [Platnick, 2013]. In the world fauna (except Australia and New Zealand), the genus contains 96 species, of which the majority are known from the Holarctic Region [Platnick, 2013]. Overall, the genus remains poorly studied, with more than a half of the described species (c. 50) being known from a single sex and/or the type locality only [Platnick, 2013]. The genus has been revised or surveyed within the scope of the faunas of North America (8 species) [Donald & Redner, 1978], Sweden (5 species) [Almqvist, 2006], Hungary (6 species) [Szita & Samu, 2000], Israel (7 species) [Levy, 1977, 1991, 1999], the United Arab Emirates (5 species) [Logunov, 2011], Turkey (8 species) [Logunov & Kunt, 2010], Azerbaijan (7 species) [Logunov & Huseynov, 2008], Middle Asia (10 species) [Lyakhov, 2000], Siberia (19 species) [Logunov, 1996], China (9 species) [Song *et al.*, 1999] and Japan (5 species) [Ono & Ban, 2009].

The first *Thanatus* species from Crimea — *T. vulgaris* Simon, 1870 — was reported by S.A. Spassky in 1927. Many years later, Kovblyuk with the co-authors [Kovblyuk, 2004a, 2007, 2013; Kovblyuk *et al.*, 2008a,b; *etc.*] recorded five additional species: viz., *T. arenarius* L. Koch, 1872; *T. atratus* Simon, 1875; *T. coloradensis* Keyserling, 1880; *T. formicinus* (Clerck, 1757) and *T. imbecillus* L. Koch, 1878. Of them, the record of *T. coloradensis* [Kovblyuk, 2007] was proven to be a misidentification and should actually be referred to *T. formicinus* (the pertinent material has been re-examined). Thus, only five species have been reported from Crimea to date.

While sorting out the spider material collected from Crimea during the last few years, we have identified four additional species. Thus, the main purpose of the present work is to gather both original and literature-derived data on the Crimean *Thanatus* and to illustrate all the recorded species. In addition, we have provided data for their distribution and phenology in Crimea, and an identification key to all Crimean species.

Material and methods

Drawings were made under both stereo and compound light microscopes by using a grid method. Epigynes were illustrated after maceration in KOH 20% water solution.

The morphological terminology follows Shick [1965], Logunov [1996] and Zhita & Samu [2000] with some amendments; the abbreviations used in the text and figure plates are as follows: *A* — alveolus; *Ap* — anterior guide pocket; *C* — conductor; *Co* — copulatory opening; *Cy* — cymbium; *D* — duct of spermathecal organ; *E* — embolus; *Ep* — epigynal pocket; *Fd* — fertilization duct; *L* — lateral edge of epigynal pocket; *M* — membranous area; *Mp* — median plate; *R* — receptaculum seminis; *RTA* — retrolateral tibial apophysis; *S* — spermatheca; *So* — spermathecal organ; *St* — subtegulum; *T* — tegulum; *Ta* — tegular apophysis; *VTA* — ventral tibial apophysis. In the material reported below the name of collector M.M. Kovblyuk is abbreviated as M.K.

In the following text we have only provided references to the most useful publications, including books and revisions. For a complete set of taxonomic references see Platnick [2013]. Species ranges have been characterized following Gorodkov [1984] and Logunov & Marusik [2000]. All the specimens treated in this study are deposited in the collection of Zoology Department, V.I. Vernadsky Taurida National University (TNU), Simferopol, Ukraine (curator: M.M. Kovblyuk).

KEY TO THE *THANATUS* SPECIES FOUND IN CRIMEA

Males:

- 1 Eye field light, with no colour pattern (Fig. 66) *T. oblongiusculus*
- Eye field with a dark pattern (Figs 61–65) 2
- 2 *RTA* bifurcated (Figs 5–6, 9–10, 26, 31–32) 3
- *RTA* uniramous (Figs 11–16) 4
- 3 *RTA* fishtail-shaped (Figs 5, 9, 26) *T. arenarius*
- *RTA* two-armed (beak-shaped) (Figs 6, 10, 31–32) *T. imbecillus*
- 4 Embolic base swollen, with a keel (Figs 7, 11, 22, 38) ... *T. vulgaris*
- Embolic base not swollen 5
- 5 *RTA* rounded (Fig. 12) *T. atratus*
- *RTA* pointed 6
- 6 *VTA* large, well-developed 7
- *VTA* small, not visible 8
- 7 *VTA* and *RTA* separated from each other *T. striatus*
- *VTA* and *RTA* closely situated and slightly overlapped (Fig. 2, 16, 19) *T. pictus*
- 8 *RTA* blade-shaped (Fig. 15) *T. formicinus*
- *RTA* with a visible ledge on its dorsal side (Fig. 13) *T. mongolicus*

Females:

- 1 Epigyne with *Ap* (Fig. 46) *T. pictus*
- Epigyne without *Ap* 2
- 2 *Mp* with well visible folds anteriorly (Fig. 42) *T. imbecillus*
- *Mp* without folds 3

- 3 *Co* visible (Fig. 48) *T. arenarius*
- *Co* not visible 4
- 4 Lateral edge of *Ep* S-shaped (Fig. 39) *T. formicinus*
- Lateral edge of *Ep* different 5
- 5 *Mp* posteriorly wider than anteriorly; *Ep* extremely narrow, slit-like (Fig. 45) *T. mongolicus*
- *Mp* posteriorly as wide as anteriorly; *Ep* wide 6
- 6 *Mp* narrowed in its central part (Fig. 49); *D* long (Fig. 52) *T. oblongiusculus*
- *Mp* pyriform; *D* short 7
- 7 Posterior edge of *Mp* bent ventrad (often like a sharpened tooth) (Fig. 47) *T. vulgaris*
- Posterior edge of *Mp* not bent (like a transverse plate) ... 8
- 8 *Ep* wide, epigyne without extra ribs (Fig. 44); spermathecae large (Figs 53, 57) *T. atratus*
- *Ep* narrow, lateral edges of *Ep* with extra ribs (Fig. 50); spermathecae small and strongly separated from each other (Fig. 58) *T. striatus*

Species survey

Thanatus arenarius Thorell, 1872

Figs 5, 9, 20, 26, 36, 48, 54, 64, 73–74.

T. a.: Tullgren, 1970: 123, f. 46B, pl. 17, f. 234–236 (♂♀).

T. a.: Logunov, 1996: 171, f. 6, 86–87, 125–136 (♂♀).

T. a.: Roberts, 1998: 189, f. (♂♀).

T. a.: Lyakhov, 2000: 226, f. 1–4 (♂♀).

T. a.: Szita & Samu, 2000: 161, f. 6–9, 16–17, 47–48 (♂♀).

T. a.: Almquist, 2006: 471, f. 402a–h (♂♀).

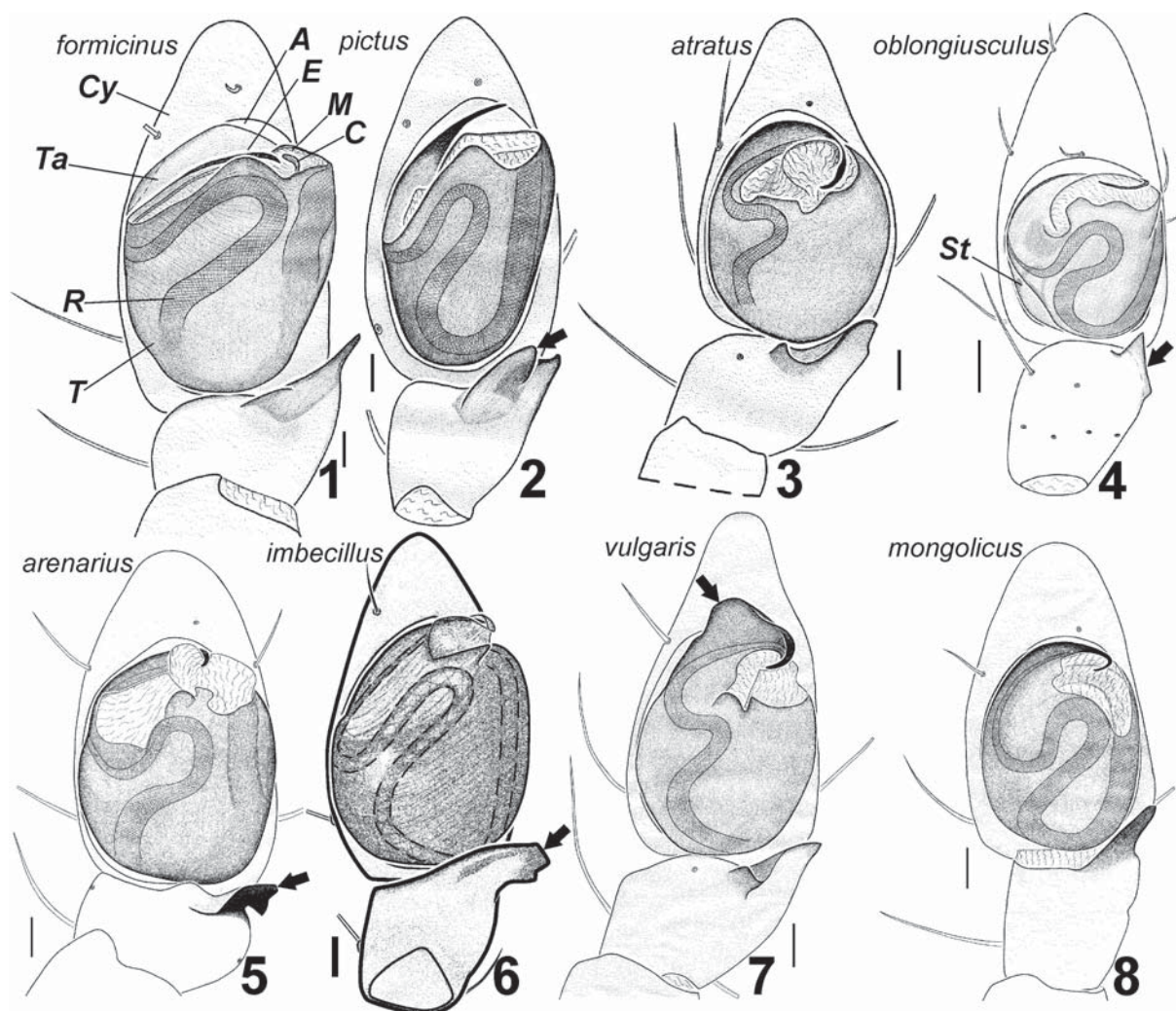
RECORDS FROM CRIMEA. Kovblyuk [2004a].

MATERIAL. UKRAINE. **Crimea**: Lenino Distr.: 1 ♀ (TNU), Kerch Peninsula, vicinity of Presnovodnaya railway station, Verkhne-Zamorskoe Vil., pitfall traps, 13.06.1997, M.K.; Saky Distr.: 3 ♀♀ (TNU-1624/6, 1626/3, 1628/3), vicinity of Pribrezhnaya railway station, saline meadow, pitfall traps, 19.07–17.10.2000, M.K.; 1 ♀ (TNU-1580/4), same locality, salt-marsh, *Salicornia europaea*, *Halocnemum strobilaceum*, pitfall traps, 28.07–9.08.2000, M.K.; Simferopol Distr.: 1 ♂ (TNU-964/3), vicinity of Lozovoe-3 Vil., western spur of Bayrakly Mt. (519 m), the watershed, ~250 m, dry steppe, pitfall traps, 14–26.05.2000, M.K.; 11 ♂♂ (TNU-1786/8, 1787/13, 1788/9, 1789/7), vicinity of Skvortsovo Vil., steppe, pitfall traps, 27.04–9.06.2002, M.K.; 1 ♂, 1 ♀ (TNU-1845/8, 1849/2), same locality, forest plantation, pitfall traps, 9.05–10.07.2002, M.K.; 3 ♂♂ (TNU-1756/10, 1757/12), same locality, steppe with *Stipa* and *Festuca*, pitfall traps, 9.05–1.06.2002, M.K.; 3 ♂♂ (TNU-1856/3, 1857/3), same locality, steppe, pitfall traps, 9.05–1.06.2002, M.K.; 1 ♂ (TNU-1838/10/1), same locality, meadow near of canal, pitfall traps, 30.06–10.07.2002, M.K.

DISTRIBUTION. West and Central Palaearctic sub-boreal range. This species is known from Spain in the west to Mongolia in the east, and from Norway in the north to Crete and Iran in the south [Marusik *et al.*, 2000; Helsdingen, 2012].

HABITATS. Salt-marshes with *Salicornia europaea* and *Halocnemum strobilaceum*; saline meadows; dry steppes; forest plantations.

PHENOLOGY. In Crimea: ♂♂ — V–VII, ♀♀ — VI–VIII, X, the peak of adults' activity is in May. In Sweden: ♂♂ — V–VI, ♀♀ — V–VIII [Almquist, 2006], as in Crimea. In Central Europe and Hungary: ♂♀ — IV–VII [Szyta & Samu, 2000; Nentwig *et al.*, 2013], the period of adults' activity seem to start a month earlier than in Crimea.



Figs 1–8. Ventral views of the male palps of *Thanatus* species: 1 — *T. formicinus*; 2 — *T. pictus*; 3 — *T. atratus*; 4 — *T. oblongiusculus*; 5 — *T. arenarius*; 6 — *T. imbecillus*; 7 — *T. vulgaris*; 8 — *T. mongolicus*. Scale = 0.1 mm.

Abbreviations: A — alveolus; C — conductor; Cy — cymbium; E — embolus; M — membranous area; R — receptaculum seminis; St — subtegulum; T — tegulum; Ta — tegular apophysis.

Рис. 1–8. Вентральные ракурсы палпы самцов рода *Thanatus*: 1 — *T. formicinus*; 2 — *T. pictus*; 3 — *T. atratus*; 4 — *T. oblongiusculus*; 5 — *T. arenarius*; 6 — *T. imbecillus*; 7 — *T. vulgaris*; 8 — *T. mongolicus*. Масштаб 0,1 мм.

Обозначения: A — ямка цимбиума; C — кондуктор; Cy — цимбиум; E — эмболюс; M — мембрана; R — рецептакула; St — субтегулум; T — тегулум; Ta — вырост тегулула.

Thanatus atratus Simon, 1875

Figs 3, 12, 21, 27, 33, 40–41, 43–44, 53, 57, 65, 70, 73–74.

T. vulgaris borealis: Tullgren, 1970: 120, f. 45B, pl. 18, f. 237 (♀).

T. a.: Logunov, 1996: 185, f. 178–179, 190–193, 198–200 (♂♀).

T. a.: Szita & Samu, 2000: 171, f. 37–39, 43–44, 55–56 (♂♀).

T. a.: Muster & Thaler, 2003: 376, f. 3, 6, 9, 14–15, 20–21 (♂♀).

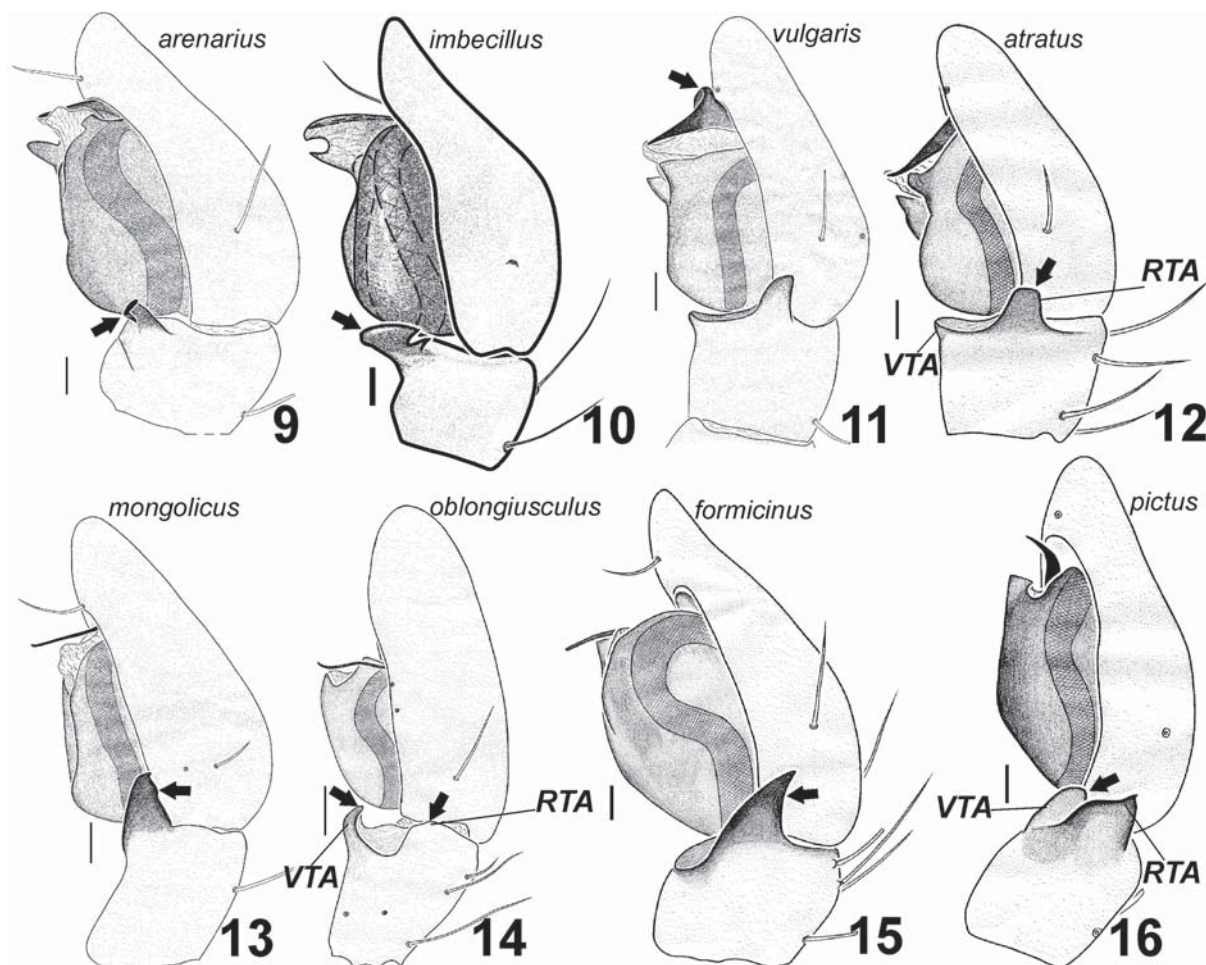
T. a.: Almquist, 2006: 471, f. 403a–d (♂♀).

T. a.: Kovblyuk et al., 2008: 24, f. 35–37 (♂).

RECORDS FROM CRIMEA. Kovblyuk et al. [2008a,b]; Kovblyuk & Kukushkin [2008].

MATERIAL. UKRAINE. Crimea: Bakhchisaray Distr.: 1 ♂ (TNU-1039/14), Crimean State Reserve, cordon Tar'er, meadow

on the dam, sweeping, 30.06.2001, M.K.; Feodosiya Distr.: 1 ♂ (TNU-2284/5), Karadag Nature Reserve, Biological station, 8–9.07.2006, M.K.; 8 ♂♂ (TNU-2720/9, 2721/7, 2722/5), same reserve, 44°55'11.7"N, 35°12'18.0"E, stony steppe, pitfall traps, 20.06–4.08.2008, A.A. Nadolny; 1 ♂ (TNU-2741/8), same reserve, 44°55'0.9"N, 35°12'17.6"E, 37 m, *Quercus pubescens* forest, ravine, pitfall traps, 2–21.07.2008, A.A. Nadolny; 80 ♂♂, 3 ♀♀ (TNU-2870/9, 2871/13, 2872/18, 2873/5), same reserve, Lobovoy Mt. Range, 44°54'58"N, 35°12'21"E, 51 m, *Pistacia mutica*, pitfall traps, 6.06–4.08.2008, M.K. & A.A. Nadolny; 11 ♂♂, 2 ♀♀ (TNU-2952/14, 2953/13, 2954/5, 2955/4), same reserve, Beregovoy Mt. Range, 44°54'58.2"N, 35°13'16.2"E, 238 m, stony steppe, pitfall traps, 7.06–5.08.2008, M.K. & A.A. Nadolny; 9 ♂♂ (TNU-2973/11, 2974/4, 2975/16, 2976/13), same reserve, Beregovoy Mt. Range, 44°54'58"N, 35°13'05"E, 226 m, *Juniperus excelsa* forest, pitfall traps, 7.06–5.08.2008, M.K. & A.A. Nadolny; 12 ♂♂ (TNU-2994/4, 2995/2, 2996/8), same reserve, Magnitnyi Mt. Range, near Chyortov Palets Mt., 44°55'55.3"N,



Figs 9–16. Retrolateral views of the male palps of *Thanatus* species: 9 — *T. arenarius*; 10 — *T. imbecillus*; 11 — *T. vulgaris*; 12 — *T. atratus*; 13 — *T. mongolicus*; 14 — *T. oblongiusculus*; 15 — *T. formicinus*; 16 — *T. pictus*. Scale = 0.1 mm.

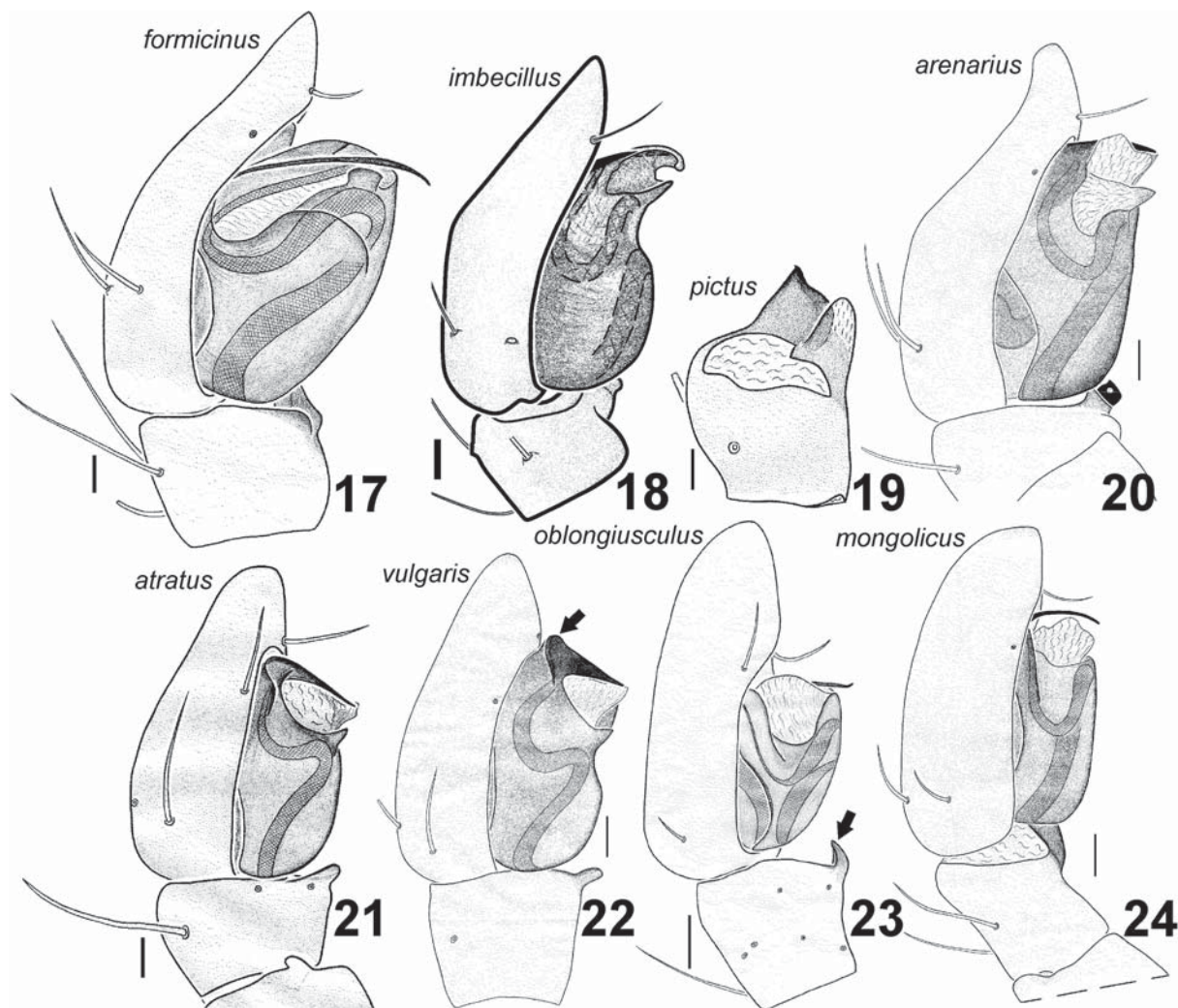
Abbreviations: RTA — retrolateral tibial apophysis; VTA — ventral tibial apophysis.

Рис. 9–16. Ретролатеральные ракурсы палпы самцов рода *Thanatus*: 9 — *T. arenarius*; 10 — *T. imbecillus*; 11 — *T. vulgaris*; 12 — *T. atratus*; 13 — *T. mongolicus*; 14 — *T. oblongiusculus*; 15 — *T. formicinus*; 16 — *T. pictus*. Масштаб 0,1 мм.

Обозначения: RTA — ретролатеральный отросток голени; VTA — вентральный отросток голени.

35°14'22.4"E, 353 m, stony steppe, pitfall traps, 7.06–22.07.2008, M.K. & A.A. Nadolny; 24 ♂♂, 2 ♀♀ (TNU-3044/13, 3045/5, 3046/9, 3047/10), same reserve, between Biological station and Gyaur-Cheshme spring, 44°55'34"N, 35°12'37"E, 109 m, meadow steppe, pitfall traps, 7.06–5.08.2008, M.K. & A.A. Nadolny; 1 ♂ (TNU-3025/2), same reserve, Kara-Agach Mt., 19.06.2008, Z.A. Kastygina; Lenino Distr.: 1 ♀ (TNU-1800/4), Kerch Peninsula, Opuk Reserve, 06.2003, A.M. Semik; Saky Distr.: 8 ♂♂, 1 ♀ (TNU-1598/13, 1599/13, 1600/5), vicinity of Pribrezhnaya railway station, meadow, pitfall traps, 8.06–19.07.2000, M.K.; 28 ♂♂, 1 ♀ (TNU-1658/13, 1659/6, 1660/4, 1661/3), same locality, *Artemisia* on sand, pitfall traps, 8.06–28.07.2000, M.K.; 33 ♂♂, 7 ♀♀ (TNU-1681/16, 1682/9, 1683/13, 1684/6, 1685/6), same locality, *Phragmites communis* on sand, pitfall traps, 8.06–9.08.2000, M.K.; 1 ♂ (TNU-1623/11/1), same locality, saline meadow, pitfall traps, 3–19.07.2000, M.K.; 2 ♀♀ (TNU-1705/8, 1714/13), same locality, *Leymus sabulosus* on sand, pitfall traps, 24.06–19.07.2000, M.K.; Simferopol Distr.: 1 ♀ (TNU), Krasnoles'e Vil., 20.06.1996, R.L. Slushaenko; 1 ♂ (TNU-1011/10), vicinity of Simferopol water reservoir, stony steppe with *Asphodeline taurica*, 23.06–16.07.1998, M.K.; 1 ♂ (TNU), same locality, NE shore, 17.07.1998, M.K.; 21 ♂♂, 15 ♀♀ (TNU-966/10, 967/7, 968/9, 969/12, 970/7), vicinity of Fersmanovo Vil., western spur of Bayrakly Mt. (519 m), ~250

m, dry steppe, pitfall traps, 6.06–26.08.2000, M.K.; 9 ♂♂, 1 ♀ (TNU-1789/8, 1790/6), vicinity of Skvortsovo Vil., steppe, pitfall traps, 1.06–10.07.2002, M.K.; 12 ♂♂, 1 ♀ (TNU-1848/6, 1849/2/1), same locality, forest plantation, pitfall traps, 9.06–10.07.2002, M.K.; 3 ♂♂ (TNU-1759/10), same locality, steppe with *Stipa* and *Festuca*, pitfall traps, 30.06–10.07.2002, M.K.; 2 ♂♂ (TNU-1859/3), same locality, steppe, pitfall traps, 30.06–10.07.2002, M.K.; 6 ♂♂ (TNU-1838/10), same locality, meadow near of canal, pitfall traps, 30.06–10.07.2002, M.K.; Sudak Distr.: 1 ♂ (TNU-2831/5), c. 10 km W of Sudak, vicinity of Mezhdurech'e Vil., grassland, pitfall traps, 26.06–2.07.2010, M.K. Yusufova; 1 ♂ (TNU-2847/14), same locality, steppe, pitfall traps, 26.06–2.07.2010, M.K. Yusufova; Yalta Distr.: 3 ♂♂, 1 ♀ (TNU-1056/7, 1087/10), Martyan Cape Reserve, *Pinus pallasiana*, *Quercus pubescens*, *Juniperus excelsa*, pitfall traps, 17.06.2000–22.07.2001, M.K.; 1 ♂ (TNU-2353/6), same reserve, *Arbutus andrachne*, *Pinus pallasiana*, *Quercus pubescens*, *Juniperus excelsa*, *Carpinus orientalis*, *Cistus tauricus*, *Ruscus ponticus*, in litter, 9.06.2007, M.K.; 4 ♂♂ (TNU-1490/8, 1491/5), Nikita Mt. Range (= Skrinita), ~1200 m, mountain steppe, *Festuca*, *Rosa*, pitfall traps, 14.07–6.08.2001, M.K. Kherson Area: Genichesk Distr.: 1 ♂ (TNU-2883/3), Arabatskaya strelka, c. 4 km S of Genichesk, on sand, 18.06.2011, N.A. Stasyuk.



Figs 17–24. Prolateral views of the male palps of *Thanatus* species: 17 — *T. formicinus*; 18 — *T. imbecillus*; 19 — *T. pictus* (tibia only); 20 — *T. arenarius*; 21 — *T. atratus*; 22 — *T. vulgaris*; 23 — *T. oblongiusculus*; 24 — *T. mongolicus*. Scale = 0.1 mm.

Рис. 17–24. Пролатеральные ракурсы палпов самцов рода *Thanatus*: 17 — *T. formicinus*; 18 — *T. imbecillus*; 19 — *T. pictus* (только голень); 20 — *T. arenarius*; 21 — *T. atratus*; 22 — *T. vulgaris*; 23 — *T. oblongiusculus*; 24 — *T. mongolicus*. Масштаб 0,1 мм.

DISTRIBUTION. West and Central Palaearctic sub-boreal range. This species is known from Spain in the west to the Altai in the east, and from Norway in the north to Turkey in the south [Logunov, 1996; Helsdingen, 2012].

HABITATS. Sub-Mediterranean forests with *Juniperus excelsa*, *Pinus pallasiana*, *Arbutus andrachne*, *Pistacia mutica*, *Quercus pubescens*, *Carpinus orientalis*, *Cistus tauricus*, *Ruscus ponticus*; forest plantations; grasslands; meadows; steppes; semi-deserts with *Artemisia*; sand dunes with *Phragmites communis* and *Leymus*.

PHENOLOGY. In Crimea: ♂♂ — VI–VIII, ♀♀ — VI–VII, the peak of adults' activity is in July. In Sweden, Central Europe and Hungary, the phenology is as in Crimea [Szyta & Samu, 2000; Almquist, 2006; Nentwig *et al.*, 2013].

COMMENTS. *T. atratus* is the most abundant *Thanatus* species in Crimea.

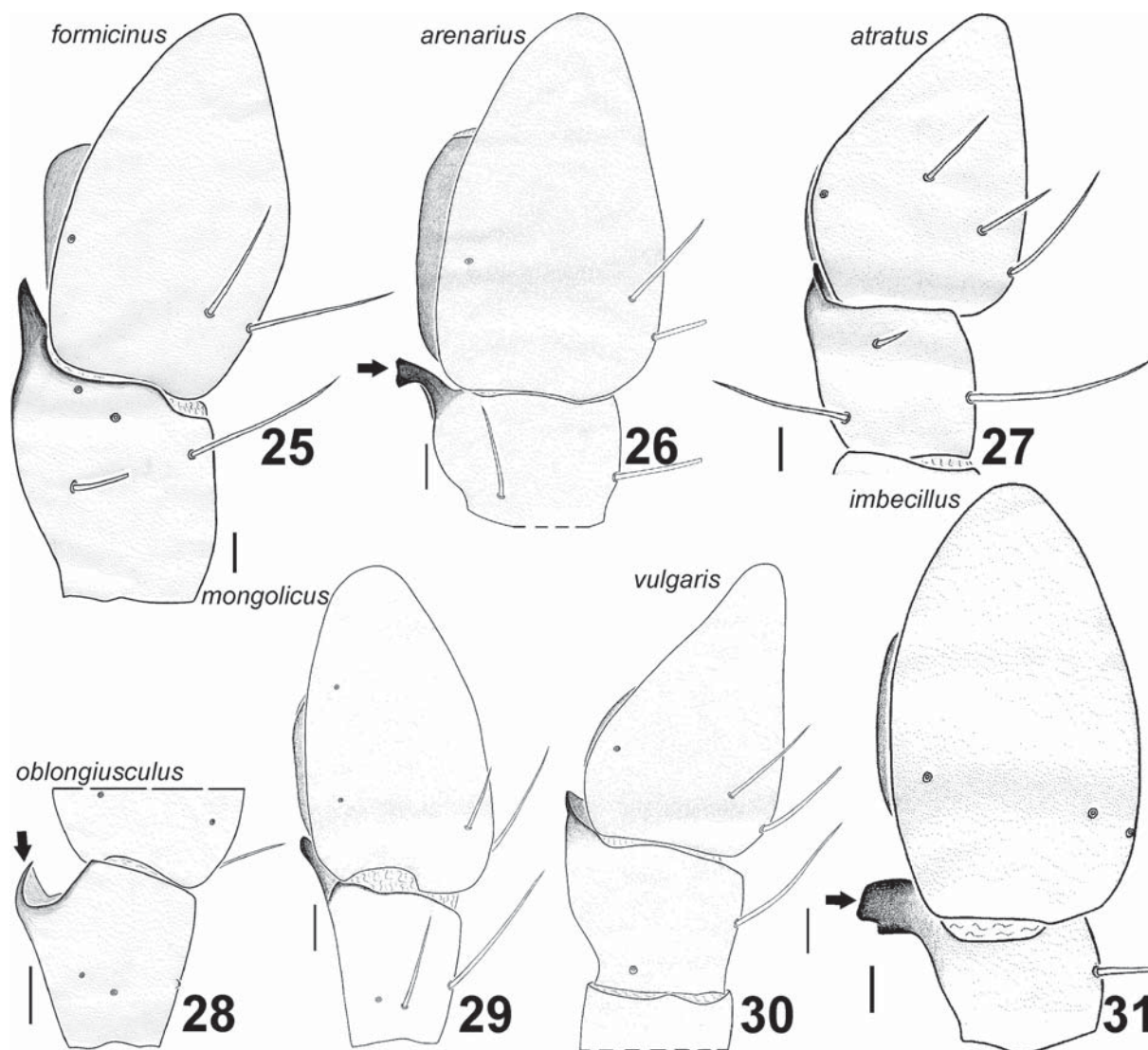
Thanatus formicinus (Clerck, 1757)

Figs 1, 15, 17, 25, 34, 39, 51, 63, 71, 73–74.

- T. f.*: Tullgren, 1970: 121, f. 46A, pl. 17, f. 231–233 (♂♀).
T. f.: Dondale & Redner, 1978: 113, f. 62, 69, 364–369 (♂♀).
T. f.: Logunov, 1996: 154, f. 73–83, 86–87, 105 (♂♀).
T. f.: Roberts, 1998: 189, f. (♂♀).
T. f.: Lyakhov, 2000: 223, f. 28–32 (♂♀).
T. f.: Szita & Samu, 2000: 164, f. 1, 22–24, 31–32, 51–52 (♂♀).
T. f.: Almquist, 2006: 471, f. 404a–d (♂♀).

RECORDS FROM CRIMEA. Kovblyuk [2007: sub *T. coloradensis*, misidentification]; Kovblyuk [2013].

NOTE. The record of *T. coloradensis* from Crimea [Kovblyuk, 2007] has been proven to be a misidentification, and it is actually referred to *T. formicinus* (the



Figs 25–31. Dorsal views of the male palps of *Thanatus* species: 25 — *T. formicinus*; 26 — *T. arenarius*; 27 — *T. atratus*; 28 — *T. oblongiusculus*; 29 — *T. mongolicus*; 30 — *T. vulgaris*; 31 — *T. imbecillus*. Scale = 0.1 mm.

Рис. 25–31. Дорсальные ракурсы палпы самцов рода *Thanatus*: 25 — *T. formicinus*; 26 — *T. arenarius*; 27 — *T. atratus*; 28 — *T. oblongiusculus*; 29 — *T. mongolicus*; 30 — *T. vulgaris*; 31 — *T. imbecillus*. Масштаб 0,1 мм.

collected specimen, male no. TNU-2191/2, has been re-examined). Therefore, we have excluded *T. coloradensis* from the current list of Crimean spiders.

MATERIAL. UKRAINE. Crimea: *Simferopol Distr.*: 1 ♂ (TNU-2191/2), Chatyr-Darh Mt. Range, Orlinoe canyon, 21.05.2000, M.K.; *Yalta Distr.*: 6 ♂♂, 2 ♀♀ (TNU-1479/5, 1480/3, 1482/3, 1483/1, 1484/5, 1491/5/1), Nikita Mt. Range (= Skrinita), ~1200 m, mountain steppe, *Festuca, Rosa*, pitfall traps, 19.03–6.08.2001, M.K.

DISTRIBUTION. Circum-Holarctic temperate range [Logunov, 1996; Mikhailov, 1998; Lyakhov, 2000; Helsdingen, 2012].

HABITATS. Mountain stony steppes.

PHENOLOGY. In Crimea: ♂♂ — III–V, VII, ♀♀ — V, VII, the peak of adults' activity is in April. A similar phenology is in Hungary [Szyta & Samu, 2000]. In Sweden, the phenology is different: ♂♀ — IV–IX [Alm-

quist, 2006], adult activity starts about a month later than in Crimea.

Thanatus imbecillus L. Koch, 1878

Figs 6, 10, 18, 31–32, 42, 55, 68, 73–74.

T. i. L. Koch, 1878: 45 (♀).

T. i.: Kulczyn'ski, 1895: 21, pl. 1, f. 13 (♀).

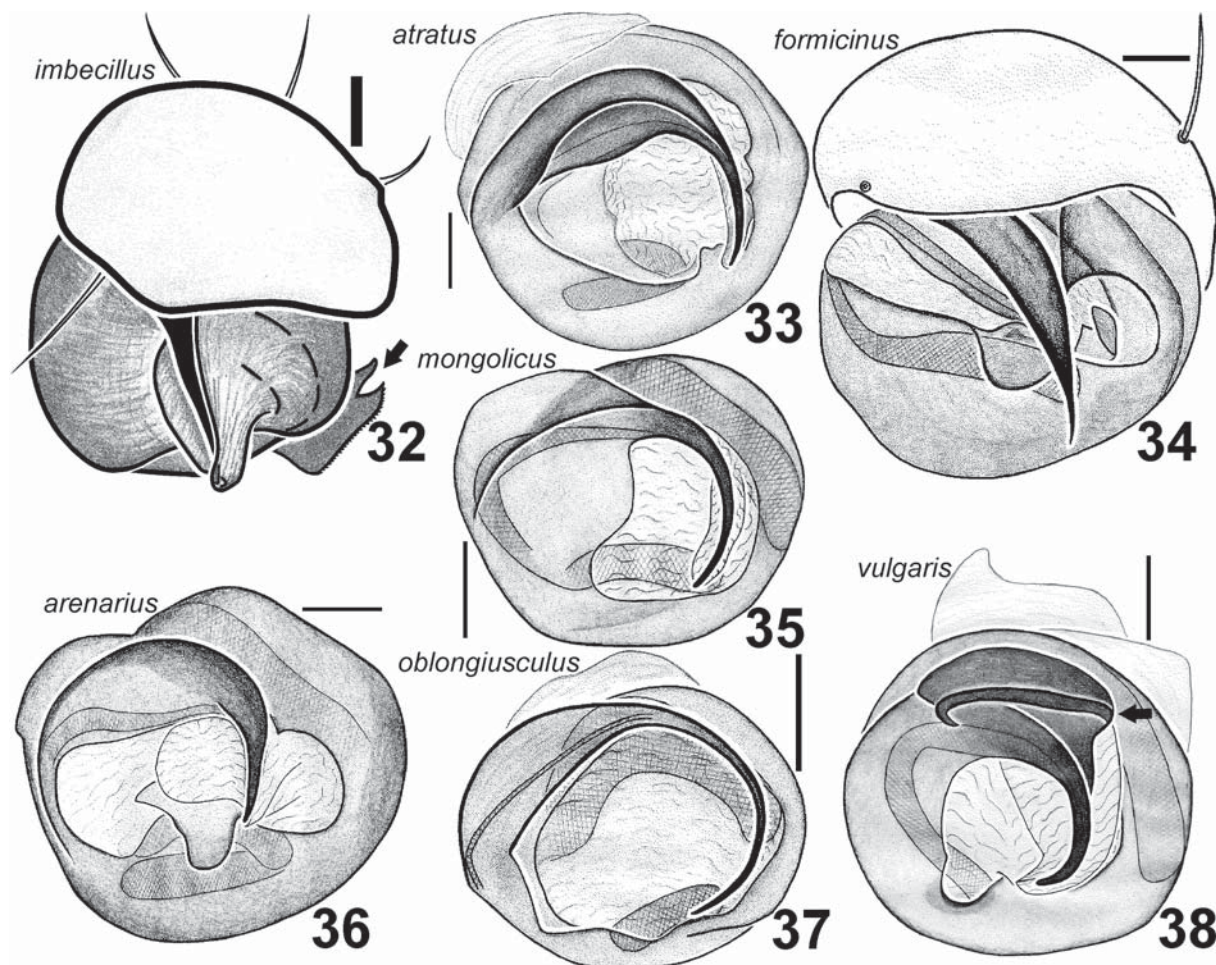
T. i.: Lyakhov, 2000: 223, f. 24–27 (♂♀).

T. i.: Kovblyuk et al., 2008: 24, f. 38–42 (♂).

T. i.: Logunov & Huseynov, 2008: 124, f. 19–22 (♂♀).

RECORDS FROM CRIMEA. Kovblyuk & Kuku-shkin [2007]; Kovblyuk et al. [2008a,b]; Logunov & Huseynov [2008]; Kovblyuk [2012].

MATERIAL. UKRAINE. Crimea: *Feodosiya Distr.*: 21 ♂♂, 11 ♀♀ (TNU-1747/4, 1749/4, 1983/6, 2028/9, 2035/12, 2038/9, 2039/13, 2370/11, 2402/8, 2380/12, 2383/17, 2399/3, 2560/16,



Figs 32–38. Apical views of the bulbuses of male palps of *Thanatus* species: 32 — *T. imbecillus*; 33 — *T. atratus*; 34 — *T. formicinus*; 35 — *T. mongolicus*; 36 — *T. arenarius*; 37 — *T. oblongiusculus*; 38 — *T. vulgaris*. Scale = 0.1 mm.

Рис. 32–38. Апикальные ракурсы бульбусов пальп самцов рода *Thanatus*: 32 — *T. imbecillus*; 33 — *T. atratus*; 34 — *T. formicinus*; 35 — *T. mongolicus*; 36 — *T. arenarius*; 37 — *T. oblongiusculus*; 38 — *T. vulgaris*. Масштаб 0,1 мм.

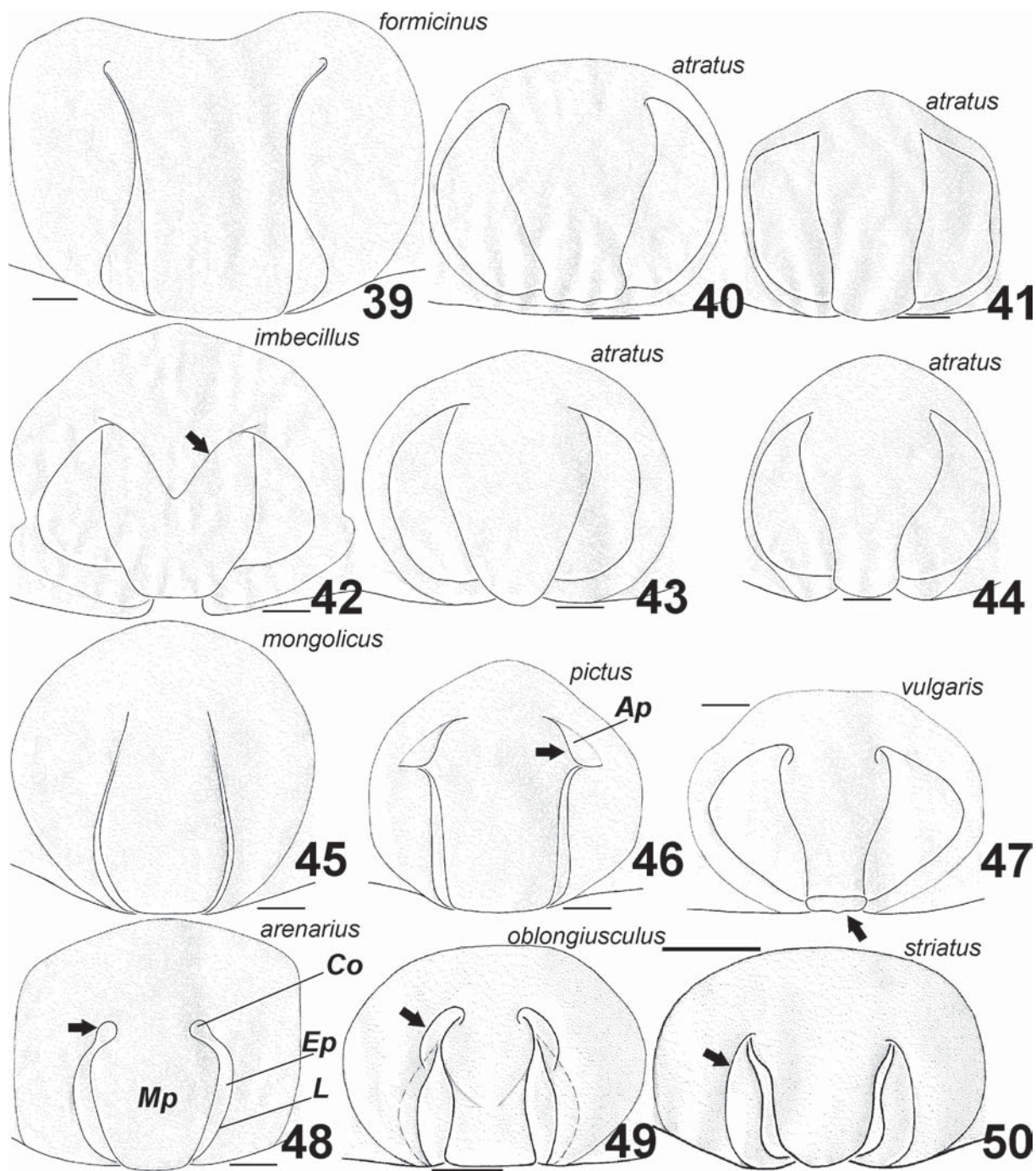
2562/8, 2586/7, 2594/15, 2596/14, 2598/19, 3033/13, 2862/12), Karadag Nature Reserve, 25.04.2003–05.2011, O.V. Kukushkin, A.A. Nadolny, M. Afanas'ev, M.K.; 15 ♂♂ (TNU-2713/7, 2714/1, 2715/1), same reserve, 44°55'11.7"N, 35°12'18.0"E, stony steppe, pitfall traps, 27.04–6.06.2008, M.K.; 2 ♂♂ (TNU-2737/8), same reserve, 44°55'10.9"N, 35°12'17.6"E, 37 m, ravine, *Quercus pubescens* forest, pitfall traps, 9–23.05.2008, M.K.; 36 ♂♂, 1 ♀ (TNU-2867/13, 2868/10, 2869/11, 2872/18/1), same reserve, Lobovoy Mt. Range, 44°54'58"N, 35°12'21"E, 51 m, *Pistacia mutica*, pitfall traps, 27.04–21.07.2008, M.K. & A.A. Nadolny; 1 ♂ (TNU-2907/6), same reserve, Chyorny Ravine, sea coast, 44°54'44.9"N, 35°12'37.5"E, 5 m, *Pistacia mutica*, pitfall traps, 27.04–9.05.2008, M.K.; 36 ♂♂, 9 ♀♀ (TNU-2948/6, 2949/10, 2950/6, 2951/4, 2952/14/1), same reserve, Beregovoy Mt. Range, 44°54'58.2"N, 35°13'16.2"E, 238 m, stony steppe, pitfall traps, 12.04–21.06.2008, M.K.; 1 ♂ (TNU-2970/14), same reserve, Beregovoy Mt. Range, 44°54'58"N, 35°13'05"E, 226 m, *Juniperus excelsa* forest, pitfall traps, 28.04–10.05.2008, M.K.; 19 ♂♂ (TNU-2991/3, 2992/8, 2993/5, 2994/3), same reserve, Magnitnyi Mt. Range, near Chyortov Palets Mt., 44°55'55.3"N, 35°14'22.4"E, 353 m, stony steppe, pitfall traps, 28.04–21.06.2008, M.K.; 13 ♂♂, 3 ♀♀ (TNU-3041/10, 3042/10, 3043/4, 3045/5/1), same reserve, between Biological station and Gyaury-Cheshme spring, 44°55'34"N, 35°12'37"E, 109 m, meadow steppe, pitfall traps, 28.04–3.07.2008, M.K.; Lenino Distr.: 1 ♂ (TNU-3099/7), Kerch Peninsula, Opuk Reserve, SSW

slope, steppe, 22.04.2005, V.A. Gnelitsa; 1 ♀ (TNU-3059/10), same locality, 31.05–2.06.2011, A.A. Nadolny; Sevastopol Distr.: 1 ♂ (TNU), vicinity of Balaklava Vil., S slope Spileya Mt., 30–100 m, 4–7. 05.1998, O.V. Kukushkin; Simferopol Distr.: 1 ♂ (TNU), 2–3 km N of Krasnopescherskoe Vil., 29.05.1998, M.K.; Sudak Distr.: 22 ♂♂, 10 ♀♀ (TNU-2658/7, 2659/6, 2660/2, 2661/7, 2662/2, 2673/7, 2677/11, 2680/2, 2687/7, 2700/2), c. 10 km W of Sudak, vicinity of Mezhdurech'e Vil., pitfall traps, 20.04–17.06. 2010, M.K. Yusufova; Yalta Distr.: 1 ♂, 1 ♀ (TNU-1303/6, 1344/6), c. 1 km N of Nikita Vil., neglected field, pitfall traps, 7.05–11.08.2000, M.K.; 1 ♂ (TNU-1083/6), Martyan Cape Reserve, *Pinus pallasiensis*, *Quercus pubescens*, *Juniperus excelsa*, pitfall traps, 29.04–19.05.2001, M.K.

DISTRIBUTION. Euro-Central Asian subboreal range. This species is known from Greek islands, Bulgaria, Crimea, Rostov Area, the Caucasus, Asia Minor, Central Asia as far as Tajikistan [Lyakhov, 2000; Logunov & Huseynov, 2008; Helsdingen, 2012].

HABITATS. Sub-Mediterranean forests with *Juniperus excelsa*, *Pistacia mutica* and *Quercus pubescens*; meadow steppes, steppes, fields.

PHENOLOGY. In Crimea: ♂♂ — IV–VI, ♀♀ — IV–VIII, the peak of adults' activity is in May.

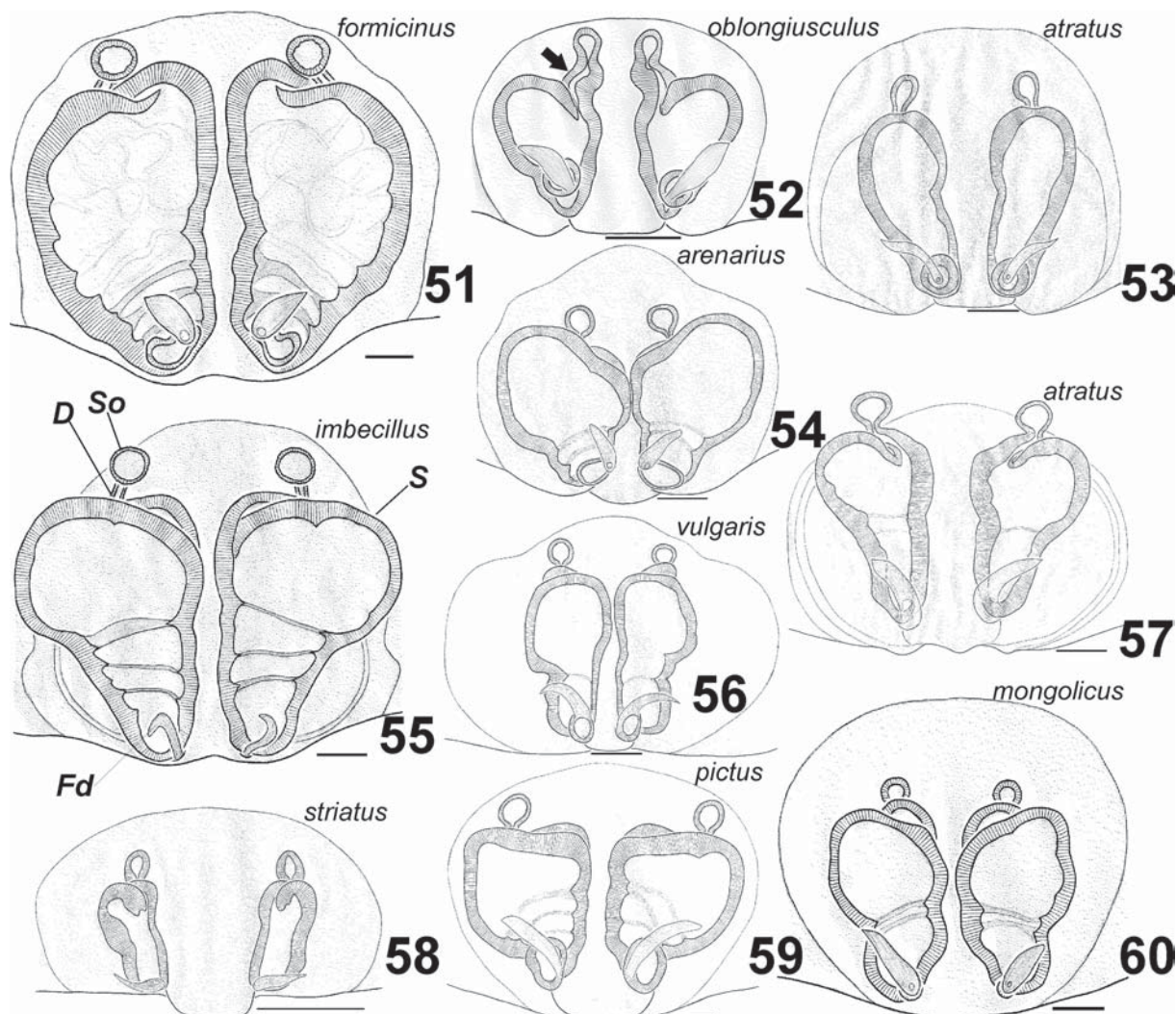


Figs 39–50. Ventral views of the epigynes of *Thanatus* species: 39 — *T. formicinus*; 40–41, 43–44 — variations of *T. atratus*; 42 — *T. imbecillus*; 45 — *T. mongolicus*; 46 — *T. pictus*; 47 — *T. vulgaris*; 48 — *T. arenarius*; 49 — *T. oblongiusculus*; 50 — *T. striatus*. Scale = 0.1 mm.

Abbreviations: *Ap* — anterior guide pocket; *Co* — copulatory opening; *Ep* — epigynal pocket; *L* — lateral edge of epigynal pocket; *Mp* — median plate.

Рис. 39–50. Вентральные ракурсы эпигин рода *Thanatus*: 39 — *T. formicinus*; 40–41, 43–44 — вариации *T. atratus*; 42 — *T. imbecillus*; 45 — *T. mongolicus*; 46 — *T. pictus*; 47 — *T. vulgaris*; 48 — *T. arenarius*; 49 — *T. oblongiusculus*; 50 — *T. striatus*. Масштаб 0,1 мм.

Обозначения: *Ap* — передний карман; *Co* — копулятивное отверстие; *Ep* — карман эпигины; *L* — латеральный край кармана эпигины; *Mp* — медиальная пластинка.



Figs 51–60. Dorsal views of the spermathecae of *Thanatus* species: 51 — *T. formicinus*; 52 — *T. oblongiusculus*; 53, 57 — variation of *T. atratus*; 54 — *T. arenarius*; 55 — *T. imbecillus*; 56 — *T. vulgaris*; 58 — *T. striatus*; 59 — *T. pictus*; 60 — *T. mongolicus*. Scale = 0.1 mm.

Abbreviations: *D* — duct of spermathecal organ; *Fd* — fertilization duct; *S* — spermatheca; *So* — spermathecal organ.

Рис. 51–60. Дорсальные ракурсы спематек рода *Thanatus*: 51 — *T. formicinus*; 52 — *T. oblongiusculus*; 53, 57 — вариации *T. atratus*; 54 — *T. arenarius*; 55 — *T. imbecillus*; 56 — *T. vulgaris*; 58 — *T. striatus*; 59 — *T. pictus*; 60 — *T. mongolicus*. Масштаб 0,1 мм.

Обозначения: *D* — канал органа сперматеки; *Fd* — оплодотворительный канал; *S* — сперматека; *So* — орган сперматеки.

Thanatus mongolicus (Schenckel, 1936)

Figs 8, 13, 24, 29, 35, 45, 60, 62, 73–74.

Philodromus m. Schenckel, 1936: 278, f. 93 (♂).

Philodromus mongolicus: Hu & Wu, 1989: 320, f. 255.1–4 (♂♀).

T. m.: Logunov, 1996: 159, f. 88–90 (♂♀).

MATERIAL. UKRAINE. **Crimea:** Saky Distr.: 4 ♂♂, 1 ♀ (TNU-1576/4, 1577/6, 1578/2), vicinity of Pribreznaya railway station, salt-marsh, *Salicornia europaea*, *Halocnemum strobilaceum*, pitfall traps, 8.06–19.07.2000, M.K.; 4 ♂♂, 2 ♀♀ (TNU-1620/20, 1622/5, 1623/11), same locality, saline meadow, pitfall traps, 28.05–19.07.2000, M.K.; 1 ♀ (TNU-1717/4), same locality, *Leymus sabulosus* on sand, pitfall traps, 9–27.08.2000, M.K.

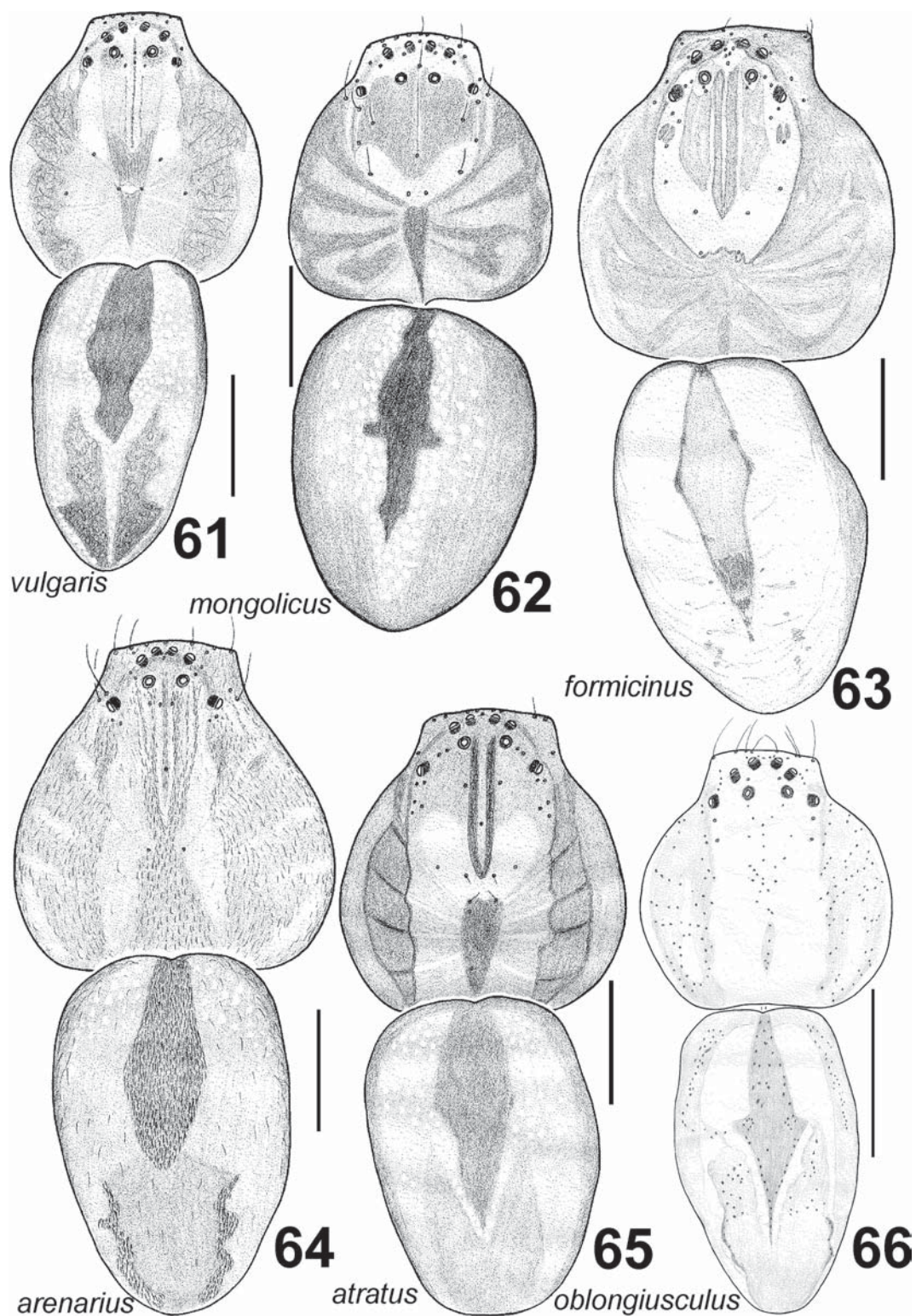
DISTRIBUTION. West and Central Palaearctic sub-boreal range. This species is known from Crimea

[present data] and Rostov Area [Ponomarev, 2011; Ponomarev & Dvanenko, 2012] to Mongolia and China (Xinjiang) [Logunov, 1996]. It seems to be a disjunction of its range in Middle Asia, as there are no records of *T. mongolicus* between Rostov Area and Xinjiang.

COMMENTS. This species is recorded from Crimea and Ukraine for the first time. The record from Crimea lies in the westernmost limit of the known species range.

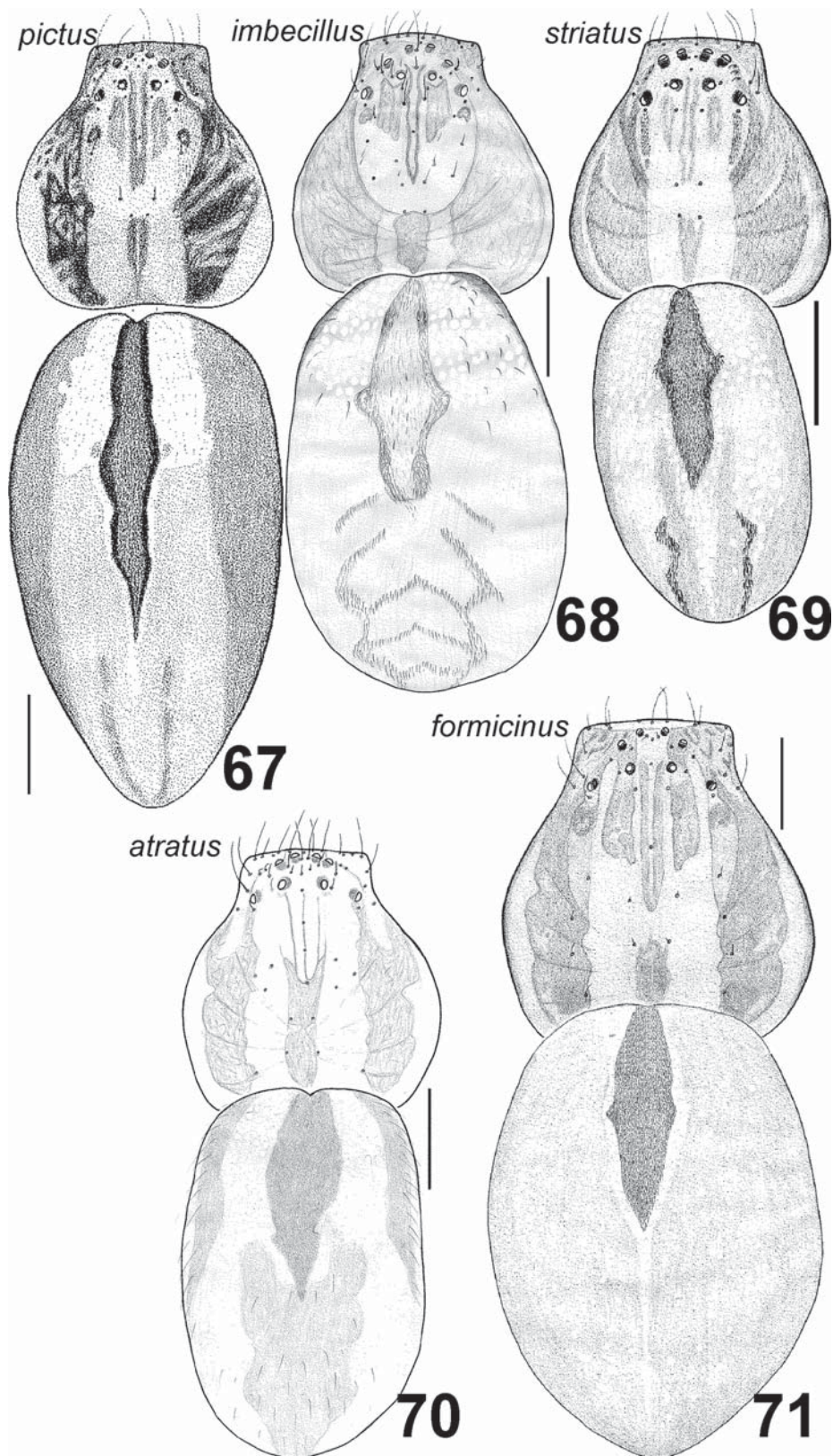
HABITATS. Salt-marshes with *Salicornia europaea* and *Halocnemum strobilaceum*; saline meadows; sand dunes with *Leymus*.

PHENOLOGY. In Crimea: ♂♂ — VI–VII, ♀♀ — VI–VIII, the peak of adults' activity is in June.



Figs 61–66. Dorsal views of *Thanatus* males: 61 — *T. vulgaris*; 62 — *T. mongolicus*; 63 — *T. formicinus*; 64 — *T. arenarius*; 65 — *T. atratus*; 66 — *T. oblongiusculus*. Scale = 1 mm.

Рис. 61–66. Дорсальные ракурсы самцов *Thanatus*: 61 — *T. vulgaris*; 62 — *T. mongolicus*; 63 — *T. formicinus*; 64 — *T. arenarius*; 65 — *T. atratus*; 66 — *T. oblongiusculus*. Масштаб 1 мм.



Figs 67–71. Dorsal views of *Thanatus* females: 67 — *T. pictus*; 68 — *T. imbecillus*; 69 — *T. striatus*; 70 — *T. atratus*; 71 — *T. formicinus*. Scale = 1 mm.

Рис. 67–71. Дорсальные ракурсы самок *Thanatus*: 67 — *T. pictus*; 68 — *T. imbecillus*; 69 — *T. striatus*; 70 — *T. atratus*; 71 — *T. formicinus*. Масштаб 1 мм.



Fig. 72. General appearance of live female of *T. striatus*.

Рис. 72. Внешний вид самки *T. striatus* при жизни.

Thanatus oblongiusculus (Lucas, 1846)

Figs 4, 14, 23, 28, 37, 49, 52, 66, 73–74.

T. constellatus: Logunov, 1996: 167, f. 118–124, 183a (♂♀).

T. constellatus: Lyakhov, 2000: 222, f. 11–16 (♂♀).

T. o.: Logunov & Huseynov, 2008: 126, f. 27 (♀).

MATERIAL. UKRAINE. **Crimea: Feodosiya Distr.**: 3 ♂♂, 1 ♀ (TNU-1768/6, 1815/6/1, 1978/13, 3158/2), Karadag Nature Reserve, vicinity of Biological station, 28.05.2003–16.07.2012, O.V. Kukushkin & M.K.; 1 ♂ (TNU-2996/17), same reserve, Magnitnyi Mt. Range, near Chyortov Palets Mt., 44°55′55.3″N, 35°14′22.4″E, 353 m, steppe, *Stipa*, pitfall traps, 3–22.07.2008, A.A. Nadolny; **Lenino Distr.**: 1 ♀ (TNU-1801/5), Kerch Peninsula, Opuk Reserve, 07.2003, A.M. Semik.

DISTRIBUTION. West and Central Palaearctic subboreal range. This species is known from Spain in the west to the Altai in the east and from Poland and Novosibirsk in the north to Turkey in the south [Logunov, 1996; Lyakhov, 2000; Logunov & Huseynov, 2008; Logunov & Kunt, 2010; Helsdingen, 2012].

COMMENTS. The record of this species is new to the Crimean spider fauna.

HABITATS. Sub-Mediterranean forests with *Pistacia mutica* and *Juniperus excelsa*; steppes.

PHENOLOGY. In Crimea: ♂♂ — V–VII, ♀♀ — VI–VII, the peak of adults' activity is in July. In Central Europe: ♂♀ — V–VII; in Spain, the peak of activity is in July [Urones, 1986; Nentwig *et al.*, 2013] as in Crimea.

Thanatus pictus L. Koch, 1881

Figs 2, 16, 19, 46, 59, 67, 73–74.

T. p.: Chyzer & Kulczyński, 1891: 113, pl. 4, f. 25 (♀).

Apollophanes babaly Lyakhov, in Logunov, 1996: 139, f. 10–15 (♂♀).

T. p.: Lyakhov, 2000: 226, f. 5–10 (♂♀).

T. p.: Szita & Samu, 2000: 168, f. 3, 5, 28–30, 35–36, 54 (♂♀).

MATERIAL. UKRAINE. **Crimea: Lenino Distr.**: 1 ♂ (TNU-2302/6), Kazantip Nature Reserve, 6.10.2006, O.V. Kukushkin; **Kherson Area. Genichesk Distr.**: 2 ♀♀ (TNU-2895/2), Arabatskaya strelka, c. 2.5 km S of Strelkovoe Vil., 24.04.2011, N.A. Stasyuk.

DISTRIBUTION. West-Central Palaearctic subboreal range. This species is known from Germany in the west to the Altai in the east and from Poland and Novosibirsk in the north to Turkey in the south [Logunov, 1996; Lyakhov, 2000; Helsdingen, 2012].

COMMENTS. The record of this species is new to the Crimean spider fauna.

HABITATS. Sand spit.

PHENOLOGY. In Crimea: ♂♂ — X, ♀♀ — IV, the peak of adults' activity is in April. In Central Europe: ♂♀ — IV–VII [Nentwig *et al.*, 2013].

Thanatus striatus C.L. Koch, 1845

Figs 50, 58, 69, 72–74.

T. s.: Schick, 1965: 94, f. 121–123 (♂♀).

T. s.: Tullgren, 1970: 119, f. 45A, pl. 17, f. 228–230 (♂♀).

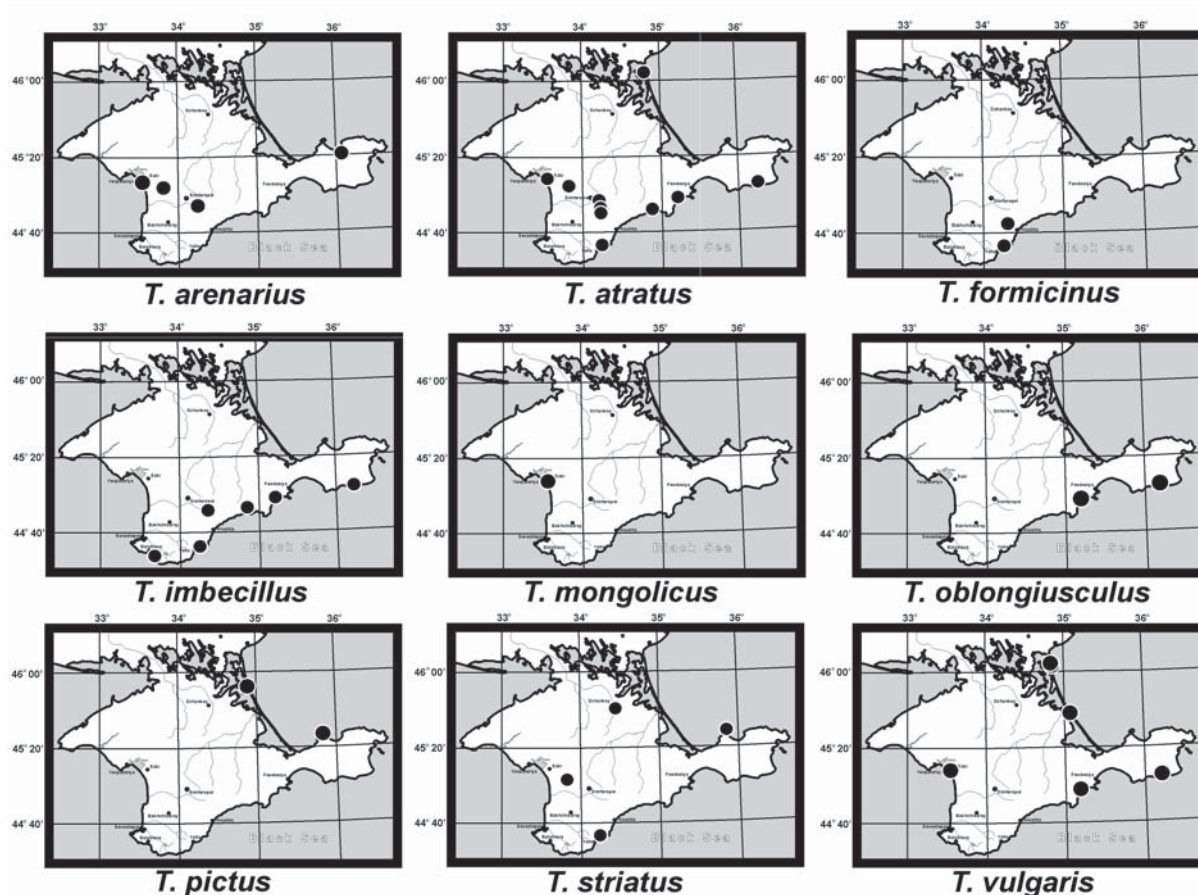


Fig. 73. Distribution maps of *Thanatus* species in Crimea, based on the specimens collected.
Рис. 73. Карты распространения видов рода *Thanatus* в Крыму по материалам коллекции.

T. s.: Dondale & Redner, 1978: 109, f. 353–357 (♂♀).
T. s.: Logunov, 1996: 192, f. 1, 3, 215, 227–233 (♂♀).
T. s.: Roberts, 1998: 188, f. (♂♀).
T. s.: Szita & Samu, 2000: 170, f. 2, 4, 13–15, 20–21, 50 (♂♀).
T. s.: Muster & Thaler, 2003: 381, f. 2, 5, 8, 12–13, 18–19 (♂♀).

T. s.: Almquist, 2006: 473, f. 405a–e (♂♀).

MATERIAL. UKRAINE. Crimea: *Dzhankoy Distr.*: 1♀ (TNU), Dzhankoy, 18.11.1997, M.V. Onchurov; *Lenino Distr.*: 1♀ (TNU), Kazantip Nature Reserve, 2–10.05.2013, M.K.; *Simferopol Distr.*: 1♀ (TNU-1754/13), vicinity of Skvortsovo Vil., steppe with *Stipa* and *Festuca*, pitfall traps, 13–27.04.2002, M.K.; *Yalta Distr.*: 1♀ (TNU-1300/5), c. 1 km N Nikita Vil., neglected field, pitfall traps, 15–22.04.2000, M.K.; 1♀ (TNU-1160/7), Martyan Cape Reserve, *Arbutus andrachne*, *Juniperus excelsa*, *Cistus taurica*, pitfall traps, 15–22.04.2000, M.K.

DISTRIBUTION. Circum-Holarctic temperate range [Dondale & Redner, 1978; Logunov, 1996; Mikhailov, 2000; Helsdingen, 2012].

COMMENTS. The record of this species is new to the Crimean spider fauna.

HABITATS. Sub-Mediterranean forests with *Arbutus andrachne*, *Juniperus excelsa*, *Cistus taurica*; steppes.

PHENOLOGY. In Crimea: ♀♀ — IV–V, XI, the peak of adults' activity is in April. In Britain, the peak is in May [Harvey *et al.*, 2002], a month later than in Crimea. In Sweden, the phenology is also different:

♂♂ — V–VI, ♀♀ — V–VIII [Almquist, 2006], with the adults' activity starting about a month later than in Crimea.

Thanatus vulgaris Simon, 1870

Figs 7, 11, 22, 30, 38, 47, 56, 61, 73–74.

T. peninsulanus: Schick, 1965: 93, f. 124–126 (♂♀).

T. v.: Levy, 1977: 214, f. 40–47 (♂♀).

T. v.: Dondale & Redner, 1978: 120, f. 404–407 (♂♀).

T. v.: Hu & Wu, 1989: 326, f. 260.1–6 (♂♀).

T. v.: Logunov, 1996: 196, f. 194–197, 204–206 (♂♀).

T. v.: Song *et al.*, 1999: 478, f. 273B, M (♂♀).

T. v.: Lyakhov, 2000: 229, f. 48–55 (♂♀).

T. v.: Szita & Samu, 2000: 173, f. 40–42, 45–46, 57 (♂♀).

T. v.: Logunov, 2011: 449, f. 21–22 (♂♀).

T. v.: Logunov *et al.*, 2011: 238, f. 13–15 (♂♀).

RECORDS FROM CRIMEA. Spassky [1927]; Charitonov [1932]; Tyshchenko [1971]; Bragina [1984]; Mikhailov [1997, 1998, 2000]; Kovblyuk [2004a,b]; Kovblyuk *et al.* [2008a].

MATERIAL. UKRAINE. Crimea: *Feodosiya Distr.*: 1♀ (TNU-3217/6), Karadag Nature Reserve, Khoba-Tepe Mt., coastal slopes, 10–11.07.2008, O.V. Kukushkin; *Lenino Distr.*: 2♀ (TNU-2239/10), Arabatskaya strelka opposite to Lyubimovka Vil. in Nizhnegorsk Distr., 10.06.2006, E.Yu. Sviridenko; 2♂♂ (TNU-3059/11), Kerch Peninsula, Opuk Reserve, 31.05–2.06.2011, A.A. Nadolny; *Saky Distr.*: 1♂ (TNU-1587/3), vicinity of Pribrezhnaya

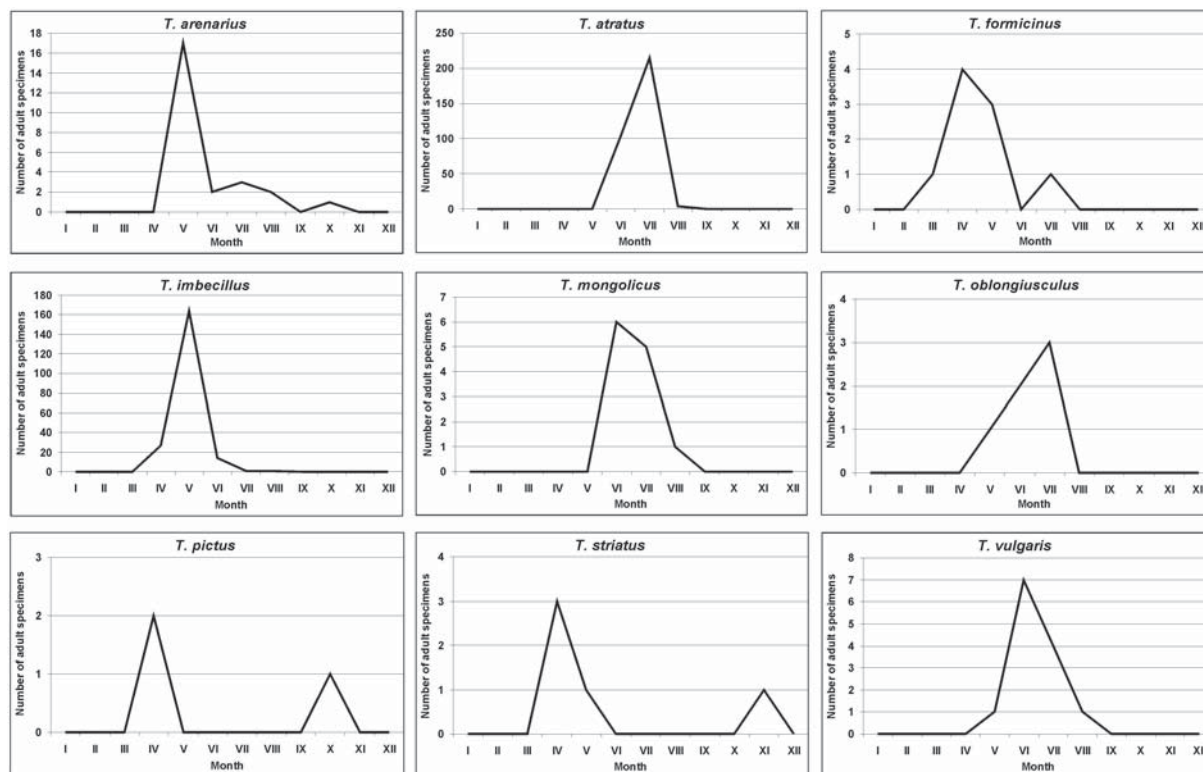


Fig. 74. Seasonal dynamics of adults activity of *Thanatus* species in Crimea, based on the specimens collected.

Рис. 74. Сезонная динамика активность взрослых особей видов рода *Thanatus* в Крыму по материалам коллекции.

railway station, salt-marsh, *Salicornia europaea*, *Halocnemum strobilaceum*, pitfall traps, 3–19.07.2000, M.K.; 1 ♂ (TNU-1601/5), same locality, meadow, pitfall traps, 19–28.07.2000, M.K.; 1 ♂ (TNU-1704/8), same locality, *Leymus sabulosus* on sand, pitfall traps, 8–24.06.2000, M.K. **Kherson Area: Genichesk Distr.:** 1 ♂ (TNU-2799/8/1), Arabatskaya strelka, c. 7 km S of Genichesk, *Artemisia* on sand, pitfall traps, 6.07.2010, N.A. Stasyuk; 1 ♀ (TNU-2794/3), Arabatskaya strelka, c. 5 km S of Genichesk, *Phragmites communis*, 15.08.2010, N.A. Stasyuk; 2 ♀♀ (TNU-3111/3, 3143/4), Arabatskaya strelka, c. 4 km S of Genichesk, *Artemisia*, sweeping, 4–18.06.2012, N.A. Stasyuk; 1 ♀ (TNU-3115/5), same locality, on sand, pitfall traps, 4–11.06.2012, N.A. Stasyuk.

DISTRIBUTION. Circum-Holarctic polyzonal range [Dondale & Redner, 1978; Logunov, 1996; Mikhailov, 2000; Logunov *et al.*, 2011; Helsdingen, 2012].

HABITATS. Reed beds with *Phragmites communis*; salt marshes with *Salicornia europaea* and *Halocnemum strobilaceum*; saline meadows; semi-desert steppes with *Artemisia*; sand dunes with *Leymus*.

PHENOLOGY. In Crimea: ♂♂ — V–VII, ♀♀ — VI–VIII, the peak of adults' activity is in June. In Israel: ♂♀ — V–VI [Levy, 1977], similar to Crimea. In Spain: ♂♀ — V–IX, the peak of activity is in July [Urones, 1986], a month later than in Crimea.

Discussion

Species diversity

The nine *Thanatus* species found in Crimea represent a rather high diversity. The same species number

has been recorded from the larger territories of Austria, Romania, the south part of European Russia and China [Helsdingen, 2012; Song *et al.*, 1999]. Twelve species are known to occur in Corsica. The highest species diversity in Europe, and probably in the entire Holarctics, is known from Spain and Bulgaria, both having 13 recorded *Thanatus* species [Helsdingen, 2012]. However, in terms of *Thanatus* species diversity per a square unit, Crimea seems to be among the most diverse regions of the Holarctics (9 species per 26,000 km²) after Corsica (12 species per 8,680 km²).

The species richness of local faunas

The maximum number of *Thanatus* species found in a single Crimean locality (=local fauna) is four: e.g., in the vicinity of Pribrezhnaya railway station (Saky District), we found *T. arenarius*, *T. atratus*, *T. mongolicus* and *T. vulgaris*; in the Karadag Reserve (Feodosiya District) and the Opuk Reserve (Lenino District) — *T. atratus*, *T. imbecillus*, *T. oblongiusculus* and *T. vulgaris*.

Zoogeography

Many Crimean *Thanatus* species display wide geographical ranges. For instance, *T. formicinus*, *T. striatus* and *T. vulgaris* are distributed across the Holarctic lowlands. Others occur throughout the entire (semi)arid zone of the Palaearctic Region, from Europe in the west to the Altai, Mongolia and/or Xinjiang in the east:

viz., *T. arenarius*, *T. atratus*, *T. mongolicus* (this species is absent from Middle Asia), *T. oblongiusculus* and *T. pictus*. The known range of *T. imbecillus* is smaller, extending from the Balkans, throughout Asia Minor to Tajikistan. The latter species, as well as *T. meronensis* Levy, 1997, seems to represent an evolutionary lineage (species group) that would have evolved in arid foothills and low mountains.

Syntopy of the closely related species

T. atratus and *T. vulgaris* are closely related species. Their males can be distinguished by the shape of emboli: *T. vulgaris* has the swollen embolic base, which is not swollen in *T. atratus* (cf. Figs 3 and 7). Females of *T. atratus* have the spermathecae clearly separated from each other, whereas in *T. vulgaris* they are in touch (cf. Figs 53, 57 and 56). Besides, the posterior edge of median plate is bent ventrad (often like a sharpened tooth) in *T. vulgaris* and not bent (and never with a sharpened tooth) in *T. atratus* (cf. Figs 47 and 40–41, 43–44). In Crimea, we have found these species to occur syntopically in the three localities: Saky Distr., vicinity of Pribrezhnaya railway station; Lenino Distr. (Kerch Peninsula), Opuk Reserve; and Kherson Area, Genichesk Distr., Arabatskaya strelka, c. 4 km S of Genichesk. However, the species have slightly different phenologies. The peak of adults' activity of *T. atratus* is in July, while that of *T. vulgaris* in June (Fig. 74). It is likely that a reproductive isolation of these species results from the differences in conformation of the copulative organs and/or courtship behavior (no data are available). This is an interesting topic for future research.

Phenology

Many specimens were collected by pitfall traps, which were checked upon every fortnight during a year. Thus, it was possible to analyze the seasonal dynamics of adults' activity. All the Crimean *Thanatus* species have one annual peak of adults' activity. Such peak for *T. formicinus*, *T. pictus* and *T. striatus* occurred in April; for *T. arenarius* and *T. imbecillus* in May; *T. mongolicus* and *T. vulgaris* in June; *T. atratus* and *T. oblongiusculus* in July (Fig. 74). It is very likely that all these species have a single generation per year.

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