

New data on *Hahnia* C.L. Koch, 1841 from Crimea (Aranei: Hahniidae)

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Abstract: Four species of *Hahnia* are recorded from Crimea: *H. helveola* Simon, 1875; *H. nava* (Blackwall, 1841); *H. ononidum* Simon, 1875; and *H. pusilla* C.L. Koch, 1841. Two species, namely *H. ononidum* and *H. pusilla*, are recorded from Crimea for the first time. Crimea is the easternmost point of the known range for *H. helveola*. Illustrations, diagnoses, distribution data, habitats, and seasonal dynamics of activity are presented.

Key words: Araneae, fauna, spider, diagnostic figure, male palp, epigyne, range, habitat, phenology

Hahniidae is a small spider family with about 250 described species from 27 genera (World Spider Catalog, 2016). *Hahnia* C.L. Koch, 1841 is the largest genus in the family. Currently it includes 92 species (World Spider Catalog, 2016) distributed worldwide except Australia and New Zealand. Two species of *Hahnia* have been known from Crimea (Kovblyuk, 2004a; Mikhailov, 2013; Kovblyuk and Kastrygina, 2015): *H. helveola* Simon, 1875 and *H. nava* (Blackwall, 1841).

Recently we found two species of *Hahnia* new to Crimea. The main purpose of the present work is to summarize original and literature-derived data on the Crimean *Hahnia* and to illustrate all the recorded species. In addition, we have provided the data for their distribution, spatial distribution and phenology.

Drawings were made with a grid method, using both reflecting- and transmitted-light microscopes MBS-9 and Lomo Biolam P-14. Illustrations of epigynes were made after maceration in KOH 20% water solution.

The morphological terminology was based on Harm (1966) and Zhang et al. (2011) with additions:

Palp: *B* – tegular brush (“comb”); *C* – conductor; *Cf* – cymbial furrow; *E* – embolus; *Pa* – patellar apophysis; *RTA* – retrolateral tibial apophysis; *T* – tegulum; *To* – tegular outgrowth.

Epigyne: *Co* – copulatory opening; *Cd* – copulatory duct; *Fd* – fertilization duct; *S* – receptacle (spermatheca); *SS* – “secondary” receptacle (subspermatheca).

All specimens treated in this study are deposited in the National Arachnological Collection of V.I. Vernadsky Taurida National University, Simferopol, Crimea, Ukraine (TNU) and in the Institute for Biological Problems of the North, Magadan, Russia (IBPN). The name of collector M.M. Kovblyuk was abbreviated as M.K., Yu.M. Marusik – as Yu.M.

In the text we provided references only to the most valuable publications, including books and revisions. All studied species are well described in the above-mentioned works so here we provide descriptions of the copulatory organs only.

***Hahnia helveola* Simon, 1875** (Figures 1-3)

Hahnia helveola: Harm, 1966: 360, f. 41-45 (♂♀); Roberts, 1998: 272, f. (♂♀); Almquist, 2005: 274, f. 258a-e (♂♀).

Records from Crimea. Kovblyuk, 2004a; Mikhailov, 2013; Kovblyuk, Kastrygina, 2015.

Material examined. UKRAINE. *Crimea: Feodosiya Distr.*: 1 ♂ (TNU), Karadag Nature Reserve, Lobovoy Mt. Range, 44°54'58.2"N, 35°13'16.2"E, stony steppe, pitfalls, 29.03–12.04.2008, M.K.; *Simferopol Distr.*: 5 ♂♂, 2 ♀♀ (TNU), Chatyr-Dagh Mt. Massif, woods, pitfalls, 08.04.–06.10.2000, M.K.; *Yalta Distr.*: 3 ♂♂ (TNU), Nikitskaya Yaila Mt., forest, pitfalls, 12–22.04.2001, M.K.; 1 ♂, 1 ♀ (TNU), environs Nikita Vill., forest, 04.09.2001–29.08.2002, M.K., A.A. Khaustov; 9 ♂♂, 1 ♀ (TNU), Yalta Mountain-Forest Natural Reserve, Uch-Kosch canyon,

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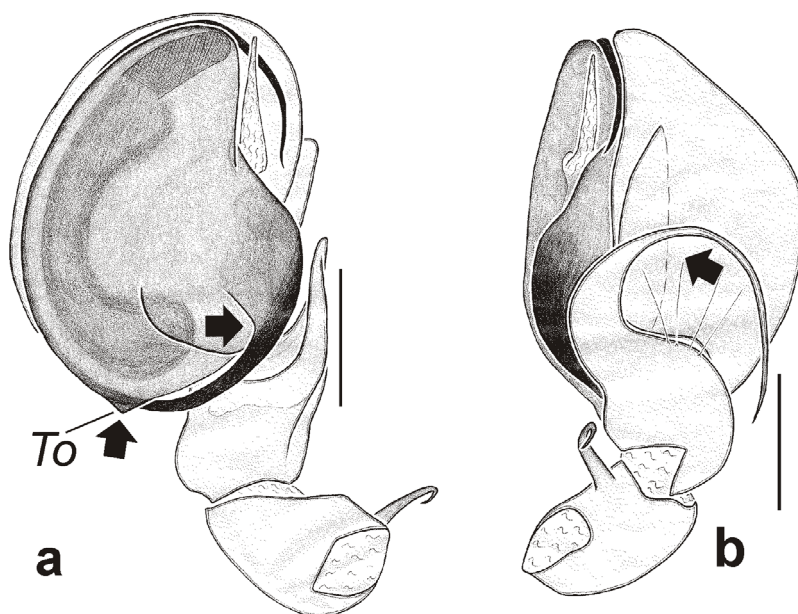


Figure 1. Male palp of *Hahnia helveola* (a- ventral, b- retrolateral). Scale = 0.1 mm. Abbreviation: To – tegular outgrowth.

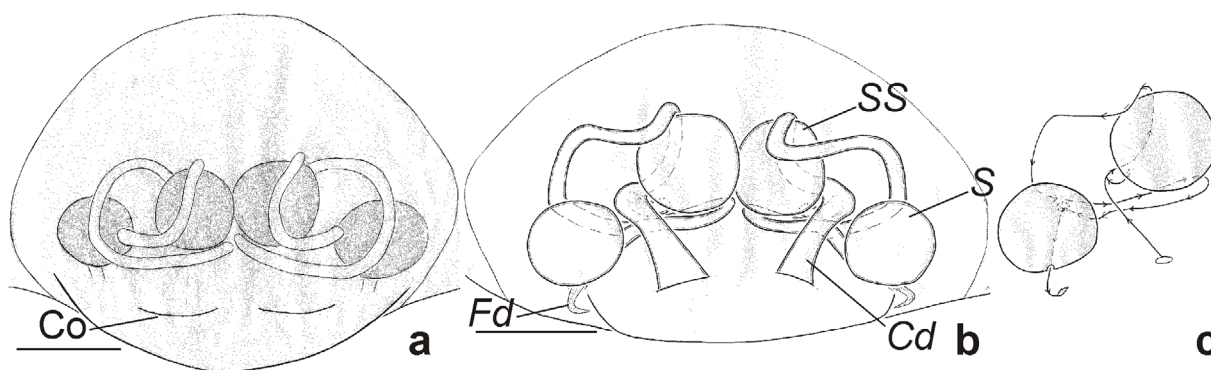


Figure 2. Epigyne of *Hahnia helveola* (a- ventral, b- dorsal, c- schematic illustration of copulatory ducts, dorsal). Scale = 0.1 mm. Abbreviations: Co – copulatory opening; Cd – copulatory ducts; Fd – fertilization duct; S – receptacle; SS – secondary receptacle.

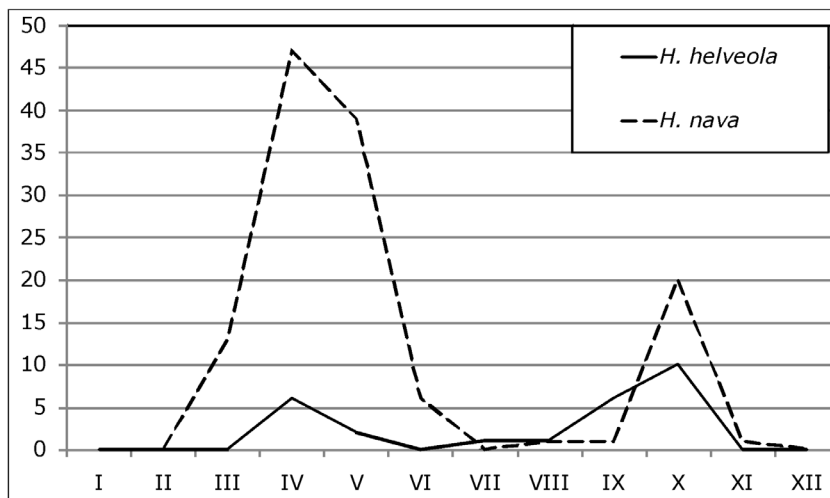


Figure 3. Seasonal dynamics of adults' activity of two *Hahnia* species in Crimea, based on the collected specimens: X-axis, month; Y-axis, number of specimens.

527 m, 44°32'22"N, 34°10'44"E, forest, pitfalls, 06.09–01.11.2008, M.K.

Diagnosis. Male is similar to that in *H. pusilla* (C.L. Koch, 1841), but differs from it by the pointed conductor (broad in *H. pusilla*) and presence of the peculiar pointed outgrowth (Figure 1) on the base of the tegulum (lacking in all other *Hahnia* species). The shape of copulatory ducts distinguishes the female of *H. helveola* from all other *Hahnia* species (Figure 2).

Description. Somatic characters well described in above-mentioned references. Male palp as in Figure 1. Patellar apophysis slender, distally hook-bent. Tibial setae long, but do not reach the RTA. Conductor pointed. Tegulum with peculiar subbasal pointed outgrowth. RTA strongly bent, sickle-shaped, its tip reaching approximately the middle of the tibia. Embolus originating retrolaterally and coiling clockwise 315° along the margin of the tegulum (left palp).

Epigyne as in Figure 2. Copulatory opening located in the posterior third of the epigynal plate. Endogyne with two pairs of rounded receptacles, subequal in size (primary and secondary).

Distribution. West Palearctic polyzonal range: from Norway to Spain and Turkey (Marusik et al., 2011; Helsdingen, 2013; Mikhailov, 2013; Nentwig et al., 2014).

Comments. Crimea is the easternmost point of *H. helveola*'s known range.

Habitats. Stony steppes, *Juniperus* sparse forests, woods with *Quercus petraea*, *Pinus pallasiana*, *Fagus*, *Populus*, *Acer*, and *Cornus mas*.

Phenology. In Crimea: ♂♂ – III-V, IX-X, ♀♀ – IV, VII-IX, ♂♀ – IV & IX, the peaks of adults' activity were in April and October (Figure 3). In Britain (Harvey et al., 2002): ♂♂ – I-IV, VIII-XII, ♀♀ – I-VII, IX-XII, ♂♀ – I-IV & IX-XII, the peak of adults' activity is in October, as in Crimea. In Britain mature males occur from the late summer (in Crimea, from September, a month later) through the winter until spring, and adult females can be found throughout the year. In Sweden: ♀♀ – VI-IX (Almquist, 2005).

Hahnia nava (Blackwall, 1841) (Figures 3–5)

Hahnia nava: Harm, 1966: 364, f. 51–56 (♂♀); Roberts, 1998: 271, f. (♂♀); Almquist, 2005: 276, f. 260a-f (♂♀); Ono, 2009: 172, f. 14–15 (♂♀).

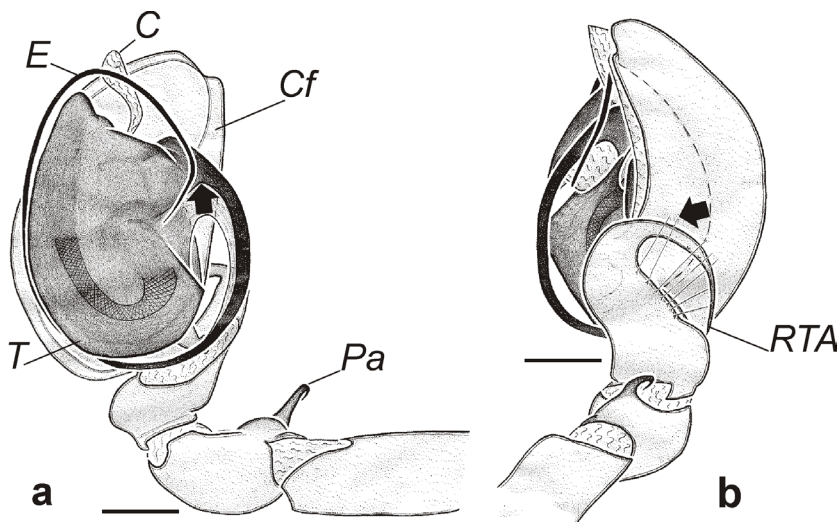


Figure 4. Male palp of *Hahnia nava* (a- ventral, b- retrolateral). Scale = 0.1 mm. Abbreviations: C – conductor; Cf – cymbial furrow; E – embolus; Pa – patellar apophysis; RTA – retrolateral tibial apophysis; T – tegulum.

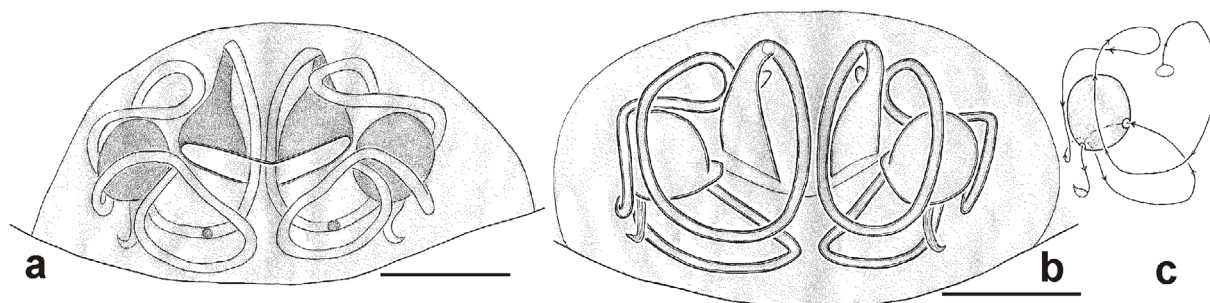


Figure 5. Epigyne of *Hahnia nava* (a- ventral, b- dorsal, c- schematic illustration of copulatory ducts, dorsal). Scale = 0.1 mm.

Records from Crimea. Kovblyuk, 2004a, 2004b; Kovblyuk et al., 2008a, 2008b; Kovblyuk, 2012; Mikhailov, 2013; Kovblyuk and Kastrygina, 2015.

Material examined. UKRAINE. *Crimea: Alushta Distr.:* 10 ♂♀ (IBPN) Crimean Reserve, Bukovskogo Kordon, 44°39'N, 34°14'E, 1050 m, 09.03.2002, Yu.M. *Feodosiya Distr.,* Karadag Nature Reserve: 35 ♂♂, 43 ♀♀ (TNU), forests and forest edges, 18.04.2003–31.05.2010, M.K., V.A. Gnelitsa; *Sevastopol Distr.:* 4 ♂♀ (IBPN), Maximova Datcha canyon, 44°34.08'N, 33°32.278'E, 100 m, 13.03.2002, Yu.M.; 1 ♀ (IBPN), environs of Balaclava, Aya Cape, 44°29.482'N, 33°36.579'E, 170 m, 14.03.2002, Yu.M. *Simferopol Distr.:* 1 ♂ (TNU-1008/14), environs Simferopol water reservoir, pitfalls, 14–26.05.2000, M.K.; 8 ♂♂, 6 ♀♀ (TNU, IBPN), Chatyr-Dagh Mt., forests, 23.04.2000–17.03.2002, M.K., Yu.M.; 1 ♂ (TNU-2170/5), Kizil-Kobinka River, pebble beach, pitfalls, 15–22.04.2001, G.A. Prokopov; *Sudak Distr.:* 3 ♂♂, 2 ♀♀ (TNU), 10 km W Sudak, Mezhdurechie Vill., forest, 23.05.–07.11.2010, M.K. Yusufova; *Yalta Distr.:* 12 ♂♂, 1 ♀ (TNU), Nikitskaya Yaila Mt., forests and meadows, pitfalls, 31.03.–18.09.2001, M.K.; Yalta Mountain-Forest Natural Reserve: 2 ♂♂, 4 ♀♀ (TNU), Uchan-Su River, *Fagus* wood, litter, 31.05.2001, N.N. Yunakov; 1 ♀ (TNU), Ay-Petri Yaila Mt., near Shaytan-Merdven pass, forest, in litter, 13.10.2001, M.K.; 2 ♂♂ (TNU), Ay-Danil', forest, pitfalls, 10.03.2002–7.04.2002, A.A. Khaustov; 1 ♀ (TNU), Botkin path, forest, 17.10.2002, M.K.; 3 ♂♂, 7 ♀♀ (TNU), Martyan Cape Reserve, sub-Mediterranean forest, 5.05.2001–08.04.2007, M.K., V.A. Gnelitsa.

Additional material. UKRAINE. *Kiev area:* 1 ♂, 1 ♀ (TNU-23/13), Kiev, Dnepr River right bank, Verblyud Bay, 20.03.2004, M.K.

Diagnosis. Males of *H. nava* are similar to those of *H. ononidum*, but they can be easily distinguished by the longer patellar apophysis, longer tibial setae, and lack of tegular brush (Figure 4). The shape of the copulatory ducts distinguishes females of *H. nava* from all other *Hahnia* species (Figure 5).

Description. Somatic characters well described in above-mentioned publications. Male palp as in Figure 4. Patellar apophysis slender, distally hook-bent. Tibial setae very long, they extend beyond the RTA. RTA knife-like. Its tip reaches the dorsum of tibia. Conductor extended. Tegulum of peculiar shape with chopped-off apex. Embolus originating retroapically and coiling clockwise 380° along the margin of the tegulum (left palp).

Epigyne as in Figure 5. Copulatory openings located in the center of epigynal plate and very distinct. Endogyne with reduced secondary receptacles and well developed primary receptacles. Copulatory ducts thin with funnels (reservoirs) near copulatory openings.

Distribution. Trans-Palaearctic nemoral range: from Portugal to Sakhalin, and from Norway to Spain, Italy, Greece, Turkey, Azerbaijan, and Afghanistan (Helsdingen, 2013; Mikhailov, 2013; Nentwig et al., 2014).

Habitats. Forests with *Pinus kochiana*, *P. pallasiana*, *Juniperus excelsa*, *J. oxycedrus*, *Fagus*, *Quercus pubescens*, *Q. petraea*, *Cornus mas*, *Populus*, *Acer*, *Carpinus betulus*, *Fraxinus*, *Crataegus*, *Arbutus andrachne*; forest steppes; bushes with *Rosa* and *Cotinus coggygria*; near streams; *Zerna cappadocina* mountain meadows; stony steppes. Most abundant in forests.

Phenology. In Crimea: ♂♂ – III–VI, VIII, X, ♀♀ – III–V, IX–X, ♂♀ – III–V & X, the peaks of adults' activity were in April and October (Figure 3). In Britain: ♂♂ – V–VII, ♀♀ – V–X, ♂♀ – V–VII, the single peak of adults' activity is in May (Harvey et al., 2002). Interestingly, there is a single peak of *H. nava* adults' activity in Britain, while two in Crimea. In Sweden: ♂♂ – V–X, ♀♀ – VI–X, ♂♀ – VI–X (Almquist, 2005).

Comments. *Hahnia nava* is the most abundant and widespread *Hahnia* species in Crimea.

Hahnia ononidum Simon, 1875 (Figures 3, 6, and 7)

Hahnia ononidum: Harm, 1966: 362, f. 46–50 (♂♀); Opell and Beatty, 1976: 426, f. 89–93 (♂♀); Roberts, 1998: 272, f. (♂♀); Almquist, 2005: 277, f. 261a–e (♂♀).

Material examined. UKRAINE. *Crimea: Feodosiya Distr.:* 1 ♂ (TNU), Karadag Nature Reserve, Beregovoy Mt. Range near Biological Station, 16–30.11.2006, O.V. Kukushkin; *Simferopol Distr.:* 4 ♀♀ (TNU), Chatyr-Dagh Mt., Orlineo canyon, 44°49.014'N, 34°18.762'E, 637 m, 17.03.2002, M.K.; 3 ♂♂, 26 ♀♀ (IBPN), same locality and date, Yu.M.

Diagnosis. Male of *H. ononidum* is similar to that of *H. nava*, but it differs from the latter with the presence of the tegular brush (“comb”) on the base of the tegulum (lacking in *H. nava*), the longer patellar apophysis, and shorter tibial setae (longer in *H. nava*) (Figure 6).

The shape of the copulatory ducts distinguishes female of *H. ononidum* from all other *Hahnia* species (Figure 7). In addition, females of *H. ononidum* differ from other Crimean *Hahnia* species by presence of peculiar epigastric sulci (sclerotized part) near the posterior of epigyne (Marusik and Kunt, 2009; Marusik et al., 2011).

Description. Somatic characters well described in above-mentioned publications. Male palp as in Figure 6. Patellar apophysis long, distally hook-like bent. RTA strongly bent, sickle-shaped, and its tip approximately reaches the middle of tibia but not dorsum of tibia. Tibial setae short and do not reach the RTA. Conductor directed retrolaterally. Tegulum with brush (“comb”) in the basal part. Embolus originating retrolaterally and coiling clockwise 315° along the margin of the tegulum (left palp).

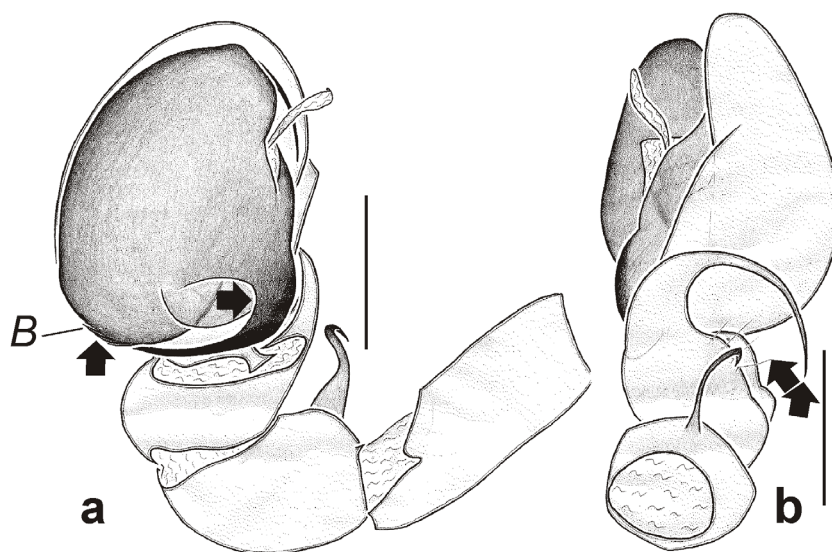


Figure 6. Male palp of *Hahnia ononidum* (a- ventral, b- retrolateral). Scale = 0.1 mm. Abbreviation: B – tegular brush (“comb”).

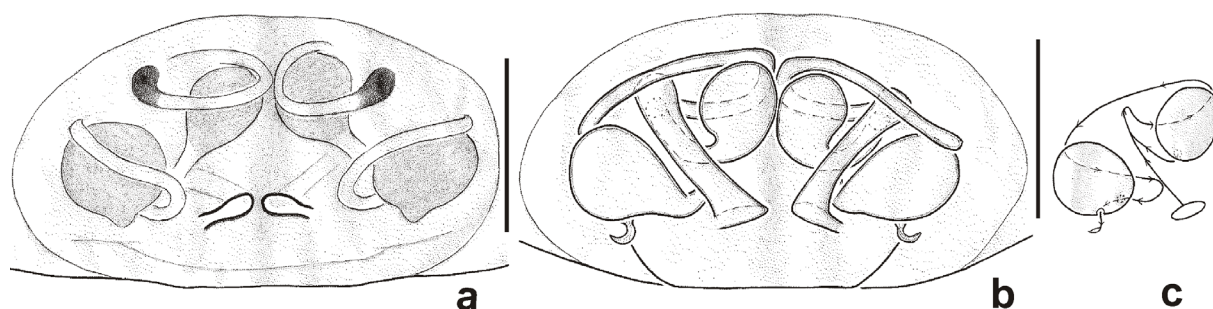


Figure 7. Epigyne of *Hahnia ononidum* (a- ventral, b- dorsal, c- schematic illustration of copulatory ducts, dorsal view). Scale = 0.1 mm.

Epigyne as in Figure 7. Copulatory openings located in the posterior third of the epigynal plate. Secondary receptacles slightly smaller than primary receptacles. Epigyne with two dark small dots.

Distribution. Circum-Holarctic polyzonal range (Marusik and Kunt, 2009; Marusik et al., 2011).

Comments. *Hahnia ononidum* is recorded from Crimea for the first time.

Habitats. Stony mountain steppes and forests.

Phenology. In Crimea males were collected in March and November, and females in March. In Sweden: ♂♂ – IV-IX, ♀♀ – IV-X, ♂♀ – IV-IX (Almquist, 2005). Males and females in Crimea were collected 1 month earlier than in Sweden. Thus, the period of activity of adults *H. ononidum* in Crimea is 2 months longer than in Sweden.

***Hahnia pusilla* C.L. Koch, 1841** (Figure 8)

Hahnia pusilla: Harm, 1966: 358, f. 36-40 (♂♀); Roberts, 1998: 272, f. (♂♀); Almquist, 2005: 278, f. 262a-f (♂♀).

Note. *Hahnia pusilla* is the type species of the genus.

Material examined. UKRAINE. *Crimea: Simferopol Distr.*: 1 ♀ (TNU-1754/12), environs of Skvortsovo Vill., steppe, pitfalls, 13-27.04.2002, M.K.

Diagnosis. Male of *H. pusilla* is similar to *H. helveola*, but it differs by the shape of conductor (not pointed) and more rounded shape of tegulum. The shape of copulatory ducts distinguishes females of *H. pusilla* from all other *Hahnia* species (Figure 8).

Description. Somatic characters are well described in above-mentioned papers. Epigyne as in Figure 8. Copulatory openings located in the posterior third of the epigynal plate. Endogyne with 2 pairs of elongated receptacles subequal in size.

Distribution. West and Central Palearctic boreonemoral range: from Ireland and France to Baikal, and from Norway to Crete (Helsdingen, 2013; Mikhailov, 2013; Nentwig et al., 2014).

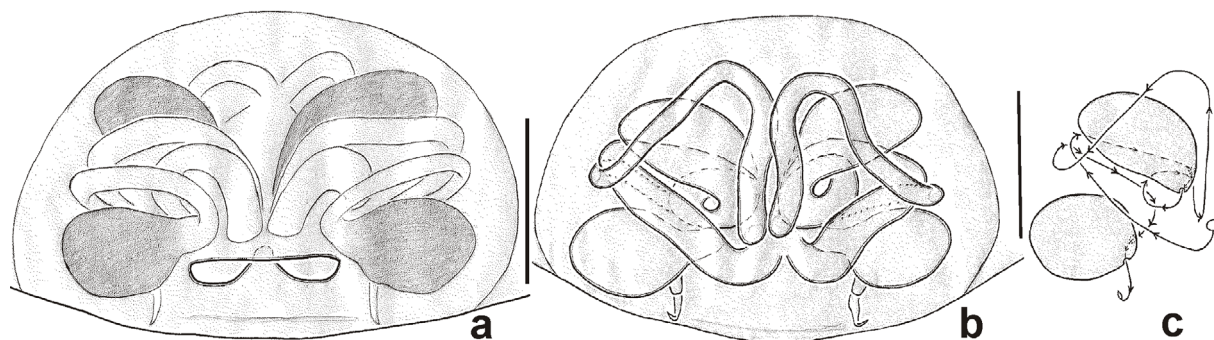


Figure 8. Epigyne of *Hahnia pusilla* (a- ventral, b- dorsal, c- schematic illustration of copulatory ducts, dorsal). Scale = 0.1 mm.

Table. Distribution of *Hahnia* species in the landscape zones of the Crimea, based on the specimens collected.

Landscape zones	<i>Hahnia</i> species				Number of species
	<i>helveola</i>	<i>nava</i>	<i>ononidum</i>	<i>pusilla</i>	
Semidesert steppe and saline lands					0
Genuine steppe				+	1
Submontane forest-steppe		+			1
Forests of the northern slope	+	+	+		3
Mountain meadows and yaila steppe		+			1
Forests of the southern slope	+	+			2
Sub-Mediterranean vegetation of the southern coast	+	+	+		3
Number of zones	3	5	2	1	

Comments. *Hahnia pusilla* is recorded from Crimea for the first time.

Habitats. Steppe with *Stipa* and *Festuca*.

Phenology. In Crimea female was collected in April.

So far, four *Hahnia* species have been recorded from Crimea (Kovblyuk, 2004a, 2004b, 2012; Kovblyuk et al., 2008a, 2008b; Mikhailov, 2013; Kovblyuk and Kastrygina, 2015; present data): *H. helveola*, *H. nava*, *H. ononidum*, and *H. pusilla*.

Traditionally, seven natural (landscape, altitudinal, geographical) zones are identified in the Crimean peninsula (Kovblyuk, 2004a). The distribution of the *Hahnia* species in these zones is presented in the Table.

The richest zones in the number of recorded *Hahnia* species are the sub-Mediterranean forests of southern Crimea and the nemoral forests of the northern slope of the Crimean Mts. Two species were recorded in nemoral

forests of the southern slope and only one species in genuine steppes, forest-steppes, and yailas. *Hahnia* was not found in the semidesert steppes and saline lands.

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References

- Almquist S (2005). Swedish Araneae, part 1: families Atypidae to Hahniidae (Linyphiidae excluded). *Ins Syst Evol Suppl* 62: 1-284.
- Harm M (1966). Die deutschen Hahniidae (Arachnida, Araneae). *Senckenb Biol* 47: 345-370 (in German).
- Harvey PR, Nellist DR, Tefler MG (2002). Provisional Atlas of British spiders (Arachnida, Araneae). Vols. 1 and 2. Huntington, UK: Biological Records Centre.
- Helsdingen PJ (2013). Fauna Europaea: Araneae. Fauna Europaea Version 2.6.2. Available online at <http://www.faunaeur.org>.
- Kovblyuk MM (2004a). Catalogue of the Spiders (Arachnida, Aranei) of the Crimea. *Voprosy razvitiya Kryma. Vyp. 15. Problemy inventarisatsii krymskoy bioty. Simferopol, Ukraine: Tavriya-Plus* (in Russian).
- Kovblyuk MM (2004b). Preliminary results of spiders fauna and biotopic distribution of spiders in Karadag Nature Reserve study. *National Academy of Sciences of Ukraine. Karadag Nature Reserve Annals* 20: 139-145 (in Russian).
- Kovblyuk MM (2012). The preliminary report about spiders (Arachnida, Aranei) in Yalta Mountain-Forest Reserve (Crimea). *Uchenye zapiski Tavricheskogo natsionalnogo universiteta im. V.I. Vernadskogo. Seriya Biologiya, Khimiya* 25: 82-97 (in Russian).
- Kovblyuk MM, Kastygina ZA (2015). Updated catalogue of the spiders (Arachnida, Aranei) of the Crimea. *Ukrainska Entomofaunistyka* 6: 1-81 (in Russian).
- Kovblyuk MM, Kukushkin OV, Gnelitsa VA, Nadolny AA (2008a). Brief Atlas of Spiders (Arachnida, Aranei) of Karadag Nature Reserve. Simferopol, Ukraine: N. Orianda (in Russian).
- Kovblyuk MM, Nadolny AA, Gnelitsa VA, Zhukovets EM (2008b). Spiders (Arachnida, Aranei) of the Martyan Cape Reserve (Crimea, Ukraine). *Caucasian Entomological Bulletin* 4: 3-40 (in Russian).
- Marusik YM, Kunt KB (2009). Spiders (Aranei) new to the fauna of Turkey. 3. Genus and species records of Hahniidae. *Arthr Sel* 18: 77-80.
- Marusik YM, Özkütük RS, Kunt KB, Kaya RS (2011). Spiders (Araneae) new to the fauna of Turkey. 8. New records of Hahniidae and Dictynidae. *Anadolu University Journal of Science and Technology C* 1: 161-170.
- Mikhailov KG (2013). The spiders (Arachnida, Aranei) of Russia and adjacent countries: a non-annotated checklist. *Arthr Sel Suppl* 3: 1-262.
- Nentwig W, Blick T, Gloor D, Hänggi A, Kropf C (2014). Spiders of Europe. Version 09.2014. Available online at www.araneae.unibe.ch.
- Ono H (2009). The Spiders of Japan with Keys to the Families and Genera and Illustrations of the Species. Kanagawa, Japan: Tokai University Press (in Japanese).
- Opell BD, Beatty JA (1976). The Nearctic Hahniidae (Arachnida: Araneae). *Bulletin of the Museum of Comparative Zoology* 147: 393-433.
- Roberts MJ (1998). Spinnengids. Baarn, the Netherlands: Tirion.
- World Spider Catalog (2016). World Spider Catalog. Version 15.5. Bern, Switzerland: Natural History Museum. Available online at <http://wsc.nmbe.ch>.
- Zhang ZS, Li SQ, Zheng G (2011). Comb-tailed spiders from Xishuangbanna, Yunnan Province, China (Araneae, Hahniidae). *Zootaxa* 2912: 1-27.