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## THE FIRST NEST RECORDS OF THE WASP *EUMENES PUNCTATICLYPEUS KOSTYLEVI* (HYMENOPTERA, VESPIDAE, EUMENINAE) AND NOTES ON ITS DISTRIBUTION IN CRIMEA

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**The First Nest Records of the Wasp *Eumenes punctaticlypeus kostylevi* (Hymenoptera, Vespidae, Eumeninae) and Notes on its Distribution in Crimea.** Fateryga A. V., Matushkina N. A. — Two nest records of the rare solitary wasp *Eumenes punctaticlypeus kostylevi* Kurzenko, 1976 are described for the first time. One non-completed nest was built in a stone surface and another one was attached to a bush stem; the latter one consisted of six cells. Nest cells are arranged in a cluster and have common internal walls. All cells are spirally disposed around the stem and their collars look at different directions. A male was reared in the first cell and three females in the second to fourth cells. Examination of the collection materials revealed that the distribution area of the species in Crimea embraces zones of Foothills and South Coast.

**Key words:** *Eumenes*, Vespidae, Eumeninae, nesting, Crimea.

**Первые находки гнезд осы *Eumenes punctaticlypeus kostylevi* (Hymenoptera, Vespidae, Eumeninae) и заметки о ее распространении в Крыму.** Фатерыга А. В., Матушкина Н. А. — Впервые приведено описание гнезд *Eumenes punctaticlypeus kostylevi* Kurzenko, 1976, основанное на двух находках. Одно неоконченное гнездо было построено на поверхности камня, другое — прикреплено к стеблю кустарника и состояло из шести ячеек. Ячейки гнезда были собраны в группу и имели общие внутренние стенки. Все ячейки располагались по спирали вокруг стебля, и их горлышки были направлены в разные стороны. Из первой ячейки гнезда вывелся самец, а из 2–4-й ячеек — 3 ♀. Исследования коллекционного материала показали, что область распространения вида в Крыму охватывает зоны южного берега и предгорий.

**Ключевые слова:** *Eumenes*, Vespidae, Eumeninae, гнездование, Крым.

### Introduction

*Eumenes punctaticlypeus* Giordani Soika, 1943 is a rare Mediterranean solitary wasp species; it has been originally described in Central Italy (Giordani Soika, 1943). The distribution area of its nominative subspecies, *Eumenes punctaticlypeus punctaticlypeus* Giordani Soika, 1943, includes South Europe and Asia Minor, eastward to Central Asia (Gusenleitner, 1999). *Eumenes punctaticlypeus kostylevi* Kurzenko, 1976 was firstly described as *Eumenes robusta* Kostylev, 1940 from vicinities of Tashkent (Uzbekistan) (Kostylev, 1940). N. V. Kurzenko (1976) found the name “*robusta*” to be a homonym of *Eumenes robustus* Isely, 1917 and proposed for this taxon a substitution name *Eumenes kostylevi* Kurzenko, 1976. This subspecies differs from the nominative form by pale and greatly reduced elements of the yellow coloration (Gusenleitner, 1999).

The distribution of the subspecies *E. p. kostylevi* is little known. This taxon is known from Iran, Crimea, Mountains of Central Asia, South Kazakhstan and Altai (Kurzenko, 1978; Tobias, Kurzenko, 1978). E. Yildirim and H. Özbek (1999) recorded one female and two males of *E. p. kostylevi* from Turkey. N. Bağrıaçık and A. Tüzün (2004) quoted for Turkey one female of *E. p. punctaticlypeus* collected in Ankara Province.

Apparently, in Turkey and probably in all regions around Black Sea there is a border between the areals of these two taxa. The bionomics of both subspecies of *E. punctaticlypeus* was completely unknown.

In this paper we firstly describe two nest records of *E. p. kostylevi* and, then, we give some information about its distribution in Crimea (South Ukraine).

### Material and methods

The nest N 1 of *E. p. kostylevi* was found in May 17, 2005 in Ayan Tract (Crimean Foothills in the vicinities of Perevalnoye Village) by AF. The nest N 2 was found in July 23, 2006 in Karadag Nature Reserve (Crimean South Coast) near the “Chertov Palets” [Devil’s Finger] Rock by NM.

In order to ascertain the species distribution more precisely, the following entomological collections were examined: Zoological Institute of the Russian Academy of Science (Saint-Petersburg, Russia) (ZIN), Zoological Museum of Lomonosov Moscow State University (Moscow, Russia) (ZMM), Vernadskiy Taurida National University (Simferopol, Ukraine) (TNU), Schmalhausen Institute of Zoology National Academy of Science of Ukraine (Kyiv, Ukraine) (SIZK), Kharkov Entomological Society (Kharkov, Ukraine), Odessa State Zoo (Odessa, Ukraine), personal collections of A. V. Amolin (Donetsk, Ukraine), S. A. Mosyakin (Simferopol, Ukraine) and D. V. Puzanov (Yevpatoria, Ukraine). Eight specimens were found in collections of ZIN, ZMM and TNU.

### Results

Description of nest findings and rearing of imagoes. The nest N 1 was found on a flat surface of a small stone (about 20 x 25 cm) which made a joined surface with the soil level and was surrounded by the meadow grass. Firstly, it was noticed a female flying in the grass, and only later it was noticed the nest. Unfortunately, the female had been caught and exhausted before the nest was discovered; thus, the nest was not finished. The discovered nest consisted of one non-completed cell, with diameter from 10.7 to 12.5 mm. The walls of the cell were made of soil mastic. They towered above the stone surface only for 2–5 mm. The soil mastic covered a part of the stone surface adjoining the walls inside the cell; but its central area remained non-covered.

The nest N 2 was attached to a bush stem in the grass layer and consisted of six cells made of biscuit soil mastic. In the moment when the nest had been found, a female was building the collar of the sixth cell (fig. 1, 1). The nest was transported in the laboratory where it was examined. It was 28 mm in the long axe (along the stem) and 26 mm



Fig. 1. Nesting of *Eumenes punctaticlypeus kostylevi*: 1 — the nest N 2 attached to a bush stem with female constructing the cell collar; 2 — the same nest dissected after exposition; one can see two-layer cocoons with lumps of preys’ remains and preys’ feces between layers and prepupae inside the inner layer.

Рис. 1. Гнездование *Eumenes punctaticlypeus kostylevi*: 1 — гнездо N 2, прикрепленное к стеблю кустарника с самкой, занятой строительством горлышка ячейки; 2 — то же гнездо, вскрытое после инкубации, видны двухслойные коконы с комками из останков и экскрементов жертв между слоями и предкуколками внутри внутреннего слоя.

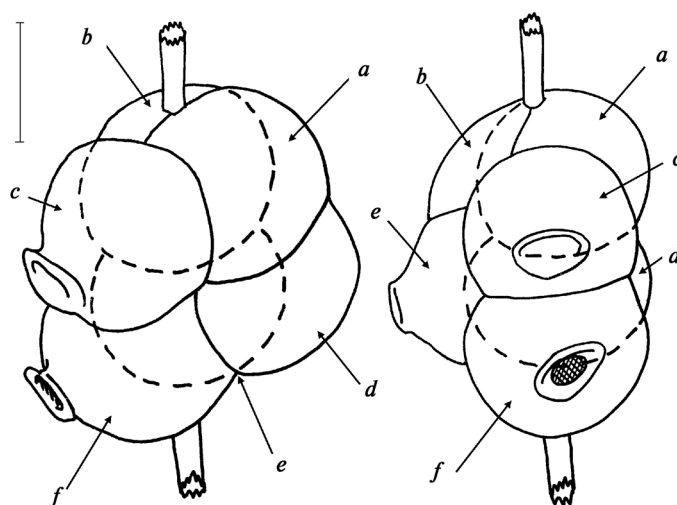


Fig. 2. Scheme of the nest N 2 of *Eumenes punctaticlypeus kostylevi* (a-f — numbers of cells from first to sixth). Scale bar 1 cm.

Рис. 2. Схема гнезда N 2 *Eumenes punctaticlypeus kostylevi* (a-f — номера ячеек с первой по шестую). Масштабная линейка 1 см.

in the short one. The cells were arranged in a cluster and had common internal walls (fig. 2). The cells N 1, N 2 and N 4 were attached to the stem and with each other; the cells N 3, N 5 and N 6 were attached only to other cells. All six cells were spirally disposed and their collars looked on at different directions. Inasmuch as both found nests were non-completed, it was impossible to establish whether females of *E. p. kostylevi* built the general coating of the nest or not.

The nest N 2 was exposed during four months (up to January, 2007) at the room conditions and then it was dissected. The first five cells contained cocoons with wasp's prepupae and the sixth cell contained a shriveled egg attached to the cell ceiling by a filament. The cocoon was two-layer and made from whitish silk. The first layer densely covered the whole inner surface of the cell and the second layer came off the first one about on an half of its volume (fig. 1, 2). Between two layers of the cocoon there was a lump consisting of preys' remains and of their feces fasten by silk threads. The lump weight was  $28.6 \pm 3.1$  mg in average. The prepupa and the feces of the wasp's larva were located inside the inner cocoon layer. The weights of prepupae were: 97 mg in the first cell, 76 mg in the second cell, 127 mg in the third cell, 132 mg in the fourth cell and 120 mg in the fifth cell. The feces weight was  $14.6 \pm 3.4$  mg in average. The weight of the nest without contents of the cells was 7,290 mg.

The prepupae from first to four cells were placed in glass tubes and exposed to the outdoor conditions. Adult wasps emerged on June 2–3, 2007. One male was reared from the first cell and three females were reared from second to fourth cells. The females from the second and the fourth cells emerged on June 2. The female from the third cell and the male emerged on June 3. The prepupa of male was very active during hibernation versus the females' prepupae.

Distribution of *Eumenes punctaticlypeus kostylevi* in Crimea. All the locations where *E. p. kostylevi* were found in Crimea have been marked in the map (fig. 3). The first two numbers are nest records and the following ones are collection specimens:

1. Described nest N 1;
2. Described nest N 2;
3. Female, vicinities of Alupka, 30.06.1899 (N. Kuznetsov) (ZIN);

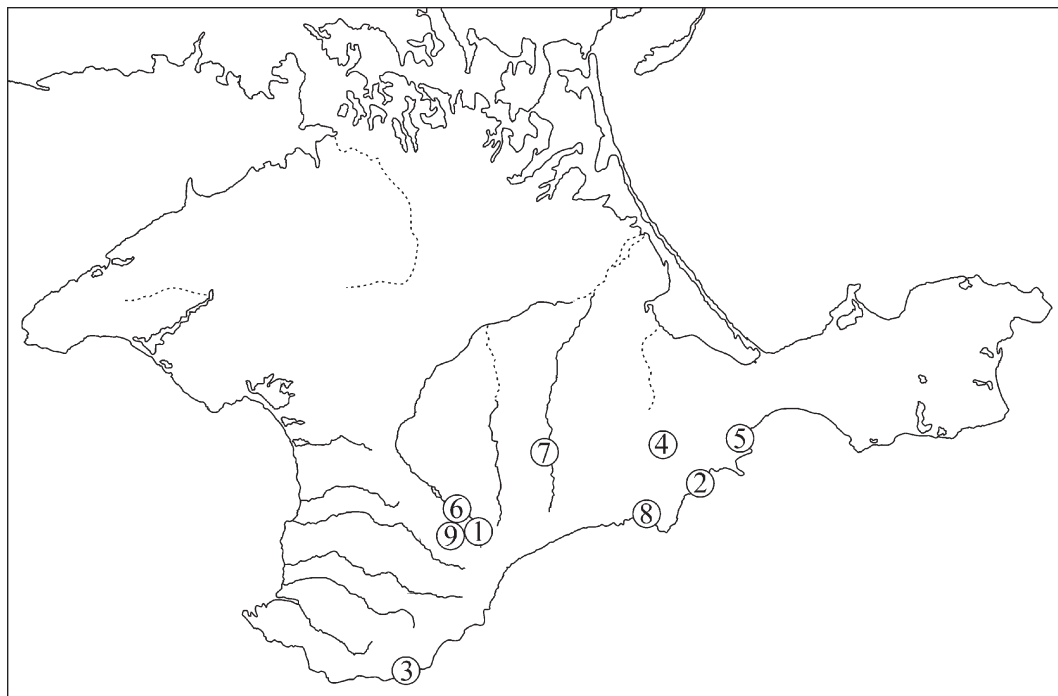


Fig. 3. Locations where *Eumenes punctaticlypeus kostylevi* have been found in Crimea.

Рис. 3. Пункты, в которых был обнаружен *Eumenes punctaticlypeus kostylevi* в Крыму.

4. Female, Staryy Krym, 28.05.1905 (Kirichenko) (ZIN);
5. Female, Feodosiya, 08.1922 (Arnoldi) (ZIN);
6. Male, Pionerskoye, 04.07.1976 (A. Zhelokhovtsev) (ZMM);
7. Male, Belogorsk District, Karasevka, 02.06.1980 (V. Lavrenyuk) (TNU);
8. Female and male, Sudak, 14.07.1980 (V. Lavrenyuk) (TNU);
9. Male, Simferopol District, Krasnolesye, on *Scrophularia umbrosa*, 29.07.2007 (Fateryga) (TNU).

The latter male is the only known specimen of *E. p. kostylevi* collecting on flowers (Fateryga et al., 2006).

## Discussion

One of the most interesting groups of vespid solitary wasps (Eumeninae) with respect to bionomics is potter wasps, which build original flask-like cells with narrow collar.

They use as nest construction materials the mortared pebbles (recorded for *Katamenes* Meade-Waldo, 1910) (Blüthgen, 1961; Fabre, 1993), the clay mastic (recorded for *Eumenes* Latreille, 1802; *Oreumenes* Bequaert, 1926; *Delta* de Saussure, 1855 and *Zeta* de Saussure, 1855) (Iwata, 1953; Olberg, 1959; Blüthgen, 1961; Jayakar, Spurway, 1968; Brooke, 1981; Taffe, 1983; Donovan, 1995; Mader, 2000; Matthews, González, 2004) or in exceptional cases the cellulose pulp (Iwata, 1939). The nests of potter-wasps are usually multi-celled and covered with secondary coating (Iwata, 1953; Blüthgen, 1961; Jayakar, Spurway, 1968). Several species of *Eumenes* and *Zeta* produce non-covered single-celled nests and camouflage them by destroying collar after sealing the cell (in species of *Zeta*) or by hiding the nests in grass tangles (some species of *Eumenes*) (Olberg, 1959; Matthews, González, 2004).

*Eumenes* is the largest and one of the most widespread genera of potter wasps. Several species of *Eumenes* generally attach their hemispherical cells to a flat surface like stones

or trunks [for example *Eumenes samuray* von Schulthess, 1908 (Iwata, 1953)], or to a concave stone surface [*Eumenes coronatus* (Panzer, 1799) (Fatoryga, unpublished)]. Some species of *Eumenes* attach their cells only to a linear substratum like grass or bush stems [for example *Eumenes coarctatus* (Linnaeus, 1758) (Olberg, 1959)], whereas some other species can use both a flat surface and a linear substratum [for example *Eumenes micado* Cameron, 1904 (Iwata, 1953)]. Females of both latter groups usually build spherical, oval or elliptical cells (see Iwata, 1976). Some of them can build a row of cells in cylindrical cavities [*E. micado* (Iwata, 1976), *Eumenes papillarius* (Christ, 1791) (Fatoryga, unpublished)]. Several species of *Eumenes* (for example *Eumenes inconspicuus* Smith, 1857) build clustered cells with linear disposition of the cells (Iwata, 1964). Females of *Eumenes pedunculatus* (Panzer, 1799) usually build spherical cells attached to grass and heather stems and pine needles. Sometimes several cells are combined in a lump and covered by an additional clay coating. However, *E. pedunculatus* can build its cells occasionally in concavities of stones (see Blüthgen, 1961). In the recently recorded nest N 2 of *E. p. kostylevi*, which was attached to the stem, the cells were arranged in a clump and were mostly irregular-shaped. However, the first cell has spherical shape. On the contrary, in the non-completed nest N 1 of *E. p. kostylevi*, which was situated on the flat stone surface, the cell was beginning to build as of a hemispherical shape.

It is interesting that in the nest of *E. p. kostylevi* the cell with male posterity was built before the cells with female posterities. Similar order of sex distribution in the nests was recorded in some wasps of the genus *Delta* (Jayakar, 1963; Jayakar, Spurway, 1968; Brooke, 1981). S. D. Jayakar (1963) marked that anticipatory founding of male-contained cells represents a special mechanism of proterandry ensuring the maturation of males before females. Probably this mechanism is peculiar to many species of solitary wasps with aerial nests. On the contrary, building cells with females before ones with males is peculiar to nearly all tube-nesting species of solitary wasps, in which proterandry is provided by the more rapid development of males (Olberg, 1959; Krombein, 1967).

*E. punctaticlypeus* is a species confined to Mediterranean light forest with arid climate and distributed in Crimea over open woodlands of South Coast and Foothills. *E. punctaticlypeus* is a rare wasp species. Only eight specimens of *E. p. kostylevi* from Crimea were found among more than 6,200 studied specimens of eumenin-wasps, which were collected on the territory of the peninsula from 1864 to 2008 and deposited in largest entomological collections of European Russia and Ukraine. Therefore, it is interesting that we succeeded in finding two nests of this subspecies during two subsequent years. The cause of the rarity of *E. p. kostylevi* in Crimea remains unknown and its biometrics requires future investigation.

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