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THE FIRST INTERCEPTION OF AGAPANTHIOLA LEUCASPIS (COLEOPTERA: CERAMBYCIDAE) IN WESTERN UKRAINE AND REMARKS ON ITS BIOGEOGRAPHY AND BIONOMY

Agapanthiola leucaspis is a steppic the long horn beetle widely distributed from Pannonian Plane in Europe to Mongolian Plateau in Asia. A. leucaspis previously was known only from the Pontic Steppe Region in Ukraine, which includes both Crimea Peninsula and Ukrainian Mainland. Here we reported the first record of A. leucaspis in Western Ukraine. We assume that A. leucaspis expands its areal northward in the light of the current climatic changes. We analyzed global geographical range of A. leucaspis and estimated current borders of its areal. We also summarized data on A. leucaspis Bionomy including food plants, habitats and life circle.

Key words: *Agapanthiola leucaspis, Cerambycidae, Ukraine.*

Agapanthiola leucaspis (Steven, 1817) is one of the two species in genus *Agapanthiola* Ganglbauer, 1900. It was described in 1817 by Christian von Steven from the region of the Caucasus under the name *Saperda leucaspis* [39]. In the same issue on the page 190 Johan Wilhelm Dalman described a new species named *Saperda cyanella* which was the similar to Steven's *S. leucaspis* [39]. However, Dalman did not indicate the type locality. Year later, Johann Friedrich Eschscholtz described *Saperda pectoralis* from the Caucasus [13], which in fact was already known *S. leucaspis*. In the beginning of XX century Ludwig Ganglbauer insubstantial separated an East Siberian morphs of *A. leucaspis* as a new species *Agapanthia euterpe* [14]. For both species he introduced subgenus *Agapanthiola* [14].

A. leucaspis is a steppic the long horn beetle widely distributed from Pannonian Plane in Europe to Mongolian Plateau in Asia. In Ukraine this species was known only from the Pontic Steppe Region including Crimea Peninsula and Ukraine Mainland [5, 6, 51]. The last two decades it was noticed far north from its known areal in Kyiv Region and in Chernihiv Region [43]. In the current study we found *A. leucaspis* in Western Ukraine at the first time. We assume that *A. leucaspis* expanding its areal northward in the light of climatic changes as it was noticed for other Cerambycidae in the region [48].

Materials and methods

Methods. Insects were manually collected on forage plants on the edge of abandoned limestone quarry situated east from the village Muzhieve in Berehove district of Zakarpattya Region, Ukraine (48.184438, 22.711440). Locality is represented by scattered thermophilic shrubs within the secondary steppe vegetation on the southern slope of the hill.

Material. 1 male 05.V.2018, vlg. Muzhieve, Berehove district, Zakarpattya Region, Ukraine, col. Vasyl Hleba.

Diagnosis. Body dark cyan colored, 6-9 mm in length. The lower part of the eye is in three times shorter than lengths of the cheek. Scutellum and lateral sides of the thorax covered by dense decumbent white hairs.

Results and discussion

A. leucaspis previously was known only from the Pontic Steppe Region in Ukraine, which includes both Crimea Peninsula and Ukrainian Mainland. It is very common species in this region. *A. leucaspis* widely distributed along Black Sea coast form Danube Delta on the West to Crimea Peninsula and along coast of Sea of Azov on the East. It also spread deep into mainland to the middle basin of the Dnipro River and Donetsk Ridge [5, 6, 25, 51]. According to our own data and published sources [5, 6, 51], *A. leucaspis* is common in Crimea from Mediterranean scrub on the South Coast to the mountain steppes (yayla) up to 1,500 m above sea and to typical steppes on the North of the peninsula. It inhabits a wide range of grassy biotopes including patches of natural or seminatural vegetation as well as ruderal vegetation.

It was believed that in Western Ukraine, *A. leucaspis* is absent due to inappropriate climatic conditions [5, 49, 51]. This species was never found in the any of the macroregions of Western Ukraine e.g. Ukrainian Part of Pannonian Plane, East Carpathian Mountains, Western Podillya Eminence, Volyn Eminence, Western Polissya [35, 49, 50, 51]. It should be noted that Jan Roubal in his Catalogue of Coleoptera of Slovakia and Zakarpattya Ukraine pointed out on the presence of *A. leucaspis* only in South-Western Slovakia in Danube Valley [35].

Our record of *A. leucaspis* in Zakarpattya Region is the first in Western Ukraine (Fig. 2). The insect was spotted on the southern slope of hill situated East from village Muzhieve (Berehove District). The locality represents patches of xerophilous ruderal and secondary natural vegetation including grasses and shrubs on the different stages of succession in the abandoned limestone quarry (Fig. 1B).

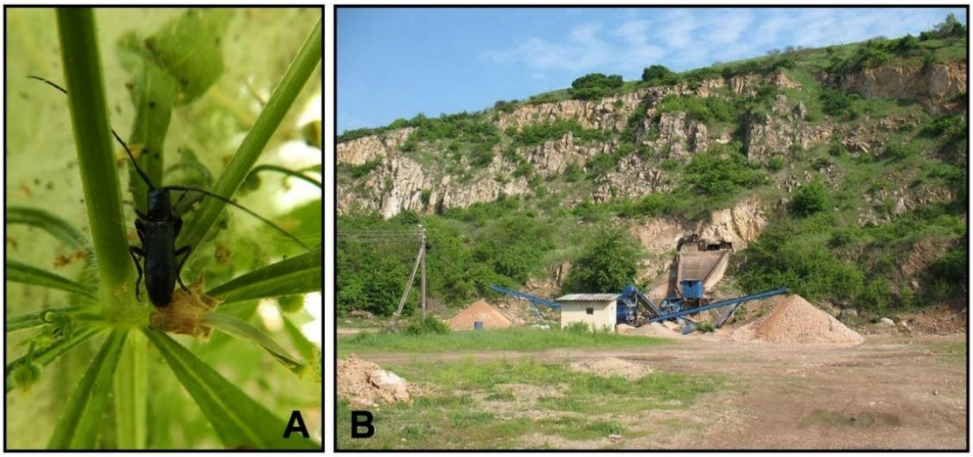

Fig. 1. Adult male of *Agapanthiola leucaspis* on *Galium aparine* (A), and the habitat (B) where the species was spotted. Photo credits: (A) Vasyl Hleba, (B) Leonid Pokrytiuk.

The nature of the appearance of *A. leucaspis* in Zakarpattya Region of Ukraine is still opened. In the one hand, the several refugia of the natural steppe and xerophilous scrubland vegetation located in Tysa River Valley, where *A. leucaspis* could preserved from warm and dry Atlantic Time (5-7 ka BP). In the other hand, the recent records of *A. leucaspis* far outside of its previously known areal (for instance, Bohemia in Czech Republic [34]; Kyiv Region

(unpublished data) and Chernihiv Region in Ukraine [43]) possibly indicate the areal expanding westward and northward due to climate changes. From this point of view our finding of *A. leucaspis* in Zakarpattya Region is a part of climate change event. Nevertheless, further studies are required.

Biogeography. Surprisingly, biogeographical position of *A. leucaspis* is still unclear. Multiple authors provide very different views on *A. leucaspis* biogeography. Zahaykevych considered that *A. leucaspis* belongs to Pontic species [51]. Karpiński with colleagues [22] and Kadyrbekov and Tleppaeva [20] suggested *A. leucaspis* is West Palearctic polyzonal species. Pil and Stanković argued that *A. leucaspis* belong to Ponto-Mediterranean species, distributed in Southeastern Europe and Southwestern Siberia [31]. Abdurakmanov indicated *A. leucaspis* as Euro-Siberian species [3] and Özdikmen similarly nested it within Sibero-European species [30]. Danilevskaya with colleagues noted that *A. leucaspis* is an ordinary Palaearctic species [10]. Georgiev with colleagues classified *A. leucaspis* to Transpalaearctic species [15]. Finally, Shapovalov suggested that *A. leucaspis* belong to Transeurasiatic polyzonal species [42]. Such uncertainty in *A. leucaspis* biogeographical view caused by poor data on its distribution. We conducted comprehensive analysis of available published sources for reconstruction of the current areal of *A. leucaspis* (Fig. 2A).

A. leucaspis is known from: **Armenia:** Armavir marz, Lori marz [6]; **Austria:** Burgenland [6, 12]; **Azerbaijan:** present, administrative region is not specified [11]; **Bosnia and Herzegovina:** present, administrative region is not specified [24]; **Bulgaria:** Blagoevgrad Province, Burgas Province, Gabrovo Province, Plovdiv Province, Sliven Province, Smolyan Province [9, 14, 15, 33]; **China:** North-West China, Inner Mongolia [47]; **Croatia:** present, administrative region is not specified [8]; **Czech Republic:** Středočeský kraj, Zlínský kraj [44, 45]; **Georgia:** present, administrative region is not specified [11]; **Greece:** widespread in continental part [32]; **Hungary:** Bács-Kiskun megye, Budapest, Pest megye, Borsod-Abaúj-Zemplén megye [17, 23, 26]; **Iran:** ?West Azerbaijan Province [6]; **Kazakstan:** Almaty Region, East Kazakhstan Region, Jambyl Region, Kostanay Region [7, 19, 20, 22]; **Moldova:** present, administrative region is not specified [4]; **Mongolia:** West Mongolia, Mongolian Plateau, Selenge [27, 47]; **North Macedonia:** present, administrative region is not specified [24]; **Serbia:** Južnobački okrug, Sremski okrug [31]; **Slovakia:** Košicky kraj, Nitriansky kraj [35]; **Slovenia:** ? possibly present [8]; **Romania:** Bucuresti, Judetul Constanţa, Judetul Ilfov, Judetul Mures, Judetul Sibiu, Judetul Tulcea, Judetul Valcea [18, 40, 41]; **Russia:** Adygheya Republic, Altai Krai, Dagestan Republic, Irkutsk Oblast, Kalmykia Republic, Krasnodar Krai, ?Mordovia Republic, Orenburg oblast, Rostov Oblast, Saratov Oblast [1, 38, 42, 46, 52]; **Tajikistan:** Khatlon Viloyati, Republic Regions, Sughd Viloyati [21]; **Turkey:** Ankara, Corum, East Thrace [29, 30, 37]; **Ukraine:** Chernihiv Region, Cherkasy Region, Crimea Region, Donetsk Region, Zaporizhzha Region, Zakarpattya Region (current study), Kharkiv Region, Kherson Region, Kyiv (unpublished data), Luhansk Region, Mykolayiv Region, Odesa Region, [6, 25, 28, 43].

The current areal of *A. leucaspis* coincides strictly with steppes spreading within Eurasia. The westernmost boundary of the areal restricted by Central European mountains: Dinaric Mountains, The Alps, Ore Mountains and The Carpathians. The northern limits of *A. leucaspis* spreading coincides with bounds of the steppe biome in Eastern Europe and North Asia. *A. leucaspis* reaches The South Ural Mountains and eastward as far as Baikalia. The eastern border of the areal is unclear. According to Xu and Neng *A. leucaspis* is widespread on Mongolian Plateau [47]. We assume that *A. leucaspis* distribution is bounded

by Greater Khingan Mountains on the East. The southern limit of its distribution is completely unknown. The species presents in Central Asian Mountains: Altai, Tien Shan, Pamir, which apparently are the nature border for *A. leucaspis* southward range. The species is known from south Tajikistan [21] and should be present in North Afghanistan where restricted by Hindu Kush Mountain Massif from South. The presence of *A. leucaspis* in North Iran is doubtful, however it is widespread in neighbor Armenia and Azerbaijan. *A. leucaspis* occupies the North of Turkey. Thus, we suggest that *A. leucaspis* is Euro-Siberian steppic species.

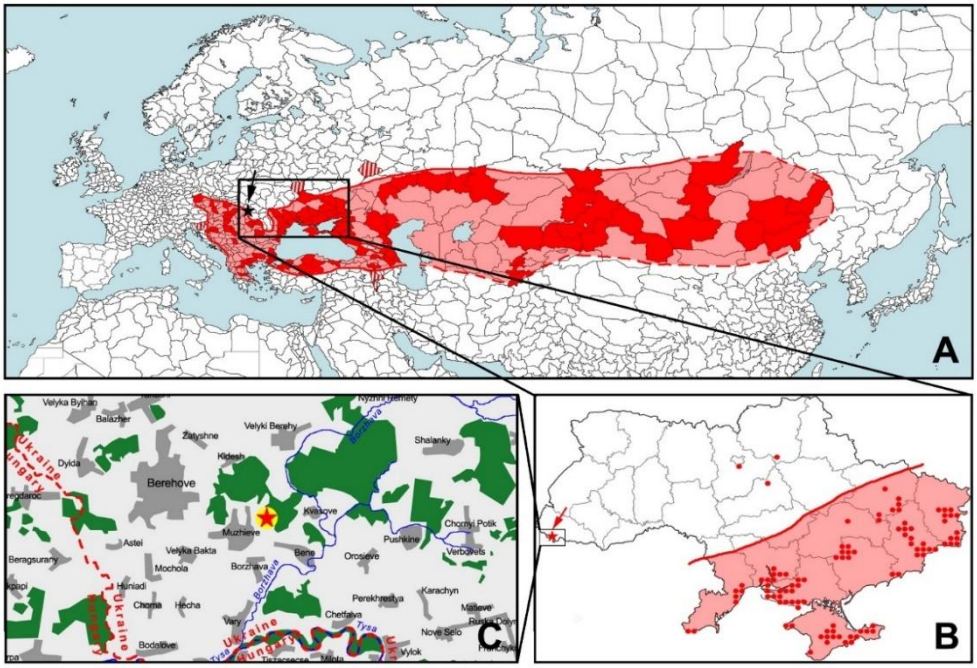

Figure 2. Areal of *Agapanthiola leucaspis* in Eurasia (A); continuous distribution *of A. leucaspis* in Ukraine and the recent findings beyond its boundary (B); location of the first record in Western Ukraine (C) marked by a star. The areas (A) shaded by lines indicate the regions with doubtful presence of *A. leucaspis*.

Bionomy. Bionomy of *A. leucaspis* is poorly known. It inhabits xerophilous biotopes as savannoid woodlands, scrublands, steppe and semi-desert grasslands. Sláma noted that *A. leucaspis* common for thermophilous natural steppe vegetation as well as pastures in Central Europe [44]. Our data shows that *A. leucaspis* is typical species for all types of xerothermophilous biotopes in Crimea (Ukraine) including mediterranean scrub, mountain steppes (yayla) and typical (true) steppes. According to Shapovalov the species inhabits cold northern steppes, mountain steppes, typical steppes and warm southern steppes in the South Ural Mountains (Russia) [42]. In Altai Mountains (Kazakhstan) *A. leucaspis* spreads dry scrub-steppes, wet floodplain meadows and mountain wildflower meadows [20].

A. leucaspis is polyphagous species whose larva undergoes develop in the stems at least of 23 herbaceous plants species preferring Asteraceae, rarely other families. These include

Asteraceae (*Achillea millefolium* L., *Achillea salicifolia* Besser., *Carduus sp*., *Cichorium sp*., *Cirsium setosum* (Wild.) M.B., *Echinops sphaerocephalus* L., *Erigeron sp*., *Hieracium sp*., *Matricaria sp.*, *Picris sp*., *Sonchus oleraceus* L.,), Apocynaceae (*Vincetoxicum hirundaria* Medik.), Campanulaceae (*Campanula sibirica* L.), Cannabaceae (*Cannabis sativa* L.), Caprifoliaceae (*Cephalaria transsylvanica* (L.) Schrad. ex Roem. & Schult., *Scabiosa ochroleuca* L.), Caryophyllaceae (*Silene multiflora* (Ehrh.) Pers.), Euphorbiaceae (*Euphorbia sp*.), Fabaceae (*Melilotus officinalis* L.), Lamiaceae (*Ballota nigra* L., *Salvia dumetorum* Andrz. ex Besser), Plantaginaceae (*Veronica longifolia* L.), Rosaceae (*Potentilla sibirica* Th. Wolf) [2, 4, 10, 20, 23, 42, 44]. We found adult beetle of *A. leucaspis* on the stem of *Galium aparine* L. (fig. 1A). However, we have no reasons for assert that *G. aparine* is food plant for larva nor for imago.

A. leucaspis life circle duration is one year. Female lay one egg into previously made nick on the stem of the host plant. Larva emerges from the egg and starts actively feeding by the stem tissues gradually migrating to the root collar. It is unclear whether the larva or pupa is wintering. Adults appeared in May and active to June.

Conclusions

In summary, we reported the first interception of *A. leucaspis* on East margin of Pannonian Plane in Western Ukraine. We assume that appearance of *A. leucaspis* in the region is the results of its areal expanding due to the recent climate changes. We also clarify the biogeographical position and bionomical features of *A. leucaspis*.

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Перша реєстрація *Agapanthiola leucaspis* (Coleoptera: Cerambycidae) на заході України та коментарі щодо біогеографії та біономії виду

Agapanthiola leucaspis – це степовий вид жуків-вусачів, широко розповсюджений від Паннонської рівнини у Європі до Монгольського плато в Азії. В Україні A. leucaspis була відома лише зі степової зони Причорномор'я та Криму. У цьому дослідженні ми повідомляємо про першу знахідку виду в Західній Україні, на території Закарпатської низовини. Припускаємо, що нова знахідка є свідченням розширення ареалу A. leucaspis на північ у канві сучасних кліматичних змін. Ми також здійснили аналіз розповсюдження A. leucaspis в Євразії та встановили особливості біономії виду.

***Ключові слова**: Agapanthiola leucaspis, Cerambycidae, Україна.*