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THE FIRST RECORD OF CALAMOBIUS FILUM (COLEOPTERA: CERAMBYCIDAE) IN WESTERN UKRAINE WITH NOTES ON ITS BIOLOGY, ECOLOGY AND DISTRIBUTION IN EUROPE

Calamobius filum (Rossi, 1790) is widely spread in Mediterranean Basin, occupying territory from Balearic Islands on West to North Iran on East, and from North Africa on South to Carpathian Mountains on North. Previously, C. filum was considered stenotopic xerothermic species, common for Mediterranean scrub and European steppe biomes. However, during last decade it was spread northward and into the mountains, where occupying the atypical habitats. We suggest, northward migration of C. filum is caused by climatic changes. In Ukraine, C. filum previously was known only from North Black Sea Basin. Our currently record of C. filum in Western Ukraine is significantly expanded its known areal. We indicated presence of C. filum in forest steppe biome and mountain oak forest zone, where it occupies habitat of secondary mesophilous meadows. Thus, we suggest, that areal of C. filum is expanding northward throughout all territory of Ukraine. Potentially, C. filum could spread to 50-degree latitude. This event could lead to negative economic effect and loses in agricultural crop production, as C. filum is known as seriously pest of cultivated cereals in South Europe.

Key words: *Calamobius filum, Cerambycidae, fauna of Western Ukraine.*

The monotypic genus *Calamobius* Guerin-Meneville 1846 comprise single species *Calamobius filum* (Rossi, 1790), originally described as *Saperda filum* by Pietro Rossi in his famous work "Fauna Etrusca" [34]. The species name is derived from Greek "saperdes" – "fish" or "perch" and "filum" – "thread", which emfasized the body shape of *C. filum*. For the first time *Calamobius* was separated from genus *Saperda* by Felix Edouard Guerin-Meneville as subgenus (originally: *Saperda* (*Calamobius*) *gracilis*) in his article published in Annales de la Société entomologique de France [15]. Since his article was published in 1847, the indicated year (1846) in the scientific name of genus should be corrected. The genus name *Calamobius* derived from ancient Greek "chaume" – "stubble" and "vie" – "to live" and mean "one who lives in stubble". Introducing name *Clamobius* Guerin-Meneville emphasized the biological features of the beetle larvae, which lives in stems of cereals grasses and especially in cultivated crops.

C. filum is Mediterranean species widespread from Balearic Islands in the West to North Iran in the East and from North Africa in the South to Carpathian Mountains in the North. *C. filum* is known as xerothermophilous stenotopic species which occupies dry and warm scrub and steppe ecosystems. However, last decade it was detected shift of *C. filum* geographic distributions toward higher latitudes and elevations, where it occupy untypical habitats [3, 7, 10, 11]. In Ukraine, *C. filum* previously was known only from steppes of North Black Sea basin [1, 2, 46, 47, 48]. In current study, we report the first occurrence of *C. filum* in forest steppe and mountain forest zones of Western Ukraine. In addition, we predict its wide distribution in the forest steppe zone of all of Ukraine.

Materials and methods

Methods. Insects were collected by entomological sweep-net on forage plants during June-July 2015. The study area located on the eastern edge of Pannonian Plane, were it bordering with Carpathian Mountains. Locality is represented by floodplain mesophilic meadow on right bank of Uzh River near village Onokivtsi, Uzhgorod District, Transcarpathia Region, Ukraine. Insects were identified using the Key to Insect Orders "Beetles of Central Europe" [12].

Material: 1 male and 1 female, 09.VII.2014, meadow on the bank of Uzh river in surroundings of village Onokivtsi, Uzhgorod District, Transcarpathia Region, Ukraine (N48°39′15″ E22°20′30″), coll. O. Mateleshko;

Diagnosis. Imago is 5-11 mm long. Body is narrow and elongated, 5-6 times longer than the width. These covered by dense greyish hair with light lengthwise stripes on disc and lateral sides of pronotum and along the suture of elytra. Antennas are thin and long, 1.5-2 times longer than body (Fig. 1.A.). The antennas segments without long standing hairs (Fig. 1.B.).

Results and discussion

Biology. The biological and breeding behavioral features of *C. filum* are well described in numerous sources starting from middle of XIX century [15]. Imago of *C. filum* appears during May and June. After mating, the *C. filum* female lay one egg into previously made nick on the stem of cereal grass. Usually, the nick is located directly below the ear. After the several days of incubation, larva emerges from egg and starts actively feeding. It gnaws around the stem in base of the ear thus the last one often break down especially in cultivated crops. The larva feeds by the stem tissues gradually migrating to the root collar, where it turns into pupa and wintering [28, 47].

Ecology. Larvae of *C. filum* develop manly in stems of wild Poaceae such as *Agropyron* sp., *Arrhenatherum elatius* (L.) P. Beauv. ex J. Presl & C. Presl., *Avena longiglumis* Durieu, *Avena sterilis* L., *Calamagrostis pseudophragmites* (Haller f.) Koeler, *Dactylis glomerata* L., *Hordeum murinum* L., *Leymus sabulosus* (Lam.) Tzvelev, *Poa* sp., *Sulla coronaria* (L.) Medik., but also it infest the cultivaled cereals: *Triticum* sp., *Secale cereale* L., *Avena sativa* L. [8, 38].

Guerin-Meneville recognized *C. filum* as a dangerous pest of wheat, barley and oats in France, which reduced the crop capacity on quarter [15]. According to current data, *C. filum* was noticed as a pest of cereals crops in Castilla and Leon Province of Spain [44]. The losses of crops capacity is significant and could reach 40% [44]. The occurrence of *C. filum* on cultivation crops (wheat and oat) also is known from Italia [37]. On the other hand, *C. filum* is listed in Red Data Book for the Maltese Islands [33] and could be recognized as an indicator of Natura 2000 xerotermophilic habitats [7].

Typically, *C. filum* associated with open and semi-open grassy and shrubby xerotermophilic habitats within the steppe and the Mediterranean scrub biomes. *C. filum* occurs in such natural and semi-natural Natura 2000 habitats as salt and gypsum continental steppes, sea dunes of the Mediterranean coast, Sub-Mediterranean and temperate sclerophyllous scrub, Mediterranean arborescent matorral, Thermo-Mediterranean and pre-steppe brush, karstic calcareous grasslands (*Alysso-Sedion albi*), xeric sand calcareous

grasslands (*Koelerion glaucae*), pseudo-steppe with grasses and annuals (*Thero-Brachypodietea*) and other.

Distribution. *C. filum* widely distributed in Mediterranean Region. It is known from Balearic Islands, Southern Europe, North Africa, Near East, Asia Minor and Caucasus Region. The eastern edge of its areal reaches North Iran.

In Europe *C. filum* widespread within South part of the continent. The Northern bounds of it areal goes on latitude of 52 deg. in Western Europe, 50 deg. in Central Europe, and 48 deg. in Eastern Europe (fig.1.). It is noticed in follow European states and regions: **Austria:** Burgenland [20]; **Bosnia and Herzegovina:** Canton 10, Republika Srpska [17]; **Bulgaria:** Plovdiv Province [13]; **Croatia:** Dalmatia [17]; **Czech Republic:** Jihomoravsky kraj, Moravskoslezsky kraj, Olomoucky kraj, Pardubicky kraj, Plzensky kraj, Kraj Vysočina, Zlinsky kraj [7, 10, 11]; **European Turkey:** Marmara Region [25]; **France:** Alsace, Bourgogne-Franche-Comte, Loire-Atlantique, Corsica, Gers, IIautes-Pyrenees, Languedoc-Roussillon, Limousin, Provence, Provence-Alpes-Cote d'Azur, Puy-de-Dome, Pyrenees-Orientales [5, 28, 32, 42]; **Germany:** Hessen, Rheinland-Pfalz [19]; **Greece:** Central Macedonia, Peloponnese, Thessaly [31]; **Hungary:** Borsod-Abauj-Zemplen, Heves, Pest [16, 35]; **Italy:** Alto Adige, Abruzzo, Basilicata, Calabria, Campania, Emilia, Friuli, Lazio, Liguria, Lombardia, Marche, Molise, Piemonte, Puglia, Romagna, Republica di San Marino, Sardegna, Sicilia, Toscana, Trentino, Umbria, Val d'Aosta, Veneto, Venezia Giulia [4, 39]; **Macedonia:** Cucer-Sandevo, Struga [30]; **Moldova:** Anenii Noi, Chisinau, Hincesti, Straseni [6]; **Netherlands:** Gelderland [3], **Serbia:** Belgrade [29], **Slovenia:** Sezana [4]; **Spain:** Andalucia, Aragon, Castilla – La Mancha, Castilla y Leon, Cataluna, Extremadura, Galicia, Islas Baleares, Madrid, Murcia, Navarra, Pais Vasco, La Rioja [8, 9, 26, 27, 42, 45]; **Swizwrland:** Ticino [40]; **Portugal:** Algarve, Alto Alentejo, Baixo Alentejo, Beira Baixa, Estremadura, Ribatejo, Tras-os-Montes e Alto Douro [8, 14]; **Romania:** Constanța, Dolj [21, 41, 42]; **European Russia:** Rostov Reg., Dagestan Reg. [18], **Ukraine:** Crimea Reg., Dnipropetrovsk Reg. (unpublished, in collection of dr. O. Sumarokov), Kherson Reg. [1, 2, 46, 47, 48].

Calamobius filum was excluded from list of Polish Cerambycidae as misidentification of *Agapanthia villosoviridescens* (DeGeer, 1775) from Bieszczady Mountains (Eastern Poland) [23]. However, *C. filum* is present in Moravskoslezsky kraj of Czech Republic along Polish border [10]. Thus, it should be present in southwestern part of Poland.

The recent occurrence of *C. filum* in The Netherlands [3] and in the mountains of The Czech Republic [7, 10, 11] indicates its northward spread. Early this decade, we reported northward migration of *Leiopus femoratus* Fairmaire 1859 and *Trichoferus campestris* (Faldermann, 1835) due to climate changing [49, 50, 51]. Thus, *C. filum* is one of many species, and Cerambycidae in particular, which range shifted north, while climate-warming event occurred.

Distribution of *C. filum* is poorly studied in Ukraine. There are a few known localities in Kherson and Crimea Regions. Zahaykevych mentioned it for Island Dzharylgach near town Skadovsk in Kherson Region and for south coast of Crimea: 39 spc. 22.V.1958, Kanakska Balka near village Pryvitne; 29.V.1958, Tuakska Balka near village Rybache [48]. Later, he indicated presence of *C. filum* in Crimea Mountains [46]. In more recent publications, *C. filum* is pointed to Kherson Region, Crimea Region in general [1, 2].

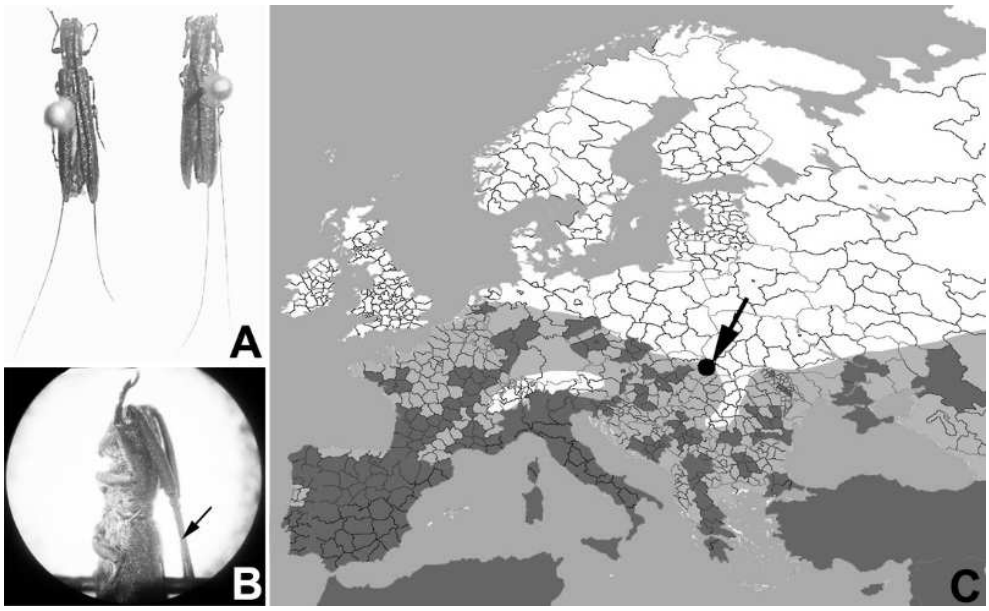

Fig. 1. A. Specimens of *C. filum* collected on the territory of Transcarpathia Region in 2015. **B.** Microphotography (20X) of *C. filum*. Arrow indicate the absence of long standing hair on the antenna. These distinguished *C. filum* from *Theophilea cylindricollis* and other Agapanthiini. **C.** The distribution map of *C. filum* in Europe. Regions of the European countries, where *C. filum* is known, are marked by dark grey. The light grey colour marked the current range of *C. filum* in Europe. Black arrow indicates locality of our record of *C. filum* in West Ukraine.

Terekhova and Bartenev [43] claimed that *C. filum* spread only in the steppe zone of Ukraine. However, its presence in most steppe regions of Ukraine is unconfirmed yet. While *C. filum* is known from neighbouring to Ukraine Rostov Region of Russia in East [18], it should be present in Donetsk, Luhansk, Kharkiv and Zaporizhya Regions. Our findings, according to data obtained from Dr. O. Sumarokov collection (village Rayivka, Synelnykove District), show the presence of *C. filum* in Dnipropetrovsk Region. We expect to find *C. filum* in Odesa, Mykolayiv, Vinnytsya, Chernivtsi and Ternopil Regions due to range data from Moldova [6]. Our current study confirm this regularity as we found *C. filum* in Transcarpathia Region which known from multiple localities in neighbouring Hungary [16].

Our record of *C. filum* in Western Ukraine indicate that these species is widely distributed in forest steppe zone. We believe, it is steadily spreading northward in Eastern Europe and its range should be expanded as far as 50° of North latitude. Potentially, *C. filum* could find throughout Ukraine except boreal zone of Carpathian Mountains and forest zone of Polissya. These include 23 of 25 regions of Ukraine: South of Chernihiv Region, Cherkasy Region, North-East of Chernivtsi Region, Crimea Region,

Dnipropetrovsk Region, Donetsk Region, East of Ivano-Frankivsk Region, Kharkiv Region, Kherson Region, Khmelnytsk Region, Kirovohrad Region, South of Kyiv Region, Mykolayiv Region, Luhansk Region, East of Lviv Region, Odesa Region, Poltava Region, South of Sumy Region, Ternopil Region, Vinnytsya Region, West of Transcarpathia Region, Zaporizhya Region, South of Zhytomyr Region.

Conclusions

We reported the first occurring of *Calamobius filum* in Western Ukraine recorded on East margin of Pannonian Plain in Transcarpathia Region. Our record indicate presence of *C. filum* in forest steppe zone of Ukraine opposing to previously known data. For our opinion, its areal is actively expanding northward due to climate change. Potentially, *C. filum* could find throughout Ukraine except boreal zone of Carpathian Mountains and forest zone of Polissya. The North bound of *C. filum* range can reach 50° of North latitude in Ukraine.

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Перша знахідка Calamobius filum (Coleoptera: Cerambycidae) на заході України та нотатки стосовно його біології, екології і поширення у Європі

Монотиповий рід *Calamobius* Guerin-Meneville 1846 представлений єдиним видом *Calamobius filum* (Rossi, 1790), широко розповсюдженим у Середземноморському басейні від Балеарських островів, на заході, до Північного Ірану, на сході, і від Північної Африки, на півдні, до Карпатських гір, на півночі. Вид, раніше, вважався ксеротермним стенотопом, приуроченим до середземноморських скребових та європейських степових екосистем, і не відмічався у лісостепу. Однак, за останнє десятиліття виявлено неухильне розширення ареалу *C. filum* на північ та у гори Європи, де вид оселяється у нетипових для нього умовах. Це, очевидно, спряжено із сучасними кліматичними змінами. В Україні, *C. filum* був відомий лише для степів Північного Причорномор'я, де вважався рідкісним, за винятком Кримського півострову. Наша знахідка виду із околиць с. Оноківці біля Ужгорода, значно розширює відомий ареал *C. filum* в Україні і вказує на його присутність у лісостеповій зоні та проникненні у нижній лісовий пояс південно-західного макросхилу Українських Карпат. Припускаємо, що аналогічна експансія відбувається по усій території України, де вид, потенційно, може розселитись на північ до 50-ї паралелі. Розширення ареалу *C. filum* в Україні може мати негативний економічний ефект, оскільки вид вважається шкідником пшениці, жита, ячменю та вівсу, і спричинює зниження урожайності до 40%.

Ключові слова: *Calamobius filum, Cerambycidae.*

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Первая находка Calamobius filum (Coleoptera: Cerambycidae) на западе Украины и заметки о его биологии, экологии и распространении в Европе

Монотипический род *Calamobius* Guerin-Meneville 1846 включает единственный вид *Calamobius filum* (Rossi, 1790), широко распространённый в Средиземноморском бассейне от Балеарских островов, на западе, к Северному Ирану, на востоке; от Северной Африки, на юге, к Карпатским горам, на севере. Раньше, вид считался ксеротермным стенотопом, приуроченным к средиземноморскому скребу и европейским степям, и не отмечался для лесостепи. Однако, за последнее десятилетие выявлено неуклонное расширение ареала *C. filum* на север и в горы Европы, где вид селится в нетипичных для него условиях. Это, очевидно, сопряжено с современными климатическими изменениями. В Украине, *C. filum* был известным лишь со степей Северного Причерноморья, где считался редким, за исключением Крымского полуострова. Наша находка вида из окрестностей с. Онокивцы возле Ужгорода, значительно расширяет известный ареал *C. filum* в Украине и указывает на его присутствие в лесостепи и проникновение в нижний лесной пояс юго-западного макросклона Украинских Карпат. Предполагаем, что аналогичная экспансия происходит по всей территории Украины, где вид, потенциально, может расселиться на север к 50-й параллели. Расширение ареала *C. filum* в Украине может иметь негативный экономический эффект, поскольку вид считается вредителем пшеницы, ржи, ячменя и овса, и приводит к снижению урожайности до 40%.

Ключевые слова: *Calamobius filum, Cerambycidae.*