NATURA SOMOGYIENSIS 40.

Válogatott tanulmányok XXIV.

Miscellanea XXIV.

Kaposvár, 2023

A megjelent kötetek pdf-ben is elérhetők:
http://www.smmi.hu/termtud/ns/ns.htm

Published volumes are available online in pdf format:
http://www.smmi.hu/termtud/ns/ns.htm

Technikai szerkesztő - *Technical editor*
Ábrahám Levente, Schmidt Péter

A technikai szerkesztő munkatársa - *The technical editor's assistants*
Horváth Péter

ISSN 2560-1040
ISSN 1587-1908 (Print)
ISSN 2062-9990 (Online)

Kiadja - *Published by:*
Rippl-Rónai Megyei Hatókörű Városi Múzeum - *Rippl-Rónai Town Museum with county's rights*
Felelős kiadó - *Responsible publisher*:
Dr. Ábrahám Levente megyei múzeumigazgató - *director*
Nyomdai munkák - *Printed by*:
Pethő & Társa Nyomdaipari Kft. Kaposvár

Tartalom - *Contents*

Natura Somogyiensis 40: 5-8. Kaposvár, 2023 DOI:10.24394/NatSom.2023.40.5
Submitted: 06.12, 2022; Accepted: 25.01, 2023; Published: 05.02, 2023 www.smmi.hu/termtud/ns/ns.htm

Study of the genus *Anthrenus* subgenus *Florilinus* from the Oriental Region Part 2. *Anthrenus* (*Florilinus*) *laosensis* sp. nov. from Laos (Coleoptera: Dermestidae: Megatominae)

Jiří Háva

Private Entomological Laboratory & Collection,
Rýznerova 37/37, CZ-252 62 Únětice u Prahy, Prague-west, Czech Republic
e-mail: jh.dermestidae@volny.cz; ORCID ID: 0000-0001-8076-9538

Háva, J.: *Study of the genus Anthrenus subgenus Florilinus from the Oriental Region Part 2. Anthrenus (Florilinus) laosensis sp. nov. from Laos (Coleoptera: Dermestidae: Megatominae).*
Abstract: The species *Anthrenus* (*Florilinus*) *laosensis* sp. nov. from Laos is described, illustrated and compared with a similar species. The new species differs by the structure of antennae and colour of scales.

Keywords: Taxonomy, new species, Coleoptera, Dermestidae, Anthrenus, Florilinus, Laos.

Introduction

The subgenus *Florilinus* Mulsant et Rey, 1868 of the genus *Anthrenus* Geoffroy, 1762 recently contains 36 species Worldwide (Háva 2022). No species of the subgenus has been yet known from Laos.

The subgenus is characterized by antennae consisting of 8 antennomeres. Males differ from females by the shape of the antennal club. In males, the terminal antennomere is longer than the penultimate one; in females it is as long as the penultimate one. Adults can be found on plants, but also in households, where the larvae are harmful to different commodities of natural origin. They are feared pests in museum collections (Peacock 1993, Háva 2021).

Material and methods

The size of the beetles or of their body parts can be useful in species recognition and thus, the following measurements were made:

total length (TL) - linear distance from anterior margin of pronotum to apex of elytra.

Elytral width (EW) - maximum linear transverse distance.

ISSN 1587-1908 (Print); ISSN 2062-9990 (Online)

The material mentioned is deposited in (JHAC) - Jiří Háva, Private Entomological Laboratory & Collection, Únětice u Prahy, Prague-West, Czech Republic.

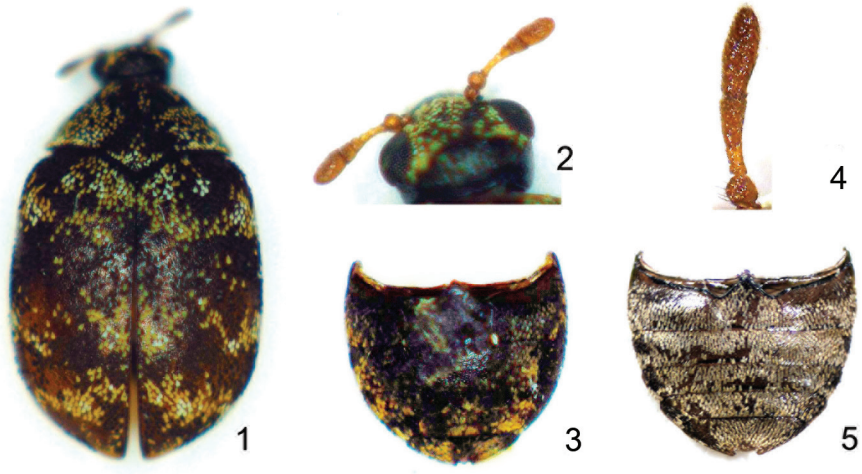
Specimen of the species described here are provided with red, printed label with text as follows: „HOLOTYPE Anthrenus (Florilinus) laosensis sp. nov. Jiří Háva det. 2023".

Description

Anthrenus (*Florilinus*) *laosensis* **sp. nov.**
(Figs. 1-3)

Type material. Holotype (♀): LAOS, Khammouan prov., 18°07´N 104°29´E, Ban Khoun Ngeun, 200 m, 24-29.iv.2001, Vít Kubáň lgt., (JHAC).

Description of holotype. Female. Body measurements (mm): TL 2.0 EW 1.4; body dark brown, small, oval (Fig. 1). Dorsal surfaces covered by intermixed dark brown, yellow and white scales. Head covered only by yellow scales. Palpomeres brown. Antennae consisting of 8 antennomeres, antennomeres brown, terminal antennomere as in (Fig. 2). Antennal fossa long and broad. Frons with median ocellus. Eyes with entire median margin. Pronotum covered with dark brown scales discally, intermixed with white and yellow scales on lateral margins. Scutellum triangular. Elytra dark brown, with dark brown, yellow and white scales; white and yellow scales are intermixed and forming transverse fasciae and apical spots (Fig. 1). Epipleuron short, with yellow scales. Individual scales small, broad and triangular. Ventral surface covered with yellow scales, particular abdominal ventrites covered by yellow scales, with small, brown, lateral spots (Fig. 3). Ventrites I-V without spots in the middle, covered by yellow scales. Prosternum only with yellow scales. Metasternum only with yellow scales, without a large patch at lateral margins. Legs brown with white scales and white setae.



Figs. 1-5. *Anthrenus* **(***Florilinus***)** *laosensis* **sp. nov.: 1- habitus, dorsal aspect; 2- antennae of female; 3- abdomen;** *Anthrenus* **(***Florilinus***)** *emili* **Herrmann & Háva, 2019: 4- antenna of female; 5- abdomen (Figs. 4-5 arranged according to A. Herrmann).**

Male. Unknown.

Differential diagnosis. The new species is similar to *Anthtrenus* (*Florilinus*) *emili* Herrmann & Háva, 2019 (China: Sichuan, Yunnan), but differs from it by the characters mentioned below. From other known Florilinus species known from the Oriental Region it differs by the same characters.

Abdominal ventrites with yellow scales and lateral spots from dark, brown scales (Fig. 3); metasternum only with yellow scales; antenna of female (Fig. 2) ……
.....*Anthrenus* (*Florilinus*) *laosensis* **sp. nov.**

Abdominal ventrites with white scales and lateral spots from brown scales (Fig. 5); metasternum only with white scales; antenna of female (Fig. 4) ……..
.....*Anthrenus* (*Florilinus*) *emili* Herrmann & Háva, 2019

Etymology. Toponymic, named after the type locality, country of Laos.

List of *Anthrenus* species recorded from Laos

Anthrenus (*Anthrenodes*) *maculifer* Reitter, 1881	antennae consisting of 10 antennomeres
Anthrenus (*Florilinus*) *laosensis* sp. nov.	antennae consisting of 8 antennomeres
Anthrenus (*Helocerus*) *fuscus* Olivier, 1789	antennae consisting of 5-6 antennomeres
Anthrenus (*Nathrenus*) *edopetri* Háva, 2004	antennae consisting of 11 antennomeres

Acknowledgements

I would like to thank Vít Kubáň (Czech Republic) for donating me the interesting material and Miloslav Rakovič (Czech Republic) for a revision of the English manuscript.

References

HÁVA, J. 2021: Brouci čeledi kožojedovití (Dermestidae) České a Slovenské republiky. Druhé, doplněné vydání. Beetles of the family Dermestidae of the Czech and Slovak Republics. Second Updated Edition. Praha: Academia, 127 + 44 pp. (in Czech and English)

HÁVA, J. 2022: Dermestidae World (Coleoptera). - World Wide Web electronic publication (open in 2004): http://www.dermestidae.wz.cz (version 2018, update March 2022)

PEACOCK, E. R. 1993: Adults and larvae of hide, larder and carped beetles and their relatives (Coleoptera: Dermestidae) and of derodontid beetles (Coleoptera: Derodontidae). Handbooks for the Identification of British Insects 5: 1-144.

Natura Somogyiensis 40: 9-12. Kaposvár, 2023 DOI:10.24394/NatSom.2023.40.9
Submitted: 30.01, 2022; Accepted: 30.01, 2023; Published: 05.02, 2023 www.smmi.hu/termtud/ns/ns.htm

A vérpettyes medvelepke (*Utetheisa pulchella* Linnaeus, 1758) újabb előfordulásai Magyarországon

Szabóky Csaba[1] & Takács Attila[2]

[1]H-1034 Budapest, Bécsi út 88., Hungary, email:szabokycs50@gamil.com
[2]Fejér Megyei Kormányhivatal Agrárügyi Főosztály, Növény-és Talajvédelmi Osztály
H-2481 Velence, Ország út 23, Hungary, email:takacs.attila@fejer.gov.hu

Szabóky, Cs. & Takács, A.: *New occurrences of Crimson-speckled Flunkey (Utetheisa pulchella Linnaeus, 1758) in Hungary.*
Abstract: In this work, the current distribution of the Crimson-speckled Flunkey moth (*Utetheisa pulchella* Linnaeus, 1758) in Hungary is presented. With 4 figures.

Keywords: Erebidae,Arctiinae, *Utetheisa pulchella*, migrant moth, distribution, Hungary

Bevezetés

Az utóbbi évtizedben, hazánkban számos melegkedvelő vándor lepkefajt észleletek; ezek közül kiemeljük a trópusi elterjedésű *Thysanoplusia orichalcea* (Fabricius, 1775) (Balogh & Tóth 2019), a *Spodoptera littoralis* (Boisduval, 1833) (Katona et al. 2020) és a *Mythimna congrua* (Hübner, [1817]) mediterrán fajt (Sum & Benedek 2020).

Az Arctiinae alcsaládba tartozó vérpettyes medvelepke (*Utetheisa pulchella* Linnaeus, 1758) (1-2. ábra) gyakori és elterjedt melegkedvelő lepkefaj. Megtalálható Afrikában, Észak-Afrikában, a Közel-Keleten és Közép-Ázsiában, továbbá az Indomaláj területeken.

A vérpettyes medvelepke extrapalaerktikus vándor faj (Varga et al. 2004). A lepke Európában elsősorban a Mediterráneumban él, de jelenlétét – Finnország, Norvégia, Izland és Észtország kivételével – minden európai országban észlelték (Karsholt & Razowski 1996). A Magyar Természettudományi Múzeum gyűjteményében az utolsó adata a múlt század első harmadából ismert (Vojnits et al 1991). Vándorlásai során várhatóan június hónapban jelenhet meg hazánkban. A vegetációs időszakban itthon több nemzedéke is kifejlődhet. Hernyója az érdeslevelűek (Boraginaceae) közé tartozó növényeket fogyasztja. Az újabb információk szerint kiemelt tápnövénye az európai kunkor (*Heliotropium europaeum*) (3. ábra). Az európai kunkor mediterrán eredetű gyomnövény, mely az ország középső területein telepedett meg.

ISSN 1587-1908 (Print); ISSN 2062-9990 (Online)

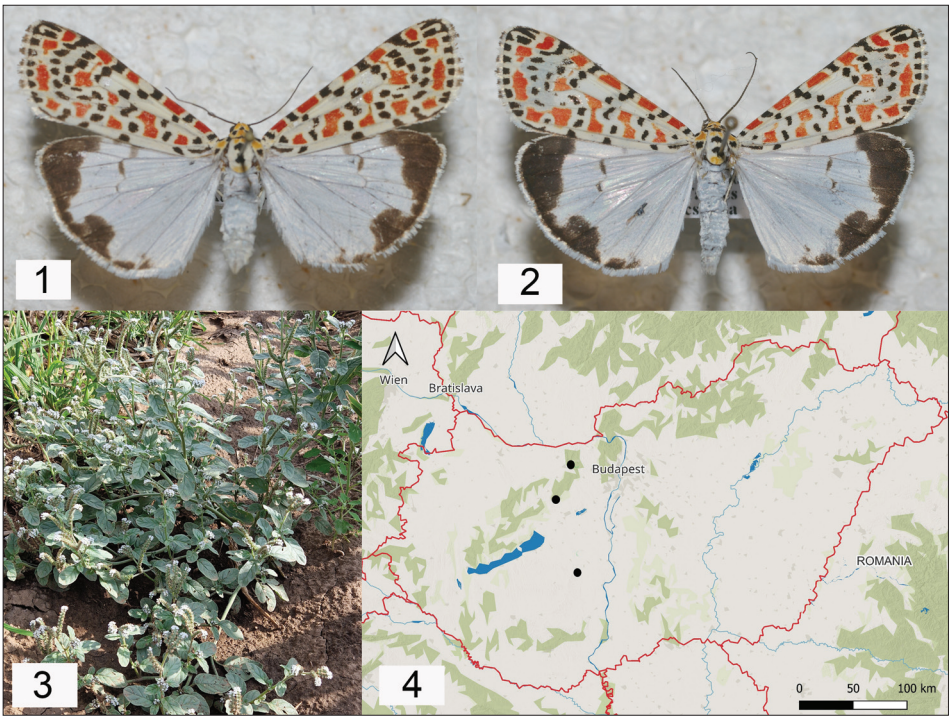
Anyag és módszer

Az elmúlt évtizedekben a Dunántúl lepkefaunájának pontosabb megismeréséhez számos ponton fénycsapdát üzemeltettünk és a gyűjtött lepkeanyagot fel is dolgoztuk. Az adott helyen működő fénycsapdák a vizsgálatok végeztével áthelyeztük a következő „fehér foltra" s így méltán nevezhetjük „vándor-fénycsapdának". A fénycsapda telepítési helyei: Bakonykúti, Pécsely, Tihany, Epöl.

Eredmények és következtetések

A vérpettyes medvelepke példánya Epölről 2006. október 27-én került elő (SZABÓKY & KUTASSY 2013). Az utóbbi években alkalmi lepkészeti megfigyelés számos több településen folyt. Így került elő a medvelepke Gánt-Gránásból 2017. októberében, melyet Babics János észlelt, de a példány nem került begyűjtésre. A Sárszentágotai csapda három éve üzemel, és itt 2022. év november 6-án fogta meg a medvelepke példányát a csapda. A lepke két „újkori" előkerülése nem feltétlenül a klímaváltozással függ össze, hanem inkább az észlelési pontok (időpontok) szaporodásával magyarázható.

A Mediterráneumot északi irányban elhagyó vándorlepkék nem az eléjük tornyosuló hegységek gerincvonulatain keresztül haladnak, hanem a völgyek kínálta lehetőségeket használják ki. A Kárpát-medencébe érkező lepkék (pannóniai vándorutak) egyik része



1-4. ábra: Vérpettyes medvelepke imágók, tápnövény és elterjedési térkép. 1. Epöl, fénycsapda 2006.10.27. 2.; Sárszentágota, fénycsapda 2022.11.06. 3. A faj tápnövénye, európai kunkor (*Heliotropium europaeum*) 4. A vérpettyes medvelepke gyűjtőhelyei az utóbbi 20 évben.

Komárom és Bécs térségét elhagyva Kelet-Ausztrián keresztül vonul. A vándorút másik ága a Nyugat-Románián, Közép- és Kelet Magyarországon, Dél-Szlovákián keresztül vezet észak felé (Vojnits 1966). A vérpettyes medvelepke új előfordulásait tekintve a bécsi vándorút irányát részesítették előnyben (4. ábra). Kutassy György 2017. július 5-án bekövetkezett haláláig Epölön gyűjtött fénycsapdával is. Az epöli példányt az özvegye Magyar Természettudományi Múzeumnak ajándékozta. Az epöli és a sárszentágotai példányok múzeumi elhelyezése tovább gazdagítja a gyűjteményt, továbbá a medvelepkékről kirajzolódó ismereteket is.

A vándorlepkék bárhol és bármikor felbukkanhatnak a Kárpát-medencében. A Magyarországra érkező egyedek a „pannon" vándorutat követik és az országot vagy észak-nyugat vagy észak-keleti felé hagyják el. A vérpettyes medvelepke utolsó ismert hazai adata közel 80 éves. Újabb példányok Epölből (2006), Gánt-Gránásból (2017) és Sárszentágotáról (2022) kerültek elő. A lepkék megjelenése nem csak klímaváltozással hozható összefüggésbe, hanem az észlelési helyek és időpontok gyarapodása is magyarázható.

Irodalom

Balogh, D. & Tóth, B. 2019: First record of Thysanoplusia orichalcea in Hungary (Lepidoptera: Noctuidae: Plusiinae). - Folia entomologica hungarica 80: 287-291.

Karsholt, O. & Razowski, J. 1996: The Lepidoptera of Europe. - A Distributional Checklist. Apollo Books. Stenstrup, 380 pp.

Sum Sz. & Benedek B. 2020: A Mythimna congrua (hübner, [1817]) (Lepidoptera: Noctuidae) története és előfordulása Magyarországon. - Folia Musei Historico-naturalis Bakonyiensis 37: 137-152.

Szabóky Cs. & Kutassy Gy. 2013: Epöl és környéke lepkefaunája. - Folia Musei Historico-naturalis Bakonyiensis 30: 101-136.

Varga Z., Ronkay L., Bálint Zs., László M. Gy. & Peregovits L. 2004: A magyar állatvilág fajjegyzéke. - 3. kötet Nagylepkék. - Magyar Természettudományi Múzeum, Budapest 111 pp.

Vojnits A., Uherkovich Á., Ronkay L. & Peregovits L. 1991: Medvelepkék, szenderek és szövőlepkék. Arctiidae, Sphinges et Bombyces - Magyarország állatvilága - Fauna Hungariae, Budapest 166. 256 pp.

Vojnits A. 1966: Az "igazi" vándorlepkék. - Folia entomologica hungarica 19:167-175.

Natura Somogyiensis 40: 13-22. Kaposvár, 2023 DOI:10.24394/NatSom.2023.40.13
Submitted: 10.01, 2022; Accepted: 3.02, 2023; Published: 10.03, 2023 www.smmi.hu/termtud/ns/ns.htm

A new owlfly genus from Africa (Neuroptera: Myrmeleontidae: Ascalaphinae)

Levente Ábrahám

Rippl-Rónai Museum, H-7400 Kaposvár, P.O. Box 70, Hungary
e-mail: labraham@smmi.hu, https://orcid.org/0000-0002-8007-7117

Ábrahám, L.: *A new owlfly genus from Africa (Neuroptera: Myrmeleontidae: Ascalaphinae).*
Abstract: This publication contains a description of the genus *Bellulula* (**gen. n.)** separated from the genus *Dicolpus* Gerstaecker, 1884. The new genus was compared with *Phalascusa* Kolbe, 1897, *Dicolpus* Gerstaecker, 1884 and *Proctarrelabris* Lefébvre, 1842. Among the type specimens kept in different collections, the lectotype specimen of the species (**present designation**) as *Bellulula sjostedti* (van der Weele, 1905) (**comb. n.**) was designated and moved to a new combination. New faunistic data and general distribution are documented. With 7 figures.

Keywords: ascalaphid, owlfly, new genus, distribution, Africa.

Introduction

Africa's owlfly fauna is the richest in species on Earth, with more than half of the valid species described from this continent (Tjeder 1972, 1980, 1986, 1989, 1992, Hansson & Tjeder 1992, Mitchel 1998). The number of new species increased significantly in the 21st century (Ábrahám 2010 (1 sp.), 2017 (1 sp.), Badano & Pantaleoni 2012 (1 sp.), Michel 2012 (1 sp., 2019 (3 sp.), Michel & Mansell 2018 (1 sp.), Prost 2013a,b (2 sp.), Prost & Popov 2021 (1 sp.)) More new species are expected to be described in the future.

The phylogenetic status of the traditional family Ascalaphidae has changed significantly in recent years (Machado et al. 2018 and Jones 2019). The acceptance of this is not uniform (Prost & Popov 2021).

Tjeder (1992) published a comprehensive monograph on the African Ascalaphids, in which he described many taxa, new tribes, new genera, and species even using the traditional taxonomic division. This work was completed by Hansson & Tjeder (1992). In the monograph, there are several references to recognized but undescribed genera, some of which were indicated in the collections revised by Bo Tjeder, but the new taxon names are not valid (nomen nudum) in the absence of a description.

The name of the new genus to be described now also belongs to this group, therefore the author created the new genus description as a continuation of the work started by Tjeder, but not completed, and searched for the species designated as type specimens.

ISSN 1587-1908 (Print); ISSN 2062-9990 (Online)

Material and methods

Over several years, many specimens of the examined species have been collected in West Africa. I used these male and female non-type specimens for the morphological examination. Of course, I checked the literature references for the species and requested high-quality photos of the type specimens from various collections. The new habitus photos were taken by Canon EOS 400 digital camera equipped with flashlight system (Sigma EM140 DM). The photo of the female genitalia was taken by using SZX9 Olympus stereomicroscope equipped with a ScopeTek DCM800 digital camera. The layers of photos were processed with Combine ZP imagine stacking and Adobe Photoshop software.

According to traditional methods, the caudal part of the abdomen was removed, treated with a 10% KOH solution, and heated for 15 minutes. After cooling, it was rinsed in distilled water. For taking the photo, the genitalia was placed in glycerine in a Petri dish. Finally, each genitalia was transferred into glycerine in a microvial for preservation.

Abbreviations of the collections:

John O'Dell's private collection – Hornsea, UK
MNHN – Muséum National d'Histoire Naturelle, Paris, France
NHRS – Naturhistoriska Riksmuseet, Stockholm, Sweden
SCMK – Rippl-Rónai Museum, (former Somogy County Museum), Kaposvár, Hungary

.

Abbreviations of the annotation:

Comb – New combination; Dist – Distribution; Mon – Monograph; Nom – Nomenclature; Odescr – Original description; List – Faunal list.

Results and discussion

TJEDER (1992) designated the species *Dicolpus sjostedti* as the type species of two undescribed genera *Bellulula* (TJEDER 1992: 27 Figs. 63 and 70.), *Apodicolpus* (TJEDER 1992: 35 and 165.) are invalid names without descriptions of the genera. During the examination of the type species, therefore I chose the first described name from Tjeder's work and prepared the description of the genus below.

Bellulula Ábrahám & †Tjeder **gen. n.**

Bellulula – Tjeder (1992) (Mon) nomen nudum without description.

Type species: Theleproctophylla? Sjöstedti van der Weele, 1905

Diagnosis: Monobasic African genus. Medium sized species. Sexual dimorphism present. Male little smaller in size, wings narrower than that of female, and pattern on wings reduced. Male pterostigma longer than that of female. Base of costal margin of female very prominent in hindwing. Hindwing triangular-shaped especially in female. Wing venation dense, with exception of costal margins. Extensive pattern on both wings. Hairs on head dense, hairs on thorax and abdomen sparse.

Head: Wider than thorax. Eye oval, divided by a furrow, equal. Vertex narrow. Vertex, frons, scapus with not dense hairs. Anterior tentorial pit and between scapes with long dense tuft of hairs. Gena, postorbital sclerite and occiput hairless. Base of mandible with

sparse hairs on lateral side. Antenna somewhat shorter than distance between base of forewing and pterostigma. Club large, subglobular shaped.

Thorax: with sparse moderate long hairs.

Legs moderate long and slender. Femora about as long as tibiae. Length of tarsi 1 variable on legs. Tarsi 2-4 equal, tarsi 5 somewhat shorter than tarsi 1-4 combined. Femora and tibiae with long bristles.

Wings: Wide, subtriangular shaped, apices rounded, anal area obtuse, anal margin straight. Venation dense. Apical area with 2 rows of cells. Pterostigma about as long as wide in forewing, wider than long in hindwing. Hindwing considerably shorter than forewing.

Abdomen: shorter than wings. Tergite 2-4 of male with long sparse hairs. Other tergites with short stiff hairs. Tergites on female only with short hairs. Sternite 1 short. Male ectoproct with long straight caudal processus curved inwards at ends. Parameres fused to arch-like gonarcus, pelta present, gonosetae moderate long (Tjeder 1992: Figs 63. and 70.). Female ectroproct oval plate, ventrovalvae hemispheric, distivalvae trigonous in lateral view, interdens not seen (Fig. 1).

Fig: 1: A female genitalia in lateral view, scale: 1 mm.

Remarks: The new genus resembles the genus of *Phalascusa* Kolbe, 1897. They also have a striking pattern on their wings. Their average size is smaller than that of the new genus. The venation is less dense, and the wing shape is more elongated.

The new genus differs from *Dicolpus* Gerstaecker, 1884 in several characteristics. The *Dicolpus* species have an elongated wing shape, the venation is not so dense as that of the genus *Bellulula*. Males have conspicuous stiff short spines on the hind margin of the forewing, wings are not patterned.

Regarding the wing shape and venation, it also shows a similarity to *Proctarrelabris* Lefébvre, 1842 but the genus is characterized by strong hairiness.

Etymology: According to OSWALD (2019) "*Unexplained, probably Bell- (from L. bellus, beautiful) + -ulula (from Ulula, an ascalaphid genus-group name, q.v.), in reference to the ascalaphid affinities and attractive wing patterning of the taxon that was to have been designated as its type species.*"

A redescription of the species is not necessary, as the original description by van der WEELE (1905-1907) was accurate and detailed, similar to the redescription in van der WEELE's (1909a) monograph later.

Bellulula sjostedti (van der Weele, 1905) **comb. n.**
*Theleproctophylla? Sjöstedt*i van der Weele, 1905: 2 – (Odescr).
Dicolpus Sjöstedti (van der Weele, 1905) – van der Weele 1909a (Mon, Comb), 1909b (List).
Dicolpus Sjostedti (van der Weele, 1905) – Navás 1912 (Mon), 1924 (Dist).
Dicolpus sjoestedti van der Weele, 1905 – Tjeder 1992 (Mon).
Bellulula sjoestedti (van der Weele) – Tjeder 1992 (Mon), Ábrahám 2017 (Nom).
Dicolpus sjostedti van der Weele, 1906 – Prost et al. 2022 (Dist).

Type of *Bellulula sjostedti* (van der Weele, 1905)

When van der WEELE (1905-1907) described the species, he indicated the Stockholm museum as the type location, and later referred to it, too (van der Weele 1909a). The Naturhistoriska, Sweden (NHRS) has two female specimens with type labels.

Material examined: 1♀ / NHRS-JLKB / 000073640 [white label with capital letters] // Typus [red label with black margins and with printed capital black letters] // Camerun [white label with printed letters] // Sjöstedt. [white label with printed italic letters] // ♀ [printed white label] // Suphalacsa (?) [sic!] / Sjöstedti v d Weele [white label with with Weele's original handwriting in black letters] // Theleproctophylla (?) / sjöstedti n sp / v. d. Weele / Typ [with handwritten white label] // 31 [printed letters] 68 [handwritten in blue ink, in reddish label] // Riskmuseum / Stockholm [blue label with printed letters] // ♀ prep. [white label with Tjeder's handwriting] // 4135 / E94 + [green label with printed letters] // sjoestedti ♀ / paralectotype [white paper with Tjeder's handwriting] /. (Figs: 2 and 3).

Remarks: van der WEELE (1905-1907) mentioned only one type specimen from Cameroon („Kamerun"), there are 2 specimens designated as types in the museum collection. In the original publication van der WEELE (1905-1907: Fig. 3.) published a photograph of the type specimen. The morphological features of this prepared specimen, such as the angle and curvature of the antennas, the pattern of the wings, the relative position of the fore and hind wings, etc. seem to be clearly identified to the specimen in inventory number NHRS-JLKB 000073640. This is confirmed by the species name (*Suphalacsa* (?) *Sjöstedti*) given to the specimen in Weele's handwriting. van der WEELE (1905-1907) mentioned in the description that the genus classification of the species was uncertain because he did not have a male specimen available. In the original description, he already used the name *Theleproctophylla* (?) *Sjöstedti*. He was also uncertain when redescribed the species in his monograph (van der WEELE 1909a) since he examined only female specimens (e.g. in Paris 1907). NHRS-JLKB 000073640 specimen was examined by Tjeder, the label of the female genitalia belonging to this specimen bears a paralectotype label in Tjeder's handwriting. This information has not been published. This specimen is therefore the lectotype of the species (***present designation***). TJEDER (1992:27 Fig. 63 and 70) published a drawing of the male genitalia under the name *Bellulula sjoestedti* (ÁBRAHÁM 2017). The deposition of this male specimen is unknown.

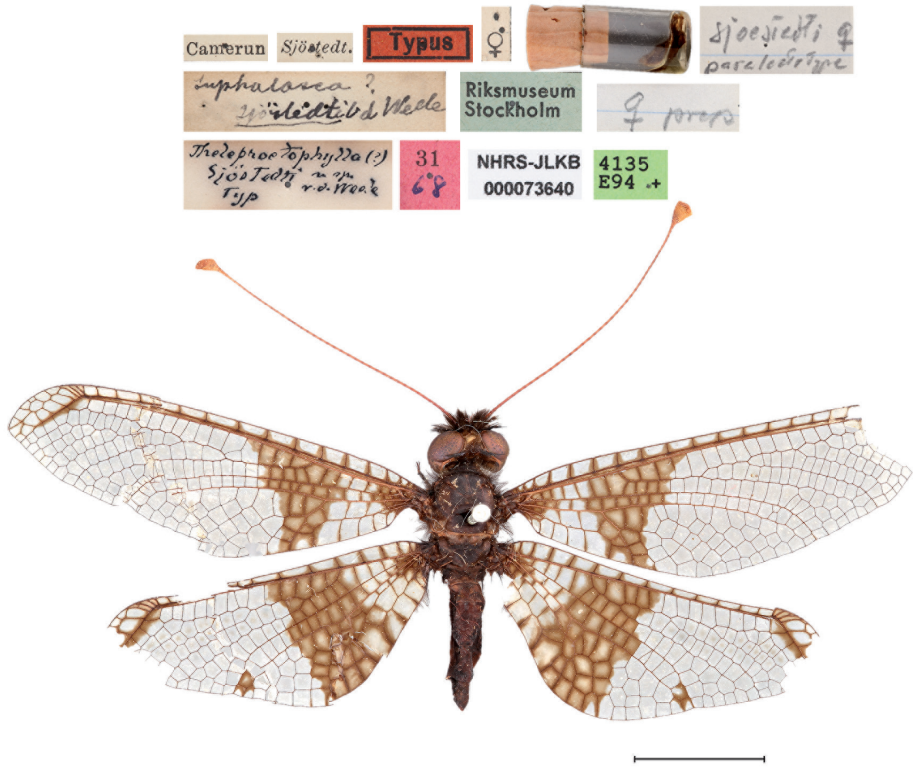


Fig. 2: Designated lectotype of *Bellulula sjostedti* (van der Weele, 1905) (NHRS-JLKB / 000073640 - in coll. NHRS, Stockholm), scale: 10 mm.

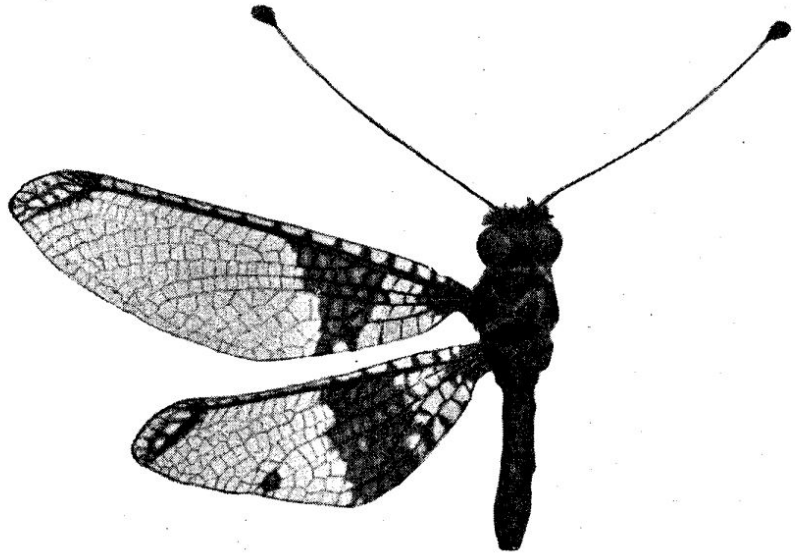


Fig. 3: Illustration of the type specimen included in the original description (van der Weele 1905-1907)

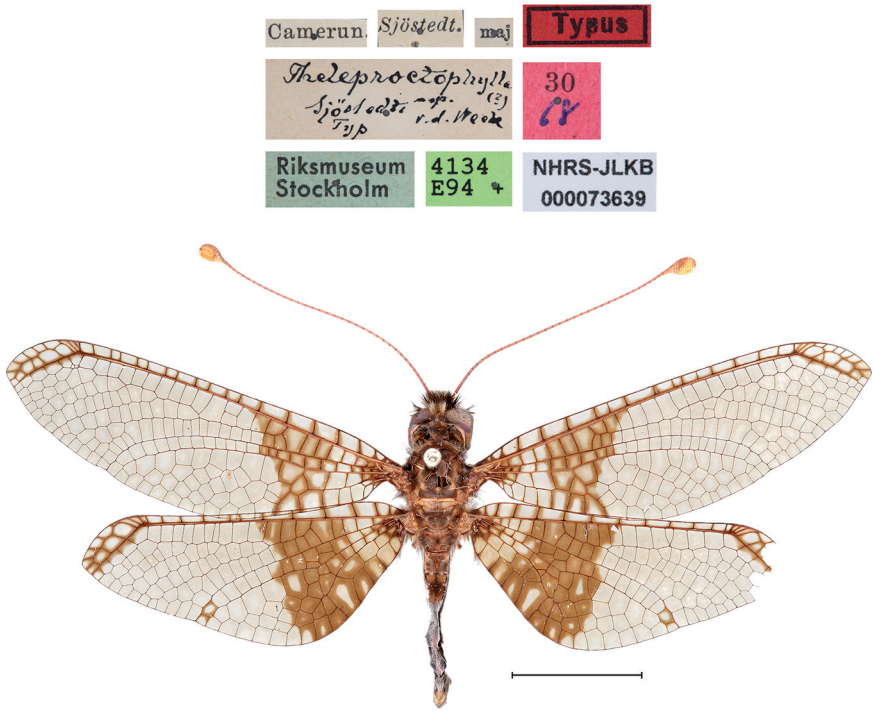


Fig. 4: Incorrectly labeled specimen as a type specimen (NHRS-JLKB / 000073639 - in coll. NHRS, Stockholm), scale: 10 mm.

Type condition: medium, the apices of the right fore and hindwing as well as the left hindwing are missing, and a small part in front of the pterostigma in the left hindwing is missing. The abdomen tip can be found in a genital vial in glycerine.

Material examined: 1♀ / NHRS-JLKB / 000073639 [white label with capital letters] // Typus [red label with black margins and with printed capital black letters] // Camerun [white label with printed letters] // Sjöstedt. [white label with printed italic letters] // Theleproctophylla (?) / sjöstedti n sp / v. d. Weele / Typ [with handwritten white label] // 30 [printed letters] 68 [reddish label with handwritten in blue ink] // Riskmuseum / Stockholm [blue label with printed letters] // 4134 / E94 + [green label with printed letters] /. (Fig: 4).

Remarks: It is not a type specimen, despite the fact that labeled as a type.

The specimen with the type label from the MNHN collection.

Material examined: 1♀ / Type [white label with printed capital and red letters] // Museum Paris / Bus-Ogooué / Entre Lamberéné et La Mer / E. Haug 1901 [greyish label with capital black letters // Dicolpus sjöstedti vdW./ det vdW. 1907 [white label with double black margins and with Weele's original handwriting in black letters /. (Fig: 5).

Remarks: The type label is incorrect, as the specimen was not published by van der WEELE (1906-07). This collecting place is located in Gabon, prov. Ogooué near Lamberéné. This does not match the published type locality "Kamerun" (Cameroon). van der WEELE (1909a) did not mention this locality and later in his ascalaphid mono-

Fig. 5: Incorrectly labeled specimen as a type specimen (in coll. MNHN, Paris), scale 10 mm.

graph. This is contradicted by the fact that van der Weele (1909b) documented it as a type specimen in his later publication. When describing the species, van der Weele (1905-1907) indicated the Stockholm museum as the locality of the type specimen. Consequently, it is not a type specimen, despite the fact that labeled as a type.

Additional non type material:
In coll. SCMK: 1♀ NeuAsc486 Ghana Central Region Abrafo Kakum Forest 02-04.11.2008 Leg: Sáfián Sz.; 1♀ NeuAsc487 Liberia Grand Gedeh County Mt. Sideh Putu Mountains 10-20.04.2011 Leg: Szabolcs Sáfián, Mártin Strausz; 2♀ NeuAsc488 Ghana Eastern Region Bunso Arboretum 19-20.X.2011 Leg: Sáfián Sz., Pühringer F. & Pöll N.; 2♂ NeuAsc489 Cameroon East Region Kagnol Haut Nyong District UFA Concession forest 3°44'34.05"N 13°23'51.97"E 02-06.V.2016 Leg: Sáfián Sz., Simonics G.; 1♀ NeuAsc1007 West Africa Republic of Guinea N'Zerekoré Region Mt.Nimba Ziela 535m N7.71559° W8.35710° 2017.10.18-11.03 Leg: Gergely Petrányi.; 1♂ NeuAsc3719 Liberia, Nimba Mountains, Zortapa FDH Headqaunters 7°22'41"N 8°33'55"W 433m 23-30.VI.2020., 250W Blended bulb, Leg: Sáfián Sz.; 1♀ NeuAsc3720 Cameroon, Mount Cameroon 2016.05.03. (Figs. 5 -6)
In coll. J. O'Dell (UK): 1♀ Cameroon Ebogo Province du Centre, 8. 2016.

Remarks: It seems to be a rare species, females can be found in the museum collections more frequently than males. The typical habitat is a moist semi-deciduous forest and secondary growth and clearings. The flying time is from May to November. Imagoes are active in the daytime but are also attracted by light at night.

Distribution: Cameroon (van der Weele 1909a), Gabon (as Französischer Congo - van der Weele 1909b, as Congo francés - Navás 1912a), Ivory Coast (Navás 1924), Benin (Prost & Popov 2021). Based on the entomological collection of SCMK, it is a new record for the fauna of Ghana, Guinea, and Liberia.

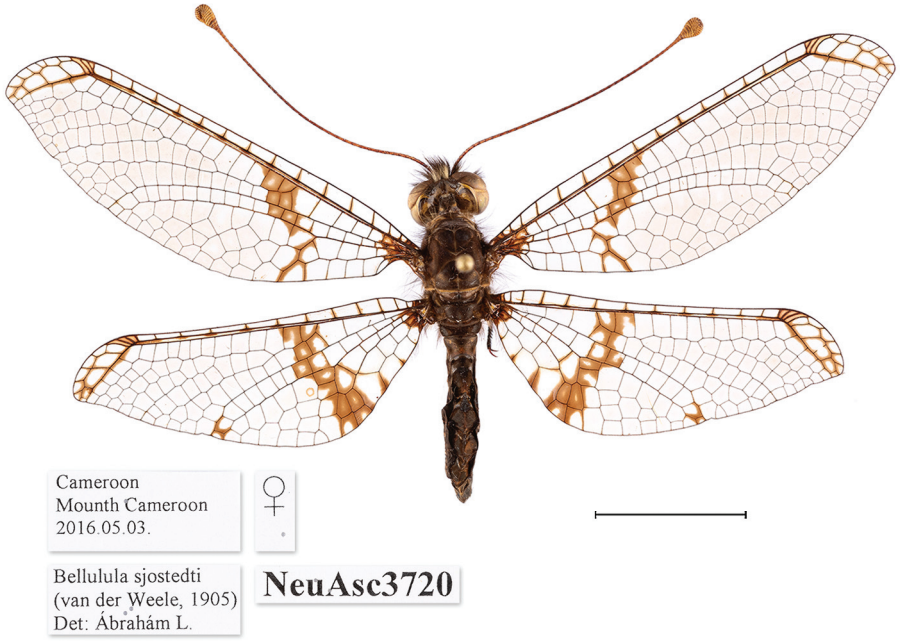


Fig. 6: A female specimen with a non-typical wing pattern (in coll. SCMK), scale: 10 mm.

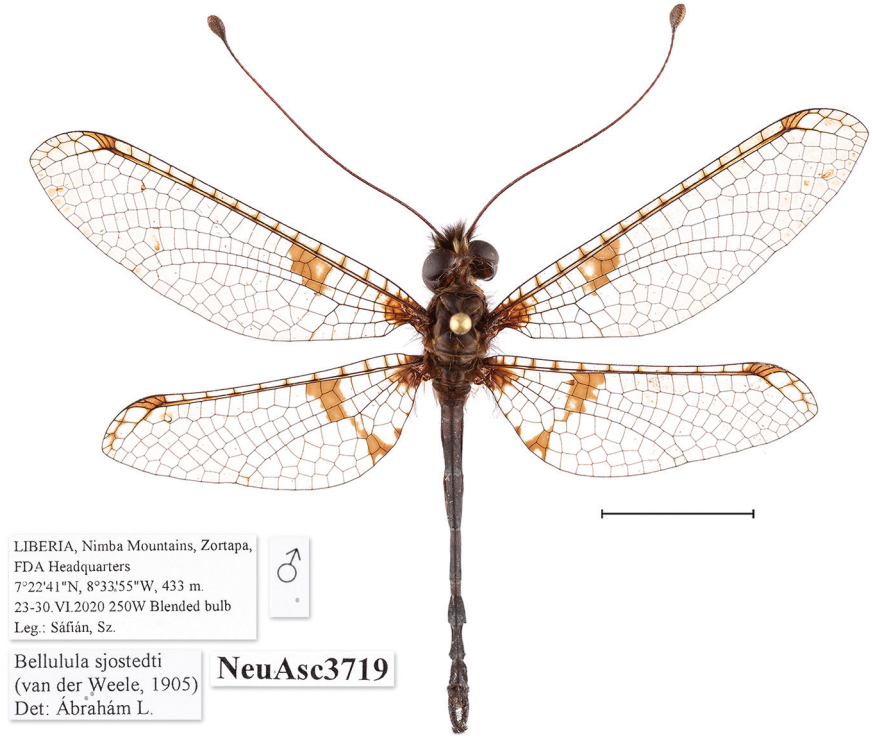


Fig. 7: The first published male illustration of the species (in coll. SCMK), scale: 10 mm.

Acknowledgement

I wish to express my grateful thanks to the curators and assistants of museum collections: Johannes Bergsten and Anna Jerve (NHRS – Naturhistoriska Riksmuseet, Stockholm, Sweden), Chritoffer Fägerström (MZLU – the Museum of Zoology at Lund University, Sweden), Jean Legrand (MNHN – Muséum National d'Histoire Naturelle, Paris, France), Matthieu Giacomino (Saint Berthevin, France) and John O'Dell (Hornsea, UK) for the photo of the type specimens and for the collection information. Special thanks to Bálint Csernyák (Hungary) for the excellent photos and to Szabolcs Sáfián and Gergely Petrányi (Hungary) for donating collected material to the entomological collection of the Rippl-Rónai Museum as well as George Hangay (Australia) for linguistic improvement.

References

Ábrahám, L. 2010: Ascalaphid studies VIII. A new Cirrops Tjeder, 1980 species from Morocco (Neuroptera: Ascalaphidae). - Acta Phytopathologica et Entomologica Hungarica 45:359-366. https://doi.org/10.1556/APhyt.45.2010.2.13

Ábrahám L. 2017: Ascalaphid studies XI. A new owlfly (Neuroptera: Ascalaphidae) from Kenya: Afroasca doboszi gen. and sp. nov. - Annals of the Upper Silesian Museum in Bytom Entomology 26: 1-6.

Badano, D.; Pantaleoni, R. A. 2012: Agadirius trojani gen. et sp. nov.: a new owlfly (Neuroptera: Ascalaphidae) from Morocco. Zootaxa 3270:51-57. https://doi.org/10.11646/zootaxa.3270.1.4

Jones, J. R. 2019: Total evidence phylogeny of the owlflies (Neuroptera, Ascalaphidae) supports a new higher level classification. - Zoologica Scripta, 48: 761-782. https://doi.org/10.1111/zsc.12382

Machado, R. J. P., Gillung, J. P., Winterton, S. L., Garzón-Orduña, I. J., Lemmon, A. R., Lemmon, E. M., & Oswald, J. D. 2018: Owlflies are derived antlions: anchored phylogenomics supports a new phylogeny and classification of Myrmeleontidae (Neuroptera). - Systematic Entomology, 44: 418-450. https://doi.org/10.1111/syen.12334

Michel, B. 1998: Description d'un nouveau genre et de deux nouvelles espèces d'Ascalaphes afrotropicaux (Neuroptera, Ascalaphidae). - Bulletin de la Société Entomologique de France 103:45-50. https://doi.org/10.3406/bsef.1998.17392

Michel, B. 2012: First record of the genus Kimulodes Tjeder & Hansson in West Africa with description of a new species (Neuroptera, Ascalaphidae). - Zootaxa 3497:37-40. https://doi.org/10.11646/zootaxa.3497.1.4

Michel, B. 2019: Revision of the genus Disparomitus van der Weele, 1909 with descriptions of four new species (Neuroptera, Ascalaphidae). - Zootaxa 4551:1-39. https://doi.org/10.11646/zootaxa.4551.1.1

Michel, B.; Mansell, M. W. 2018: A new genus and species of owlfly from eastern and southern Africa (Neuroptera: Ascalaphidae). - European Journal of Entomology 413:1-12. https://doi.org/10.5852/ejt.2018.413

Navás, L. 1912: Sinopsis de los Ascaláfidos (Ins. Neur.). - Arxius de l'Institut de Ciències, Institut d'Estudis Catalans, Secció de Ciències 1:45-143. https://doi.org/10.5962/bhl.title.8510

Navás, L. 1914: Notes sur quelques Névroptères du Congo Belge II. - Revue de Zoologie Africaines, Bruxelles 4: 91-100.

Navás, L. 1924: Névroptères d'Afrique. - Annales de la Société Scientifique de Bruxelles 43(pt. 1): 375-380.

Oswald, J. D. (chief editor) 2019: Lacewing Digital Library. Lacewing Digital Library module. http://lacewing.tamu.edu/. - Last accessed on 13rd December 2019.

PROST, A. 2013a: Phalascusa longistigma (MacLachlan, 1871) : statut et redescription (Neuroptera, Ascalaphidae, Ascalaphinae). - Bulletin de la Société Entomologique de France 118:301-304. https://doi.org/10.3406/bsef.2013.3110

PROST, A. 2013b: The genus Ascalaphus (Fabricius, 1775) (Neuroptera, Ascalaphidae) in Africa. de Frias Martins, A. M. Mateus Ventura, M. d. A. (editors). - XI International Symposium on Neuropterology (13-15 June 2011, Ponta Delgada, Portugal). Açoreana, Revista de Estudos Açoreanos, Suplemento 9:57-72.

PROST, A.; POPOV, A. 2021: A first comprehensive inventory of Ascalaphidae, Palparidae, and Myrmeleontidae (Insecta: Neuroptera) of Northeastern Nigeria with description of two new species and an overview of genus Bankisus Navás. - Historia Naturalis Bulgarica 43(5):51-77. https://doi.org/10.48027/hnb.43.051

VAN DER WEELE, H. W. 1905-1907: Über die von Prof. Dr. Y. Sjöstedt auf seiner Reise in Kamerun gesammelten Planipennia. - Arkiv för Zoologi 3(2):1-14. https://doi.org/10.5962/bhl.part.4542

VAN DER WEELE H. W. 1909a: Ascalaphiden monographisch bearbeitet. - Collection Zoologique Selys Longchamps 8: 1-326.

VAN DER WEELE, H. W. 1909b: Catalogue des ascalaphides des collections du muséum. - Bulletin du Muséum National d'Histoire Naturelle, Paris (1)15:170-174.

TJEDER, B. 1972: Two necessary alterations in long-established genus nomenclature in Ascalaphidae (Neuroptera). - Entomologica Scandinavica 3: 153-155. https://doi.org/10.1163/187631272X00238

TJEDER B. 1980: Ascalaphidae (Neuroptera) from Senegal and the Gambia. - Entomologica Scandinavica 11: 401-412. https://doi.org/10.1163/187631280794710006

TJEDER, B. 1989: A new genus and species of Ascalaphidae from south western Africa (Insecta: Neuroptera). - Journal of the Entomological Society of Southern Africa 52: 149-155.

TJEDER, B. 1992: The Ascalaphidae of the Afrotropical Region (Neuroptera). 1. External morphology and bionomics of the family Ascalaphidae, and taxonomy of the subfamily Haplogleniinae including the tribes Proctolyrini n. tribe, Melambrotini n. tribe, Campylophlebini n. tribe, Tmesibasini n. tribe, Allocormodini n. tribe, and Ululomyiini n. tribe of Ascalaphidae. - Entomologica Scandinavica, Supplement 41: 3-169.

TJEDER, B.; HANSSON, C. 1992: The Ascalaphidae of the Afrotropical Region (Neuroptera). 2. Revision of the tribe Ascalaphini (subfam. Ascalaphinae) excluding the genus Ascalaphus Fabricius. - Entomologica Scandinavica, Supplement 41: 171-237.

Natura Somogyiensis 40: 23-30. Kaposvár, 2023 DOI:10.24394/NatSom.2023.40.23
Submitted: 06.02, 2023; Accepted: 15.02, 2023; Published: 13.03, 2023 www.smmi.hu/termtud/ns/ns.htm

Paraglenurus ornatus (Needham, 1913) comb.n. from the Seychelles (Neuroptera: Myrmeleontidae)

Levente Ábrahám

Rippl-Rónai Museum H-7400 Kaposvár, Hungary, e-mail: labraham@smmi.hu
https://orcid.org/0000-0002-8007-7117

Ábrahám, L.: *Paraglenurus ornatus (Needham, 1913) comb.n. from the Seychelles (Neuroptera: Myrmeleontidae).*
Abstract: The second specimen of *Distoleon ornatus* (Needham, 1913), an endemic species from the Seychelles, has become known. As a result of the morphological examination, it is moved into a new genus *Paraglenurus ornatus* (Needham, 1913) (**comb.n.**), and a redescription is given.

Keywords: antlion, *Paraglenurus*, new combination, redescription, Seychelles

Introduction

Stange (2004) listed 9 species in the genus *Paraglenurus* van der Weele, 1909, of which one species (*P. lotzi* Miller and Stange, 2000 syn. of *P. pumilus* (Yang, 1997)) was later synonymized (Ábrahám & Giacomino 2020). Surprisingly, Matsumoto et al. (2021) described a significant number of 5 new species from the Japanese Archipelago based on the morphological and genetic examinations of *Paraglenurus* adults and larvae.

Almost all of the species belonging to the genus *Paraglenurus* occur mainly in the costal zones of the continents and in the neighboring archipelagos. They spread from the islands of the Eastern Palearctic areas, from Japan through Taiwan to the Indonesian archipelago, which already belongs to the Oriental realm, and extends to the Afrotropical realm to Madagascar.

Matsumoto et al. (2021) pointed out that the diverse habitats in that non-pitbuilding larvae can occur on these islands, and with the high degree of morphological similarity, genetic studies may cover these cryptic species in the future. The species belonging to the genus are not common in taxonomic collections either, so new species are expected.

Needham (1913) studied the antlion fauna of the Seychelles islands north of Madagascar and described an endemic species of antlions as *Formicaleo ornatus* Needham, 1913. Based on the description of Needham (1913), Ohm & Hölzel (1995) treated it in the genus *Distoleon* Banks, 1910. In the publication of Needham (1913), the short description of the species and the poor quality of the published photograph of the wings did not make it possible to combine the species into a genus precisely later. The type specimen was not examined by Ohm & Hölzel (1995) and Whittington (2013) only its faunistic data were cited.

ISSN 1587-1908 (Print); ISSN 2062-9990 (Online)

WHITTINGTON (2013) compiled a paper on the entire Neuroptera fauna by searching for unpublished and published data from the Seychelles islands preserved in the various collections. He provided a key for the imagoes and larvae at the genus or tribe level, but he did not have any recent material.

It is an endemic species, so it has a very local distribution, and apart from the type specimen, no additional material was available until now. Recently, the second known specimen of the species was found. This provided an opportunity to revise the species and to make morphological additions to the original description.

Material and methods

The second known specimen was collected on the illuminated terrace of a tourist building on the island of Praslin. The imago was drawn there by the light of the lamp.

Material examined: 1 (tip of abdomen missing), Seychelles Praslin, 150 m St. Anna bay, 10-18.02.2013 Saldaitienė & Saldaitis leg.

The habitus photos were taken by Canon EOS 6DM2 digital camera equipped Canon macro lens 100 mm and a flashlight system (Godox MS 300). Later, the layers of photos were processed with stacking and Adobe Photoshop software.

Results and discussion

Abbreviations: Comb – New combination, Dist – Distribution, Key – Key to sp., Mon – Monograph, Ordescr – Original description.

Paraglenurus ornatus (Needham, 1913) – **comb.n**. (Fig. 1)

Formicaleo ornatus Needham, 1913: 245 – (Ordescr).

Distoleon ornatus (Needham, 1913) – Ohm & Hölzel 1995: 8 (Comb, Dist), Stange 2004: 158 (Mon), Whittington 2013: 195 (Key, Dist)

The type is preserved in the Natural History Museum London, England. Not seen.

Redescription.

Head: Vertex not prominent in frontal view, top of yellow with very sparse and short black hairs. Frons narrow and yellow without hairs. Shining dark brown stripe spreading from eye to eye above antenna. Gena yellow, hairless. Clypeus and labrum yellow, sparse medium long, and black hairs. Mandible yellow with shining brown apex and inner margin. Maxillary and labial palps yellow. Eyes remarkably large and shiny brown. Antenna clavate, 10 mm long. Scape, pedicel brown above and yellow below; flagellar segments brown to yellow in one-third of basal part, then yellow up to club with short dense and brown setae. Club large brown, tip of club dark brown. (Fig. 2)

Thorax: Pronotum 1.5x longer than wide, subromboid-shaped, dominantly yellow with two latero-posterial area indistinct brownish spots, with sparse medium long upstanding and black hairs. Mesonotum and metanotum yellow dorsally with brown indistinct stripe laterally and with sparse very short hairs. Sides yellow with distinct longitudinal brown stripe below wings and with sparse short yellow and brown hairs (Fig. 3).

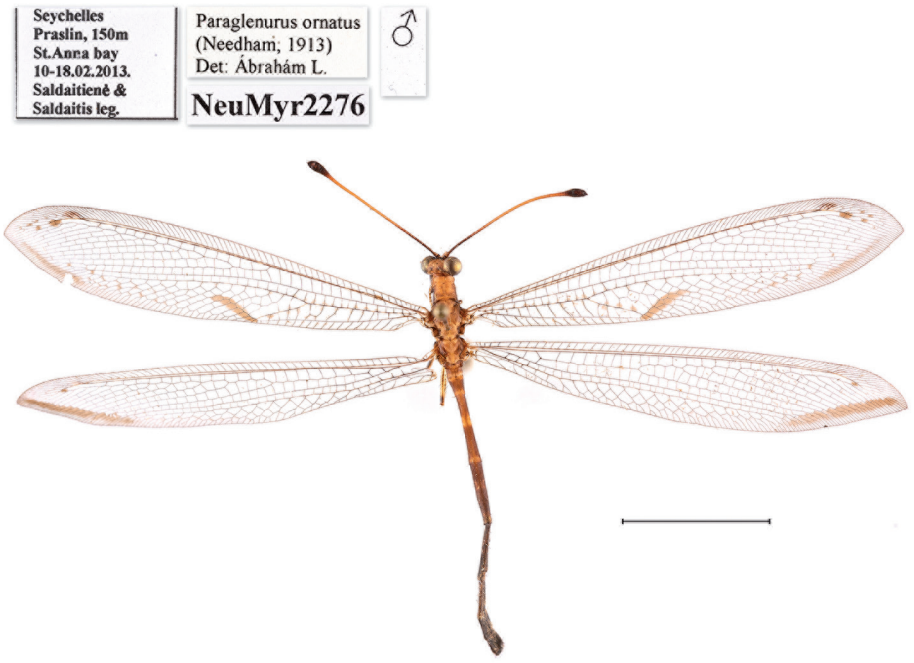


Fig. 1: Habitus of *Paraglenurus ornatus* (Needham, 1913)

Fig. 2: Head in frontal view

Fig. 3: Vertex and thprax in dorsal view

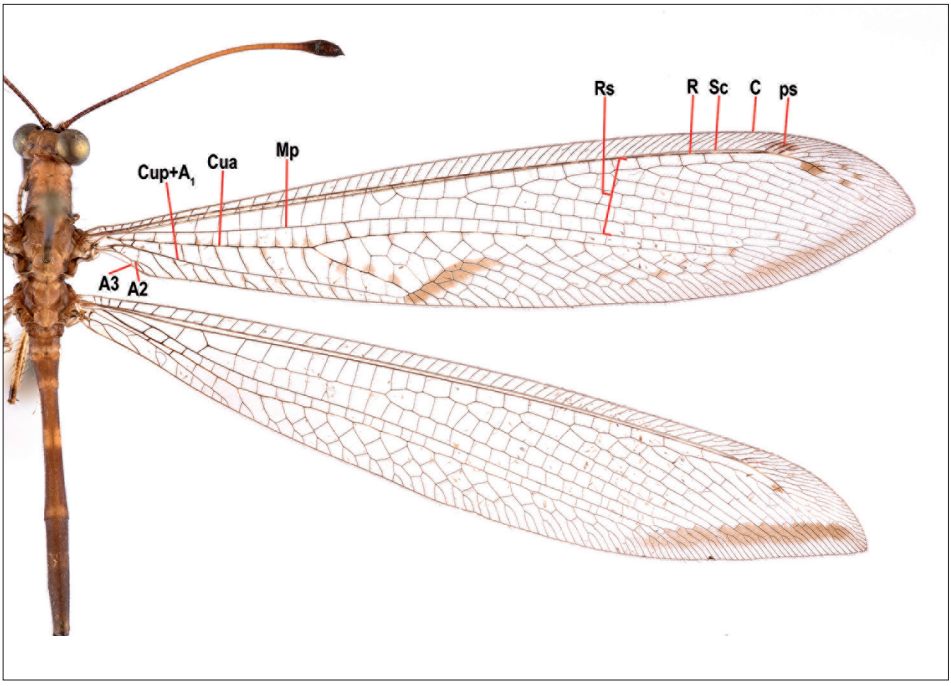


Fig. 4. Pattern in fore and hindwings

Abbreviations: C – Costa, Sc – Subcosta, R – Radius, Mp – Media posterior, Cua – Cubitus anterior, Cup+A1 – Cubitus posterior+Anal 1, A2 and A3 – Anal vein 2 and Anal vein 3, ps – pterostigma, Rs – radius sector.

Wings: Forewing: 29 mm long, 5.5 mm wide. Forewing with acute apices and blunt anal area. Membrane transparent with smaller and larger light brown shadows and dots as in Fig. 4. C yellow, Sc, R, and Cua yellow interrupted with brown dashes at cross veins. Mp dominantly brown. Cup+A1 brown basally and yellow distally reaching Rs origin. A2 and A3 yellow. A2 bifurcated. Pterostigma indistinct, with 4 brown cross-veins, membrane slightly pigmented with brown. Rs origin well beyond cubital fork. 11 radial cross-veins in front of origin of Rs.

Hindwing: 30 mm long, 5 mm wide narrow with acute apices, subapical area straight. C yellow, Sc interrupted with brown dashes at cross veins. Other longitudinal veins dominantly brown basally and yellow distally. Pterostigma indistinct with 2 brown cross-veins, membrane without pigmentation. 1 radial cross-vein in front of origin of Rs.

Legs: Slender and very long. Coxa dominantly brown in fore leg. Coxae yellow with pale hairs on middle and hind legs. Femora longer than tibiae in fore and middle legs and as long as in hind leg. All femora with longitudinal brown stripes dorsally and with brown dots at origin of black hairs. Middle and hind femora with distal brown rings before joints. Long black sense hair on fore and middle femora, missing on hind femur. Femora with long stiff and black bristles and short black and with hairs. Tibiae yellow with brown dots at origin of black hairs. Tibial spurs slightly longer than tarsal segment 1. Tarsal yellow with black bristles, segment 1 as long as tarsal 5. Tarsal segments 2-4 equal, combined lengths slightly longer than tarsal segment 1. Claws bent, half as long as tarsal segment 5. (Fig. 5).

Abdomen: shorter than wings. Tergites dominantly brown with yellow spots laterally. Tergite 2 short and brown and with yellow in caudal margin. Tergite 3 about 3x longer than tergite 2 brown with round centro-lateral spot, and caudal margin with yellow mark. Other tergites brown. Tergites with short and black setose. Sternites 2-3 yellow with longitudinal brown stripes laterally and with pale hairs then segments turn brown.

Genitalia: Tip of abdomen broken, gender unknown.

Fig. 5. Legs in lateral view

Distribution. It is endemic in the Seychelles, Mahé, and Praslin. The distance between the two islands is approx. 50 km.

Habitat. In the known sites of the endemic species (Mahé and Praslin), granite is the bedrock and they rise as high boulders from the Indian Ocean. Praslin is the second largest granitic island of Seychelles (38 km^2). The vegetation on the higher islands shows zonation (Coastal Plateau, Lowland and Coastal Forests, Intermediate Forest, and Mountain Mist Forest) with increasing altitude (Fleischmann et al. 2003).

The Coastal Plateau, Lowland and Coastal Forests (200-300 m) or Intermediate Forest (200-500 m) can provide habitat for P. ornatus. Due to soil moisture, Mountain Mist Forest (400-500 m) and the coastal strip (mangrove zone) are not typically preferred by antlion larvae.

The lower we are in the coastal zone, the more the natural vegetation has been transformed by human activity. In the mentioned habitats, a number of micro-habitats suitable for local conditions can develop. The larvae of the *Paraglenurus* species are not pit-building, they can have microhabitats in the root zone of less dense vegetation, on slightly disturbed surfaces, on shorelines, at the foot of rocks, etc. In their habitats, the structure of the vegetation is more important than the composition of the vegetation.

In Praslin, compared to the other islands, most of the natural vegetation has been preserved. The species is found in so-called Lowland and Coastal Forests, this is a fairly dense forest with thick undergrowth. In many places, the original vegetation is replaced by economic crops and deforested hillsides. This area is drier than the higher elevations. Fig. 6.

Seasonal activity. Imago flies from November to Marc. Larva probably develops during the drier period from May to October.

Fig. 6: Habitat of *Paraglenurus ornatus* in Praslin, St Anna bay (Photo: A. Saldaitis)

The Seychelles archipelagos lie 1.500 km east of mainland Africa. Nearby territories include the Comoros, Madagascar, Mauritius, the Mayotte, Réunion, and Maldives are located at a significant distance (at least 1,200 km) in the Indian Ocean. With the exception of Madagascar, the species of *Paraglenurus* does not occur in the antlion fauna of the other islands. However, a generic revision of *Paraglenurus pinnulus* (Auber, 1955) from Madagascar is needed.

Its considerable distance from Madagascar and the size of the area do not allow for a larger number of antlion species to colonialize on the islands. So far, four species have been recorded in the Seychelles islands (Needham 1913, Ohm & Hölzel 1995, Whittington 2013). Two of them (*Creoleon mortifer* (Walker, 1853), *Myrmeleon obscurus* Rambur, 1842) are more widely distributed in Africa. Unfortunately, since the publishing of the first data on *C. mortifer*, it has not been collected in the Seychelles again. It is registered as extinct species (Gerlach 2013). If it appears in the future, the status of the species will be revised together with the Madagascan and East African *Creoleon* species (Ábrahám 2020). *Syngenes maritimus* (Needham, 1913) was previously considered an endemic species, then it was synonymized as *Syngenes longicornis* (Rambur, 1842) by Ohm & Hölzel (1995). Mansell (2018) revised the genus, and *S. maritimus* was reinstated from synonymy with S. *longicornis*, and extended its distribution area to Madagascar. The most common antlion species on Praslin Island is *Myrmeleon obscurus* Rambur, 1842. The type locality is Mauritius. Based on literature (eg. Stange 2004, Oswald 2023), it is widespread in Africa, but it will be worth revising the African *Myrmeleon* species in the future from a taxonomic and genetic point of view.

Thus, the only endemic species of *Paraglenurus ornatus* (Needham, 1913) in the Seychelles. This species represents a high value from a nature conservation point of view, as tourism is very important for local inhabitants, and its habitats in the coastal zone are presumably highly endangered. It was treated as an extinct species according to Seychelles red list (Gerlach 2013).

Acknowledgments

The author thanks Mr. and Mrs. Saldaitis for donating their collected antlion material from Seychelles to the entomological collection of Rippl-Rónai Museum, and a photo of the collecting site of the specimen was provided. Special thanks to Bálint Csernyák (Hungary) for the excellent photos.

References

ÁBRAHÁM L. 2020: A new Creoleon sp. n. (Neuroptera: Myrmeleontidae) from Socotra (Yemen). - Natura Somogyiensis 35: 37-44.
https://doi.org/10.24394/NatSom.2020.35.37

ÁBRAHÁM, L. & GIACOMINO, M. 2020: A little known and synonym ant-lions 2 (Neuroptera: Myrmeleontidae). - Natura Somogyiensis 34: 21-72.
https://doi.org/10.24394/NatSom.2020.34.21

FLEISCHMANN, K. HÉRITIER, P., MEUWLY, C., KÜFFER, C. & EDWARDS, P. J. 2003: Virtual gallery of the vegetation and flora of the Seychellles. - Bulletin of the Geobotanical Institute ETH, 69: 57-64.

GERLACH, J. (editor) 2013: Hemiptera, Hymenoptera and other insects of the Seychelles Islands. - Siri Scientific Press, Manchester, U.K. pp. 343-369.

MANSELL, M. W. 2018: Antlions of southern Africa: Syngenes Kolbe, 1897, with descriptions of two new species and comments on extra-limital taxa (Neuroptera: Myrmeleontidae: Acanthaclisini). - Zootaxa 4497:346-380.
https://doi.org/10.11646/zootaxa.4497.3.2

MATSUMOTO, R., KIKUTA, Y. & HAYASHI, F. 2021: Unexpected Species Diversity of Japanese Paraglenurus (Neuroptera: Myrmeleontidae) Based on DNA Barcoding and Adult and Larval Morphology. - Japanese Journal of Systematic Entomology 27 (1): 1-30.

NEEDHAM, J. G. 1913-1914: Neuroptera, Myrmeleonidae from the Indian Ocean. Transactions of the Linnean Society of London, Zoology (2)16: 243-246.
https://doi.org/10.1111/j.1096-3642.1913.tb00118.x

OHM, P.; HÖLZEL, H. 1995: Die Neuropteren der Seychellen. - Entomologisches Nachrichtenblatt, Wien (N.F.)2(2/3): 3-12.

OSWALD, J. D. 2023: Neuropterida Species of the World. Lacewing Digital Library, Research Publication No. 1. Available from: http://lacewing.tamu.edu/SpeciesCatalog/Main (accessed 31 January 2023)

STANGE, L. A. 2004: A systematic catalog, bibliography and classification of the world antlions (Insecta: Neuroptera: Myrmeleontidae). Memoirs of the American Entomological Institute 74:[iv]+565.

WHITTINGTON, A. E. 2013: Superorder Endopterygota Sharp, 1898. Order Neuroptera Linnaeus, 1758. Pp. 178-211. In: GERLACH, J. (editor). Hemiptera, Hymenoptera and other insects of the Seychelles Islands. - Siri Scientific Press, Manchester, U.K.

Natura Somogyiensis 40: 31-46. Kaposvár, 2023 DOI:10.24394/NatSom.2023.40.31
Submitted: 26.02, 2023; Accepted: 04.03, 2023; Published: 30.03, 2023 www.smmi.hu/termtud/ns/ns.htm

Revision on the genus *Bubopsis* MacLachlan, 1898 known in India (Neuroptera: Myrmeleontidae: Ascalaphinae)

Thangalazhi Balakrishnan Suryanarayanan[1], Levente Ábrahám[2]
Chenthamarakshan Bijoy[1*] & Rishikesh Tripathi[3]

[1]Shadpada Entomology Research Lab, Department of Zoology, Christ College (Autonomous), Irinjalakuda, Thrissur, 680125, Kerala, India
suryantb1995@gmail.com, https://orcid.org/0000-0002-0679-6914
*Corresponding Author: drbijoyc@gmail.com, https://orcid.org/0000-0002-5016-0454,
[2]Rippl-Rónai Museum, H-7400 Kaposvár, Hungary
labraham@smmi.hu, https://orcid.org/0000-0002-8007-7117
[3]Centre for Animal Taxonomy and Ecology, Department of Zoology, Christ College, Irinjalakuda, Thrissur, 680 125, Kerala, India
rishikesh.tripathi14@gmail.com, https://orcid.org/0000-0002-9192-4609

Suryanarayanan, T. B, Ábrahám, L., Bijoy, C. & Tripathi, R.: *Revision on the genus Bubopsis MacLachlan, 1898 known in India (Neuroptera: Myrmeleontidae: Ascalaphinae).*
Abstract: The ascalaphid, *Bubopsis zarudnyi* Martynova, 1926 is recorded for the first time from India. *Bubopsis rubrapunctata* Ghosh, 1981 was the only owlfly species previously described from India from the genera. The two species are revised from a taxonomic point of view and *Bubopsis zarudnyi* is redescribed. The habitat and flight activity of the species is documented. Based on the re-identified specimens preserved in different collections, the distribution of the species is outlined. After examining type specimens, *Bubopsis rubrapunctata* is removed from the genus *Bubopsis* MacLachlan, 1898 and *Pseudobubopsis* **gen. n.** is erected for *Pseudobubopsis rubrapunctata* (Ghosh, 1981) (**comb. n.**). Also, the new genus is compared with *Bubopsis*, and generic key is provided.

Keywords: owlfly, ascalaphid, Ascalaphinae, *Bubopsis*, taxonomy, redescription, new genus, India.

Introduction

According to Machado et al. (2019), Ascalaphini is the largest tribe with 286 species belonging to 70 genera. *Bubopsis* which belongs to Ascalaphini was described by MacLachlan (1898) and is distributed mainly in Southern Europe, North Africa, the Middle East, and Arabian Peninsula (McLachlan 1898, van der Weele 1909, Martynov 1926, Aspöck et al. 1978, Aspöck et al. 1980, Sziráki 1998, Sziráki 2000, Hölzel 2004). *Bubopsis* currently includes 7 species in the world, i.e., *B. agrionoides* (Rambur, 1838), *B. andromache* U. Aspöck et al. 1978, *B. eatoni* McLachlan, 1898, *B. hamata* (Klug in Ehrenberg, 1834), *B. rubrapunctata* Ghosh, 1981, *B. tancrei* van der Weele, 1909 and *B. zarudnyi* Martynova, 1926 (Oswald 2023). In India, only one *Bubopsis* species was reported so far, i.e., *B. rubrapunctata* which was distributed in the

ISSN 1587-1908 (Print); ISSN 2062-9990 (Online)

state Karnataka (Maruti Hills, Belgaum) (GHOSH 1981, CHANDRA & SHARMA 2009). Through this paper, we report another *Bubopsis* species, *B. zarudnyi* for the first time from India. It was previously recorded in Iran, Oman, Turkey and the United Arab Emirates.

The main aim of this paper is to redescribe and illustrate *B. zarudnyi* based on the freshly collected specimens (and museum specimens), and check the earlier faunistic data as well as revise of taxonomic status of *B. rubrapunctata*.

Material and methods

The adult owlflies were collected by hand from Desert National Park and Wildlife Sanctuary (Fig. 6). The collected specimens were transferred into a killing jar with ethyl acetate. After that, specimens were pinned, stretched, dried, labeled, and preserved.

The specimens were examined through Labomed Luxeo 6Z Stereomicroscope. Specimens were identified after MARTYNOVA (1926) and compared to the lecto-, and paratype specimens.

The photos were prepared with Canon 7D Mark II digital camera with a 100 mm F/2.8L macro lens. For the preparation of male genitalia, the last 3-4 abdominal segments were removed and put in 10% KOH overnight. These were then washed in distilled water and kept in 80% ethyl alcohol with a drop of glycerol for observation. The photography was done under Leica M205 Stereomicroscope with LAS V3.7 software. After photography, the genitalia of each specimen was transferred to a glass vial with 60-70% glycerin. The terminology for male and female genitalia follows ASPÖCK et al. 1980, ASPÖCK & ASPÖCK 2008. The voucher specimens were deposited in the Shadpada Entomology Research Lab (SERL) at Christ College (Autonomous), Irinjalakuda, Thrissur, Kerala, India. Distribution maps were produced using the Simplemappr software.

Abbreviations:

Chlist – checklist, Comb – new combination, Dist – distribution, Faun – faunal record, Mon – monograph, Nom – nomenclature, Odescr – original description, Redescr – redescription, Syn – Synonym, Typ – type sp. FW – forewing, HW – hindwing, C – Costa, Sc – Subcosta, R – Radius, Sc+R – Subcosta + Radius, Rs + Ma – Radial vein + Media anterior, Mp – Media posterior, Mp_1 – Media posterior 1, Mp_2+Cua_1 – Media posterior 2 + Cubitus anterior 1, Cua – Cubitus anterior, Cua_1 – Cubitus anterior 1, Cua_2 – Cubitus anterior 2, Cup – Cubitus posterior, Cup+A1 – Cubitus posterior + Anal vein 1, A1, A2 and A3 – Anal veins 1, 2 and 3, Av – ambient vein, aa – apical area, ps – pterostigma, ca – costal area, sca – subcostal area, t1-t5 – tarsomeres 1-5, ts – tibial spurs, gx – gonocoxites, T8 and T9 – tergite 8, and 9, ep – ectoproct, S8 and S9 – sternite 8, and 9, dmp – dorso-medial processus, vp – ventral processus, L. gon. – lateral gonopophysis, P. gon. – posterior gonopophysis, A. gon. – anterior gonopophysis.

Referred collections:

CMC – Private reference collections of C. Monerrat, Switzerland
NZSI – Zoological Survey of India, National Zoological Collection, Calcutta, India
SCM – Rippl-Rónai Museum, Kaposvár, Hungary
SERL – Shadpada Entomology Research Lab Christ College (Autonomous), Irinjalakuda, Thrissur, Kerala, India
ZIN – Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia

Results

Bubopsis MacLachlan, 1898

Type species: *Ascalaphus agrionoides* Rambur, 1838. Subsequent designation by van der Weele, 1909: 271.
Bubo Rambur, 1842: 353 (Odescr), Brauer & Löw 1857: 63 (Redescr), Oswald 1988: 90 (Nom), Oswald and Penny 1991: 14 (Nom), Aspöck et al. 2001 (Mon).
Bubopsis MacLachlan, 1898: 159 - (Nom), Oswald & Penny 1991: 14 (Nom), Aspöck et al. 2001 (Mon).
Phyurus Navás, [1901] 1900–1901: 95 (Odescr), Oswald 1988: 90 (Syn), Oswald & Penny 1991: 14 (Nom), Aspöck et al. 2001 (Mon).

Diagnosis: Medium-sized species. Sexual dimorphism insignificant. Head as wide as thorax. Vertex narrow with long hairs. Frons with dense hairs. Eye large, divided by transverse furrow, lower part smaller than upper one. Antenna subglobular shaped, straight, not reaching pterostigma in forewing. Basal flagellomeres with long hairs. Wings elongated, hyaline, without markings but subcostal area regularly discoloured on both wings and sometimes apical area of hindwing fumated. Pterostigma rhomboid-shaped, yellow to dark brown. Venation rather dense. Apex of wings rounded, forewing with round projection on anal area. Apical area beyond Sc+R with three rows of cells in forewing, and with two or three rows in hindwing. More than two rows of cells between Mp_2+Cua_1 and hind margin. Legs rather short, and tibial spurs as long as tarsal segments 1-2 together. Hairs on abdomen short and sparse. Ectoproct forceps of males about as long as 6-9 abdominal segments together with long ventral projection (short dorsomedial projection in *B. eatoni* MacLachlan, 1898).

Distribution: South Europe, North Africa, Southwest and Central Asia.

Fig. 1: Adult male *Bubopsis zarudnyi* in resting position in natural habitat of Desert National Park, Rajasthan, India (Photo: Tripathi, R.)

Bubopsis zarudnyi Martynova, 1926

Bubopsis zarudnyi Martynova 1926: 198 (Odescr), Kimmins 1938: 254 (Faun), Krivokhatsky 1995: 6 (Typ), Sziráki 1998: 61 (Chlist), Hölzel 2004: 220 (Dist), Sziráki 2011: 63 (Faun).

Material examined:
CMC: 1 ♀ - 29.III.2011 OMN Wadi Dima 22,97824 58,55437 491 m Christian Monnerat day collect; 1 ♀ - 31.III.2013 OMN Ar Raddah 23,14078 52,12208 615 m Christian Monnerat & Andreas Sanchez light trap; 1 ♀ - 12.IV.2013 OMN Wadi Abyad 23,44212 57,65541 240 m Christian Monnerat & Andreas Sanchez light trap
SCMK: 1 ♀ - Oman Prov. Al Batinah South Balad Seet 914 m oasis, spring N23°11,794' E57°23,426' 06.V.2019. Leg: L. Ábrahám, S. Ilniczky, G. Körtési.
SERL: 2 ♂ - India: Rajasthan State: Jaisalmer District, Thar Desert, Desert National Park and Wildlife Sanctuary, Myajlar area, asl. 275 m, (coordinates: 26°17'10.8"N, 70°24'25.7"E), R. Tripathi, SERLNR315, 20.VIII.2022.
ZIN: Lectotype: 1 ♀, Karvandar-Bampur, SE Persia [SE Iran] 25.IV.[19]01 Zarudny (Fig: 2); Paralectotype: 1 ♀, River Kir, Ge, Makran, SE Persia [SE Iran], Zarudny 22-26.III.[19]01.

Fig. 2: Lectotype female *Bubopsis zarudnyi* with labels, deposited in ZIN, St. Petersburg, Russia

Redescription

Diagnosis: Vertex, frons, and thorax are densely hairy. Wing tips are rounded, and forewing has a small blunt projection on anal margin. The membrane is transparent, only subcostal area discoloured on both wings. The apical part of the membrane is more or less fumed in the hindwing of female. Pterostigmas are rather narrow. Legs are short and

strong. Large yellow spots distally on both sides of tergal segments. The ectoproct with an extraordinary processus of males is broken at an obtuse angle, and the end of the ventral processus flattens and becomes bifurcated. (Figs. 3 A and B).

Head. Vertex narrow; frontal and dorsal parts shining black, and densely covered with long, soft and white hairs intermingled with some black ones. Caudal part of vertex yellow without hairs. Frons shining black, with long dense soft, and white hairs. Long dense tuft of white hairs intermingled with some black ones between scapes. Gena yellow with white hairs on inner margins. Clypeus yellow, hairless, labrum yellow with ochreous setae directed to mouth part. Mandible yellow, apices and on inner margin, brown to

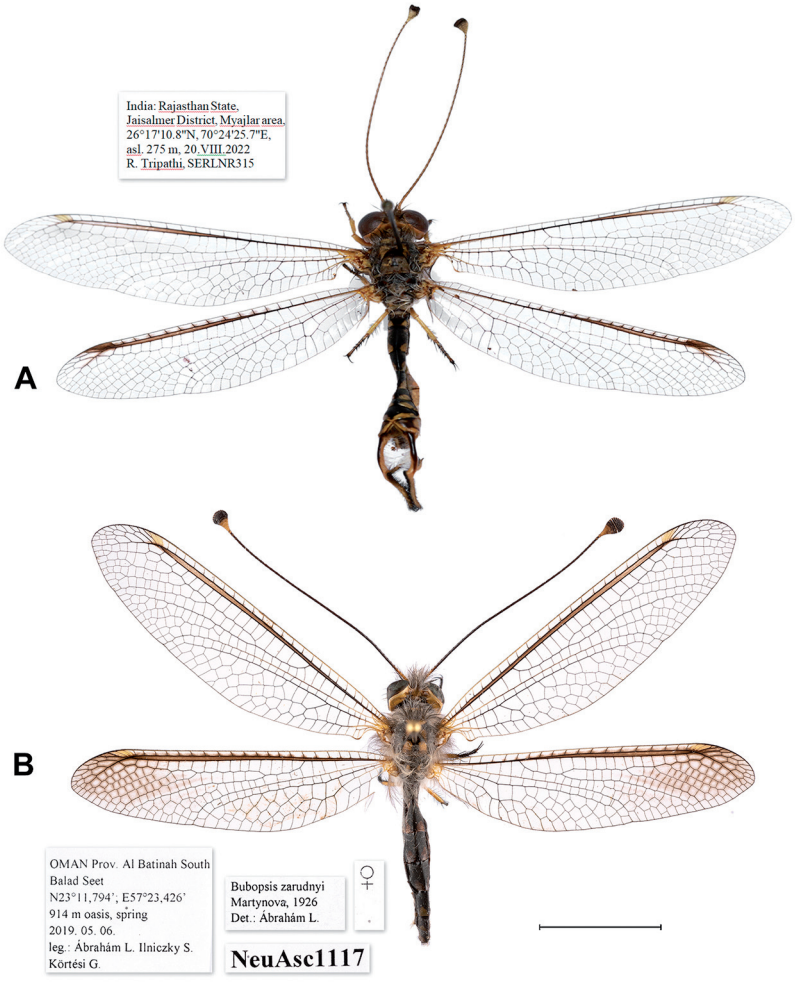


Fig. 3. ***Bubopsis zarudnyi,*** **A – Male habitus; B – Female habitus, Scale: 10 mm**

dark brown, hairless. Maxillary and labial palpi yellow, with short black setae at joints. Eye divided by a transverse furrow. Scape dark brown and pedicel yellow, covered with long soft and white hairs intermingled with some black ones. Basal flagellomeres (5-6 segments) yellow, and become brown. Club subglobular with flattened apex, basal part yellow, distal part brown with distal yellow ring, and with black verticils. (Fig. 4 A).

Thorax. Pronotum narrow, both margins yellow, and with transverse dull black stripe, posterior margin with long soft and white hairs intermingled with some black ones. Mesonotum: Prescutum black with large yellow marks dorso-laterally, and with dense long soft, and white hairs intermingled with some black ones on anterior margin; scutum black with two large yellow spots dorso-laterally; scutellum black with two large yellow lateral spots. Dense long white hairs laterally, sparse short white hairs dorsally on scutum and scutellum. Metanotum: Postnotum black, postscutum with large yellow spots on both sides, postscutellum black. Dense decumbent and white hairs on metanotum laterally. (Fig. 4 B). Sides brown with very dense long and white hairs.

Wings (Fig. 4 C). Forewing, length 28-30 mm, 7 mm wide, longer than hindwing. Membrane completely transparent, sca light brown. Wing tips rounded; wing tapering basally; anal area with obtuse projection. Costa and basal part of Mp, Cua, Cup, and anal veins yellow, otherwise brown. Pterostigma about as wide as long, rhomboid-shaped, yellow to light brown, with 4-5 crossveins; apical area beyond Sc+R with three rows of cells. Rs with 6 branches. In front of Rs+Ma with 5-6 cross-veins.

Hindwing length 27 mm, 7 mm wide. Membrane dominantly transparent, cross-veins with brown shaded in costal area, subcostal area completely light brown, considerable brown pigmentation on membrane in apical area. Pterostigma about as wide as long, rhomboid-shaped, yellow to brown with 4-5 cross-veins; apical area beyond Sc+R with two- three rows of cells. In front of Rs+Ma with 4 cross-veins. Rs with 6 branches.

Legs. short yellow and hairy. Coxae and trochanters with long dense and white hairs. Femora with dominantly long dense white hairs. Femora and tibiae equal sized. Tibiae yellow with short and long black setae; tibial spurs equal in length to t1-t2. Tarsomeres with short black setae; t1-t4 subequal in length; t5 as long as t1-t4 combined (Figs. 4 D and E).

Abdomen. Shorter than hindwing, Tergites dark brown with alternate yellow patches in caudal margins, covered with short black and white setae; sternites black with short white hairs.

Male genitalia. Tergite 9 somewhat quadrate, yellow with black hairs dorsally, ectoproct yellow equipped with extraordinary forceps, which breaks at obtuse angle at dmp. Proximal and distal parts of forceps almost equal. Proximal part of forceps (occasionally with brown stripe laterally), covered with dense white hairs on inner side. Ventral processus slightly bent forward and bifurcated apically, with stiff and black hairs on inner side. Distal part of processus with very dense stiff and black hairs on inner side and rather long black hairs on outside. Gonocoxites elongated arch-like, connected with gonocoxites 9 (gonarcus and parameres complex) as in Figs. 5 A and B in lateral and ventral views.

Female genitalia: Tergite 9 subrhomboid-shaped, dominantly yellow with dark brown mark ventro-caudally covered evenly with short brown hairs. Ectoproct oval plate, yellow covered with dense dark brown hairs caudally and ventrally. Gonocoxites 8 (ventrovalvae) finger-like yellow with dark brown hairs, gonocoxites 9 (distivalvae) small hemispherical with brown hairs in lateral view. (Fig. 5 C). Interdens not seen, linguella weekly sclerotized in ventral view.

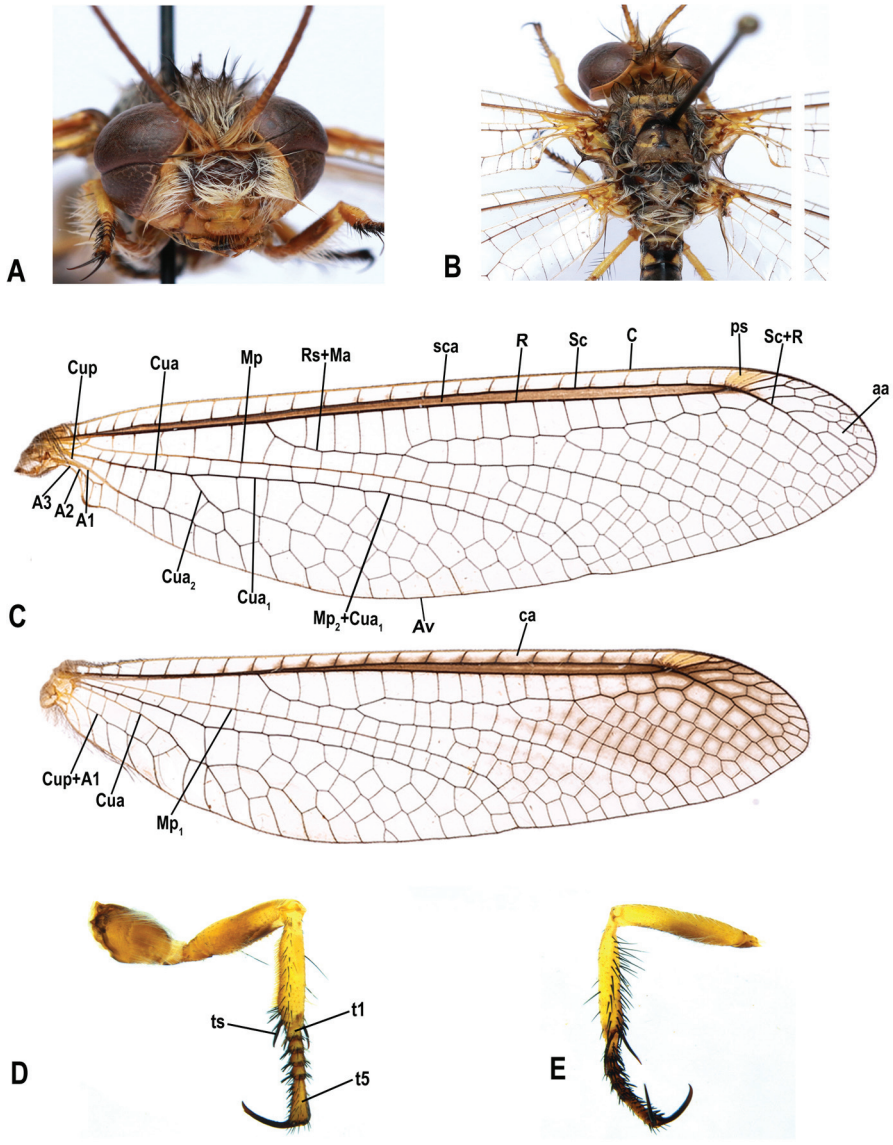


Fig. 4: ***Bubopsis zarudnyi,*** **A – head in frontal view; B – head and thorax in dorsal view, C – female wing venation, D – foreleg; E – hindleg in lateral view**

Distribution. The collected specimens of the species have been revised. This was easy because in total only 5 males and 9 females published are known (Krivokhatsky 1995, Hölzel 2004, Sziráki 2011). Of the syntype specimens, two females were studied, and they were designated as lectotype and paratype females by Krivokhatsky (1995) from Iran. Several specimens were found in the SE Arabian Peninsula, in the Al-Hajar Mountains (Oman: 1♂ 5♀ - Hölzel 2004; 2♂ and 3♀ in the UAE - Sziráki 2011) Other unpublished specimens are kept (1♀ in coll: SCMK, and 3♀ in coll: CMC).

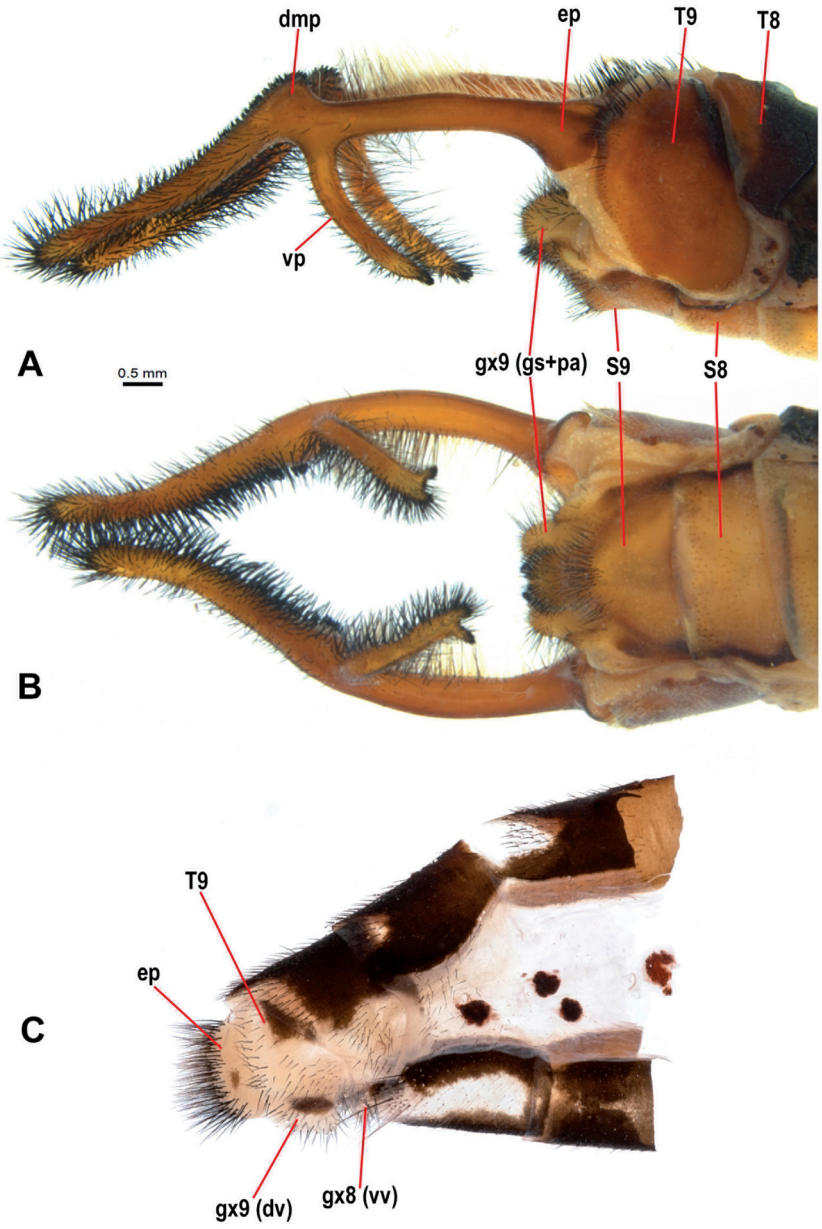


Fig. 5: ***Bubopsis zarudnyi*** **A – Male genitalia, in lateral view; B – the same, in ventral view, C – Female genitalia, in lateral view, Scale 0.5 mm**

Satar & Özbay (2002) identified *Bubopsis zarudnyi* as a new record in the fauna of SE Turkey and figured it in a short paper. Unfortunately, the specimen in the figure (Satar & Özbay 2002: 192, Fig. 1) cannot be found anymore (Satar pers. comm.). Based on figure 1, it is only a specimen of *Bubopsis hamata* (Klug in Ehrenberg, 1834) with a dark hindwing tip, which is otherwise not such a common colour variation. Satar also collected other similar specimens, which belonged to the species *B. hamata*. He mailed photos of the collected specimens for revision.

Both pterostigma of *B. hamata* are typically light yellow, and the subcostal area is transparent, not shaded while *B. zarudnyi* has darker pterosigma, especially in the hindwing and the membrane in the subcostal area of both wings always shaded. Canbulat (2007) later cited this data in the Turkish checklist. Dobosz & Ábrahám (2007) already proposed a revision of this Turkish specimen. Thus, the species should be deleted from the fauna of Turkey.

The collecting site in India, Rajasthan, Jaisalmer (Myajlar) is a new record for the Indian fauna. The occurrence of the species was expected in Rajasthan since this state of India is associated with the eremial area (Fig. 7).

Based on the currently known distribution data of *Bubopsis* species, *B. zarudnyi* does not overlap with the distribution of either species. The area of *B. hamata* (Klug in Ehrenberg, 1834) in Iran does not cross the Zagros Mts. Its area stretches towards Central Asia. *Bubopsis tancrei* van der Weele, 1909 is a typically Central Asian species. *B. zarudnyi* is an eremial species whose area continues in Baluchistan in the southeastern part of Iran and presumably in Pakistani Baluchistan, and it can also be potentially found in several parts of Rajasthan, the driest state of India. Similar to this region is the Al-Hajar Mountains in the northeastern part of Oman, whose northern extension is the United Arab Emirates mountainous region.

Habitat: The new collection site in India, the Thar Desert or the Great Indian Desert located in the north-western part of India covering about 10% of India's total geographic area with more than 60% lying in the state of Rajasthan (Sivaperuman et al. 2009; Sharma 2013, Rao et al. 2015). Being an arid biogeographic zone, it is a hydrologically deficient landscape with 250 mm mean annual precipitation (100 to 500 mm) and around 24°C mean annual temperature (-2 to 51°C) (Sharma & Mehra 2009). It is occupied either by dry two open grasslands or by grasslands interspersed with trees and shrubs and holding a wide range of topographic features such as plains, gravels, sand-soil mix, sand dunes, and rocky hillocks (Sharma & Mehra 2009). Despite the xeric and inhospitable climatic conditions, the Thar Desert provides dynamic micro-ecosystems for various taxa, thus exhibiting high levels of biodiversity, mostly due to its juxtaposition of Palaearctic, Oriental and Saharan elements (Sharma & Mehra 2009, Roy & Singhvi 2016).

Flight period: Based on the collection data of *B. zarudnyi*, adults are active at night, and the majority of specimens known so far are females. Similar to other Bubopsis species, the adults are on wings already at dusk and show hill-topping behavior. During the day, as long as the daily temperature is not so high that it would hinder the daily activity of the insects, the adults are active in the morning hours (till 10 O'clock). After that, they typically settle on the stems of plants (Fig. 1).

Based on collecting data, the seasonal activity of adults lasts from the end of March to the end of August. The peak of seasonal activity is in April and May.

Fig. 6: Habitat of *Bubopsis zarudnyi* in the Thar Desert, Rajasthan (Photo: Tripathi, R.)

Pseudobubopsis Suryanarayanan, Ábrahám & Bijoy **gen. n**.
Type species: *Bubopsis rubrapuncta* Ghosh, 1981

Diagnosis: The new genus is very similar to the genus *Bubopsis*. The main differences are that the head is wider than the thorax; the base of the antenna is bare; the costal and hind margins of the wings are strikingly parallel; the venation is loose; there are only two rows of cells between Cua_1 and hind margin in the hindwing; the male ectoproct forceps curved and not broken at an angle as well as without long ventral projection.

Description: Small to medium-sized species (forewing length 21-23 mm, hindwing length 17-20 mm). Sexual dimorphism insignificant. Head wider than thorax. Vertex narrow with long dense hairs. Frons with dense hairs. Eye large, divided by transverse furrow, lower part about same size as upper one. Antenna subglobular shaped, straight, and not reaches pterostigma in forewing. Basal flagellomeres without hairs. Wings, elongated, both sides parallel, hyaline, without markings but sometimes subcostal area on both wings shaded. Pterostigma rhomboid-shaped. Apex of wings rounded, forewing with round projection on anal area. Apical area beyond Sc+R with two or three rows of cells in forewing and two cells in hindwing. Legs rather short, and tibial spurs as long as t1-t2 together. Hairs on abdomen short and sparse. Ectoproct forceps of males about as long as 6-9 abdominal segments together only with small internal protrusion.
Distribution: Known only in India.

Etymology: The name of the new genus, *Pseudobubopsis*, is based on its morphological similarity to the genus *Bubopsis*. The Greek word *pseudo* means false.

Pseudobubopsis rubrapuncta (Ghosh, 1981)

Material examined:
NZSI: Holotype: ♀, India: Karnataka, Maruti Hills, Belgaum; call. nil, 27. xii. 1971, Regd. no. 963/H12; Paratype ♂ (Allotype): same as holotype, Regd. no. 964/H12 (Figs. 7 A and B).

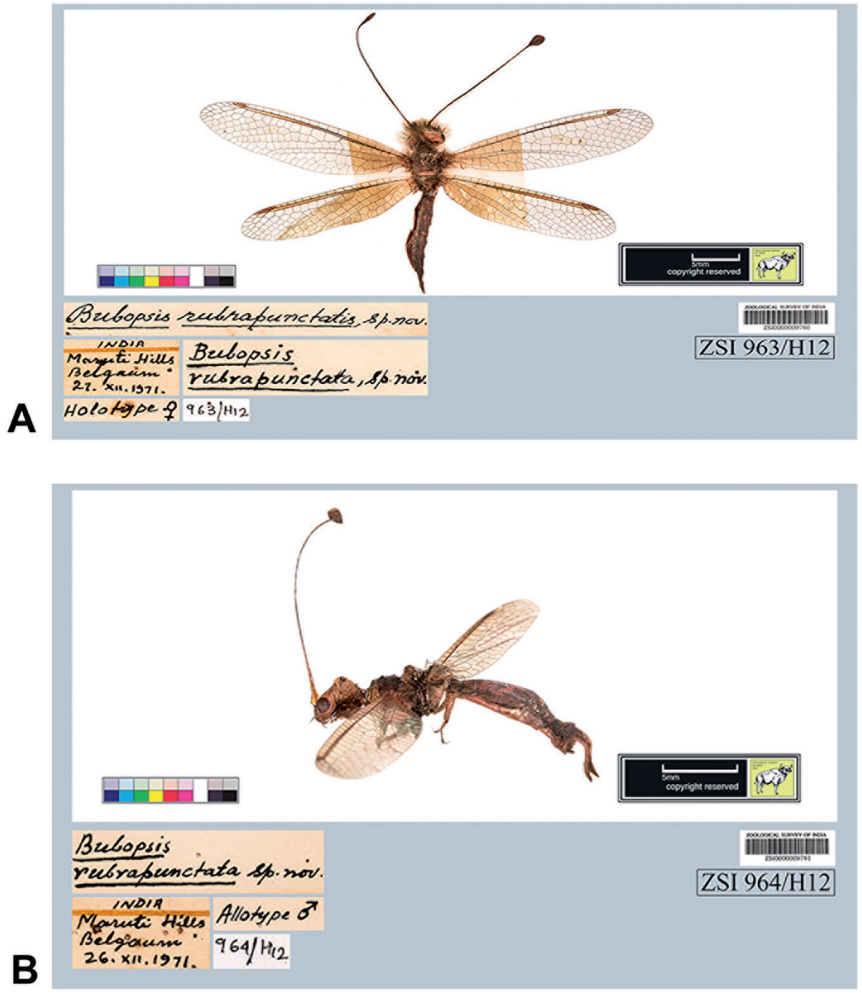


Fig. 7: *Pseudobubopsis rubrapuncta* (Ghosh, 1981) comb. n. A – Dorsal habitus of holotype female (wings discoloured basally); B – Lateral habitus of paratype male

Remarks: Ghosh's (1981) description of the species is detailed and thorough. Unfortunately, the condition of the type specimens is very bad. *Pseudobubopsis rubrapuncta* (Ghosh, 1981) needs to be examined with the help of freshly collected specimens and genitalia preparation.

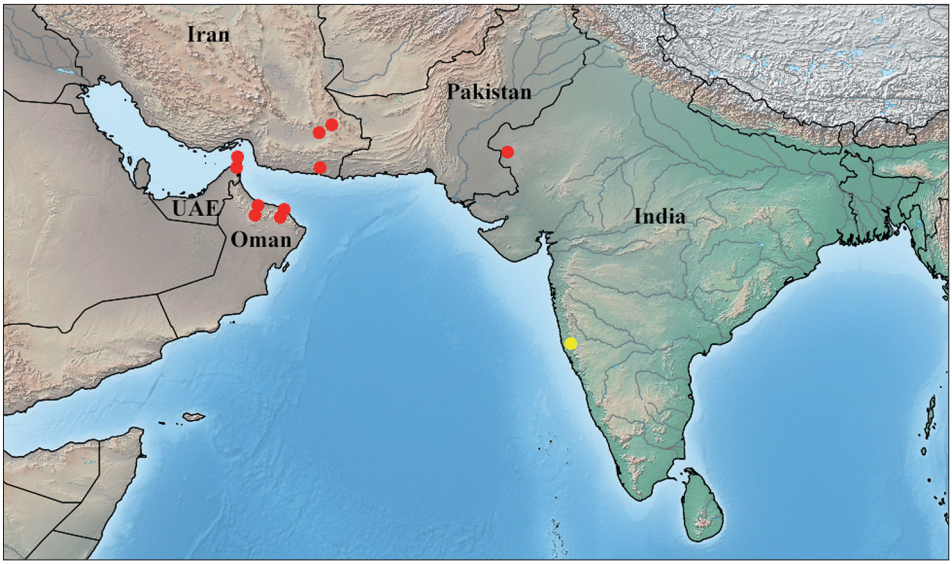


Fig. 7: Known distribution of *Bubopsis zarudnyi* (red circle) and *Pseudobubopsis rubrapuncta* (yellow circle) in the World

Key to related Indian genera

1. Medium-sized species (forewing length: 28-30 mm), basal part of antenna with hairs, costal and hind margins of wing almost parallel, male ectoproct forceps with long ventral processus, only one species in India…….....***Bubopsis*** Mclachlan

- Small to medium-sized species (forewing length: 21-23 mm), basal part of antenna without hairs, costal and hind margins of wing strikingly parallel, male ectoproct forceps only with small internal protrusion, and only one species in India …..... .....***Pseudobubopsis* gen. n.**

Discussion

In recent years, many conflicting publications have been published on the phylogenetic status of owlflies in the traditional sense. They supplemented the traditional morphological division (TJEDER 1992) with the results of genetic studies (JONES 2019, MACHADO et al. 2019). Further studies will probably be needed to clarify the phylogenetic status of taxa in the future (WU et al. 2022).

Owlflies are interesting members of Myrmeleontidae with minimum taxonomic studies and documentation from India (MACHADO et al. 2019). India currently includes 156 species under 52 genera of Myrmeleontidae, of which only 33 species under 17 genera are owlflies (CHANDRA & SHARMA 2009; SURYANARAYANAN et al. 2022). More in-depth and concentrated studies will give a way for discovering new species and new distributional records of owlflies from India. Previously CHANDRA & SHARMA (2009) reported

only one species of *Bubopsis* from India. After examining type specimens of *Bubopsis rubrapunctata*, it is removed from the genus *Bubopsis* MacLachlan, 1898 into *Pseudobubopsis* **gen. n.** i.e., *Pseudobubopsis rubrapunctata* (Ghosh, 1981) (**comb. n.**). Through this paper, the less known owlfly species, *B. zarudnyi* is redescribed. Also, the new genus is compared with *Bubopsis*, and genus keys are provided.

Acknowledgments

We are grateful to the Principal, Christ College (Autonomous), Irinjalakuda, Kerala for providing us with the facilities for undertaking this work. The first author offers sincere gratitude to CSIR, Government of India, for financial support in the form CSIR Senior Research Fellowship (08/376(0010)/2019-EMR-I). We are thankful to the Chief Wildlife Warden, Rajasthan, for the collection permit to the Desert National Park and Wildlife Sanctuary (F19(29) Permission/cwlw/2017/5173). The collection at Desert National Park & Wildlife Sanctuary was part of the Bustard Recovery Programme of the Wildlife Institute of India, funded by the National Compensatory Afforestation Fund Management and Planning Authority, Government of India. We are thankful to Dhriti Banerjee, the Director, Zoological Survey of India, Kolkata for giving permission to study and access the type specimens photos from National Zoological Collection. Thanks to Nidheesh K. B. for photographing the specimen as well as Bálint Csernák (Hungary) for further excellent photos. We thank the late Victor Krivokhatsky (ZIN, St. Petersburg) for previously providing a photo of the lectotype in his collection. Christian Monerrat (CMC - Private reference collections, Switzerland) and Ali Satar (Dicle University, Diyarbakır, Turkey) for providing distribution data and revision of specimens in their collections.

References

Alexandrov-Martynov, O. M. 1926: Die Ascalaphiden von Turkestan, Persien und West-Himalaya (nach den Sammlungen des Zoologischen Museums der Akademie der Wissenschaften des U.S.S.R.). - Энтомологическое Обозрение [=Entomologicheskoe Obozrenie; =Entomological Review, Leningrad] 20: 197-203.

Aspöck, H., Aspöck, U. & Hölzel, H. 1980: Die Neuropteren Europas, Eine zusammenfassende Darstellung der Systematik, Ökologie und Chorologie der Neuropteroidea (Megaloptera, Raphidioptera, Planipennia) Europas. - Vols. 1 & 2. Goecke & Evers, Krefeld, 495 & 355 pp.

Aspöck, H., Hölzel, H. & Aspöck, U. 2001: Kommentierter Katalog der Neuropterida (Insecta: Raphidioptera, Megaloptera, Neuroptera) der Westpaläarktis. - Denisia 2: 1-606.

Aspöck, U., Aspöck, H. & Hölzel, H. 1978: Bubopsis andromache n. sp. -- eine neue Spezies der Familie Ascalaphidae (Neuropteroidea, Planipennia) aus dem östlichen Mittelmeerraum. - Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen 30: 113-116.

Aspöck, U. & Aspöck, H. 2008: Phylogenetic relevance of the genital sclerites of Neuropterida (Insecta: Holometabola). - Systematic Entomology 33: 97-127. https://doi.org/10.1111/j.1365-3113.2007.00396.x

Brauer, F. & Löw, F. 1857: Neuroptera austriaca. Die im Erzherzogthum Oesterreich bis jetzt aufgefundenen Neuropteren nach der analytischen Methode zusammengestellt, nebst einer kurzen Charakteristik aller europäischen Neuropteren-Gattungen. - C. Gerold's Sohn, Wien. xxiii + 80 pp.

Canbulat, S. 2007: A checklist of Turkish Neuroptera with annotating on provincial distributions. - Zootaxa 1552: 35-52.

CHANDRA, K. & SHARMA, R. M. 2009: Checklist of Indian Neuropterids (Insecta: Megaloptera; Raphidioptera; Neuroptera). Zoological Survey of India, Central Zone Regional Centre Jabalpur, Madhya Pradesh, 22 pp.

DOBOSZ, R. & ÁBRAHÁM, L. 2007: New data to the Turkish ascalaphid fauna (Neuroptera: Ascalaphidae). - Rocznik Muzeum Górnoslaskiego w Bytomiu, Entomologia [=Annals of the Upper Silesian Museum in Bytom, Entomology] 14-15: 13-27.

GHOSH, S. K. 1981: On new and little-known species of Planipennia (Order Neuroptera) from India. - Bulletin of the Zoological Survey of India 4: 131-139.

HÖLZEL, H. 2004: Ascalaphidae der Arabischen Halbinsel (Neuropterida, Neuroptera, Ascalaphidae). - In ASPÖCK, U. (sci. ed.), Entomologie und Parasitologie. Festschrift zum 65. Geburtstag von Horst Aspöck. Denisia 13: 213-228.

JONES, J. R. 2019: Total-evidence phylogeny of the owlflies (Neuroptera, Ascalaphidae) supports a new higher-level classification. - Zoologica Scripta 48 (6): 761-782. https://doi.org/10.1111/zsc.12382

KIMMINS, D. E. 1938: Ptyngidricerus iranensis n. sp. [Neuroptera Ascalaphidae]. - Revue Française d'Entomologie 4: 253-254.

KLUG, J. C. F. 1829–1845 [1834]: [Genus Myrmeleon and Ascalaphus]. In: EHRENBERG, C. G. (Ed.), Symbolae physicae, seuicones et descriptiones corporum naturalium novorum aut minus cognitorum, quae ex itineribus per Libyam, Aegyptum, Nubiam, Dongalam, Syriam, Arabiam et Habessiniam …. P.C. Hemprich et C.G. Ehrenberg….studio annis 1820–25 redierunt….pars Zoologica. C. G. Ehrenberg, Berolini, pls. 35 & 36 and associated unpaginated letterpress of Insecta. Bd. 4.

KRIVOKHATSKY, V. A. 1995: Каталог типовых экземпляров коллекции зоологического института РАН. Насекомые сетчатокрылые (Neuroptera) [=Katalog tipovykh ekzemplyarov kollektsii zoologicheskogo instituta RAN. Nasekomye setchatokrylye (Neuroptera); =A catalog of the type-specimens in the collection of the Zoological Institute Russian Academy of Sciences. Insecta, Neuroptera]. - Российская Академия Наук. Зоологический Институт [=Rossiiskaia Akademiia Nauk. Zoologicheskii Institut; =Russian Academy of Sciences. Zoological Insitute], Санкт-Петербург [=Sankt-Peterburg; =Saint Petersburg]. 18 pp.

MACHADO, R. J, GILLUNG, J. P., WINTERTON, S. L., GARZÓN-ORDUÑA, I. J., LEMMON, A. R., LEMMON, E. M. & OSWALD, J. D. 2019: Owlflies are derived antlions: Anchored phylogenomics supports a new phylogeny and classification of Myrmeleontidae (Neuroptera). - Systematic Entomology 44 (2): 418-450. https://doi.org/10.3897/dez.64.11704

MCLACHLAN, R. 1898: Neuroptera-Planipennia collected in Algeria by the Rev. A. E. Eaton. - Transactions of the [Royal] Entomological Society of London 46: 151-168. https://doi.org/10.1111/j.1365-2311.1898.tb02372.x

NAVÁS, L. 1900–1901 [1901]: Notas entomológicas. III. Neurópteros del Montseny (Barcelona). - Actas de la Sociedad Española de Historia Natural. 29: 92-96.

OSWALD, J. D. 1988: Remarks on the taxonomy of three recently discovered generic nomina oblita in the family Ascalaphidae (Neuroptera). - Neuroptera International 5: 89-92.

OSWALD, J. D. 2023: Neuropterida Species of the World. - Lacewing Digital Library, Research Publication No. 1. http://lacewing.tamu.edu/SpeciesCatalog/Main. Accessed on [08 February 2023].

OSWALD, J. D. & PENNY, N. D. 1991: Genus-group names of the Neuroptera, Megaloptera and Raphidioptera of the world. Occasional Papers of the California Academy of Sciences 147: 1-94.

RAMBUR, J. P. (1837-1840) Faune entomologique de l'Andalousie. Vol. 2. Paris.

RAMBUR, J. P. (1842) Histoire naturelle des Insectes. Nevropteres. Fain et Thunot, Paris. 534 pp.

RAO, S., CHAN, Y., BUGLER-LACAP, D. C., BHATNAGAR, A., BHATNAGAR, M. & POINTING, S. B. 2015: Microbial Diversity in Soil, Sand Dune and Rock Substrates of the Thar Monsoon Desert, India. Indian Journal of Microbiology 56: 35-45. https:// doi.org/10.1007/s12088-015-0549-1

ROY, P. D. & SINGHVI, A. K. 2016: Climate variation in the Thar Desert since the Last Glacial Maximum and evaluation of the Indian monsoon. - Tip 19: 32-44.

SATAR, A. & ÖZBAY, C. 2002: Bubopsis zarudnyi Alexandrov-Martynova, 1926 new to Turkey (Neuroptera: Ascalaphidae). Boletín de la Sociedad Entomológica Aragonesa 30: 192.

SHARMA. G. 2013: A review on the Studies on Faunal diversity, status, Threats and Conservation of Thar Desert or Great Indian Desert Ecosystem. - Biological Forum – An International Journal 5: 81-90

SHARMA, K. K. & MEHRA, S. P. 2009: The Thar of Rajasthan (India): Ecology and Conservation of a Desert Ecosystem. In: SIVAPERUMAN C, BAQRI QH, RAMASWAMY G, NASEEMA M (Eds), Faunal Ecology and Conservation of the Great Indian Desert. - Springer, Berlin, Heidelberg, pp. 1-11.

https:// doi.org/10.1007/978-3-540-87409-6_1

Sivaperuman, C. & Rathore, N. S. 2009: Spiders in the Desert National Park. In: Sivaperuman, C., Baqri, Q. H., Ramaswamy, G. & Naseema, M. (Eds), Faunal Ecology and Conservation of the Great Indian Desert. Springer, Berlin, Heidelberg, pp. 49-52.
https://doi.org/10.1007/978-3-540-87409-6_5

Suryanarayanan, T. B., Bijoy, C. & Ábrahám, L. 2022: Redescription of Banyutus cubitalis (Navás, 1914) (Neuroptera, Myrmeleontidae) and key to antlion genera in tribe Nemoleontini from India. - Zootaxa 5182 (1): 64-74.
https://doi.org/10.11646/zootaxa.5182.1.4

Sziráki, Gy. 1998: An annotated checklist of the Ascalaphidae species known from Asia and from the Pacific Islands. - Folia Entomologica Hungarica 59: 57-72.

Sziráki, Gy. 2000: Data to the knowledge of the Asian Ascalaphidae (Neuroptera), with description of a new subspecies. - Folia Entomologica Hungarica Rovartani Közlemények 87-93.

Sziráki, Gy. 2011: Order Neuroptera, family Ascalaphidae. - Arthropod fauna of the United Arab Emirates 4: 59-65.

Tjeder, B. 1992: The Ascalaphidae of the Afrotropical Region (Neuroptera). 1. External morphology and bionomics of the family Ascalaphidae, and taxonomy of the subfamily Haplogleniinae. - Entomologica Scandinavica, Supplement 41: 3-169.

van der Weele, H. W. 1909: Ascalaphiden. Collections Zoologiques du Baron Edm. de Selys Longchamps, Catalogue Systématique et Descriptif 8: 1-326.

Wu, J., Zheng, Y. & Liu, X. 2022: Phylogenetic implications of the complete mitochondrial genome of Ogcogaster segmentator (Westwood, 1847) and first record of the genus Ogcogaster Westwood, 1847 from China (Neuroptera, Myrmeleontidae, Ascalaphinae). - Biodiversity Data Journal 10: e85742.
https://doi.org/10.3897/BDJ.10.e85742

Natura Somogyiensis 40: 47-54. Kaposvár, 2023 DOI:10.24394/NatSom.2023.40.47
Submitted: 28. 03, 2023; Accepted: 05.04, 2023; Published: 20.04, 2023 www.smmi.hu/termtud/ns/ns.htm

First record of the genus *Bassaniodes* Pocock, 1903 (Araneae, Thomisidae) from India

Rishikesh Tripathi[1], Ashish Kumar Jangid[2], Usha Bhagirathan[3] & Ambalaparambil Vasu Sudhikumar[1]

[1]Centre for Animal Taxonomy and Ecology, Department of Zoology, Christ College, Irinjalakuda 680 125, Kerala, India. email: rishikesh.tripathi14@gmail.com*; avsudhi@rediffmail.com
[2]Wildlife Institute of India, Dehradun 248 001, Uttarakhand, India, email: ashishjangid22@gmail.com
[3]Sree Kerala Varma College, Thrissur, Kerala 680011, India
*correspondig author

Tripathi, R., Jangid, A. K., Bhagirathan, U. & Sudhikumar A. V.: *First record of the genus Bassaniodes Pocock, 1903 (Araneae, Thomisidae) from India.*
Abstract: The thomisid genus *Bassaniodes* Pocock, 1903 is recorded for the first time from India. The species *Bassaniodes tristrami* (O. Pickard-Cambridge, 1872) is redescribed based on specimens collected from the Thar desert, India and information on the species' natural history is presented.

Keywords: crab spider, Desert National Park, distribution, Rajasthan

Introduction

The genus *Bassaniodes* Pocock, 1903 was first described from Socotra island, Yemen with a new species, *Bassaniodes socotrensis* Pocock, 1903 under the family Thomisidae Sundevall, 1833. To date, the genus includes 40 nominal species globally (World Spider Catalog, 2023).

The species *Bassaniodes tristrami* (O. Pickard-Cambridge, 1872) was originally described under genus *Thomisus* Walckenaer, 1805. It was later transferred to *Xysticus* C. L. Koch, 1835 (Simon 1889), *Psammitis* Menge, 1876 (Wunderlich 1987) and finally to *Bassaniodes* (Breitling, 2019). It is found to be distributed in Greece, Turkey, Caucasus, Russia to Central Asia and the Middle East (World Spider Catalog, 2023).

Here, we report the occurrence of the species *B. tristrami* in the Indian subcontinent, thereby recording the genus for the first time from the country.

Material and methods

All measurements are in millimeters (mm). Lengths of palp/pedipalp and leg segments are given as: total (femur, patella, tibia, metatarsus (except for palp/pedipalp), tarsus). The micrographic images were taken with a Leica DMC4500 digital camera attached to a Leica M205A stereomicroscope with the software package Leica Application Suite

ISSN 1587-1908 (Print); ISSN 2062-9990 (Online)

(LAS, version 3.8) for stacking images taken at different focal planes. Terminology of male and female genitalia mostly follows MARUSIK & LOGUNOV (1995). The specimens examined are deposited at the National Centre for Biological Sciences Research Collections (NRC), Bengaluru, India.

Illustrations of this species given in O. P. CAMBRIDGE (1872; plate 14, fig. 16) and LEVY (1976: figs 9–10) are diagnostic and were used for comparison.

Abbreviations:

Morphology: ALE – anterior lateral eyes; AME – anterior median eyes; do – dorsal; IMA – intermediate apophysis; pl – prolateral; pld – prolateral dorsal; PLE – posterior lateral eyes; plv – prolateral ventral; PME – posterior median eyes; rl – retrolateral; rld – retrolateral dorsal; rlv – retrolateral ventral; RTA – retrolateral tibial apophysis; VTA – ventral tibial apophysis; I–IV– 1st to 4th leg.

Institution: NRC – National Centre for Biological Sciences Research Collections, Bengaluru, India.

Figs. 1-6: Field photographs of *Bassaniodes tristrami* (O. Pickard-Cambridge, 1872), 1. - male habitus, dorsal; 2. - same, lateral; 3. - same, frontal; 4. - female habitus, frontal; 5. - same, dorsal; 6. - same, lateral (Photo: R. Tripathi)

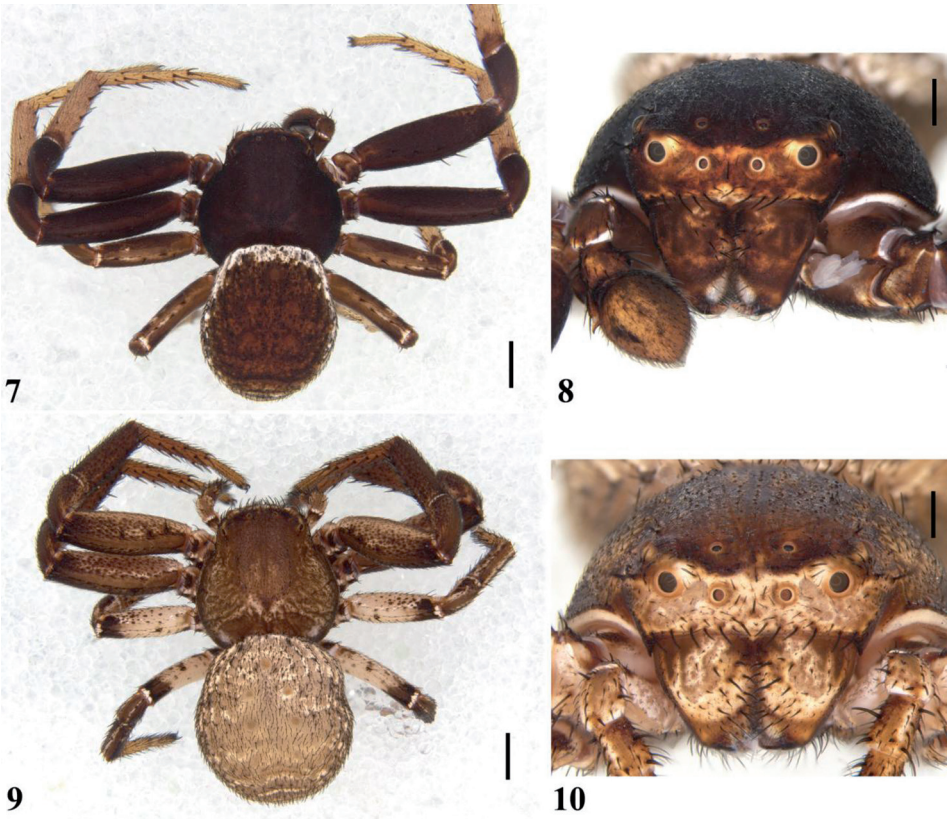
Taxonomy

Thomisidae Sundevall, 1833
Bassaniodes Pocock, 1903

Bassaniodes tristrami (O. Pickard-Cambridge, 1872) Figs: 1-16.
Thomisus tristrami O. Pickard-Cambridge, 1872: 304, plate XIV, fig. 16 (♂ ♀).
Xysticus tristrami Simon, 1889: 380. Kulczyński, 1911: 32, plate I, figs 31, 34–35 (♂ ♀) (for complete list of references, see World Spider Catalog 2023).

Material examined. 1 ♂, 1 ♀ (NRC-AA-4158 & NRC-AA-4159) INDIA: Rajasthan: Jaisalmer: Thar Desert: Desert National Park Wildlife Sanctuary: Myajlar area (26°17'10.8"N 70°24'25.7"E; 275 m asl.), 20 Aug 2022, R. Tripathi leg., from the grass clump, by hand.

Diagnosis. For description and diagnosis of the species, see LEVY (1976) and KIANY et al. (2017).



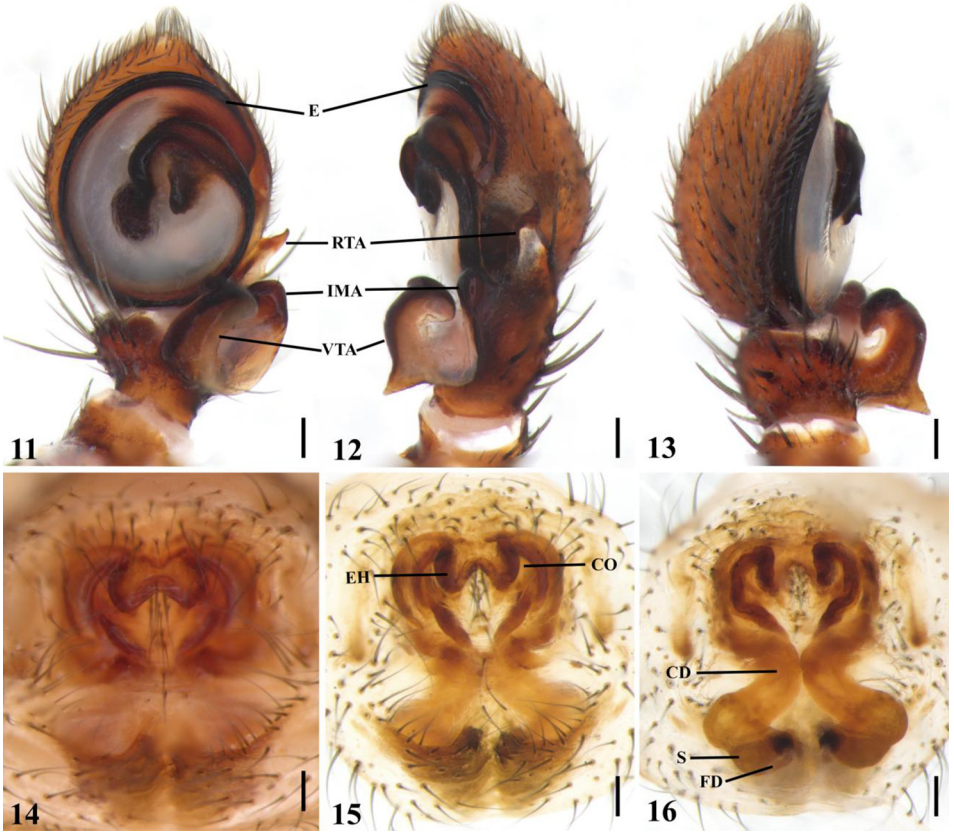
Figs 7–10: *Bassaniodes tristrami* (O. Pickard-Cambridge, 1872). 7. - male habitus, dorsal view; 8 - same, front view; 9. - female habitus, dorsal view; 10. - same, front view Scale bar: 7 and 9. - 1 mm, 8 and 10. - 0.5 mm.

Supplementary description

Male (Figs 1–3, 7–8, colouration in alcohol): Carapace, labium, endites, sternum, leg and pedipalp segments, spinnerets deep red-brown; chelicerae, eye field, clypeus rusty brown; opisthosoma yellow brown. Carapace nearly disc-shaped, with very few hairs. Fovea indistinct. Legs I–II long and robust, all the joints articulation except of tarsi and metatarsi with narrow yellow-white bands. Opisthosoma oval, flat, hirsute; mottled and marked with deep red-brown, white border on sides, covered with six sigillae (five large, two small), three arranged in pair, and one anteriorly. Body length 5.89. Carapace 2.65 long, 3.11 wide. Opisthosoma 3.01 long, 2.90 wide. Eye sizes and interdistances: ALE 0.16, AME 0.08, PLE 0.14, PME 0.07; ALE–ALE 1.12, AME–ALE 0.30, AME–AME 0.37, PLE–PLE 1.53, PME–PLE 0.52, PME–PME 0.42. Clypeus height at AMEs 0.25, at ALEs 0.30. Length of chelicerae 1.04. Length of pedipalp and legs: pedipalp 2.31 [0.77, 0.34, 0.28, 0.92], I 10.14 [3.18, 1.29, 2.37, 2.09, 1.21], II 10.12 [3.26, 1.33, 2.31, 2.06, 1.16], III 6.28 [1.98, 0.70, 1.52, 1.33, 0.75], IV 6.39 [2.19, 0.81, 1.50, 1.12, 0.77]. Leg formula: 1243. Spination of pedipalp: femur pld 1 do 1 rl 1, patella pl 1 pld 2 do 2, tibia pl 2 pld 3 do 2 rl 1 rld 2, tarsus/cymbium pld 2 do 2 rld 1; legs: femur I pl 3 do 4, II do 5, III do 4, IV do 3; patellae I–IV 0; tibia I pl 1 plv 4 rl 2 rlv 4, II pl 2 plv 4 rl 2 rlv 4, III–IV pl 2 plv 3 rl 2 rlv 3; metatarsus I pl 3 plv 5 rl 2 rlv 5, II pl 3 plv 4 rl 2 rlv 4, III–IV pl 3 plv 2 rl 2 rlv 3; tarsi I–IV 0. Pedipalp (Figs 11–13): tibia with ventral, intermediate and retrolateral apophyses (Fig. 12). VTA slightly translucent, inclined sideways, and bent at tip, with big, straight, and pointed thorn-shaped basal projection (Figs 11–12); IMA thumb-shaped, short, with round apex (Fig. 12); RTA long, broad, with angular apex having slight prolateral curvature (Fig. 12). Tegulum slightly longer than wide, without distinct apophyses, with a ridge marking the embolus base (Fig. 11). Embolus long, with oval embolic base, thickest between 12-o'clock to 2-o'clock at start, narrowed at the end, apically curved and hook-like (Fig. 11).

Female (Figs 4–6, 9–10, colouration in ethanol): General aspects essentially as in male except for the followings: body colour lighter; carapace with black blotches; dorsal opisthosoma with numerous grey-brown spots. Body length 7.24. Carapace 3.28 long, 3.45 wide. Opisthosoma 3.96 long, 3.81 wide. Eye sizes and interdistances: ALE 0.17, AME 0.09, PLE 0.15, PME 0.08; ALE–ALE 1.33, AME–ALE 0.34, AME–AME 0.48, PLE–PLE 1.78, PME–PLE 0.62, PME–PME 0.51. Clypeus height at AMEs 0.30, at ALEs 0.40. Length of chelicerae 1.07. Length of palp and legs: palp 2.50 [0.80, 0.51, 0.56, 0.63], I 9.60 [3.05, 1.39, 2.23, 1.85, 1.08], II 9.51 [3.01, 1.34, 2.31, 1.84, 1.01], III 5.96 [2.05, 0.76, 1.42, 1.01, 0.72], IV 6.50 [2.10, 0.71, 1.57, 1.32, 0.80]. Leg formula: 1243. Spination of palp: femur pld 1 do 2 rl 1, patella pl 1 do 2, tibia pl 1 pld 2 do 2 rl 1 rld 2, tarsus/cymbium pld 1 do 2 rld 1; legs: femur I pl 2 do 4, II do 5, III do 4, IV do 3; patellae I–IV 0; tibia I pl 2 plv 3 rl 1 rlv 2, II pl 1 plv 4 rl 2 rlv 4, III–IV pl 1 plv 3 rl 2 rlv 2; metatarsus I pl 2 plv 5 rl 2 rlv 5, II pl 3 plv 4 rl 2 rlv 4, III–IV pl 2 plv 2 rl 2 rlv 2; tarsi I–IV 0. Genitalia (Figs 14–16): epigynum hirsute, with widely oval posterior epigynal atrium having W-shaped posterior margin (Figs. 14–15), with anteromedian, bow-tie shaped hood, laterally with two large sclerotized caps (Figs. 14–16). Copulatory ducts S-shaped, anteriorly narrow, broad at middle, with medially contiguous posterior parts (Fig. 13). Spermathecae small, oval, slightly separated from each other (Fig. 13). Fertilization ducts narrow, diverging (Fig. 13).

Distribution. Caucasus, Greece, Middle East, Russia (Europe) to Central Asia, Turkey (LEVY 1976; WSC, 2023) and India (new record).



Figs 11–16: Copulatory organs of *Bassaniodes tristrami* (O. Pickard-Cambridge, 1872). 11. – male palp, ventral view; 12. – same, retrolateral view; 13. – same, prolateral view; 14. – epigynum, ventral view; 15. – epigyne, same cleared in KOH; 16. – vulva, dorsal view. Abbreviations: CD – copulatory duct; CO – copulatory opening; E – embolus; EH – epigynal hood; FD – fertilization duct; IMA – intermediate apophysis; RTA – retrolateral tibial apophysis; S – spermatheca; SD – sperm duct; VTA – ventral tibial apophysis. Scale bar: 11–16. – 0.1 mm.

Natural history. In Thar desert, most of the time species, was observed near the root of perennial grass species (*Lasiurus scindicus*), presumably to avoid desert excessive heat or to hide from predator. Only during monsoon, mature individuals were observed from July-September.

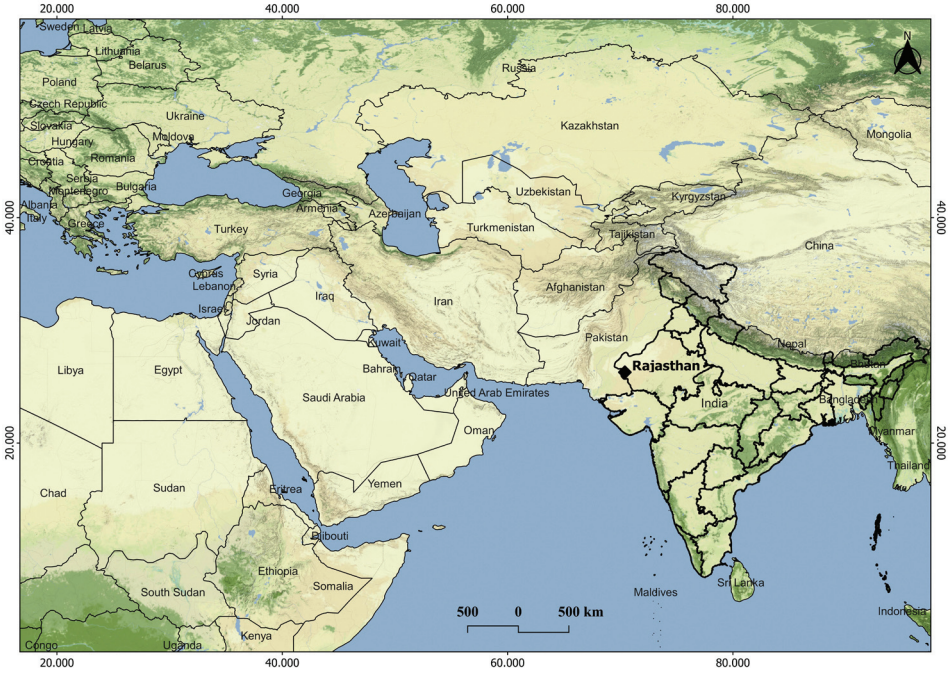


Fig. 18: Map showing the new record of *Bassaniodes tristrami* from Thar Desert, Rajasthan, India.

Acknowledgments

We are grateful to Rev. Fr. Jolly Andrews CMI, Principal, Christ College, Irinjalakuda, Thrissur for providing all facilities for completing this work and to the Curator, National Centre for Biological Sciences, Bengaluru, India for the deposition of voucher specimens. Authors RT and AKJ owe a special debt of gratitude towards Dr Sutirtha Dutta and Dr Manju Siliwal, both from the Wildlife Institute of India, Dehradun for their support, to the Rajasthan State Forest Department for the collecting permit, to Sohan Lal Genwa and Amrat Genwa for assistance during field activities. Dr. Pradeep Sankaran is deeply acknowledge for critical review of the manuscript. Author RT is thankful to Joint CSIR-UGC for the research fellowship. The study was part of the Bustard Recovery Programme of the Wildlife Institute of India, funded by the National Compensatory Afforestation Fund Management and Planning Authority, Government of India, with an additional grant from the Rajasthan State Pollution Control Board.

References

BREITLING, R. 2019: A barcode-based phylogenetic scaffold for Xysticus and its relatives (Araneae: Thomisidae: Coriarachnini). - Ecologica Montenegrina 20: 198-206. https://doi.org/10.37828/em.2019.20.16

KIANY, N., SADEGHI, S., KIANY, M., ZAMANI, A. & OSTOVANI, S. 2017: Additions to the crab spider fauna of Iran (Araneae: Thomisidae). - Arachnologische Mitteilungen 53: 1-8. https://doi.org/10.5431/aramit5301

KULCZYŃSKI, W. 1911: Fragmenta Arachnologica. XVI, XVII. - Bulletin International de l'Academie des Sciences de Cracovie 1911: 12-75.

LEVY, G. 1976: The spider genus Xysticus (Araneae: Thomisidae) in Israel. - Israel Journal of Zoology 25: 1-37.

MARUSIK, Y. M. & LOGUNOV, D. V. 1995: The crab spiders of Middle Asia (Aranei, Thomisidae), 2. - Beiträge zur Araneologie 4(1994): 133-175.

PICKARD-CAMBRIDGE, O. 1872: General list of the spiders of Palestine and Syria, with descriptions of numerous new species, and characters of two new genera. - Proceedings of the Zoological Society of London 40(1): 212-354, pl. 13-16. https://doi.org/10.1111/j.1469-7998.1872.tb00489.x

POCOCK, R. I. 1903: Arachnida. In: FORBES, H. O. (ed.) The natural history of Sokotra and Abd-el-Kuri. - Special Bulletin of the Liverpool Museums, pp. 175-208, pl. 14, 26. https://doi.org/10.5962/bhl.title.34934

SIMON, E. 1889: Arachnidae transcaspicae ab ill. DR. G. RADDE, DR. A. WALTER et A. CONCHIN inventae (annis 1886-1887). - Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien 39: 373-386.

World Spider Catalog 2023. World Spider Catalog. Version 23.5. - Natural History Museum Bern, online at http://wsc.nmbe.ch (Accessed on November 13, 2022). https://doi.org/10.24436/2

WUNDERLICH, J. 1987: Die Spinnen der Kanarischen Inseln und Madeiras: Adaptive Radiation, Biogeographie, Revisionen und Neubeschreibungen. - Triops, Langen, 435 pp.

Natura Somogyiensis 40: 55-80. Kaposvár, 2023 DOI:10.24394/NatSom.2023.40.55
Submitted: 31.03, 2023; Accepted: 13.04, 2023; Published: 20.04, 2023 www.smmi.hu/termtud/ns/ns.htm

A somogyi Dráva-sík égerligetei (*Paridi quadrifoliae-Alnetum glutinosae* Kevey in Borhidi et Kevey 1996)

Kevey Balázs

Pécsi Tudományegyetem, Ökológiai Tanszék, 7624 Pécs, Ifjúság u. 6.
e-mail: keveyb@gamma.ttk.pte.hu

Kevey, B.: *Fragmentary alder gallery forests in the Dráva-sík (Paridi quadrifoliae-Alnetum glutinosae Kevey in Borhidi et Kevey 1996).*
Abstract: In this paper, I present the results of my phytosociological analyses and describe the phytosociological characteristics of the studied vegetation stands using 30 relevés. Because of their similarity to the association *Paridi quadrifiliae-Alnetum glutinosae* Kevey in Borhidi et Kevey 1996 described from the Szigetköz, and substantial difference from the *Carici pendulae-Alnetum glutinosae* Borhidi in Borhidi – Kevey 1996 distributed in the mountain ranges, they are identified with the former association.

Keywords: Syntaxonomy, alder gallery forests, cluster analysis, ordinatio.

Bevezetés

A somogyi Dráva-síkon a természetszerű égerligetek viszonylag ritkák. Alapos terepbejásásaim során 30 cönológiai felvételt készítettem, s e felvételi anyag alapján jellemzem a somogyi Dráva-sík égerligeteit.

Anyag és módszer

A cönológiai felvételeket a Zürich-Montpellier növénycönológiai iskola (Becking 1957, Braun-Blanquet 1964) hagyományos kvadrát-módszerével végeztem. A felvételek táblázatos összeállítását, valamint a karakterfajok csoportrészesedését és csoporttömegét az „NS" számítógépes programcsomaggal (Kevey – Hirmann 2002) készítettem. A felvételkészítés és a hagyományos statisztikai számítások módszerét korábban részletesen közöltem (Kevey 2008). A vizsgált égerligeteket összehasonlítottam a Szigetközből korábban leírt *Paridi quadrifoliae-Alnetum* (Kevey 2008), és a Mecsekből ismert *Carici pendulae-Alnetum* (Borhidi in Borhidi – Kevey 1996; Kevey – Baranyi 2002) társulással. Az asszociációk összehasonlításánál a SYN-TAX 2000 programcsomag (Podani 2001) segítségével bináris adatokon alapuló hierarchikus osztályozást, cluster-analízist (hasonlósági index: Baroni-Urbani–Buser; osztályozó módszer: teljes lánc) és szintén bináris alapú ordinációt (hasonlósági index: Baroni-Urbani–Buser; ordinációs módszer: főkoordináta-analízis) készítettem. A fajok esetében Király

ISSN 1587-1908 (Print); ISSN 2062-9990 (Online)

(2009), a társulásoknál pedig az újabb hazai nómenklatúrát (BORHIDI & KEVEY 1996, KEVEY 2008, BORHIDI et al. 2012) követem. A társulástani és a karakterfaj-statisztikai táblázatok felépítése az újabb eredményekkel (OBERDORFER 1992, MUCINA et al. 1993, KEVEY 2008, BORHIDI et al. 2012) módosított SOÓ (1980) féle cönológiai rendszerre épül. A növények cönoszisztematikai besorolásánál is elsősorban SOÓ (1964, 1966, 1968, 1970, 1973, 1980) Synopsis-ra támaszkodtam, de figyelembe vettem az újabb kutatási eredményeket is (vö. BORHIDI 1993, 1995, HORVÁTH F. et al. 1995, KEVEY 2008).

Eredmények

A somogyi Dráva-sík égerligeteiből 1982 és 2020 között 30 cönológiai felvételt készítettem. Alább e felvételi anyag alapján adom meg a társulás jellemzését.

Termőhelyi viszonyok

A vizsgált égerligetek a somogyi Dráva-síkon, 106 és 120 m tengerszint feletti magasság között találhatók. Az alapkőzetet homokos öntésföld képezi, amelyen néhol kissé kotus öntés erdőtalaj alakult ki. A vizsgált állományok mikroklímája hűvös, párás, talajuk a félnedves-nedves vízgazdálkodási fokozatba sorolható. Ezen égerligetek (*Paridi quadrifoliae-Alnetum glutinosae*) általában a kissé magasabb szinten kialakult tölgy-kőris-szil ligetekkel (*Carici brizoidis-Ulmetum*) érintkeznek, míg a nedvesebb, mélyebb termőhelyeken néhol – épp úgy, mint a baranyai Dráva-síkon – égerlápokba (*Carici elongatae-Alnetum glutinosae*) mennek át (KEVEY 2022).

Fiziognómia

A felső lombkoronaszint közepesen, vagy erősebben zárt, 60–80% borítást mutat, magassága pedig – az állomány korától függően – 18–25 méter. Az átlagos törzsátmérő ennek megfelelően 30 és 60 cm között változik. Állandó (K: IV-V) fái az *Alnus glutinosa*, a *Fraxinus angustifolia* és az *Ulmus laevis*. Nagyobb tömeget (A-D: 3-5) is e három faj képez. Az alsó lombkoronaszint általában gyengén, vagy közepesen fejlett. Borítása 5–50%, magassága pedig 10–18 m. Állandó (K: IV) fái az *Alnus glutinosa*, az *Acer campestre*, az *Ulmus laevis* és az *Ulmus minor*. Nagyobb tömeget (A-D: 3) elérő fajok ebben a szintben az *Alnus glutinosa* és ritkán a *Crataegus monogyna* (1-3. táblázat).

A cserjeszint közepesen, vagy erősen fejlett. Borítása 25–80%, magassága pedig 2–4 m. Állandó (K: IV–V) fajai a következők: *Acer campestre, Cornus sanguinea, Corylus avellana, Crataegus monogyna, Sambucus nigra, Ulmus minor*. Jelentősebb tömeget (A–D: 3–4) a *Cornus sanguinea*, a *Corylus avellana*, és a *Sambucus nigra* ér el. Az újulat borítása igen változó: 1–60%. Állandó (K: IV–V) fajai az alábbiak: A*cer campestre, Cornus sanguinea, Corylus avellana, Euonymus europaeus, Fraxinus angustifolia, Hedera helix, Rubus caesius, Quercus robur, Sambucus nigra, Ulmus laevis, Ulmus minor*. Közülük nagyobb tömegben (A-D: 3) csak a *Hedera helix* és a *Rubus caesius* fordul elő (1-3. táblázat).

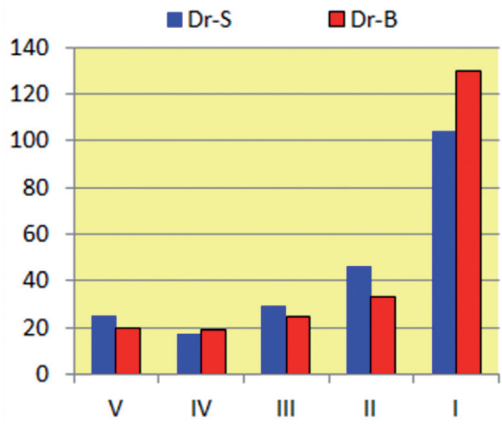
A gyepszint fejlett, borítása 60–100%. Viszonylag állandó (K: IV–V) fajai a következők: *Aegopodium podagraria, Ajuga reptans, Alliaria petiolata, Anemone ranunculoides, Asarum europaeum, Brachypodium sylvaticum, Carex acutiformis, Carex sylvatica, Circaea lutetiana, Corydalis cava, Festuca gigantea, Gagea lutea, Galanthus nivalis, Galeobdolon luteum, Galium aparine, Galium odoratum, Geum*

urbanum, Glechoma hederacea, Iris pseudacorus, Lamium maculatum, Persicaria dubia, Pulmonaria officinalis, Ranunculus ficaria, Rumex sanguineus, Solidago gigantea, Stachys sylvatica, Stellaria holostea, Urtica dioica, Veronica sublobata. Fáciest (A–D: 3–5) az *Allium ursinum*, a *Corydalis cava*, a *Galeobdolon luteum*, a *Glechoma hederacea*, a *Lamium maculatum*, a *Leucojum vernum*, a *Ranunculus ficaria* és az *Urtica dioica* képez (1-2. táblázat).

Fajkombináció

Állandósági osztályok

A vizsgált égerligetekből – a 25 cönológiai felvétel alapján 25 konstans (K: V) és 17 szubkonstans (K: IV) faj került elő: – K V: *Alnus glutinosa, Acer campestre, Anemone ranunculoides, Asarum europaeum, Brachypodium sylvaticum, Circaea lutetiana, Cornus sanguinea, Euonymus europaeus, Fraxinus angustifolia, Gagea lutea, Galanthus nivalis, Galeobdolon luteum, Galium aparine, Geum urbanum, Glechoma hederacea, Iris pseudacorus, Lamium maculatum, Pulmonaria officinalis, Quercus robur, Ranunculus ficaria, Rubus caesius, Sambucus nigra, Ulmus laevis, Ulmus minor, Urtica dioica*. – K IV: *Aegopodium podagraria, Ajuga reptans, Alliaria petiolata, Carex acutiformis, Carex sylvatica, Corydalis cava, Corylus avellana, Crataegus monogyna, Festuca gigantea, Galium odoratum, Hedera helix, Persicaria dubia, Rumex sanguineus, Solidago gigantea, Stachys sylvatica, Stellaria holostea, Veronica sublobata*. A felvételi anyagban ezen kívül 29 akcesszórikus (K III), 46 szubakcesszórikus (K II) és 104 akcidens (K I)



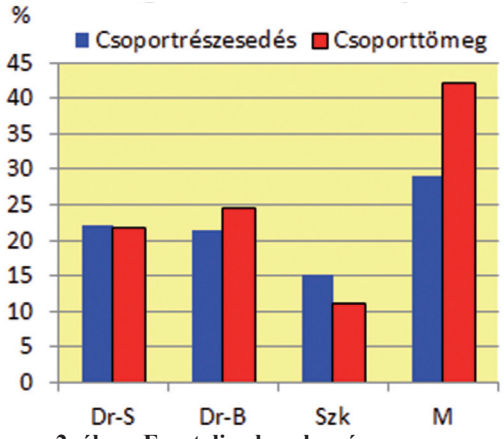
1. ábra: Állandósági osztályok eloszlása,
Dr-S: Somogyi Dráva-sík, Dr-B: Baranyai Dráva-sík

faj is szerepel (1. táblázat; 1. ábra).

Karakterfajok aránya

A társulás felépítésében jelentős szerepet játszanak a mezofil lomberdei elemek, a Fagetalia fajok: – K V: *Anemone ranunculoides, Asarum europaeum, Circaea lutetiana, Gagea lutea, Galanthus nivalis, Galeobdolon luteum, Pulmonaria officinalis. – K IV: Aegopodium podagraria, Carex sylvatica, Corydalis cava, Galium odoratum, Hedera helix, Stachys sylvatica, Stellaria holostea*. – K III: *Anemone nemorosa, Arum maculatum, Carpinus betulus, Corydalis solida, Galeopsis speciosa, Moehringia trinervia, Polygonatum multiflorum, Paris quadrifolia, Viola reichenbachiana. – K II:– Acer*

pseudo-platanus, Allium ursinum, Athyrium filix-femina, Cerastium sylvaticum, Cardamine impatiens, Cerasus avium, Dryopteris filix-mas, Mercurialis perennis, Milium effusum, Omphalodes scorpioides, Scilla drunensis. – K I: *Adoxa moschatellina, Epipactis helleborine agg., Euphorbia amygdaloides, Fagus sylvatica, Geranium phaeum, Isopyrum thalictroides, Knautia drymeia, Lathraea squamaria, Listera ovata, Sanicula europaea, Ulmus glabra, Veronica montana, Vinca minor*. A Fagetalia jellegű fajok 22,08% csoportrészesedést és 21,89% csoporttömeget mutatnak, arányuk tehát magasabb, mint a szigetközi *Paridi quadrifoliae-Alnetum* társulásnál és alacsonyabb,



2. ábra: Fagetalia elemek aránya
Dr-S: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík (Kevey ined.: 30 felv.)
Dr-B: *Paridi quadrifoliae-Alnetum glutinosae*, baranyai Dráva-sík (KEVEY 2022: 25 felv.)
Szk: *Paridi quadrifoliae-Alnetum glutinosae*, Szigetköz (KEVEY 2008: 25 felv.)
M: *Carici pendulae-Alnetum glutinosae*, Mecsek (KEVEY – BARANYI 2002: 25 felv.)

mint a mecseki *Carici pendulae-Alnetum* társulásnál (1. és 4. táblázat; 2. ábra).

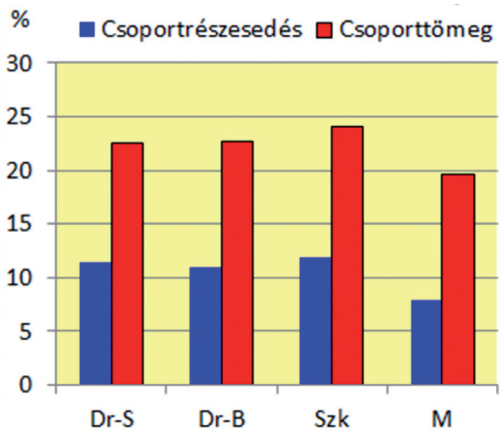
Ugyancsak jelentősek a keményfás ligeterdők karakterfajai, az *Alnion incanae* jellegű elemek: – K V: *Ulmus laevis, Fraxinus angustifolia*. – K IV: *Festuca gigantea, Rumex sanguineus*. – K III: *Carex strigosa, Viburnum opulus*. – K II: *Carex brizoides, Carex remota, Dipsacus pilosus, Impatiens noli-tangere, Leucojum vernum, Malus sylvestris, Populus alba*. – K I: *Chrysosplenium alternifolium, Crepis paludosa, Equisetum telmateia, Frangula alnus, Ribes rubrum, Vitis sylvestris*. E növények 10,95% csoportrészesedést és 22,66% csoporttömeget mutatnak. Arányuk az összehasonlított tájegységek között csaknem azonos, csupán a Mecseken kisebb (1. és 4. táblázat; 3. ábra).

Sokváltozós elemzések eredményei

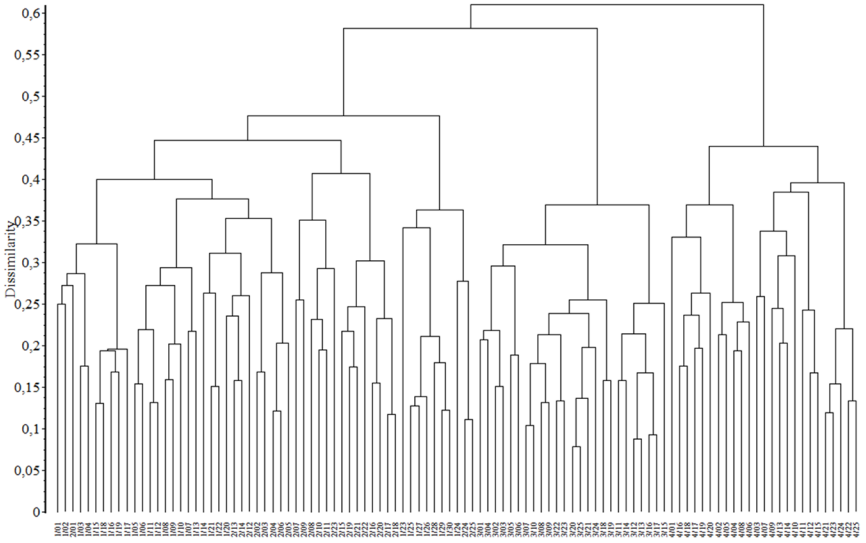
A vizsgált felvételi anyag összehasonlításával a dendrogramon (4. ábra) és ordinációs diagramon (5. ábra) három fő csoport különült el. Az első főcsoportban a somogyi és baranyai Dráva-sík égerligetei (*Paridi quadrifoliae-Alnetum glutinosae*) találhatók. A második főcsoportba a Szigetköz égerligetei (*Paridi-quadrifoliae-Alnetum glutinosae*) kerültek. Végül a harmadik főcsoport a Nyugati-Mecsek égerligeteit (*Carici pendulae-Alnetum glutinosae*) foglalja magába.

Természetvédelmi eredmények

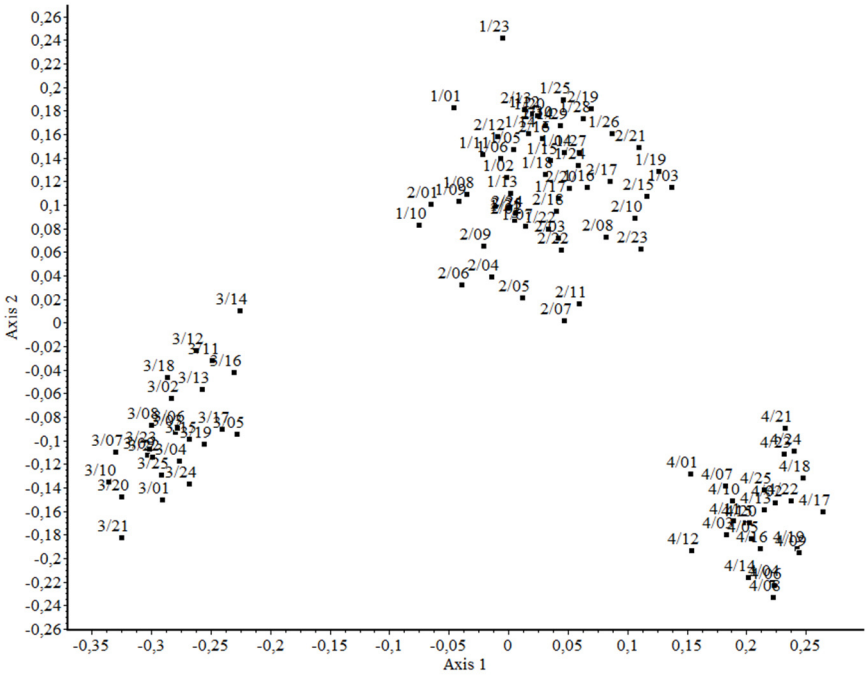
A somogyi Dráva-sík égerligeteiben készített 30 cönológiai felvételből 19 védett



3. ábra: Alnion incanae s.l. elemek aránya
Dr-S: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík (Kevey ined.: 30 felv.)
Dr-B: *Paridi quadrifoliae-Alnetum glutinosae*, baranyai Dráva-sík (KEVEY 2022: 25 felv.)
Szk: *Paridi quadrifoliae-Alnetum glutinosae*, Szigetköz (KEVEY 2008: 25 felv.)
M: *Carici pendulae-Alnetum glutinosae*, Mecsek (KEVEY – BARANYI 2002: 25 felv.)



4. ábra: A kutatott erdőtársulások dendrogramja
(hasonlósági index: Baroni-Urbani–Buser; osztályozó módszer: teljes lánc)
1/1-30: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík (Kevey ined.)
2/1-25: *Paridi quadrifoliae-Alnetum glutinosae*, baranyai Dráva-sík (KEVEY 2022)
3/1-25: *Paridi quadrifoliae-Alnetum glutinosae*, Szigetköz (KEVEY 2008)
4/1-25: *Carici pendulae-Alnetum glutinosae*, Mecsek (KEVEY – BARANYI 2002)



5. ábra: A kutatott erdőtársulások ordinációs diagramja
(hasonlósági index: Baroni-Urbani–Buser; ordinációs módszer: főkoordináta-analízis)
1/1-30: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík (Kevey ined.)
2/1-25: *Paridi quadrifoliae-Alnetum glutinosae*, baranyai Dráva-sík (KEVEY 2022)
3/1-25: *Paridi quadrifoliae-Alnetum glutinosae*, Szigetköz (KEVEY 2008)
4/1-25: *Carici pendulae-Alnetum glutinosae*, Mecsek (KEVEY – BARANYI 2002)

növényfaj került elő: K V: *Galanthus nivalis*. – K III: *Carex strigosa, Dryopteris carthusiana*. – K II: *Leucojum vernum, Omphalodes scorpioides, Scilla drunensis. – K I: Carpesium abrotanoides, Dryopteris dilatata, Dryopteris expansa, Epipactis helleborine agg. Fritillaria meleagris, Leucojum aestivum, Listera ovata, Tamus communis, Thelypteris palustris, Polystichum aculeatum, Polystichum setiferum, Veratrum album, Vitis sylvestris*.

Dendrológiai értéket képeznek egyes fává nőtt cserjék (*Acer tataricum, Corylus avellana, Crataegus monogyna*), amelyek törzsátmérője helyenként a 40 cm-t is elérheti. Ugyanígy említésre méltóak egyes famatuzsálemek, amelyek törzsátmérője eléri a másfél métert is (pl. *Salix alba*: Babócsa „Dékány”).

Flóraszennyező hatást fejtenek ki a felvételekben is szereplő egyes adventív növényfajok: K IV: *Solidago gigantea*. – K III: *Erigeron annuus*. – K I: *Echinocystis lobata, Fraxinus pennsylvanica, Juglans nigra, Juglans regia, Morus alba, Oxalis stricta, Phytolacca americana, Populus × euramericana, Quercus rubra*.

Eredmények megvitatása

A négy felvételi anyag összehasonlításakor az egyes paramétereknél többé-kevésbé eltérő adatokat kaptunk. Ezekből az az összefüggés olvasható le, hogy a somogyi és baranyai Dráva-sík égerligetei közelebb állnak a Szigetközből *Paridi-Alnetum* néven leírt égerligethez, mint a mecseki *Carici pendulae-Alnetum* nevű égerligethez (4. és 5. ábra). Ugyanezt bizonyítják a hagyományos statisztikai ábrák (2. és 3. ábra) és táblázatok (4. táblázat). Ezek szerint a baranyai és somogyi ártéri égerligeteit a *Paridi quadrifoliae-Alnetum glutinosae* nevű asszociációhoz sorolhatjuk, amelynek szüntaxonómiai helye az alábbi módon vázolható:

Divisio: Q U E R C O - F A G E A Jakucs 1967
Classis: QUERCO-FAGETEA Br.-Bl. et Vlieger in Vlieger 1937 em. Borhidi in Borhidi et Kevey 1996
Ordo: *FAGETALIA SYLVATICAE* Pawłowski in Pawłowski et al. 1928
Alliance: **Alnion incanae** Pawłowski in Pawłowski et al. 1928
Suballiance: ***Alnion glutinosae-incanae*** Oberdorfer 1953
Associatio: *Paridi quadrifoliae-Alnetum glutinosae* Kevey in Borhidi et Kevey 1996

Összefoglalás

Jelen tanulmány 30 cönológiai felvétellel mutatja be a somogyi Dráva-sík égerligeteinek társulási viszonyait. Állományai a tölgy-kőris-szil ligetek (*Fraxino pannonicae-Ulmetum*), és a magyar kőrises égerlápok (*Fraxino pannonicae-Alnetum glutinosae*) között helyezkednek el. A társulás a Szigetközből leírt *Paridi quadrifiliae-Alnetum glutinosae* Kevey in Borhidi et Kevey, 1996 asszociációval azonosítható és elkülöníthető a Nyugati-Mecsek *Carici pendulae-Alnetum glutinosae* Borhidi in Borhidi-Kevey, 1996 nevű asszociációtól.

Rövidítések:
A1: felső lombkoronaszint; A2: alsó lombkoronaszint; Adv: Adventiva; AF: Aremonio-Fagion; Agi: Alnenion glutinosae-incanae; Ai: Alnion incanae; Alo: Alopecurion pratensis; Aon: Alnion glutinosae; AQ Aceri tatarici-Quercion; AR: Agropyro-Rumicion crispi; Ara: Arrhenatheretalia; Arc: Arction lappae; Arn: Arrhenatherion elatioris; Ata: Alnetalia glutinosae; B1: cserjeszint; B2: újulat (alsó cserjeszint); Ber: Berberidion; Bia: Bidentetalia; Bon: Bidention tripartiti; C: gyepszint; Cgr: Caricenion gracilis; Che: Chenopodietea; Chr: Chenopodion rubri; ChS: Chenopodio-Scleranthea; Cia: Calystegietalia sepium; CM Cardamini-Montion; Cn Calystegion sepium; Cp Carpinenion betuli; Cro: Caricenion rostratae; Des: Deschampsion caespitosae; Epa: Epilobietalia; Epn: Epilobion angustifolii; EuF: Eu-Fagenion; F: Fagetalia sylvaticae; FBt: Festuco-Brometea; FiC: Filipendulo-Cirsion oleracei; FPe: Festuco-Puccinellietea; FPi: Festuco-Puccinellietalia; Fru: Festucion rupicolae; GA: Galio-Alliarion; GSp: Glycerio-Sparganion; I: Indifferens; ined. (ineditum): kiadatlan közlés; LeP: Lemno-Potamea; Mag: Magnocaricion; Moa: Molinietalia coeruleae; MoA: Molinio-Arrhenatherea; Moa: Molinio-Juncetea; Ncn: Nanocyperion flavescentis; Pea: Potametea; Phn: Phragmition; Pla: Plantaginetalia majoris; Pna: Populenion nigro-albae; PQ: Pino-Quercion; Prf: Prunion fruticosae; Pru: Prunetalia spinosae; Pte: Phragmitetea; Qc: Quercetalia cerridis; Qfa: Quercion farnetto; QFt: Querco-Fagetea; Qpp: Quercetea pubescentis-petraeae; Qr: Quercetalia roboris; S (summa): összeg; Sal: Salicion albae; SaS: Sambuco-Salicion capreae; SCn: Scheuchzerio-Caricetalia nigrae; Sea: Secalietea; s.l. (sensu lato): tágabb értelemben; Spu: Salicetalia purpureae; Str: Salicion triandrae; TA: Tilio platyphyllae-Acerenion pseudoplatani; Ulm: Ulmenion; VP: Vaccinio-Piceetea.

1. táblázat: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík

1/1. táblázat		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	A-D	K	K%
1. Querco-Fagea																																		
1.1. Salicetea purpureae																																		
1.1.1. Salicetalia purpureae																																		
Populus nigra	B2	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
1.1.1.1. Salicion triandrae																																		
Salix purpurea (Cn)	B1	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Salix triandra (Cn)	B1	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
1.1.1.2. Salicion albae																																		
Humulus lupulus (Cn, Ata, Ai)	A2	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	B1	-	+	-	-	+	-	+	-	+	+	-	+	+	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	II	30
	B2	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	C	-	+	-	-	+	-	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	+	+	+	+	-	2	+	1	+-2	III	56,7
	S	-	+	-	-	1	-	+	+	+	+	+	+	+	1	-	-	-	-	-	-	-	-	+	+	+	+	-	2	+	1	+-2	III	56,7
Cucubalus baccifer (Cn, Ulm)	C	-	+	-	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	+	+	-	+	-	-	-	-	+	+	III	53,3
Salix alba (Ai, Cn)	A1	+	-	-	2	-	-	1	1	1	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+-2	II	23,3
	A2	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	I	3,33
	S	+	-	-	2	-	-	1	1	2	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+-2	II	23,3
Leucojum aestivum (Des)	C	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	+	+	I	16,7
Salix fragilis (Ai, Cn)	A2	-	-	-	-	-	-	-	-	1	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+-1	I	6,66
Alnus incana (Ai, Agi)	A1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	I	3,33
	B2	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	S	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	I	3,33
1.2. Alnetea glutinosae																																		
1.2.1. Alnetalia glutinosae																																		
Alnus glutinosa (Ai, Agi)	A1	3	4	5	4	2	2	3	4	3	4	4	4	2	3	4	4	3	4	4	2	2	2	5	3	2	4	4	4	4	3	2-5	V	100
	A2	1	-	1	1	2	2	2	2	3	2	2	2	-	2	1	1	-	-	-	-	-	-	1	1	1	+	-	2	+	+	+-3	IV	70
	B1	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
	B2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	I	3,33
	S	3	4	5	4	3	3	4	5	4	5	5	5	2	4	4	4	3	4	4	2	2	2	5	3	2	4	4	5	4	3	2-5	V	100
Dryopteris carthusiana (F, Agi, Qr, VP)	C	+	+	+	+	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	+	-	-	+	+	+	+	-	+	+	+	+	III	46,7
Dryopteris dilatata (F, Agi, Qr, VP)	C	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	I	6,66

1. táblázat: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík

1/2. táblázat		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	A-D	K	K%
Salix cinerea (Pte, Aon, Ai)	B1	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
Dryopteris expansa (F, Agi, Qr, VP)	C	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
1.2.1.1. Alnion glutinosae																																		
Carex elongata (Cro)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	+	I	6,66
Thelypteris palustris (Mag)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	+	I	6,66
1.3. Querco-Fagetea																																		
Ranunculus ficaria	C	3	2	4	4	4	3	2	3	3	3	2	2	1	3	1	2	2	1	2	1	3	2	3	+	+	1	+	+	1	2	+-4	V	100
Geum urbanum (Epa, Cp, Qpp)	C	+	+	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+-1	V	96,7
Acer campestre (Qpp)	A1	-	-	-	-	-	-	2	-	-	+	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+-2	I	10
	A2	2	2	2	2	-	-	1	-	1	+	-	-	1	1	-	2	-	2	2	-	1	-	-	+	1	1	+	1	+	1	+-2	IV	66,7
	B1	+	+	+	1	-	-	-	+	+	+	1	2	+	1	-	1	-	2	+	-	+	+	-	2	1	1	1	+	1	2	+-2	IV	76,7
	B2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	1	-	+	+	+	-	+	+	+	+	+	+	+	+-1	V	86,7
	S	2	2	2	2	+	+	2	+	1	1	1	2	2	2	-	2	-	3	2	+	1	+	-	2	2	2	1	1	1	2	+-3	V	90
Euonymus europaeus (Qpp)	B1	-	-	-	-	-	+	-	+	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	II	33,3
	B2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	-	+	-	+	+	+	-	+	+	+	+	+	V	86,7
	S	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	-	+	-	+	+	+	+	+	+	+	+	+	V	90
Brachypodium sylvaticum (Qpp)	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	1	+	+	+	-	+	-	-	-	-	+	+-1	V	83,33
Cornus sanguinea (Qpp)	A2	+	-	+	-	-	+	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	16,7
	B1	3	2	2	3	3	2	2	3	4	3	2	2	3	3	2	-	2	1	-	2	2	-	+	2	-	-	-	2	-	1	+-4	IV	76,7
	B2	-	+	+	+	2	+	+	+	2	1	1	+	1	+	+	+	+	+	-	+	+	+	+	+	-	-	-	+	-	+	+-2	IV	80
	S	3	2	2	3	4	2	2	3	5	3	2	2	3	3	2	+	2	1	-	2	2	+	+	2	-	-	-	2	-	1	+-5	V	83,3
Quercus robur (Ai, Cp, Qpp)	A1	-	-	-	-	-	-	1	-	-	-	-	-	-	2	1	-	1	-	-	1	1	1	-	-	-	-	-	-	-	-	1-2	II	23,3
	A2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	I	6,66
	B1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	+	I	13,3
	B2	+	+	-	-	+	+	-	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	-	+	-	-	+	-	+	-	+	IV	66,7
	S	+	+	-	-	+	+	1	+	+	-	-	+	+	2	1	+	1	+	+	1	1	1	-	+	+	+	+	+	+	+	+-2	V	83,3
Ulmus minor (Ai, Ulm, Qpp)	A1	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
	A2	-	-	2	2	-	-	-	+	2	1	1	2	1	+	-	-	1	+	-	1	2	+	-	2	1	+	2	-	1	1	+-2	IV	66,66
	B1	+	-	1	1	+	+	-	-	-	+	+	1	+	2	-	-	+	+	-	+	+	+	-	1	1	2	1	+	1	1	+-2	IV	73,33
	B2	+	-	+	+	+	+	+	+	+	1	+	+	+	+	-	-	+	+	-	+	+	+	-	1	+	+	+	+	+	+	+-1	V	83,33
	S	+	-	2	2	+	+	+	+	2	2	1	2	1	2	-	-	1	1	-	1	2	1	-	2	2	2	2	+	2	2	+-2	V	83,3
Ajuga reptans (MoA)	C	+	+	+	+	+	+	+	+	+	+	-	+	-	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	+	+	IV	76,7

1. táblázat: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík

1/3. táblázat		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	A-D	K	K%
Crataegus monogyna (Qpp)	A2	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+-3	I	6,66
	B1	-	-	-	1	-	-	-	+	+	+	+	+	2	+	-	+	-	-	-	+	+	+	-	+	2	1	2	+	+	2	+-2	IV	63,3
	B2	+	-	+	+	+	-	-	+	+	-	+	+	+	-	-	-	-	-	+	+	+	-	-	+	-	-	+	+	-	-	+	III	50
	S	+	-	+	1	+	-	-	+	+	+	+	+	4	+	-	+	-	-	+	+	+	+	-	+	2	1	2	+	+	2	+-4	IV	76,7
Corylus avellana (Qpp)	A2	-	+	-	-	-	-	+	-	-	-	-	-	1	-	+	+	1	-	+	-	-	1	-	-	-	-	-	-	-	-	+-1	II	26,7
	B1	+	1	-	-	1	1	1	-	+	-	2	1	1	1	2	3	3	2	4	1	3	4	-	-	-	-	+	+	-	-	+-4	IV	66,7
	B2	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	-	-	-	-	+	-	-	-	+	IV	66,7
	S	+	1	-	-	1	1	1	+	+	+	2	1	2	1	2	3	3	2	4	1	3	4	-	-	-	-	+	+	-	-	+-4	IV	73,3
Veronica sublobata	C	+	+	+	-	+	+	+	+	+	+	+	+	+	+	1	+	+	+	+	+	-	-	-	-	-	+	+	-	-	-	+-1	IV	70
Galeopsis pubescens (Qpp, Epa)	C	-	-	+	+	-	+	-	+	-	-	-	-	-	+	+	+	+	-	+	1	+	+	+	-	-	-	-	-	-	-	+-1	III	43,3
Viola suavis s.l. (Qpp)	C	1	1	+	-	-	-	-	+	-	-	+	+	+	-	-	+	+	+	-	-	-	+	-	+	-	-	-	-	-	-	+-1	II	40
Carex divulsa	C	-	-	+	-	+	-	+	+	-	-	-	+	-	-	-	+	+	+	+	1	-	-	-	+	-	-	-	-	-	-	+-1	II	36,7
Crataegus laevigata	B1	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	+	-	2	+	-	1	+	+	+	+-2	II	30
	B2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	+	I	6,66
	S	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	+	-	2	+	-	1	+	+	+	+-2	II	30
Scrophularia nodosa (GA, Epa)	C	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	+	+	-	-	-	+	+	-	+	+	+	-	-	-	-	+	II	30
Geranium robertianum (Epa)	C	-	-	+	+	+	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	+	-	-	-	-	+	-	-	+	-	+	II	26,7
Heracleum sphondylium (Qpp, MoA)	C	-	+	-	-	-	+	-	-	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	II	26,7
Symphytum tuberosum (Cp, Qpp)	C	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	II	26,7
Fallopia dumetorum (Qpp, GA)	C	-	-	-	-	+	-	-	-	+	-	-	-	-	+	-	+	-	-	-	-	+	+	-	-	-	-	-	+	-	-	+	II	23,3
Viola odorata	C	-	+	-	+	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	+	II	23,3
Lapsana communis (Qpp, GA, Epa)	C	-	-	+	-	-	+	+	-	-	-	-	+	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	+	I	20
Ranunculus auricomus agg. (MoA)	C	+	-	-	-	+	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	+	I	20
Rhamnus catharticus (Qpp, Pru)	B1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	+	-	-	+	I	10
	B2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	+	I	6,66
	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	+	+	-	-	+	I	13,3
Clematis vitalba (Qpp)	A2	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	B1	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
	B2	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
	S	-	-	-	-	-	-	+	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	10
Ligustrum vulgare (Cp, Qpp)	B1	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	B2	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	10
	S	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	10

1. táblázat: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík

1/4. táblázat		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	A-D	K	K%
Viscum album	A1	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	10
Tilia cordata (Cp, Qpp)	A2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	I	3,33
	B2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	I	6,66
	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	I	6,66
Campanula trachelium (Epa, Cp)	C	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Convallaria majalis (Qpp)	C	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Dactylis polygama (Qpp, Cp)	C	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Fragaria vesca (Qpp, Epa)	C	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Hypericum hirsutum (Qpp)	C	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Populus tremula (Qr, Qc, Ber)	B2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	I	3,33
Veronica chamaedrys (Qpp, Ara)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	I	3,33
Vicia dumetorum (Qpp)	C	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
1.3.1. Fagetalia sylvaticae																																		
Anemone ranunculoides	C	1	2	+	+	1	2	-	2	2	2	2	2	2	1	2	2	2	2	2	+	1	2	2	2	1	+	1	+	1	+	+-2	V	96,7
Gagea lutea (Ai, Cp)	C	+	+	+	+	+	+	+	1	1	1	+	+	+	+	+	+	1	+	+	-	+	+	-	+	+	+	+	+	+	+	+-1	V	93,3
Circaea lutetiana (Ai)	C	1	+	1	1	1	1	-	+	+	+	+	+	1	+	+	+	+	+	+	2	-	+	+	+	+	1	1	-	1	1	+-2	V	90
Pulmonaria officinalis	C	-	+	+	+	+	+	+	1	+	1	+	+	+	+	+	+	+	+	+	+	1	-	+	+	+	+	-	+	+	+	+-1	V	90
Galanthus nivalis	C	1	2	1	1	-	-	1	1	1	1	+	+	+	1	2	2	1	1	-	1	1	1	-	+	+	+	+	2	1	1	+-2	V	86,7
Asarum europaeum	C	-	+	+	+	+	1	+	+	+	+	+	+	-	+	+	-	+	-	+	+	+	+	-	+	+	+	+	+	+	+	+-1	V	83,3
Galeobdolon luteum	C	-	-	-	-	+	+	2	2	2	3	1	+	4	+	2	3	2	3	2	+	1	2	-	1	2	2	3	1	1	2	+-4	V	83,3
Corydalis cava	C	+	2	1	+	2	1	2	3	3	3	2	2	2	3	1	+	2	3	3	-	-	-	-	-	+	1	+	+	-	+	+-3	IV	80
Stellaria holostea (Cp)	C	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	-	+	+	+	-	+	+	+	+	IV	76,7
Aegopodium podagraria (Ai, Cp)	C	-	+	+	-	-	2	2	-	-	-	1	1	+	-	1	1	1	+	2	1	1	2	-	+	2	1	1	1	+	2	+-2	IV	73,3
Carex sylvatica	C	+	+	+	+	-	-	+	+	+	-	+	+	-	+	1	-	1	+	+	+	+	+	-	+	-	-	+	+	+	+	+-1	IV	73,3
Hedera helix	A1	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	A2	+	+	+	+	+	1	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	+	+-1	II	33,3
	B1	+	+	+	+	+	+	+	-	-	-	-	-	+	-	+	+	-	+	+	-	-	-	-	-	-	-	-	-	+	-	+	III	43,3
	B2	3	2	2	3	1	2	2	+	+	-	-	-	1	-	+	1	+	+	+	+	+	+	-	-	-	-	-	-	+	+	+-3	IV	66,7
	S	3	2	2	3	1	2	2	+	+	-	-	-	1	-	+	1	+	+	+	+	+	1	-	-	-	-	-	-	+	+	+-3	IV	66,7
Galium odoratum	C	-	+	-	-	+	+	+	+	+	+	+	-	+	+	+	+	+	+	-	+	+	+	-	+	+	-	-	-	-	-	+	IV	63,3
Stachys sylvatica (Epa)	C	+	-	-	-	+	+	+	-	-	+	+	+	-	-	+	+	+	+	+	+	-	+	-	+	+	+	+	-	-	+	+	IV	63,3
Arum maculatum	C	-	-	-	-	-	-	-	+	+	+	-	-	-	-	+	+	1	1	1	+	+	+	-	+	+	+	+	+	+	+	+-1	III	60
Galeopsis speciosa (Epn, Ai)	C	+	+	+	-	+	-	+	+	+	+	-	-	+	+	-	-	-	-	+	-	-	-	+	+	-	+	+	+	+	+	+	III	60

1. táblázat: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík

1/5. táblázat		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	A-D	K	K%
Moehringia trinervia	C	-	+	+	+	-	-	-	+	+	+	+	+	+	+	-	-	-	-	-	+	+	+	+	+	-	-	+	+	-	+	+	III	60
Anemone nemorosa	C	-	-	-	-	-	+	-	+	-	+	+	+	-	+	-	+	-	-	+	-	+	1	-	2	+	+	+	+	+	+	+-2	III	56,7
Polygonatum multiflorum (QFt)	C	-	+	-	-	+	-	+	+	+	+	+	+	+	+	-	+	-	-	-	-	+	+	-	+	-	-	-	-	-	+	+	III	50
Carpinus betulus (Cp)	A1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	-	-	+	-	+	I	10
	A2	-	-	+	-	-	-	+	-	-	+	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	+	+	+	+-1	II	26,7
	B1	-	-	+	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	I	20
	B2	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	+	-	-	+	I	16,7
	S	-	-	+	+	-	-	+	+	-	+	-	+	-	-	-	-	-	1	1	-	-	+	-	+	-	+	-	1	1	+	+-1	III	46,7
Corydalis solida	C	-	1	-	-	+	+	2	-	-	-	-	-	+	+	1	1	-	-	+	-	+	+	-	-	+	-	-	+	-	+	+-2	III	46,7
Paris quadrifolia (Ata, Ai)	C	-	-	-	-	-	-	-	+	+	+	+	+	-	-	+	+	+	-	-	+	+	+	-	+	-	-	-	-	-	+	+	III	43,3
Viola reichenbachiana	C	-	+	+	1	+	-	+	-	-	-	-	+	-	-	-	+	+	+	+	-	+	+	-	+	-	-	-	-	-	-	+-1	III	43,3
Athyrium filix-femina (Qr, VP)	C	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	1	-	+	+	-	+	+	-	+	+	+	+-1	II	40
Cerastium sylvaticum (Ai)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	1	-	+	+	+	+	1	1	+	+	+	+-1	II	36,7
Dryopteris filix-mas	C	+	+	+	-	-	-	+	-	-	-	-	-	+	-	-	+	-	-	-	+	-	-	+	-	+	-	+	+	-	-	+	II	36,7
Mercurialis perennis	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	+	+	-	2	2	2	2	1	1	1	+-2	II	36,7
Acer pseudo-platanus (TA)	A1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	+	-	-	1	-	-	-	-	-	-	-	-	-	-	-	+-1	I	10
	A2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+-1	I	10
	B1	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	+	-	1	+	-	-	-	-	-	-	-	-	-	-	-	-	+-1	I	16,7
	B2	-	-	-	-	-	+	-	-	-	+	+	-	-	+	+	+	-	1	+	+	-	-	-	-	-	-	-	-	-	-	-	+-1	II	30
	S	-	-	-	-	-	+	-	-	-	1	+	-	-	+	+	1	-	2	1	+	-	-	-	-	-	-	-	-	-	-	-	+-2	II	30
Cerasus avium (Cp)	B2	-	-	-	-	-	-	+	+	+	-	-	-	-	+	+	+	+	-	-	-	+	+	-	-	-	-	-	-	-	-	+	II	30
Omphalodes scorpioides (TA)	C	-	-	-	-	1	2	-	+	+	+	+	+	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+-2	II	30
Scilla drunensis (Ai, Cp)	C	-	-	-	-	-	+	-	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	II	26,7
Allium ursinum	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	5	5	3	4	5	1-5	II	23,3
Cardamine impatiens	C	-	+	+	+	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	+	II	23,3
Milium effusum	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	-	-	+	-	-	+	-	+	+	II	23,3
Adoxa moschatellina (Ai)	C	-	+	1	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	+-1	I	16,7
Knautia drymeia (Cp)	C	-	-	-	-	-	-	1	-	-	-	-	-	+	-	-	-	+	-	-	-	+	+	-	-	-	-	-	-	-	-	+-1	I	16,7
Lathraea squamaria (Cp)	C	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	+	I	16,7
Veronica montana (Ai)	C	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	I	13,3
Geranium phaeum	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	+	-	-	-	-	+	I	10
Listera ovata (Ata, Ai)	C	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	10
Sanicula europaea	C	+	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	10

1. táblázat: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík

1/6. táblázat		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	A-D	K	K%
Isopyrum thalictroides	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	+	I	6,66
Ulmus glabra (TA)	B2	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
Epipactis helleborine agg.	C	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Euphorbia amygdaloides	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	I	3,33
Fagus sylvatica (EuF)	B2	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Vinca minor (Cp)	C	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
1.3.1.1. Alnion incanae																																		
Ulmus laevis (Sal, Ulm)	A1	2	1	-	-	1	-	+	+	1	-	1	1	-	1	1	-	-	1	-	2	3	3	+	-	+	+	+	+	-	-	+-3	IV	63,3
	A2	2	2	+	-	1	-	-	+	1	+	+	-	-	2	2	-	-	-	1	2	-	2	+	1	1	1	+	-	1	1	+-2	IV	66,7
	B1	+	+	-	+	+	-	-	+	-	-	-	-	-	+	+	-	-	-	-	1	-	-	+	+	+	1	1	-	+	1	+-1	III	50
	B2	-	+	+	+	+	+	-	+	+	-	+	+	-	+	-	+	+	+	+	+	+	-	-	+	+	+	+	-	+	+	+	IV	73,3
	S	3	2	+	+	2	+	+	1	2	+	1	1	-	2	2	+	+	1	1	3	3	4	1	1	1	2	1	+	1	2	+-4	V	96,7
Fraxinus angustifolia ssp. danubialis (Ata)	A1	3	1	-	+	3	4	1	1	-	-	1	1	-	1	1	-	2	1	-	3	3	3	-	3	4	2	1	-	2	3	+-4	IV	73,3
	A2	1	-	+	+	1	2	-	-	-	-	1	1	-	-	-	-	1	-	-	2	2	1	+	1	2	2	2	-	2	2	+-2	III	60
	B1	+	-	+	+	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+	+	+	+	+	+	1	1	+	2	1	+-2	III	53,3
	B2	+	+	+	+	-	+	-	-	-	-	+	+	+	+	+	+	+	-	+	+	-	+	+	1	+	+	+	-	-	-	+-1	IV	66,7
	S	3	1	1	1	3	5	1	1	-	-	2	2	+	1	1	+	2	1	+	4	4	3	1	3	5	3	2	+	3	4	+-5	V	93,3
Rumex sanguineus (Epa, Pna)	C	-	-	+	+	-	+	+	-	+	-	+	+	+	1	+	+	-	+	+	+	+	-	+	+	+	+	+	+	+	+	+-1	IV	76,7
Festuca gigantea (Cn, Epa)	C	+	-	+	-	+	-	+	+	+	+	+	+	+	+	+	+	-	+	-	+	-	+	+	+	+	-	+	-	-	-	+	IV	66,7
Carex strigosa (AF)	C	-	+	+	+	-	-	-	-	-	-	+	+	-	-	+	+	+	+	+	+	-	-	+	+	+	+	+	-	-	+	+	III	56,7
Viburnum opulus (Ata)	B1	-	-	-	-	+	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	I	20
	B2	+	+	-	+	+	-	-	+	+	+	+	+	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+	+	II	40
	S	+	+	-	+	+	-	-	+	+	+	+	+	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	+	+	+	III	43,3
Carex remota	C	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	+	-	-	-	+	-	-	+	-	+	+	+	II	36,7
Carex brizoides (Ata)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	+	1	-	-	-	-	-	+	-	-	1	1	+	1	2	+	+	+-2	II	33,3
Impatiens noli-tangere (Sal)	C	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	+	+	1	1	+	+	+	+-1	II	33,3
Malus sylvestris (Qpp)	A1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	I	3,33
	A2	-	+	-	-	-	-	-	-	-	-	-	-	1	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+-1	I	13,3
	B1	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	+	+	I	16,7
	B2	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	+	I	13,3
	S	-	+	-	-	-	-	-	+	-	+	-	-	2	+	-	-	-	-	-	+	+	-	-	+	+	-	-	-	-	+	+-2	II	33,3
Dipsacus pilosus (GA)	C	-	-	-	+	+	-	+	-	-	+	-	-	-	-	+	+	-	+	-	+	-	-	-	-	-	-	-	-	-	-	+	II	26,7
Leucojum vernum (Cp)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	2	3	2	3	+	1	2	+-3	II	26,7

1. táblázat: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík

1/7. táblázat		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	A-D	K	K%
Populus alba (Sal, AQ)	A1	1	-	-	-	-	-	1	-	-	1	-	-	-	-	2	-	2	-	-	1	-	-	-	-	-	-	-	-	-	1-2	I	20
	A2	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	B1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	B2	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	I	10
	S	1	-	-	-	-	-	1	-	-	1	-	-	-	-	2	-	2	+	-	1	-	-	-	-	-	-	-	-	-	+-2	II	23,3
Chrysosplenium alternifolium (TA)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	1	+	+	+-1	I	20
Frangula alnus (Ata, Qr, PQ)	B1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	-	+	I	6,66
	B2	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	+	I	10
	S	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	-	-	+	-	+	I	16,7
Crepis paludosa (Moa, Ata)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	+	I	6,66
Ribes rubrum	B2	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	I	6,66
Vitis sylvestris (Ulm)	A2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
1.3.1.1.1. Alnenion glutinosae-incanae																																	
Equisetum telmateia (FiC)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	I	3,33
1.3.1.2. Fagion sylvaticae																																	
1.3.1.2.1. Tilio-Acerenion																																	
Polystichum aculeatum	C	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
1.3.1.3. Aremonio-Fagion																																	
Tamus communis (Qfa)	B1	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	C	-	-	-	-	+	+	+	+	+	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	II	26,7
	S	-	-	-	-	+	+	+	+	+	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	II	26,7
Polystichum setiferum (TA)	C	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
1.4. Quercetea pubescentis-petraeae																																	
Prunus spinosa (Pru, Prf)	B1	-	+	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	+	I	20
	B2	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	I	13,3
	S	-	+	-	-	-	-	+	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	+	-	+	-	-	-	+	II	26,7
Pyrus pyraster (Cp)	A2	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	B1	-	-	1	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+-1	I	10
	B2	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	S	-	-	1	+	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+-1	I	13,3
Quercus cerris (Qr, PQ)	B2	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	I	6,66
Allium oleraceum (Fru)	C	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33

1. táblázat: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík

1/8. táblázat		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	A-D	K	K%
Physalis alkekengi (Ulm)	C	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Rosa canina agg. (Pru, Prf)	B2	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
1.4.1. Quercetalia cerridis																																		
1.4.1.1. Aceri tatarici-Quercion																																		
Acer tataricum (Qpp)	A2	-	-	-	-	-	-	-	-	-	-	-	-	1	+	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	+-1	I	13,3
	B1	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	I	10
	B2	-	-	-	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	+	II	26,7
	S	-	-	-	-	-	-	+	+	+	-	-	-	1	+	+	-	-	+	-	+	+	-	-	-	-	-	-	-	-	-	+-1	II	30
2. Cypero-Phragmitea																																		
2.1. Phragmitetea																																		
Iris pseudacorus (Sal, Ata, Ai)	C	+	+	-	+	+	+	+	+	+	+	+	+	+	1	+	+	+	+	-	+	+	+	+	+	-	-	-	+	+	+	+-1	V	83,3
Carex acutiformis (Mag, Cgr, Moa, Sal, Ata)	C	-	-	-	+	+	+	+	-	+	+	+	+	-	+	+	-	+	+	-	1	+	+	1	+	+	+	+	1	+	+	+-1	IV	76,7
Stachys palustris (Moa, Cn, Bon, Spu, Ata)	C	+	-	+	+	-	-	-	+	+	+	+	+	-	+	+	-	-	-	-	-	+	+	+	-	+	+	-	+	+	+	+	III	60
Lycopus europaeus (Moa, Cn, Bia, Spu, Ata)	C	-	-	+	+	-	-	-	+	+	+	+	+	-	+	-	-	+	-	-	+	+	+	-	+	-	-	-	-	+	+	+	III	50
Carex riparia (Mag, Cgr, Moa, Sal, Ata)	C	+	1	-	-	-	-	-	-	-	+	-	+	-	+	-	-	-	+	-	+	-	-	+	-	+	+	+	+	+	+	+-1	III	46,7
Eupatorium cannabinum (Epa, Sal, Ata, Ai)	C	+	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	+	-	-	+	-	+	+	-	+	+	+	II	30
Galium palustre (Mag, Moa, FPi, Spu, Ata)	C	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	+	+	+	-	-	-	+	II	26,7
Solanum dulcamara (Cn, Bia, Spu)	C	-	-	-	-	-	-	-	+	+	+	-	-	-	+	-	-	-	-	-	-	+	+	-	+	-	-	-	-	-	+	+	II	26,66
Phalaris arundinacea (Des)	C	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	1	-	+	-	+	+	+	-	+-1	II	23,33
Phragmites australis (Moa, FPe, Spu, Ata)	C	-	-	-	-	-	-	+	-	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	13,3
Scirpus sylvaticus (Moa, Ata, Ai)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	+	+	+	I	13,33
Scutellaria galericulata (Moa, Spu, Ata)	C	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	+	I	13,3
Glyceria maxima (Phn, Spu)	C	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	I	10
Myosotis scorpioides (Moa, Spu, Ata, Cn)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	+	I	10
Alisma plantago-aquatica (Pea, Spu, Ata, LeP)	C	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Epilobium parviflorum (GSp, Moa, Moa, Ata)	C	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Epilobium tetragonum (Mag, Des, Bia)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	I	3,33
Hypericum tetrapterum (FiC)	C	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Oenanthe aquatica (Spu, Ata)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Rorippa amphibia (Pla, Spu, Ata)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Sium latifolium (Sal, Ata)	C	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33

1. táblázat: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík

1/9. táblázat		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	A-D	K	K%
2.1.1. Nasturtio-Glycerietalia																																		
2.1.1.1. Glycerio-Sparganion																																		
Berula erecta (Mag, Ai)	C	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
2.1.2. Magnocaricetalia																																		
2.1.2.1. Magnocaricion																																		
Carex vulpina (Pte, Cgr, MoA, FPi, AR)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	I	3,33
2.1.2.1.1. Caricenion rostratae																																		
Carex elata (Mag, Moa, Ata)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
2.1.2.1.2. Caricenion gracilis																																		
Carex acuta (Pte, Mag, Moa, Ata, Ai)	C	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
2.2. Montio-Cardaminetea																																		
2.2.1. Montio-Cardaminetalia																																		
2.2.1.1. Cardamini-Montion																																		
Cardamine amara (Ata, Ai)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	+	1	+	+	+	+-1	II	23,33
3. Molinio-Arrhenatherea																																		
Poa trivialis (Pte, Spu, Ata, Ai)	C	+	1	+	+	+	+	+	-	+	-	+	+	-	-	-	-	-	-	-	+	-	-	+	+	+	+	+	-	-	+	+-1	III	56,66
Cardamine pratensis (Mag, Des, Sal, Ata, Ai)	C	+	-	+	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-	+	II	23,33
Colchicum autumnale (Moa)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	I	3,33
Lychnis flos-cuculi (Mag, Ata)	C	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
3.1. Molinio-Juncetea																																		
Symphytum officinale (Pte, Cn, Spu, Ata, Ai)	C	+	+	-	+	+	+	+	+	+	+	+	+	-	+	+	-	-	-	-	-	+	+	+	-	-	-	-	+	-	+	+	III	60
Deschampsia caespitosa (Des, Sal, Ata, Ai)	C	+	-	-	-	+	-	-	-	-	-	-	+	+	+	-	-	+	-	-	1	-	-	+	+	+	+	-	+	+	+	+-1	III	46,66
Valeriana dioica (Mag, Moa, Ata, Ai)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	+	+	-	+	+	+	II	26,66
Cirsium oleraceum (FiC, Ata, Ai)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	I	3,33
Veratrum album (Ata, Ai)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	I	3,33
3.1.1. Molinietalia coeruleae																																		
Angelica sylvestris (Mag, Ata, Ai)	C	-	-	-	-	+	+	-	-	+	+	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	+	II	23,33
3.1.1.1. Deschampsion caespitosae																																		
Fritillaria meleagris (Ulm)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	I	3,33
3.1.1.2. Filipendulo-Cirsion oleracei																																		
Filipendula ulmaria (Moa, Sal, Ata, Ai)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	I	3,33

1. táblázat: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík

1/10. táblázat		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	A-D	K	K%
3.2. Arrhenathеretea																																		
3.2.1. Arrhenatheretalia																																		
Anthriscus sylvestris (Arc, GA, Spu, Ai)	C	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
4. Chenopodio-Scleranthea																																		
Chenopodium polyspermum (Bia, Chr)	C	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	I	6,66
Solanum nigrum (Che)	C	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
4.1. Chenopodietea																																		
Arctium minus (Arc, Bia, Pla)	C	-	+	-	+	+	+	+	+	+	+	-	+	+	-	+	+	+	+	-	-	+	-	-	-	-	-	-	-	-	-	+	III	50
Arctium lappa (Arc, Pla, Spu)	C	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+	I	6,66
4.2. Artemisietea																																		
4.2.1. Artemisietalia																																		
4.2.1.1. Arction lappae																																		
Sambucus ebulus (Epa)	C	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	10
4.3. Galio-Urticetea																																		
4.3.1. Calystegietalia sepium																																		
4.3.1.1. Galio-Alliarion																																		
Alliaria petiolata (Epa)	C	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	+	IV	70
Chaerophyllum temulum	C	1	+	+	1	+	-	+	-	-	-	+	+	+	-	+	+	-	+	-	+	-	-	+	-	-	-	-	-	-	-	+-1	III	46,7
Aethusa cynapium (Che)	C	-	-	+	-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	II	30
Parietaria officinalis (Cn, TA)	C	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
4.3.1.2. Calystegion sepium																																		
Lamium maculatum (Pna, Agi, TA)	C	2	2	2	2	2	+	+	1	1	1	2	+	1	2	2	1	+	1	2	3	2	+	2	+	+	-	-	+	+	+	+-3	V	93,3
Calystegia sepium (Pte, Bia, Pla, Spu, Ata)	C	+	-	-	-	-	-	+	-	+	+	-	-	+	+	-	-	-	-	-	-	+	+	+	-	-	-	-	-	+	+	+	II	36,7
Myosoton aquaticum (Pte, Spu, Ata, Ai)	C	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	+	-	-	-	+	-	-	-	-	+	I	16,7
Carpesium abrotanoides (Sal, Ulm)	C	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	10
Aristolochia clematitis (Sea, Sal)	C	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Rumex obtusifolius (Sal, Ai)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	I	3,33
4.4. Bidentetea																																		
4.4.1. Bidentetalia																																		
Persicaria dubia (Alo, Bon, Spu, Ai)	C	+	+	1	+	+	+	+	+	+	-	+	1	+	1	+	-	-	-	-	+	+	+	-	+	-	+	-	-	-	-	+-1	IV	63,3
Persicaria hydropiper (Ncn, Bon, Spu, Ata, Ai)	C	+	+	+	+	-	-	-	-	-	-	+	+	-	1	+	+	+	-	+	-	-	-	-	+	-	+	-	-	-	-	+-1	III	43,3
Bidens tripartita (Pte, Ncn, Sea, Sal)	C	-	+	+	+	-	-	-	-	-	-	-	-	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	20
Persicaria minor (Des, Bon, Spu, Ata, Ai)	C	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66

1. táblázat: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík

1/11. táblázat		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	A-D	K	K%
4.5. Epilobietea angustifolii																																		
4.5.1. Epilobietalia																																		
Galeopsis bifida (Cn)	C	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
Salix caprea (SaS, QFt)	B1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	I	3,33
5. Indifferens																																		
Rubus caesius (Spu)	B1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	+	I	6,66
	B2	2	1	2	+	+	1	+	1	1	2	3	2	1	2	+	+	1	1	1	1	2	2	2	2	1	2	2	2	2	2	+-3	V	100
	S	2	1	2	+	+	1	+	1	1	2	3	2	1	2	+	+	1	1	1	1	2	2	2	2	1	2	2	2	2	2	+-3	V	100
Sambucus nigra (Epa, SaS, QFt)	B1	1	2	1	1	3	3	3	3	2	+	3	1	3	1	1	-	-	1	1	2	-	-	4	+	1	1	1	2	3	1	+-4	V	86,7
	B2	+	+	-	+	+	+	+	+	+	+	+	+	1	-	+	+	+	+	+	+	+	-	-	+	+	-	-	+	+	+	+-1	IV	80
	S	1	2	1	1	3	3	3	3	2	+	3	1	3	1	1	+	+	1	1	2	+	-	4	+	1	1	1	2	3	1	+-4	V	96,7
Urtica dioica (Arc, GA, Epa, Spu)	C	2	2	1	+	+	+	+	+	+	-	2	3	+	1	+	+	+	+	+	2	1	+	1	+	+	+	1	+	+	1	+-3	V	96,7
Galium aparine (Sea, Epa, QFt)	C	+	+	-	+	1	+	+	1	+	1	2	2	+	+	+	+	+	+	+	1	+	-	1	+	1	1	1	+	+	+	+-2	V	93,3
Glechoma hederacea (MoA, QFt, Sal, Ai)	C	2	2	2	2	+	1	-	+	1	+	2	2	+	1	2	1	1	+	+	3	+	1	1	3	+	-	+	-	+	+	+-3	V	90
Stellaria media (ChS, QFt, Spu)	C	+	+	+	+	+	+	+	-	+	-	+	+	+	-	+	-	-	+	+	1	-	-	+	-	-	-	-	-	+	+	+-1	III	60
Lysimachia nummularia (Pte, Moa, Bia)	C	+	-	+	+	+	+	-	-	-	-	+	+	+	-	-	-	+	-	+	+	-	-	+	+	+	+	+	-	-	-	+	III	53,3
Lysimachia vulgaris (Ai, Pte, SCn, Moa, Sal)	C	+	+	-	-	+	+	-	+	+	-	-	-	-	-	-	-	-	-	-	+	+	+	-	+	+	-	+	-	-	+	+	III	43,3
Torilis japonica (Arc, GA, Epa, QFt)	C	-	-	+	-	+	+	+	-	+	+	+	+	+	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	+	+	III	43,3
Ranunculus repens (Pte, MoA, ChS, Spu, Ata)	C	-	-	+	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	+	+	+	+	-	+	+	+	II	36,7
Caltha palustris (Mag, Moa, Spu, Ata, Ai)	C	+	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	+	-	+	+	+	+	+	+	+	II	33,3
Lythrum salicaria (Pte, Moa, Bia, Spu, Ata)	C	+	-	-	-	-	-	+	+	+	-	-	-	-	+	-	-	-	-	-	+	-	+	-	-	-	-	-	+	+	+	+	II	33,3
Equisetum arvense (MoA, Sea, Sal, Ata, Ai)	C	-	-	+	+	+	+	-	-	+	+	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	II	30
Rubus fruticosus agg. (QFt, Epa, SaS)	B1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	1	-	1	+	1	+-1	I	16,7
	B2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	1	+	2	-	2	+-2	I	20
	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	2	+	2	+	2	+-2	II	23,3
Juncus effusus (Pte, Moa, Bia, Pla, Spu)	C	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	+	I	10
Agrostis stolonifera (Pte, Moa, FPe, Bia, Pla)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	+	I	6,66
Cruciata laevipes (Arn, Fru, Arc, Cia, Qpp)	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	+	I	6,66
Mentha aquatica (Pte, Moa, Spu, Ata, Ai)	C	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
Ornithogalum umbellatum (Ara, FBt, Sea)	C	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
Plantago major (Pla)	C	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
Chelidonium majus (Che, Arc, GA, Epa)	C	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33

1. táblázat: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík

1/12 táblázat		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	A-D	K	K%
6. Adventiva																																		
Solidago gigantea	C	-	-	+	+	+	+	+	+	+	+	1	+	+	-	-	-	-	-	-	+	+	-	1	-	+	+	+	1	+	1	+-1	IV	66,66
Erigeron annuus	C	+	-	+	+	+	+	-	+	+	+	+	+	+	+	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	+	III	46,66
Phytolacca americana	C	-	-	-	-	+	+	+	-	-	-	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	I	16,66
Fraxinus pennsylvanica	A1	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	A2	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	+-2	I	6,66
	B1	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	B2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	S	-	+	-	-	+	-	-	-	-	-	-	+	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	+-2	I	13,33
Echinocystis lobata	B1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	I	3,33
	C	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	+	I	10
	S	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	+	I	10
Juglans nigra	B2	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	I	10
Morus alba	A2	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	B1	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
	S	-	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	10
Oxalis stricta	C	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
Populus × euramericana	A1	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
Quercus rubra	A2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33
	B2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	6,66
Juglans regia	B1	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	I	3,33

2. táblázat: Felvételi adatok 1.

2/1. táblázat	1	2	3	4	5	6	7	8	9	10
Kvadrát felvételi sorszáma	17752	17751	3909	3910	17755	17754	17753	3899	6533	6531
Felvételi évszám 1.	2019	2019	2004	2004	2019	2019	2019	2001	2001	2001
Felvételi időpont 1.	03.24	03.24	04.12	04.12	03.23	03.23	03.24	03.23	03.23	03.23
Felvételi évszám 2.	2019	2020	2004	2004	2019	2019	2019	2001	2001	2001
Felvételi időpont 2.	08.03	08.25	09.01	09.01	09.28	09.28	09.28	07.29	07.29	07.29
Tengerszint feletti magasság	106	106	106	106	113	113	113	112	112	112
Lejtőszög (fok)	0	0	0	0	0	0	0	0	0	0
Felső lombkoronaszint borítása (%)	75	70	80	75	70	75	65	70	60	70
Felső lombkoronaszint magassága (m)	25	23	25	22	22	25	20	23	22	20
Átlagos törzsátmérő (cm)	45	45	45	40	55	60	45	40	50	35
Alsó lombkoronaszint borítása (%)	40	40	30	40	30	40	25	15	50	25
Alsó lombkoronaszint magassága (m)	18	17	17	16	17	18	15	16	15	15
Cserjeszint borítása (%)	50	50	30	50	60	60	60	80	75	70
Cserjeszint magassága (m)	3	2	3,5	3	3	3	3,5	3	3	3
Újulat borítása (%)	60	5	40	50	15	25	20	5	20	15
Gyepszint borítása (%)	70	95	90	90	95	90	90	90	85	90
Felvételi terület nagysága (m²)	1600	1600	1600	1600	1600	1600	1200	1600	1600	1600

2/2. táblázat	11	12	13	14	15	16	17	18	19	20
Kvadrát felvételi sorszáma	6528	6526	2531	6523	17746	17747	17748	17749	17750	6501
Felvételi évszám 1.	2001	2001	1999	2000	2019	2019	2019	2019	2019	2001
Felvételi időpont 1.	03.23	03.23	04.08	04.21	03.23	03.23	03.23	03.23	03.23	04.14
Felvételi évszám 2.	2001	2001	1999	2000	2020	2020	2020	2020	2020	2001
Felvételi időpont 2.	07.29	07.29	07.15	07.20	08.26	08.26	08.26	08.26	08.26	08.12
Tengerszint feletti magasság	112	112	110	113	115	115	115	115	115	114
Lejtőszög (fok)	0	0	0	0	0	0	0	0	0	0
Felső lombkoronaszint borítása (%)	65	60	60	70	70	70	70	75	70	60
Felső lombkoronaszint magassága (m)	23	22	18	25	25	25	25	25	25	25
Átlagos törzsátmérő (cm)	45	45	35	50	45	45	45	45	45	50
Alsó lombkoronaszint borítása (%)	25	30	50	35	25	25	25	20	25	50
Alsó lombkoronaszint magassága (m)	17	15	10	17	18	18	15	17	17	18
Cserjeszint borítása (%)	60	35	70	60	50	50	60	50	60	50
Cserjeszint magassága (m)	2	3	2,5	3	3	4	3,5	3	3,5	2,5
Újulat borítása (%)	35	20	15	15	1	5	5	10	5	3
Gyepszint borítása (%)	90	95	75	70	85	80	80	85	85	90
Felvételi terület nagysága (m²)	1600	800	1200	1600	1600	1600	1600	1600	1600	1600

2/3. táblázat	21	22	23	24	25	26	27	28	29	30
Kvadrát felvételi sorszáma	6503	6504	2127	2787	6510	6515	6516	6514	6513	6511
Felvételi évszám 1.	2001	2001	1998	2003	1982	1982	1982	1982	1982	1982
Felvételi időpont 1.	04.14	04.14	04.04	09.02	03.26	03.26	03.26	03.26	03.26	03.26
Felvételi évszám 2.	2001	2001	1998	2004	1982	1982	1982	1982	1982	1982
Felvételi időpont 2.	08.12	08.12	07.13	04.27	07.01	07.01	07.01	07.01	07.01	07.01
Tengerszint feletti magasság	114	114	120	119	119	119	119	119	119	119
Lejtőszög (fok)	0	0	0	0	0	0	0	0	0	0
Felső lombkoronaszint borítása (%)	70	75	80	70	80	75	75	75	80	70
Felső lombkoronaszint magassága (m)	25	25	22	25	25	25	25	18	25	25
Átlagos törzsátmérő (cm)	50	50	35	50	50	45	45	30	45	40
Alsó lombkoronaszint borítása (%)	40	30	5	50	30	30	30	30	25	35
Alsó lombkoronaszint magassága (m)	17	18	15	16	16	16	16	10	16	14
Cserjeszint borítása (%)	60	60	60	40	25	35	35	40	55	45
Cserjeszint magassága (m)	3,5	4	3,5	3,5	2,5	3	3	3	3	3
Újulat borítása (%)	15	10	25	25	5	25	25	30	20	40
Gyepszint borítása (%)	60	70	90	90	100	100	100	100	90	90
Felvételi terület nagysága (m²)	1000	1600	1600	1600	1600	1600	1600	1600	1600	1600

3. táblázat: Felvételi adatok 2.

	Sorszám	Település	Dűlő	Alapkőzet	Talajtípus	Szerző
1	17752	Drávaszentes	Tarcsa	öntéshomok	öntés erdőtalaj	Kevey
2	17751	Drávaszentes	Komlósdi-berekerdő	öntéshomok	öntés erdőtalaj	Kevey
3	3909	Babócsa	Dékány	öntéshomok	öntés erdőtalaj	Kevey
4	3910	Babócsa	Dékány	öntéshomok	öntés erdőtalaj	Kevey
5	17755	Bélavár	Bereki-erdő	öntéshomok	öntés erdőtalaj	Kevey
6	17754	Bélavár	Bereki-erdő	öntéshomok	öntés erdőtalaj	Kevey
7	17753	Bélavár	Bereki-erdő	öntéshomok	öntés erdőtalaj	Kevey
8	3899	Bélavár	Bereki-erdő	öntéshomok	öntés erdőtalaj	Kevey
9	6533	Bélavár	Bereki-erdő	öntéshomok	öntés erdőtalaj	Kevey
10	6531	Bélavár	Bereki-erdő	öntéshomok	öntés erdőtalaj	Kevey
11	6528	Bélavár	Bereki-erdő	öntéshomok	öntés erdőtalaj	Kevey
12	6526	Bélavár	Bereki-erdő	öntéshomok	öntés erdőtalaj	Kevey
13	2531	Bélavár	Palinai-erdő	öntéshomok	öntés erdőtalaj	Kevey
14	6523	Somogyudvarhely	Almási-erdő	öntéshomok	öntés erdőtalaj	Kevey
15	17746	Somogyudvarhely	Vecsenye	öntéshomok	öntés erdőtalaj	Kevey
16	17747	Somogyudvarhely	Vecsenye	öntéshomok	öntés erdőtalaj	Kevey
17	17748	Somogyudvarhely	Vecsenye	öntéshomok	öntés erdőtalaj	Kevey
18	17749	Somogyudvarhely	Vecsenye	öntéshomok	öntés erdőtalaj	Kevey
19	17750	Somogyudvarhely	Vecsenye	öntéshomok	öntés erdőtalaj	Kevey
20	6501	Somogyudvarhely	Vecsenye	öntéshomok	öntés erdőtalaj	Kevey
21	6503	Somogyudvarhely	Vecsenye	öntéshomok	öntés erdőtalaj	Kevey
22	6504	Somogyudvarhely	Vecsenye	öntéshomok	öntés erdőtalaj	Kevey
23	2127	Gyékényes	Lankóczi-erdő	öntéshomok	öntés erdőtalaj	Kevey
24	2787	Gyékényes	Lankóczi-erdő	öntéshomok	öntés erdőtalaj	Kevey
25	6510	Gyékényes	Lankóczi-erdő	öntéshomok	öntés erdőtalaj	Kevey
26	6515	Gyékényes	Lankóczi-erdő	öntéshomok	öntés erdőtalaj	Kevey
27	6516	Gyékényes	Lankóczi-erdő	öntéshomok	öntés erdőtalaj	Kevey
28	6514	Gyékényes	Lankóczi-erdő	öntéshomok	öntés erdőtalaj	Kevey
29	6513	Gyékényes	Lankóczi-erdő	öntéshomok	öntés erdőtalaj	Kevey
30	6511	Gyékényes	Lankóczi-erdő	öntéshomok	öntés erdőtalaj	Kevey

4. táblázat: Karakterfajok aránya
1/1-30: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík (Kevey ined.)
2/1-25: *Paridi quadrifoliae-Alnetum glutinosae*, baranyai Dráva-sík (KEVEY 2022)
3/1-25: *Paridi quadrifoliae-Alnetum glutinosae*, Szigetköz (KEVEY 2008)
4/1-25: *Carici pendulae-Alnetum glutinosae*, Mecsek (KEVEY – BARANYI 2002)

4/1. táblázat	Csoportrészesedés				Csoporttömeg			
	Dr-S	Dr-B	Szk	M	Dr-S	Dr-B	Szk	M
Querco-Fagea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Salicetea purpureae	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Salicetalia purpureae	2,03	1,52	2,14	0,96	1,67	1,52	3,98	0,13
Salicion triandrae	0,05	0,00	0,03	0,00	0,01	0,00	0,00	0,00
Salicion albae	2,53	2,06	4,53	0,58	2,18	2,08	4,50	0,33
Populenion nigro-albae	0,69	0,60	0,09	0,53	0,65	0,43	0,01	0,16
Salicion albae s.l.	3,22	2,66	4,62	1,11	2,83	2,51	4,51	0,49
Salicetalia purpureae s.l.	5,30	4,18	6,79	2,07	4,51	4,03	8,49	0,62
Salicetea purpureae s.l.	5,30	4,18	6,79	2,07	4,51	4,03	8,49	0,62
Alnetea glutinosae	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Alnetalia glutinosae	3,63	4,12	3,61	1,16	9,96	9,88	5,77	8,39
Alnion glutinosae	0,12	0,07	0,14	0,00	0,01	0,01	0,05	0,00
Alnetalia glutinosae s.l.	3,75	4,19	3,75	1,16	9,97	9,89	5,82	8,39
Alnetea glutinosae s.l.	3,75	4,19	3,75	1,16	9,97	9,89	5,82	8,39
Querco-Fagetea	12,16	13,79	13,57	14,39	17,18	15,60	16,46	9,45
Fagetalia sylvaticae	22,08	21,32	15,18	28,98	21,89	24,46	11,14	42,13
Alnion incanae	9,28	8,97	10,03	6,60	14,24	14,28	16,94	11,14
Alnenion glutinosae-incanae	1,00	0,89	0,91	1,24	6,55	5,95	6,61	8,43
Ulmenion	1,12	1,09	0,96	0,13	1,72	2,43	0,57	0,04
Alnion incanae s.l.	11,40	10,95	11,90	7,97	22,51	22,66	24,12	19,61
Fagion sylvaticae	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Eu-Fagenion	0,02	0,10	0,00	0,73	0,00	0,03	0,00	0,42
Carpinenion betuli	3,42	3,71	2,34	6,36	1,81	1,52	1,83	7,15
Tilio-Acerenion	1,05	0,34	1,55	1,83	0,90	0,41	5,74	0,71
Fagion sylvaticae s.l.	4,49	4,15	3,89	8,92	2,71	1,96	7,57	8,28
Aremonio-Fagion	0,64	0,93	0,08	2,02	0,07	0,12	0,02	0,33
Erythronio-Carpinenion betuli	0,00	0,00	0,00	0,03	0,00	0,00	0,00	0,00
Aremonio-Fagion s.l.	0,64	0,93	0,08	2,05	0,00	0,00	0,00	0,00
Fagetalia sylvaticae s.l.	38,61	37,35	31,05	47,92	47,18	49,20	42,85	70,35
Quercetalia roboris	0,45	0,36	0,28	0,63	0,06	0,06	0,03	0,14
Deschampsio flexuosae-Fagion	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Gentiano asclepiadeae-Fagenion	0,00	0,00	0,00	0,03	0,00	0,00	0,00	0,00
Deschampsio flexuosae-Fagion s.l.	0,00	0,00	0,00	0,03	0,00	0,00	0,00	0,00
Quercion robori-petraeae	0,00	0,01	0,28	0,02	0,00	0,00	0,03	0,00
Quercetalia roboris s.l.	0,45	0,37	0,56	0,68	0,06	0,06	0,06	0,14
Querco-Fagetea s.l.	51,22	51,51	45,18	62,99	64,42	64,86	59,37	79,94
Quercetea pubescentis-petraeae	6,46	8,65	11,30	8,93	8,01	11,36	13,75	4,51
Orno-Cotinetalia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Orno-Cotinion	0,00	0,03	0,10	0,17	0,00	0,02	0,01	0,04
Orno-Cotinetalia s.l.	0,00	0,03	0,10	0,17	0,00	0,02	0,01	0,04
Quercetalia cerridis	0,01	0,04	0,12	0,10	0,00	0,00	0,01	0,01
Quercion farnetto	0,19	0,30	0,00	1,01	0,02	0,03	0,00	0,19
Quercion petraeae	0,00	0,00	0,00	0,21	0,00	0,00	0,00	0,03
Aceri tatarici-Quercion	0,32	0,68	0,41	0,32	0,19	1,37	0,94	0,04
Quercetalia cerridis s.l.	0,52	1,02	0,53	1,64	0,21	1,40	0,95	0,27

4. táblázat: Karakterfajok aránya
1/1-30: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík (Kevey ined.)
2/1-25: *Paridi quadrifoliae-Alnetum glutinosae*, baranyai Dráva-sík (KEVEY 2022)
3/1-25: *Paridi quadrifoliae-Alnetum glutinosae*, Szigetköz (KEVEY 2008)
4/1-25: *Carici pendulae-Alnetum glutinosae*, Mecsek (KEVEY – BARANYI 2002)

4/2. táblázat	Csoportrészesedés				Csoporttömeg			
	Dr-S	Dr-B	Szk	M	Dr-S	Dr-B	Szk	M
Prunetalia spinosae	0,20	0,44	0,59	0,56	0,02	0,05	0,06	0,08
Berberidion	0,01	0,01	0,02	0,04	0,00	0,00	0,00	0,01
Prunion fruticosae	0,14	0,32	0,18	0,21	0,02	0,04	0,02	0,03
Prunetalia spinosae s.l.	0,35	0,77	0,79	0,81	0,04	0,09	0,08	0,12
Quercetea pubescentis-petraeae s.l.	7,33	10,47	12,72	11,55	8,26	12,87	14,79	4,94
Querco-Fagea s.l.	67,60	70,35	68,44	77,77	87,16	91,65	88,47	93,89
Abieti-Piceea	0,00	0,00	0,02	0,02	0,00	0,00	0,00	0,00
Vaccinio-Piceetea	0,19	0,24	0,00	0,34	0,03	0,05	0,00	0,12
Pino-Quercetalia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Pino-Quercion	0,09	0,15	0,30	0,37	0,01	0,03	0,03	0,08
Pino-Quercetalia s.l.	0,09	0,15	0,30	0,37	0,01	0,03	0,03	0,08
Vaccinio-Piceetea s.l.	0,28	0,39	0,30	0,71	0,04	0,08	0,03	0,20
Abieti-Piceea s.l.	0,28	0,39	0,32	0,73	0,04	0,08	0,03	0,20
Lemno-Potamea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Potametea	0,01	0,04	0,00	0,00	0,00	0,00	0,00	0,00
Lemno-Potamea s.l.	0,01	0,04	0,00	0,00	0,00	0,00	0,00	0,00
Cypero-Phragmitea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Phragmitetea	2,60	2,21	3,17	1,26	0,34	0,37	0,60	0,19
Phragmitetalia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Phragmition	0,05	0,04	0,02	0,00	0,01	0,00	0,00	0,00
Phragmitetalia s.l.	0,05	0,04	0,02	0,00	0,01	0,00	0,00	0,00
Nasturtio-Glycerietalia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Glycerio-Sparganion	0,04	0,19	0,01	0,45	0,00	0,02	0,00	0,06
Nasturtio-Glycerietalia s.l.	0,04	0,19	0,01	0,45	0,00	0,02	0,00	0,06
Magnocaricetalia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Magnocaricion	0,78	0,63	0,83	0,13	0,11	0,17	0,25	0,02
Caricenion rostratae	0,06	0,06	0,02	0,00	0,01	0,01	0,00	0,00
Caricenion gracilis	0,31	0,23	0,38	0,00	0,06	0,12	0,18	0,00
Magnocaricion s.l.	1,15	0,92	1,23	0,13	0,18	0,30	0,43	0,02
Magnocaricetalia s.l.	1,15	0,92	1,23	0,13	0,18	0,30	0,43	0,02
Phragmitetea s.l.	3,84	3,36	4,43	1,84	0,53	0,69	1,03	0,27
Isoëto-Nanojuncetea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Nanocyperetalia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Nanocyperion flavescentis	0,16	0,06	0,06	0,20	0,02	0,01	0,01	0,03
Nanocyperetalia s.l.	0,16	0,06	0,06	0,20	0,02	0,01	0,01	0,03
Isoëto-Nanojuncetea s.l.	0,16	0,06	0,06	0,20	0,02	0,01	0,01	0,03
Montio-Cardaminetea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Montio-Cardaminetalia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Cardamini-Montion	0,11	0,02	0,00	0,09	0,02	0,00	0,00	0,10
Montio-Cardaminetalia s.l.	0,11	0,02	0,00	0,09	0,02	0,00	0,00	0,10
Montio-Cardaminetea s.l.	0,11	0,02	0,00	0,09	0,02	0,00	0,00	0,10
Cypero-Phragmitea s.l.	4,11	3,44	4,49	2,13	0,57	0,70	1,04	0,40
Oxycocco-Caricea nigrae	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Scheuchzerio-Caricetea nigrae	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Scheuchzerio-Caricetalia nigrae	0,10	0,10	0,20	0,03	0,01	0,02	0,03	0,00
Scheuchzerio-Caricetea nigrae s.l.	0,10	0,10	0,20	0,03	0,01	0,02	0,03	0,00
Oxycocco-Caricea nigrae s.l.	0,10	0,10	0,20	0,03	0,01	0,02	0,03	0,00

4. táblázat: Karakterfajok aránya
1/1-30: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík (Kevey ined.)
2/1-25: *Paridi quadrifoliae-Alnetum glutinosae*, baranyai Dráva-sík (KEVEY 2022)
3/1-25: *Paridi quadrifoliae-Alnetum glutinosae*, Szigetköz (KEVEY 2008)
4/1-25: *Carici pendulae-Alnetum glutinosae*, Mecsek (KEVEY – BARANYI 2002)

4/3. táblázat	Csoportrészesedés				Csoporttömeg			
	Dr-S	Dr-B	Szk	M	Dr-S	Dr-B	Szk	M
Molinio-Arrhenatherea	1,49	1,69	0,92	1,17	0,59	0,46	0,22	0,19
Molinio-Juncetea	1,26	1,13	1,27	0,27	0,16	0,24	0,32	0,04
Molinietalia coeruleae	0,55	0,60	0,91	0,30	0,06	0,08	0,32	0,05
Deschampsion caespitosae	0,52	0,25	1,13	0,09	0,08	0,03	0,25	0,01
Filipendulo-Cirsion oleracei	0,07	0,24	0,18	0,46	0,01	0,03	0,11	0,08
Alopecurion pratensis	0,18	0,06	0,02	0,15	0,04	0,01	0,00	0,02
Molinietalia coeruleae s.l.	1,32	1,15	2,24	1,00	0,19	0,15	0,68	0,16
Molinio-Juncetea s.l.	2,58	2,28	3,51	1,27	0,35	0,39	1,00	0,20
Arrhenatheretea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Arrhenatheretalia	0,05	0,13	0,26	0,20	0,01	0,02	0,03	0,03
Arrhenatherion elatioris	0,02	0,03	0,00	0,00	0,00	0,00	0,00	0,00
Cynosurion cristati	0,00	0,01	0,00	0,01	0,00	0,00	0,00	0,00
Arrhenatheretalia s.l.	0,07	0,17	0,26	0,21	0,00	0,00	0,00	0,00
Arrhenatheretea s.l.	0,07	0,17	0,26	0,21	0,01	0,02	0,03	0,03
Nardo-Callunetea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Nardetalia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Nardo-Agrostion tenuis	0,00	0,05	0,05	0,00	0,00	0,01	0,01	0,00
Nardetalia s.l.	0,00	0,05	0,05	0,00	0,00	0,01	0,01	0,00
Nardo-Callunetea s.l.	0,00	0,05	0,05	0,00	0,00	0,01	0,01	0,00
Calluno-Ulicetea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Vaccinio-Genistetalia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Calluno-Genistion	0,00	0,00	0,02	0,02	0,00	0,00	0,00	0,00
Vaccinio-Genistetalia s.l.	0,00	0,00	0,02	0,02	0,00	0,00	0,00	0,00
Calluno-Ulicetea s.l.	0,00	0,00	0,02	0,02	0,00	0,00	0,00	0,00
Molinio-Arrhenatherea s.l.	4,14	4,19	4,76	2,67	0,95	0,88	1,26	0,42
Puccinellio-Salicornea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Festuco-Puccinellietea	0,05	0,02	0,16	0,00	0,01	0,01	0,02	0,00
Festuco-Puccinellietalia	0,06	0,04	0,10	0,01	0,01	0,00	0,01	0,00
Festuco-Puccinellietea s.l.	0,11	0,06	0,26	0,01	0,02	0,01	0,03	0,00
Puccinellio-Salicornea s.l.	0,11	0,06	0,26	0,01	0,02	0,01	0,03	0,00
Festuco-Bromea	0,00	0,02	0,00	0,01	0,00	0,00	0,00	0,00
Festuco-Brometea	0,02	0,04	0,07	0,00	0,00	0,01	0,01	0,00
Festucetalia valesiacae	0,00	0,03	0,00	0,03	0,00	0,00	0,00	0,00
Asplenio-Festucion pallentis	0,00	0,00	0,00	0,03	0,00	0,00	0,00	0,00
Festucion rupicolae	0,04	0,05	0,06	0,03	0,00	0,01	0,01	0,00
Cynodonto-Festucenion	0,00	0,01	0,00	0,01	0,00	0,00	0,00	0,00
Festucion rupicolae s.l.	0,04	0,06	0,06	0,04	0,00	0,00	0,00	0,00
Festucetalia valesiacae s.l.	0,04	0,09	0,06	0,10	0,00	0,01	0,01	0,00
Festuco-Brometea s.l.	0,06	0,13	0,13	0,10	0,00	0,02	0,02	0,00
Festuco-Bromea s.l.	0,06	0,15	0,13	0,11	0,00	0,02	0,02	0,00
Chenopodio-Scleranthea	0,35	0,20	0,17	0,36	0,05	0,02	0,02	0,06
Secalietea	0,50	0,51	0,71	0,22	0,19	0,08	0,10	0,04
Secalietalia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Caucalidion platycarpos	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00
Secalietalia s.l.	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00
Secalietea s.l.	0,50	0,51	0,73	0,22	0,00	0,00	0,00	0,00
Chenopodietea	0,45	0,08	0,39	0,40	0,05	0,01	0,11	0,05

4. táblázat: Karakterfajok aránya
1/1-30: *Paridi quadrifoliae-Alnetum glutinosae*, somogyi Dráva-sík (Kevey ined.)
2/1-25: *Paridi quadrifoliae-Alnetum glutinosae*, baranyai Dráva-sík (KEVEY 2022)
3/1-25: *Paridi quadrifoliae-Alnetum glutinosae*, Szigetköz (KEVEY 2008)
4/1-25: *Carici pendulae-Alnetum glutinosae*, Mecsek (KEVEY – BARANYI 2002)

4/4. táblázat	Csoportrészesedés				Csoporttömeg			
	Dr-S	Dr-B	Szk	M	Dr-S	Dr-B	Szk	M
Artemisietea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Artemisietalia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Arction lappae	0,70	0,49	0,57	0,49	0,31	0,09	0,15	0,13
Artemisietalia s.l.	0,70	0,49	0,57	0,49	0,31	0,09	0,15	0,13
Artemisietea s.l.	0,70	0,49	0,57	0,49	0,31	0,09	0,15	0,13
Galio-Urticetea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Calystegietalia sepium	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Galio-Alliarion	2,31	2,08	0,87	1,78	0,55	0,27	0,12	0,31
Calystegion sepium	2,03	1,83	2,82	1,23	0,99	0,65	0,54	0,50
Calystegietalia sepium s.l.	4,34	3,91	3,69	3,01	1,54	0,92	0,66	0,81
Galio-Urticetea s.l.	4,34	3,91	3,69	3,01	1,54	0,92	0,66	0,81
Bidentetea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Bidentetalia	1,16	0,76	0,95	0,90	0,15	0,10	0,18	0,13
Bidention tripartiti	0,44	0,22	0,08	0,15	0,07	0,02	0,01	0,02
Chenopodion rubri	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Bidentetalia s.l.	1,63	0,98	1,03	1,05	0,22	0,12	0,19	0,15
Bidentetea s.l.	1,63	0,98	1,03	1,05	0,22	0,12	0,19	0,15
Plantaginetea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Plantaginetalia majoris	0,35	0,21	0,45	0,10	0,04	0,04	0,12	0,01
Plantaginetea s.l.	0,35	0,21	0,45	0,10	0,04	0,04	0,12	0,01
Epilobietea angustifolii	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Epilobietalia	3,95	4,25	3,43	4,48	2,03	1,01	0,89	1,40
Epilobion angustifolii	0,28	0,40	0,00	0,23	0,03	0,04	0,00	0,04
Atropion bella-donnae	0,00	0,00	0,00	0,16	0,00	0,00	0,00	0,02
Epilobietalia s.l.	4,23	4,65	3,43	4,87	2,06	1,05	0,89	1,46
Epilobietea angustifolii s.l.	4,23	4,65	3,43	4,87	2,06	1,05	0,89	1,46
Urtico-Sambucetea	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Sambucetalia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Sambuco-Salicion capreae	0,44	0,40	0,35	0,73	1,25	0,45	0,28	0,70
Sambucetalia s.l.	0,44	0,40	0,35	0,73	1,25	0,45	0,28	0,70
Urtico-Sambucetea s.l.	0,44	0,40	0,35	0,73	1,25	0,45	0,28	0,70
Chenopodio-Scleranthea s.l.	12,99	11,43	10,81	11,23	5,71	2,78	2,52	3,41
Indifferens	3,08	2,97	2,68	1,87	3,73	2,40	3,80	0,94
Adventiva	2,79	2,93	3,14	1,18	0,57	0,43	1,78	0,27

Irodalom

BECKING, R. W. 1957: The Zürich-Montpellier School of phytosociology – Botanical Review 23: 411–488. https://doi.org/10.1007/BF02872328

BORHIDI, A. 1993: A magyar flóra szociális magatartás típusai, természetességi és relatív ökológiai értékszámai – A Janus Pannonius Tudományegyetem, Pécs, 95 pp.

BORHIDI, A. 1995: Social behaviour types, the naturalness and relative ecological indicator values of the higher plants in the hungarian flora – Acta Botanica Academiae Scientiarum Hungaricae 39: 97–181.

BORHIDI, A. – KEVEY, B. 1996: An annotated checklist of the Hungarian plant communities II. – In: BORHIDI, A. ed.). Critical revision of the Hungarian plant comuunities. – A Janus Pannonius University, Pécs, pp. 95–138.

BORHIDI, A. – KEVEY, B. – LENDVAI, G. 2012: Plant communities of Hungary. Akadémiai Kiadó, Budapest, 544 pp.

BRAUN-BLANQUET, J. 1964: Pflanzensoziologie (ed. 3.). Springer Verlag, Wien–New York, 865 pp. https://doi.org/10.1007/978-3-7091-8110-2

HORVÁTH F. – DOBOLYI Z. K. – MORSCHHAUSER T. – LŐKÖS L. – KARAS L. – SZERDAHELYI T. 1995: Flóra adatbázis 1.2. – Vácrátót, 267 pp.

JAKUCS, P. 1967: Gedanken zur höheren Systematik der europäischen Laubwälder – Contribuţii Botanice Cluj 1967: 159–166.

KEVEY B. 2008: Magyarország erdőtársulásai (Forest associations of Hungary). Die Wälder von Ungarn – Tilia 14: 1-488. + CD-adatbázis (230 táblázat + 244 ábra).

KEVEY B. 2022: Égerligetek a baranyai Dráva-síkon (Paridi quadrifoliae-Alnetum glutinosae). – Natura Somogyiensis 38: 61–88. https://doi.org/10.24394/NatSom.2022.38.61

KEVEY B. – BARANYI Á. 2002: A Nyugati-Mecsek égerligetei (Carici pendulae-Alnetum Borhidi & Kevey 1996). Die Erlen-Auen im Westmecsek-Gebirge, Süd-Ungarn (Carici pendulae-Alnetum Borhidi & Kevey 1996). – A Janus Pannonius Múzeum Évkönyve 44–45 (1999–2000): 5–24.

KEVEY B. – HIRMANN A. 2002: „NS" számítógépes cönológiai programcsomag – In: Aktuális flóra- és vegetációkutatások a Kárpát-medencében V. Pécs, 2002. március 8–10. (Összefoglalók), pp.: 74.

KIRÁLY G. (szerk.) 2009: Új magyar füvészkönyv. Magyarország hajtásos növényei. Határozókulcsok. – Aggteleki Nemzeti Park Igazgatóság, Jósvafő, 616 pp.

MUCINA, L. – GRABHERR, G. – WALLNÖFER, S. 1993: Die Pflanzengesellschaften Österreichs III. Wälder und Gebüsche. – Gustav Fischer, Jena – Stuttgart – New York, 353 pp.

OBERDORFER, E. 1953: Der europäische Auenwald. – Beiträge zur Naturkundlichen Forschung in Südwestdeutschland 12(1): 23–70.

OBERDORFER, E. 1992: Süddeutsche Pflanzengesellschaften IV. A. Textband – Gustav Fischer Verlag, Jena – Stuttgart – New York, 282 pp.

PAWŁOWSKI, B. – SOKOŁOWSKI, M. – WALLISCH, K. 1928: Die Pflanzenassoziationen des Tatra-Gebirges VII. Die Pflanzenassoziationen und die Flora des Morskie Oko-Tales. – Bulletin International de l'Academie Polonaise des Sciences et des Lettres, Classe des Sciences Mathématiques et Naturelles; Série B: Sciences Naturelles, Cracovie, Suppl. 1927: 205-272.

PODANI, J. 2001: SYN-TAX 2000 Computer Programs for Data Analysis in Ecologi and Systematics – Scientia, Budapest, 53 pp.

SOÓ R. 1964, 1966, 1968, 1970, 1973, 1980: A magyar flóra és vegetáció rendszertani-növényföldrajzi kézikönyve I–VI. – Akadémiai Kiadó, Budapest.

VLIEGER, J. 1937: Aperçu sur les unités phytosociologiques supérieures des Pays-Bas. – Nederlandsch Kruidkundig Archief 47: 335.

Natura Somogyiensis 40: 81-90. Kaposvár, 2023 DOI:10.24394/NatSom.2023.40.81
Submitted: 02.04, 2023; Accepted: 21.04, 2023; Published: 27.04, 2023 www.smmi.hu/termtud/ns/ns.htm

On the type specimen of *Ascalaphus obscurus* Westwood, 1847, a lost and rediscovered owlfly species (Neuroptera: Myrmeleontidae: Ascalaphinae)

Levente Ábrahám

Rippl-Rónai Museum, H-7400 Kaposvár, P.O. Box 70, Hungary
e-mail: labraham@smmi.hu, https://orcid.org/0000-0002-8007-7117

Ábrahám, L.: *On the type specimen of Ascalaphus obscurus Westwood, 1847, a lost and rediscovered owlfly species (Neuroptera: Myrmeleontidae: Ascalaphinae)*.
Abstract: After the description of *Ascalaphus* (*Haploglenius*) *obscurus* Westwood, 1847, the type specimen was lost. Thus, the genus and subfamily classification of the species became uncertain. Later taxonomists (Hagen 1866, McLachlan 1873, van der Weele 1909) could not clarify the correct combination of the genus (*Haploglenius, Idricerus*). Tauber et al. (2019) found the syntype of the species, this solved a number of nomenclatural and taxonomic problems. *Ascalaphus* (*Haploglenius*) *obscurus* Westwood, 1847 is moved to *Protidricerus obscurus* (Westwood, 1847) (**comb. n.**) and the lectotype is designated. *Protidricerus philippinensis* Esben-Petersen, 1927 (**syn. n.**) is a junior synonym of *Protidricerus obscurus* (Westwood, 1847). Instead of *Ascalaphus* (*Haploglenius*) *obscurus* Westwood, 1847, *Stylascalaphus fabiani* Mészáros & Ábrahám, 2005 is designated to type species (present designation) of *Stylascalaphus* Sziráki, 1998. *Mansellacsa longicornis* Hölzel, 2004 (**syn. n.**) is a junior synonym of *Stylascalaphus krueperi* (van der Weele, 1909).

Keywords: new synonym, new combination, type designation

Introduction

Frederick William Hope (1797-1862), a famous entomologist of the 19th century, donated his insect collections to the University of Oxford in 1849, which later gave rise to the well-known the Hope Entomological Collections (Oxford). He appointed his younger friend, John Obadiah Westwood (1805-1893) as the first curator of the collection. In 1857, Westwood's collection was transferred to the University of Oxford as well.

In the 19th century, more and more exotic insect species were brought to the United Kingdom from India and Southeast Asia (East India), from the ever-growing British colonial empire. Both of them described many new exotic insect species and they founded the Entomological Society of London (The Royal Entomological Society) in 1833.

Thus, as the curator of the collection, Professor Westwood had the opportunity to study insects from different parts of the world and describe new species. In one of his very elaborately illustrated works (Westwood 1848), he described 6 new species of Ascalaphidae from the Oriental area and provided colour illustrations of 3 species. In this publication, he described the species *Ascalaphus* (*Haploglenius*) *obscurus* Westwood,

ISSN 1587-1908 (Print); ISSN 2062-9990 (Online)

1847. According to his description, this species is an average-sized owlfly with transparent wings, of which he did not provide an illustration like the other coloured species. Not long after, the type specimen of the species was not found in the large collection.

TRAUBER et al. (2019) published the Neuropterida type material preserved in the Hope Entomological Collection (Oxford). After more than 150 years, the type specimen of *Ascalaphus* (*Haploglenius*) *obscurus* Westwood, 1847 was found again. The inventory number of the syntype is NEUR0073. This made it possible to redetermine the exact taxonomic status of the species.

Material and methods

5 high-resolution photos of the syntype specimen of the previously lost species from the Hope Entomological Collections (Oxford) were requested (head in frontal view, habitus with scale, fore leg, abdomen in lateral view, and label). Then, the species to other species in the same genus was compared. Finally, the genus and species and related information were followed in the literature. When citing distribution data, only the first record from a given area is cited.

Abbrevations:
Comb – new combination, COdescr – cited original description, Dist – distribution, Misid – Misidentification, Mon – Monograph, Nom – Nomenclature, Odescr – original description, Redescr – redescription, Tax – Taxonomy, Typ – Type.

Results and discussion

Protidricerus obscurus (Westwood, 1847) **comb. n.**
Ascalaphus (*Haploglenius*) *obscurus* Westwood, 1847:69 - (Odescr); Walker 1853:447 (COdescr); Tauber et al. 2019:28 (Typ); Ábrahám 2017:120 (Nom).
Ascalaphus obscurus Westwood,1847 - Hagen 1866:385 (List), Hassan & Liu 2021:433 (List).
Haploglenius obscurus (Westwood, 1847) - Hagen 1866:406 (Comb).
Idricerus obscurus (Westwood, 1847) - McLachlan 1873:241 (Comb); van der Weele 1909:68 (Mon); New 2003:118, 171 (List).
Stylonotus obscurus sensu Needham, 1909 nec (Westwood, 1847) - Needham 1909:198-199 (Redescr, Tax, Dist) – Misid; Navás 1912:97 (Cat); Oswald and Penny 1991:56 (Nom, Hom); Sziráki 1998:65 (Nom, Hom).
Stylascalaphus obscurus sensu Needham, 1909 nec (Westwood, 1847) - Sziráki 1998:65 (Nom); Mészáros & Ábrahám 2005:110 (Dist); Tauber et al. 2019 (Tax), – Misid.
Stephanolasca obscurus (Westwood, 1847) – Halder et al. 2018 (Comb, Chlist).
Protidricerus philippinensis Esben-Petersen 1927:550 – (Odescr), Sziráki 1998:69 (Chlist), New 2003:171 (Chlist), Ábrahám 2008:65 (Dist), 2016:57 (Dist), Wang et al. 2018:168 (Mon). **Syn. n.**

In the name of the species described by Westwood (*Ascalaphus* (*Haploglenius*) *obscurus*), the name *Haploglenius* Burmeister, 1839 refers to one of the important characteristic features of the species, that its eyes are undivided, which is used in the higher classification of owlfly taxa until recently (MACHADO et al. 2019).

The type specimen of the species was no longer found a few years later when WALKER (1853) compiled a list of the specimens of neuropterous insects in the collection of the

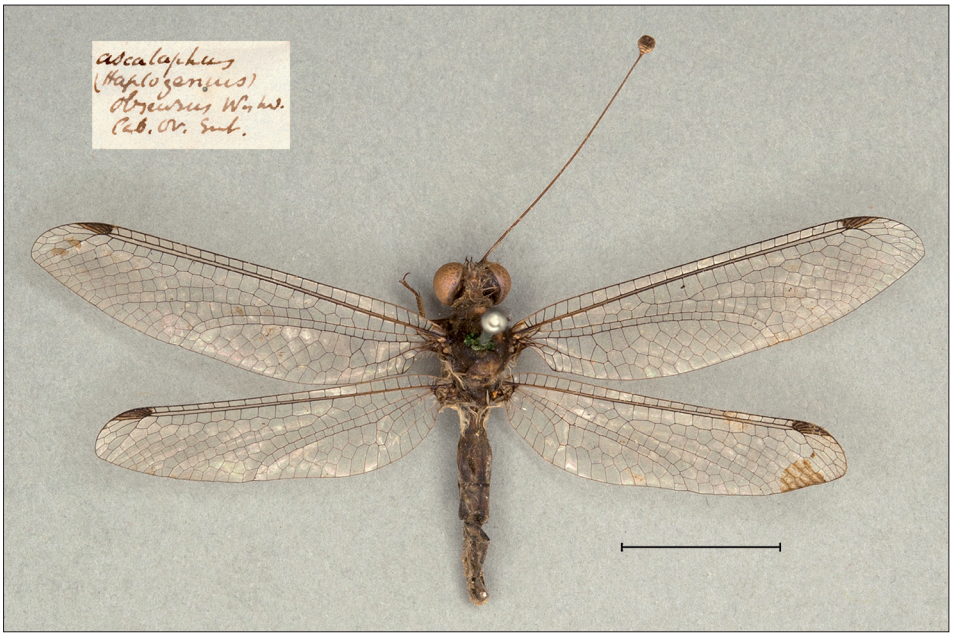


Fig. 1: Habitus and label of the syntype of *Ascalaphus* (*Haploglenius*) *obscurus* Westwood, 1847

Fig. 2: Head of *Ascalaphus* (*Haploglenius*) *obscurus* Westwood, 1847 in frontal view

British Museum, so he only quoted the original description of the species from Westwood (1848).

Hagen (1866) revised the described species of Neuroptera, and based on the undivided eye, he placed this species in a new combination as *Haploglenius obscurus* (Westwood, 1847).

Among the many new species in neuropteran research, the classification introduced by Walker (1853) has become untenable, according to which, rejecting the previously described genera. He classified, for example, all owlflies into the genus *Ascalaphus*

Fabricius, 1775, and antlions into the genus *Myrmeleon* Linnaeus, 1767. MCLACHLAN (1873) tried to resolve this problem when he revised the work of WALKER (1853) and restored genera and classified the species into new genera, making the recognition of additional new species much easier.

MCLACHLAN (1873) also proposed an owlfly classification and separated two groups based on eye characters (Holophthalmi division, with undivided eyes and Schizophthalmi division with divided eyes). His study contained the species as *Haploglenius obscurus*. He also did not find the type specimen of the species, but based on the description of the species, he classified it in the Holophthalmi division. MCLACHLAN (1873) even assumed that it could not belong to the genus *Haploglenius* Burmeister, 1839 known only from America, and therefore moved it to the genus *Idricerus* McLachlan, 1873, of which only one species, *Idricerus decrepitus* (Walker, 1853) was known at that time.

The first large monograph of Ascalaphidae on Earth is compiled by van der WEELE (1909). The missing type specimen of *Ascalaphus obscurus* was still not found at that time. So van der WEELE (1909) could not establish a genus either, as the original description of the species was too general. Thus, he left the species in the genus *Idricerus* McLachlan, 1873. He considered it an unidentifiable species for now.

During the study of the collection of the Indian Museum in Kolkata (Calcutta), NEEDHAM (1909) studied one male and four female specimens from the Himalayas and described a new genus, *Stylonotus* Needham, 1909 on the characteristics of the male. He designated the type species as *Ascalaphus obscurus* Westwood, 1847. The new genus was ranked into the divided-eyed subfamily, Ascalaphinae (=Schizophthalminae). OSWALD and PENNY (1991) stated that *Stylonotus* Needham, 1909 was a homonym (*Stylonotus* Olfers, 1907 – Collembola). Later, SZIRÁKI (1998) replaced the genus name with *Stylascalphus*, and listed it as *Stylascalphus obscurus* (Westwood, 1847) in an annotated checklist.

After finding the type specimen of *Ascalaphus* (*Haploglenius*) *obscurus* Westwood, 1847 (TAUBER et al. 2019), we already know that NEEDHAM (1909) misidentified the species and moving to the subfamily Ascalaphinae was wrong. There are no available specimens (1 male 4 females) examined by NEEDHAM (1909) any more in the Indian Museum, (Kolkata).

NAVÁS (1912) compiled a catalogue of Ascalaphidae, in which he adopted the information published by NEEDHAM (1909). He got a note from Banks (N.B.=Nathan Banks) that he also confirmed that the eyes of the specimens were divided. Banks could only examine the specimen identified by Needham in India, but could not study the type specimen described by WESMAEL (1848), as it was no longer available.

NEW (2003) compiled a faunal catalogue from Malesia (SE Asia), which partially overlaps with the type locality (East India) of *Ascalaphus* (*Haploglenius*) *obscurus* Westwood, 1847. He did not mention the nomenclature and taxonomic modification made by NEEDHAM (1909) about the well-circumscribed area (Malesia), since it is outside the area he examined.

TAUBER et al. (2019) found one syntype specimen of *Ascalaphus* (*Haploglenius*) *obscurus* Westwood, 1847 in the Hope Entomological Collection, Oxford University Museum of Natural History, but erroneously identified to Ascalaphinae as *Stylascalaphus obscurus* (Westwood, 1847).

Ascalaphus (*Haploglenius*) *obscurus* Westwood, 1847 is correctly combined to the genus *Protidricerus* van der Weele, 1909, and *Protidricerus philippinensis* Esben-Petersen, 1927 (**syn. n.**) is a junior synonym of *Protidricerus obscurus* (Westwood, 1847).

The male syntype of *Ascalaphus* (*Haploglenius*) *obscurus* Westwood, 1847, ivory number: NEUR0073, in OUMNH is designated as lectotype (present designation).

After the identification of the species, the type locality can be further narrowed down based on the currently known distribution of *Protidricerus phillipensis* (McLachlan, 1891). Westwood (1848) mentioned "East Indies" as the type locality. The known collecting places of *Protidricerus phillipensis* are the Philippines (Esben-Petersen 1927), Taiwan (Sziráki 1998), and China (Wang et al. 2018). There are hitherto unpublished distribution data from Laos, Malaysia (Kalamantan), and Thailand in the collection of Rippl-Rónai Museum, Kaposvár. These areas partly overlap with the territory of the East Indian British colonies.

Protidricerus van der Weele, 1908
Protidricerus van der Weele, 1908:61- (Odescr),
Type species: *Protidricerus exilis* (McLachlan, 1894)

Protidricerus elwesii (McLachlan, 1891)
Idricerus elwesii McLachlan, 1891:512.
Protidricerus elwesii (McLachlan, 1891) – van der Weele 1908:63 (Mon), Navás 1912:64 (Mon), Ghosh & Sen 1977:319 (Chlist), Ghosh 1988:168 (Dist), Sziráki 1998:69 (Chlist), Ghosh 2000:99 (Redescr), New 2003:171 (Chlist), Ábrahám 2008:64 (Dist), Zhang et al. 2015:381 (Dist), Wang et al. 2018:165 (Mon), Yang et al. 2018:75 (Chlist), Hassan et al. 2019:516 (Chlist), Hassan & Liu 2021:433 (Redescr, Dist).
Protidricerus palliventralis C.-k. Yang, 1999:141 – (Odescr), Zhang et al. 2015:381 (Syn), Wang et al. 2018 (Syn).

Distribution: China (Sziráki 1998), India (McLachlan 1891), Myanmar (Zhang et al. 2015), Pakistan (Ábrahám 2008), further unpublished data found in coll. SCMK: Vietnam, Laos, Thailand.

Protidricerus exilis (McLachlan, 1894)
Idricerus exilis McLachlan, 1894:424 – (Odescr).
Protidricerus exilis (McLachlan, 1894) – van der Weele 1909:62 (Mon), Navás 1912:64 (Mon), Sziráki 1998:69 (Chlist), Whittington 2002:378 (Dist), Zhang et al. 2015: 383 (Redescr, Dist), Wang et al. 2018:166 (Mon), Yang et al. 2018:75 (Chlist).

Distribution: China (McLachlan 1894).

Protidricerus irene van der Weele, 1909
Protidricerus irene van der Weele, 1909:315 – (Odescr, Mon), Navás 1912:64 (Cat), Sziráki 1998:69 (Chlist), Ábrahám 2016:57 (Dist).

Distribution: Malaysia (van der Weele 1909), the Philippines (Ábrahám 2016).

Protidricerus steropterus X.-l. Wang & C.-k. Yang, 2002
Protidricerus steropterus X.-l. Wang & C.-k. Yang, 2002:562 – (Odescr), Zhang et al. 2015:385 (Redescr, Dist), Wang et al. 2018:169 (Mon), Yang et al. 2018:75 (Chlist).

Distribution: China (Wang & Yang 2002).

Protidricerus japonicus (McLachlan, 1891)
Idricerus japonicus McLachlan 1891:513 – Odescr, Matsumura 1908: 40 (List).
Protidricerus japonicus (McLachlan, 1891) – van der Weele 1908:63 (Mon), Navás 1912 (Mon), Navás 1924:220 (Dist), Kuwayama 1960:32 (Dist), Kuwayama 1962:391 (Dist), Sziráki 1998:69 (Chlist), Zhang et al. 2015:385 (Dist), Ábrahám 2016:57 (Dist), Wang et al. 2018:167 (Mon), Yang et al. 2018:75 (Chlist),

Distribution: Japan (McLachlan 1891), Thailand (Ábrahám 2016), China (Zhang et al. 2015).

Stylascalaphus Sziráki, 1998
Stylonotus Needham, 1909:198 – (Odescr), Oswald & Penny 1991:56 (Hom); Sziráki 1998:65 (Nom, Hom).
Mansellacsa Hölzel, 2004:220 – (Odescr), **Syn. n**.
Type species: Stylascalaphus fabiani Mészáros & Ábrahám, 2005 - present designation.

The genus *Stylascalaphus* Sziráki, 1998 is a replacement name, therefore Ábrahám (2017) redescribed the genus, and also listed *Ascalaphus* (*Haploglenius*) *obscurus* Westwood, 1847 (sensu *Needham* 1909) as the type species. Since it has been proven that Needham (1909) misidentified the species *Stylonotus obscurus* (Westwood, 1847), so *Stylascalaphus fabiani* Mészáros & Ábrahám, 2005, the second described species in the genus is designated to the type species (present designation, Article 70.3. of ICZN) of *Stylascalaphus* Sziráki, 1998.

Stylascalaphus fabiani Mészáros & Ábrahám, 2005
Stylascalaphus fabiani Mészáros & Ábrahám, 2005:103 – Odescr, Dobosz & Ábrahám 2007 (Dist), Hassan et al. 2019 (Chlist), Hassan & Liu 2021 (List, Dist).

Distribution: Pakistan (Mészáros & Ábrahám 2005), Turkey, Iran (Dobosz & Ábrahám 2007).

Stylascalaphus krueperi (van der Weele, 1909)
Helicomitus krueperi van der Weele 1909:180 – (Odescr), Navás 1912:90 (List, Dist).
Helicomitus hyalinus Navás 1921:11 – (Odescr).
Ascalaphus hyalinus (Navás 1921) – Aspöck & Hölzel 1996:78 (List, Dist), Ábrahám 2017 (Syn).
Ascalaphus krueperi (van der Weele, 1909) Aspöck & Hölzel 1996:78 (Comb, List, Dist), Sziráki 1998:59 (Chlist), El Hamouly & Fadl 2011:96 (Dist), El-Hawagry et al. 2016:1220 (Dist).
Stylascalaphus krueperi (van der Weele, 1909) – Ábrahám 2017 (Comb), Monnerat & Ábrahám 2020:142 (Dist), Letardi et al. 2020:139 (Dist).
Mansellacsa longicornis Hölzel, 2004:220 – (Odescr), **Syn. n.**

Remarks: Reviewing genera similar to the genus *Stylascalaphus*, I found that *Mansellacsa longicornis* Hölzel, 2004 (**syn. n.**) is a junior synonym of *Stylascalaphus krueperi* (van der Weele, 1909).

Distribution: Africa: Algeria (Navás 1921), Egypt (Aspöck et al. 2001), Morocco (Ábrahám 2017), Asia: Jordan (Monnerat & Ábrahám 2020), Saudi Arabia (El-Hawagry et al. 2016), Syria (van der Weele 1909).

Acknowledgement

The author would like to express his sincere thanks to curator Amoret Spooner, Oxford, (UK) for sending several high-quality digital photos of *Ascalaphus obscurus* Wesmael, 1847 syntype to clarify the taxonomic and nomenclature problems of the species. Thanks also to Susanne Randolf and Harald Bruckner Natural History Museum, Wien for providing the holotype photo.

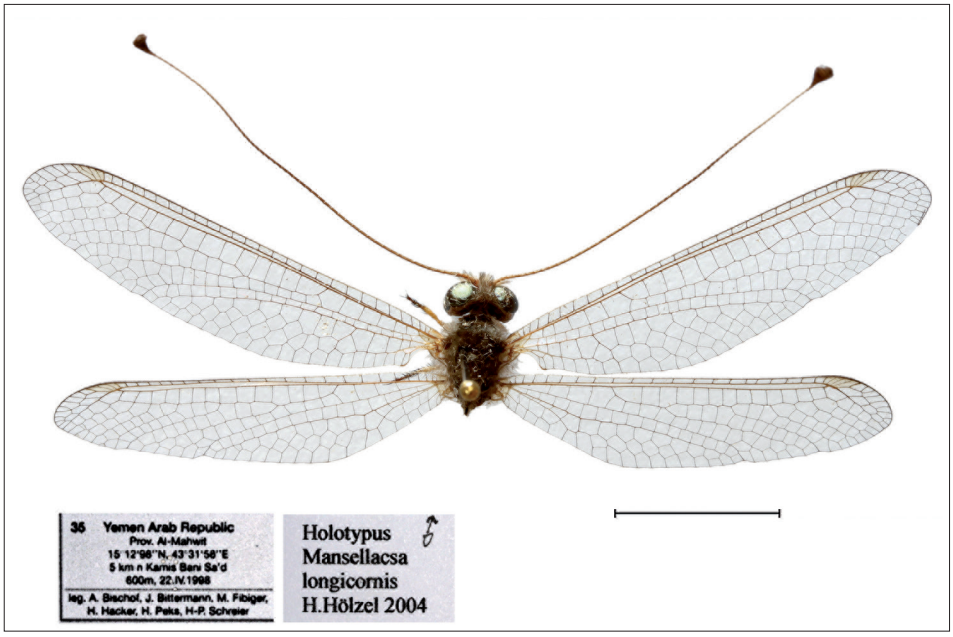


Fig. 1: Habitus and labels of the holotype of *Mansellacsa longicornis* Hölzel, 2004

References

Aspöck, H.; Hölzel, H. 1996: The Neuropteroidea of North Africa, Mediterranean Asia and of Europe: a comparative review (Insecta). Pp. 31–86. - In: Canard, M.; Aspöck, H.; Mansell, M. W. (editors). Pure and Applied Research in Neuropterology. Proceedings of the Fifth International Symposium on Neuropterology. Meeting: 2-6 May 1994, Cairo, Egypt. Privately printed, Toulouse, France. 341 pp.

Ábrahám, L. 2008: Ascalaphid studies VII. On the ascalaphid fauna of Taiwan (Neuroptera: Ascalaphidae). - Natura Somogyiensis 12:63-77.
https://doi.org/10.24394/NatSom.2008.12.63

Ábrahám L. 2016: Ascalaphid studies X. Maezous maezousi sp. n. – a new ascalaphid species from the Philippines (Neuroptera: Ascalaphidae). - Natura Somogyiensis 28: 51-64.
https://doi.org/10.24394/NatSom.2016.28.51

Ábrahám, L. 2017: New data to the Moroccan Myrmeleontiformia (Nemopteridae, Myrmeleontidae, Ascalaphidae) fauna. - Natura Somogyiensis 30:75-138.
https://doi.org/10.24394/NatSom.2017.30.75

Dobosz, R.; Ábrahám, L. 2007: New data to the Turkish ascalaphid fauna (Neuroptera: Ascalaphidae). - Rocznik Muzeum Górnoslaskiego w Bytomiu, Entomologia [=Annals of the Upper Silesian Museum in Bytom, Entomology] 14-15:13-27.

El-Hawagry, M. S.; Sharaf, M. R.; Al Dhafer, H. M.; Fadl, H. H.; Aldawood, A. S. 2016: Addenda to the insect fauna of Al-Baha Province, Kingdom of Saudi Arabia with zoogeographical notes. - Journal of Natural History 50:1209-1236.
https://doi.org/10.1080/00222933.2015.1103913

El Hamouly, H.; Fadl, H. H. 2011: Checklist of order Neuroptera in Egypt, with a key to families. - African Journal of Biological Sciences 7:85-104.

Esben-Petersen, P. 1927: New species of Neuroptera Planipennia in British collections. - Proceedings of the Zoological Society of London 1927:549-551.
https://doi.org/10.1111/j.1469-7998.1927.tb07427.x

GHOSH, S. K.; SEN, S. 1977: Check-list of Indian Planipennia (Order Neuroptera). - Records of the Zoological Survey of India 73:277-326.
https://doi.org/10.26515/rzsi/v73/i1-4/1977/161921

GHOSH, S. K. 1988: Contribution to the taxonomical studies of Neuroptera (suborder Planipennia) from eastern India. II. Family Ascalaphidae. - Records of the Zoological Survey of India 85:163-191.
https://doi.org/10.26515/rzsi/v85/i2/1988/161049

GHOSH, S. K. 2000: Neuroptera fauna of north-east India. - Records of the Zoological Survey of India, Miscellaneous Publications, Occasional Paper 184:xiii+1-179.

HAGEN, H. A. 1866: Hemerobidarum Synopsis synonymica. - Stettiner Entomologische Zeitung 27:369-462.

HALDER, S., MUKHERJEE, T., GUPTA, D. AND CHANDRA, K. 2018: Insecta : Neuroptera. - In, Faunal Diversity of Indian Himalaya: 591-596 (Published by the Director, Zoologocal Survey India, Kolkata).

HASSAN, M. A.; OSWALD, J. D.; ZIA, A.; LIU, X.-Y. 2019: Neuropterida (Insecta: Megaloptera, Raphidioptera, Neuroptera) of Pakistan: a catalogue and faunistic review. - Zootaxa 4686:497-541.
https://doi.org/10.11646/zootaxa.4686.4.3

HASSAN, M. A.; LIU, X.-Y. 2021: Taxonomic notes on owlflies from Pakistan (Neuroptera: Myrmeleontidae: Ascalaphinae). - Zootaxa 4970:401-452.
https://doi.org/10.11646/zootaxa.4970.3.1

HÖLZEL, H. 2004: Ascalaphidae der Arabischen Halbinsel (Neuropterida, Neuroptera, Ascalaphidae). in ASPÖCK, U. (sci. ed.). - Entomologie und Parasitologie. Festschrift zum 65. Geburtstag von Horst Aspöck. Denisia 13:213-228.

JONES, J. R. 2019: Total evidence phylogeny of the owlflies (Neuroptera, Ascalaphidae) supports a new higher level classification. - Zoologica Scripta 48: 761-782.
https://doi.org/10.1111/zsc.12382

KUWAYAMA, S. 1960: Corydalidae, Chrysopidae, Mantispidae, Myrmeleontidae and Ascalaphidae of Niigata Prefecture (Neuroptera). - Ins. Niigata Pref. 4:29-32.

KUWAYAMA, S. 1962: A revisional synopsis of the Neuroptera in Japan. - Pacific Insects 4:325-412.

LETARDI, A.; ABDEL-DAYEM, M. S.; AL DHAFER, H. M. 2020: New faunal data on lacewings (Insecta, Neuroptera) collected from Saudi Arabia. - ZooKeys 936:111-148.
https://doi.org/10.3897/zookeys.936.49962

MACHADO, R. J. P.; GILLUNG, J. P.; WINTERTON, S. L.; GARZÓN-ORDUÑA, I. J.; LEMMON, A. R.; LEMMON, E. M.; OSWALD, J. D. 2019: Owlflies are derived antlions: anchored phylogenomics supports a new phylogeny and classification of Myrmeleontidae (Neuroptera). - Systematic Entomology 44:418-450.
https://doi.org/10.1111/syen.12334

MATSUMURA, S. 1908: Nihon ekichu mokuroku [=Catalogue of the beneficial insects of Japan]. - Rokumeikwan Co., Tokyo. 174 pp.

MCLACHLAN, R. 1873: An attempt towards a systematic classification of the family Ascalaphidae. - Journal of the Linnean Society of London, Zoology 11:219-276.
https://doi.org/10.1111/j.1096-3642.1871.tb02588.x

MÉSZÁROS, Z.; ÁBRAHÁM, L. 2005: Ascalaphid studies IV. A new ascalaphid species from Asia (Neuroptera: Ascalaphidae). - Acta Phytopathologica et Entomologica Hungarica 40:103-110.
https://doi.org/10.1556/APhyt.40.2005.1-2.10

MONNERAT, C.; ÁBRAHÁM, L. 2020: Owflies from Jordan (Neuroptera, Ascalaphidae). - Alpine Entomology 4:139-150.
https://doi.org/10.3897/alpento.4.50696

NAVÁS, L. 1912: Sinopsis de los Ascaláfidos (Ins. Neur.). - Arxius de l'Institut de Ciències, Institut d'Estudis Catalans, Secció de Ciències 1:45-143.
https://doi.org/10.5962/bhl.title.8510

NAVÁS, L. 1921. Névroptères de Barbarie. Deuxième [II] série. - Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord 12:11-14.

NAVÁS, L. 1924: Insecta orientalia. III Series. - Memorie dell'Accademia Pontifica dei Nuovi Lincei, Rome (2)7:217-228.

NEEDHAM, J. G. 1909: Notes on the Neuroptera in the collection of the Indian Museum. - Records of the Indian Museum, Calcutta 3:185-210.
https://doi.org/10.26515/rzsi/v3/i3/1909/163272

NEW, T. R. 2003: The Neuroptera of Malesia. - Fauna Malesiana. Vol. 4. Brill, Leiden. viii + 204 pp.
https://doi.org/10.1163/9789004474611

Oswald, J. D. 2021: Lacewing digital library. - Available from: http://lacewing.tamu.edu (accessed 10 Marc 2023)

Oswald, J. D.; Penny, N. D. 1991: Genus-group names of the Neuroptera, Megaloptera and Raphidioptera of the world. - Occasional Papers of the California Academy of Sciences 147:1-94. https://doi.org/10.5962/bhl.part.3428

Sziráki, Gy. 1998: An annotated checklist of the Ascalaphidae species known from Asia and from the Pacific Islands. - Rovartani Közlemények [=Folia Entomologica Hungarica] (N.S.)59:57-72.

Tauber, C. A.; Simmons, Z.; Tauber, A. J. 2019: Type specimens of Neuropterida in the Hope Entomological Collection, Oxford University Museum of Natural History. - ZooKeys 823: 1-126. https://doi.org/10.3897/zookeys.823.30231.figure41

van der Weele, H. W. 1909: Ascalaphiden. - Collections Zoologiques du Baron Edm. de Selys Longchamps, Catalogue Systématique et Descriptif 8:1-326.

Wang, X.-l.; Zhan, Q.-b.; Wang, A.-q. 2018: 中国动物志 [=Fauna Sinica]. 昆虫纲 第六十八卷 [=Insecta Vol. 68]. 脉翅目 [=Neuroptera], 蚁蛉总科 [=Myrmeleontoidea]. - Science Press, Beijing. [viii] + x + 285 pp.

Walker, F. 1853: List of the specimens of neuropterous insects in the collection of the British Museum. Part II (Sialidae--Nemopterides). British Museum, London. [iii] + 193-476 pp. https://doi.org/10.5962/bhl.title.9318

Westwood, J. O. 1848: The Cabinet of Oriental Entomology; being a selection of the rarer and more beautiful species of insects, natives of India and the adjacent islands. - The greater portion of which are now, for the first time, described and figured. Smith, London. 88 pp. https://doi.org/10.5962/bhl.title.34273

Whittington, A. E. 2002. Resources in Scottish Neuropterology. Sziráki, Gy. (editor). Neuropterology 2000. Proceedings of the Seventh International Symposium on Neuropterology. Meeting: 6-9 August 2000, Budapest, Hungary. - Acta Zoologica Academiae Scientiarum Hungaricae 48(Suppl. 2):371-387.

Zhang, J.; Sun, M.-x.; Wang, X.-l. 2015. Synopsis of subfamily Haplogleniinae Newman, 1853 in China (Neuroptera: Ascalaphidae). - Zootaxa 3941:375-390. https://doi.org/10.11646/zootaxa.3941.3.4

Yang, D.; Liu, X.-y.; Yang, X.-k. (editorial committee chairs). 2018. 中国生物物种名录 [=Species Catalogue of China]. 第二卷 动物, 昆虫(II) 脉翅总目 [=Vol. 2 (Animals), Insecta II (Neuropterida)]. - Science Press, Beijing. [x] + [x] + 112 pp.

Natura Somogyiensis 40: 91-98. Kaposvár, 2023 DOI:10.24394/NatSom.2023.40.91
Submitted: 03.05, 2023; Accepted: 12.05, 2023; Published: 12.05, 2023 www.smmi.hu/termtud/ns/ns.htm

First report of *Araneus marmoreus* Clerck, 1757 from India (Araneae, Araneidae)

Irina Das Sarkar*, Manju Siliwal, V. P. Uniyal

Wildlife Institute of India, Dehradun, India
emails: irina.dassarkar@gmail.com, siliwal.manju@gmail.com, uniyalvp@gmail.com
*Corresponding author

Sarkar, I. D., Siliwal, M. & Uniyal, V. P.: *First report of Araneus marmoreus Clerck, 1757 from India (Araneae: Araneidae).*

Abstract: The paper provides the first occurrence report of *Araneus marmoreus* Clerck, 1757 from India, based on both male and female specimens from the village of Keylong, Lahaul and Spiti district, Himachal Pradesh. Global distribution of the species ranges from North America in the west to Japan in the east (holartic distribution), with no prior record from India.

Keywords: Orb-web weaver, Trans-Himalayas, first report, Himachal Pradesh, spider

Introduction

Araneidae Clerck, 1757 represents the third most-speciose family within the order Araneae, typically represented by conventional orb web weavers, globally represented by 3119 species across 188 genera (World Spider Catalog 2023 (WSC)). Members of the family are widely distributed globally and appear to be relatively easy to study and determine. However, much of them remain inadequately studied and incompletely described (Sestakova et al. 2009).

The genus *Araneus* Clerck, 1757 represents one of the most speciose and widely distributed groups currently housing 555 species, of which 22 are reported from India (World Spider Catalog, 2023). Over the years, several taxonomists have attempted to systematically study and/or categorize members of the genus from various geographic regions (e.g., Simon 1929, Wiehle 1931, Locket & Millidge, 1953, Tikader & Bal 1982). Although members of the genus occur commonly across the Indian sub-continent, much of the taxonomic literature date back to 1800s-1900s (see O. Pickard-Cambridge 1885, Simon 1889, Strand 1907, Tikader & Bal 1982) with very few recent updates. Singh & Garima (2021) listed 39 species of *Araneus* from India, few of which were taxonomically revised to other genera, and 20 species were enlisted with distribution in the Western Himalayas. However, upon cross-referencing with WSC (2023), only 8 species can be confidently placed within Indian Western Himalayas, followed by 7 species with distribution in Pakistan, and 4 species whose distribution remains debated between the two countries. Singh & Garima (2021) also reports the presence of *A. diadematus* Clerck, 1757 from India, although it remains to be confirmed on the WSC (2023).

The species *Araneus marmoreus* Clerck, 1757 has a wide global distribution ranging from North America in the west to Japan in the east, with Asian reports spanning Central

ISSN 1587-1908 (Print); ISSN 2062-9990 (Online)

Asia, China, Korea, and Japan. However, the species remains unreported from India. During systematic elevational surveys in the Indian Trans-Himalayas, several specimens of *A. marmoreus* were collected from the village of lower Keylong, Lahaul and Spiti district, Himachal Pradesh, India, thereby providing the first report of the species from the Indian Himalayas.

Material and methods

Spiders were actively collected from orb-webs made around concrete human settlements from lower Keylong village, Himachal Pradesh, India. Specimens were preserved in 70% alcohol followed by examination under a stereomicroscope and genus identification based on SESTAKOVA et al. (2009). Epigyne and left palp were dissected and cleaned using lactic acid. Photographs and measurements were taken using MICAPS camera attachment with Carton DSZ-45T microscope and ToupView software. All measurements are in mm. Specimens are deposited at the Wildlife Information Liaison Development Society (WILD), Coimbatore, Tamil Nadu, India.

Abbreviations: AER – Anterior Eye Row, ALE – Anterior Lateral Eyes, AME – Anterior Median Eyes, BL – Basal Lamellae, fe – femur, C – Conductor, LP – Lateral Plates, MA – Median Apophysis, mt – metatarsus, pa – patella, PER – Posterior Eye Row, PLE – Posterior Lateral Eyes, PME – Posterior Median Eyes, S – Scape, STA – Sub-terminal Apophysis, TA – Terminal Apophysis, ta – tarsus, ti – tibia, WILD – Wildlife Information Liaison Development Society.

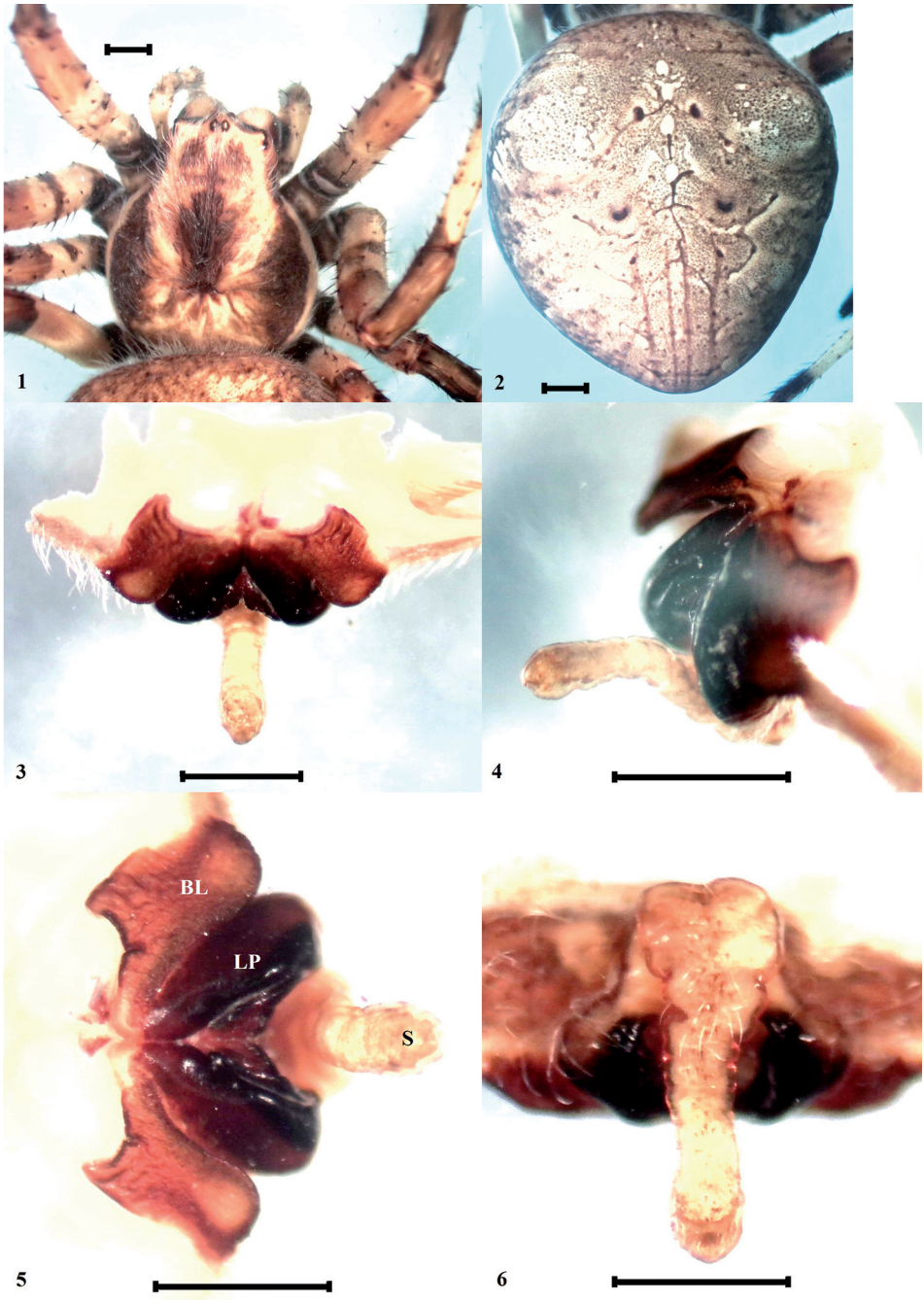
Results

Family **Araneidae** Clerck,1757
Genus *Araneus* Clerck, 1757
Type species: *Araneus angulatus* Clerck, 1757

Araneus marmoreus Clerck, 1757 (Figs: 1-14.)

Material examined: 3 females, WILD-21-ARA-1630, WILD-21-ARA-1631, WILD-21-ARA-1632, Keylong, Lahaul and Spiti, Himachal Pradesh, 32°34'19.18"N, 77° 1'27.32"E, 3078m. 17 August 2021. Coll. Irina Das Sarkar. 3 males, WILD-21-ARA-1633, WILD-21-ARA-1634, WILD-21-ARA-1635. Same data as female.

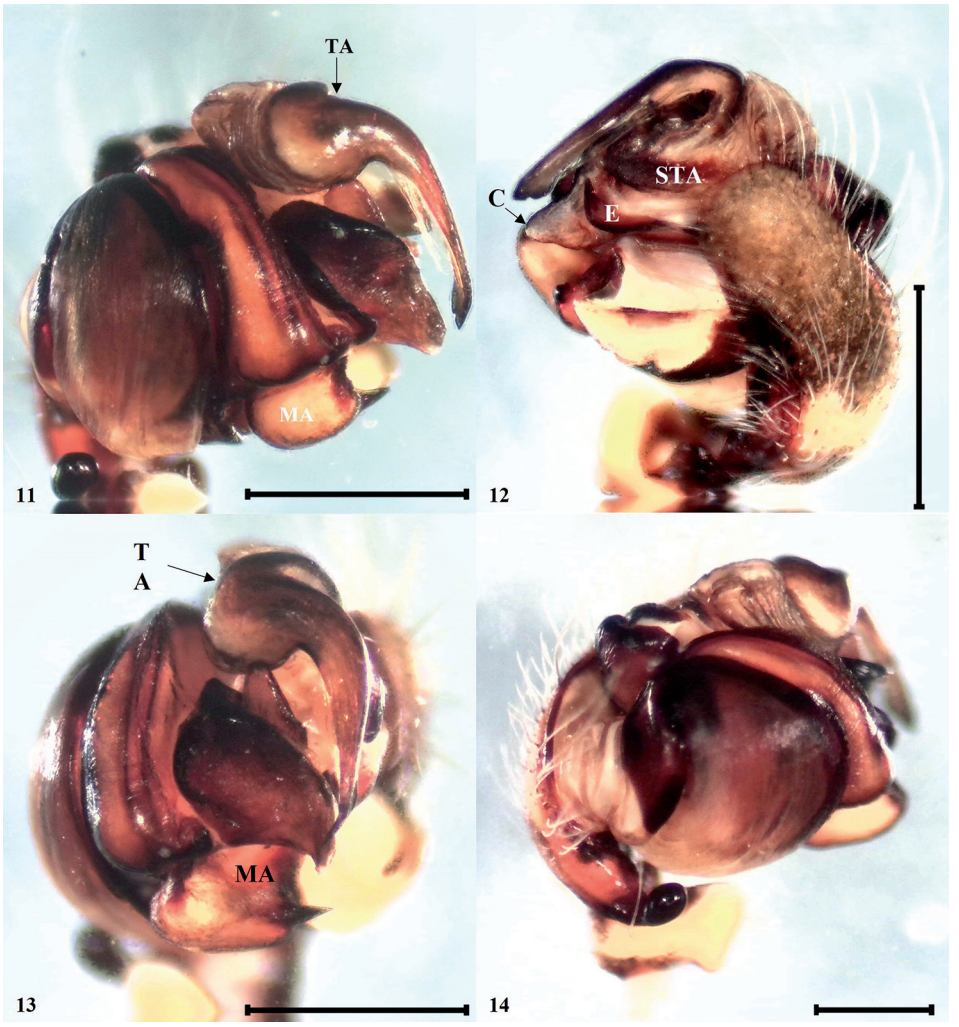
Description. Female (Figs 1-6). Cephalothorax length 6.14, width 5.34, light brown with darker median and lateral bands, the former concentrated around fovea; ocular region bearing pallid white hair. Fovea distinct, slit-like with radiating striae towards lateral margins. AER procurved, PER almost straight. Eye measurements: AME 0.18, ALE 0.15, PME 0.18, PLE 0.15. Inter-eye distances: AME-AME 0.23, AME-ALE 0.74, PME-PME 0.07, PME-PLE 0.93, ALE-PLE 0.06. Sternum length 2.63, width 2.44, dark brown with wavy lateral margins, bluntly pointed posteriorly. Endites length 1.29, width 0.98. Labium length 0.80, width 1.13. Chelicerae with condyles, length 2.28, width 1.38, 4 (right) and 3 (left) promarginal teeth and 3 retromarginal teeth. Legs strong, with numerous robust spines of varying lengths that are more pronounced in anterior legs; distal end of each segment dark brown, anterior half yellow-brown. Leg measurements



Figs 1-6: ***Araneus marmoreus*** **Clerck, 1757 Female. 1. Cephalothorax, dorsal. 2. Abdomen, dorsal. 3, 5. Epigyne, ventral. 4. Epigyne, lateral. 6. Scape, close-up. Scale 0.5 mm.**

Figs 7-10: ***Araneus marmoreus*** **Clerck, 1757 Male. 7. Habitus, dorsal. 8. Spines on Tibia II. 9. Coxa II spur. 10. Abdomen, dorsal. Scale 0.5 mm.**

(fe, pa, ti, mt, ta, total): I fe 6.37 pa 2.90 ti 5.51 mt 5.24 ta 1.78 (21.8), II fe 4.98 pa 2.77 ti 5.09 mt 4.79 ta 1.81 (19.44), III fe 4.46 pa 1.96 ti 2.95 mt ta 2.55 1.25 (13.17), IV fe 6.15pa 2.52 ti 4.90 mt 4.32 ta 1.34 (19.23). Leg formula 1243. Abdomen length 10.27, width 9.40, brown with white marbled pattern, oval, anterio-laterally with two prominent humps; three pairs of distinct brown spots and irregularly shaped white spots on mid-dorsal plane, middle spots larger; prominent folium pattern arising from base of humps and continuing posteriorly with distinct transverse lines forming a four-pronged pattern; folium margins less distinct posteriorly. Epigyne (Figs 2-6) ventrally with medium



Figs 11-14: ***Araneus marmoreus*** **Clerck, 1757 Male. 11, 13. Palp, retrolateral. 12. Palp, prolateral. 14. Palp showing paracymbium, ventral. Scale 0.5 mm.**

length scape, wrinkled, wider and thicker at base than apex, arched in lateral view, with one pair each of sclerotised basal lamellae (BL) and lateral plates (LP) placed close to each other forming winged shape; anterior margin of LP horn-shaped, BL bearing triangular notch from where scape arises.

Male (Figs 7-14). Total length 9.00, morphologically similar to female. Cephalothorax length 4.73, width 3.61. Anterior margin of ocular region bearing prominent notches between median and lateral eyes. Eye measurements: AME 0.16, ALE 0.12, PME 0.16, PLE 0.12. Inter-eye distances: AME-AME 0.18, AME-ALE 0.21, PME-PME 0.08, PME-PLE 0.59, ALE-PLE adjacent. Sternum length 2.02, width 1.41. Endites length 0.81, width 0.61. Labium length 0.47, width 0.73. Chelicerae with condyles, length 1.47, width 0.92, 4 promarginal teeth and 3 retromarginal teeth. Legs strong, with numerous

robust spines of varying lengths that are more pronounced in anterior legs; distal end of each segment dark brown, anterior half yellow-brown; ti II with two rows to clustered robust thorn-like spines dorsally and retrolaterally; coxa I bearing hook-shaped process on distal ends; coxa II bearing spurs near base of article (Fig 9). Leg measurements (fe, pa, ti, mt, ta, total): I fe 5.42 pa 2.34 ti 5.14 mt 4.15 ta 1.43 (18.48), II fe 5.05 pa 2.10 ti 4.03 mt 3.83 ta 1.27 (16.28), III fe 3.46 pa 1.49 ti 2.39 mt 2.12 ta 0.96 (10.42), IV fe 4.96 pa 1.95 ti 3.70 mt 3.44 ta 1.03 (15.08). Leg formula 1243. Abdomen length 5.45, width 3.89, similarly patterned as female with some differences; abdominal humps less prominent in males; five pairs of brown spots on mid-dorsal plane, anterior two pairs largest; white spots smaller and more evenly sized; folium with pronounced black wavy margins without posterior transverse lines. Palp (Figs: 11-13) bulbous and sclerotized; terminal apophysis (TA) long, wider at base, pointed apically, bent sharply downwards with translucent lateral membranes; sub-terminal apophysis (STA) triangular with blunt distal end, almost parallel to TA; embolus short with blunt distal tip, situated under TA; conductor translucent, triangular with broad blunt distal end; median apophysis (MA) with broad base, medial depression and sharply pointed distal tip; paracymbium strongly sclerotised, knob-shaped (Fig: 14).

Habitat. Several research highlights that the preferred habitat of the species includes sunny and moist forested areas with sufficient herbaceous growths, especially open grass habitats, meadows, and forest clearings (e.g., SESTAKOVA et al. 2009, ALMQUIST 2005, DONDALE et al. 2003, ROBERTS 1998). However, our findings contradict this affinity, corroborated by occurrences in heavily anthropogenized areas, with an affinity towards dingy abandoned corners under/beside concrete houses. All specimens were collected from orb-webs constructed around human habitations. Webs were preferentially constructed in open but shaded spaces within house structures such as under staircases, near drainages, and abandoned corners.

Distribution. North America, Europe, Turkey, Caucasus, Russia (Europe to Far East), Iran, Central Asia, China, Korea, Japan, India (new record).

Acknowledgements

The authors thank the Director and Dean of Wildlife Institute of India, Dehradun and the HP forest department (Lahaul sub-division, Lahaul and Spiti district) for extending support during fieldwork. We thank the Ministry of Environment, Forest and Climate Change, Government of India for funding the study (AICOPTAX: 22018/60/2019-CS). We also extend a special note of thanks to Ms. Jennifer Peter for briefly helping during field surveys. We also acknowledge the spiders that were sacrificed for the study.

References

Almquist, S. 2005: Swedish Araneae, part 1 – families Atypidae to Hahniidae (Linyphiidae excluded). - Insect Systematics & Evolution Supplement 62:1-284.

Dondale, C. D., Redner, J. H., Paquin, P. & Levi, H. W. 2003: The insects and arachnids of Canada. Part 23. - The orb-weaving spiders of Canada and Alaska (Araneae: Uloboridae, Tetragnathidae, Araneidae, Theridiosomatidae). - NRC Research Press. Ottawa. pp 371.

Locket, G. H. & Millidge, A. F. 1953: British spiders. Vol. II. Ray Society. - London. pp. 449.

Pickard-Cambridge, O. 1885: Araneidea. - In: Scientific results of the second Yarkand mission; based upon the collections and notes of the late Ferdinand Stoliczka, Ph. D. Government of India, Calcutta. pp. 115. doi: 10.5962/bhl.title.119960

Roberts, M. J. 1998: Spinnengids. - Tirion, Baarn. Netherlands. pp. 1-397.

Šestáková, A., Krumpál, M. & Krumpálová, Z. 2009. Araneidae (Araneae) of Central Europe: I. Genus Araneus. Faculty of Natural Sciences of Comenius University. Bratislava. pp. 1-151.

Simon, E. 1889: Arachnids of the Himalayas, collected by MM. Oldham and Wood-Mason, and forming part of the collections of the Indian Museum. First part. - Journal of the Asiatic Society of Bengal 58 (4):334-344.

Simon, E. 1929: The arachnids of France. General synopsis and catalog of French species of the order Araneae, Vol. VI, 3rd part. – Roret pp. 533-772.

Singh, R., & Singh, G. 2021: Faunal diversity of orb-weaver spiders (Araneidae: Araneomorphae: Araneae: Arachnida) in India. Singh, R. & Singh, G. (2021). Faunal diversity of orb-weaver spiders (Araneidae: Araneomorphae: Araneae: Arachnida) in India. - International Journal of Biological & Environmental Investigations 1(2):62-133.
https://doi.org/10.33745/ijbei.2021.v01i02.001

Strand, E. 1907: Süd- und ostasiatische Spinnen. - Abhandlungen der Naturforschenden Gesellschaft Görlitz 25:107-215.

Tikader, B. K. 1982: Part 1. Family Araneidae (= Argiopidae). Typical orb-weavers. - In: The fauna of India. Spiders: Araneae. Vol. II. - Zoological Survey of India, Calcutta. pp. 1-293.

Wiehle, H. 1931: Arachnids or arachnoids. 27. Family. Araneidae. - The Animal World of Germany 23: 47-136.

World Spider Catalog (WPC) 2023: World Spider Catalog. Version 24. - Natural History Museum Bern, online at http://wsc.nmbe.ch (Accessed on May 03, 2023).
https://doi.org/10.24436/2

Natura Somogyiensis 40: 99-118. Kaposvár, 2023 DOI:10.24394/NatSom.2023.40.99
Submitted: 02.05, 2023; Accepted: 15.05, 2023; Published: 01.06, 2023 www.smmi.hu/termtud/ns/ns.htm

Repetated macromoth faunistic survey in Zselic Hills after 40 years (Lepidoptera: Macrolepidoptera)

Péter Schmidt[1], Levente Ábrahám[1] & Sándor Farkas[2]

[1]Rippl-Rónai Museum, Kaposvár, Hungary, email: peter.schmidt.smmi@gmail.com, labraham@smmi.hu
[2]Hungarian University of Agriculture and Life Sciences, Kaposvár, Institute for Wildlife Management and Nature Conservation, Hungary, email: Farkas.Sandor@uni-mate.hu

Schmidt, P., Ábrahám, L. & Farkas, S.: *Repeated macromoth faunistic survey in Zselic after 40 years (Lepidoptera: Macrolepidoptera)*.
Abstract: This is the first of a series of papers dealing with the results of light trapping research in Ropolypuszta, Zselic Hills, Hungary. In this paper, the authors publish the basic faunistic results of two-year sampling taken between 2019-2020. Altogether 24,499 specimens of 375 macromoth species were collected. The circumstances of the whole survey, the species list with quantitative data, and the protected and valuable species in nature conservational point of view are given.

Keywords: macromoth, faunistic, light pollution, basic survey, nature conservation

Introduction

The butterfly and moth fauna of the Zselic is one of the best documented in Hungary. Research in this area began already at the beginning of the 20th century. The research carried out in the 20th century can be divided into two parts: the first period, which lasted from the beginning of the century until the 1970s, was characterized by intensive entomological collections in the vicinity of Kaposvár by local lepidopteran researchers (Ábrahám & Uherkovich 2001).

Among the lepidopterologists, who mainly carried out faunal recordings, prominent collectors were István Karvajszky, secondary school teacher Sándor Pazsiczky and clerk Miklós Nattán.

The local collectors left very beautiful and valuable collections of butterflies and moths for museums. Sándor Pazsiczky's collection was transferred to the Hungarian Natural History Museum (Budapest), Miklós Nattán's collection to the Janus Pannonius Museum (Pécs). Published faunistic data from this period only appeared after the collections had been housed in museums (Kovács 1953, 1954, Ábrahám 1989). Apart from a few small papers (eg. Pazsiczky 1942), the very active collectors did not publish the data of their collection materials but provided the faunistic data for the fauna catalogue of Kovács (1953, 1954). After that, Miklós Nattán increased his collection for another 25 years, the complete processing of which was published by Ábrahám (1989).

In the second half of the 20th century, research methods completely changed. Traditional petroleum vapor lamps were no longer used during night samplings, as they could not result in the same amount of collected material as the mercury vapor lamp

ISSN 1587-1908 (Print); ISSN 2062-9990 (Online)

samplings that appeared with the technical development of the second half of the '70s.

In parallel with the personal samplings, light traps were operated in five places for several years, their data was mainly determined by Á. Uherkovich. Thus, we have available not only faunistic data but also quantitative data based on traps from the second period of lepidopterological research in Zselic. These can be regarded as basic survey data of the fauna (UHERKOVICH 1978, 1981a,b, 1982, 1983, ÁBRAHÁM 1992).

After that, further investigations were carried out in Zselic, but their material remained unpublished. A nature conservation population survey was conducted by Sándor Farkas in the vicinity of Dombóvár.

With the start of the South Transdanubian nature conservation investigation in Somogy County, the weight of faunal surveys shifted to other areas. Of these, the fauna surveys carried out in the Boronka landscape protection area (ÁBRAHÁM 1992), in and around Lake Baláta (ÁBRAHÁM 2016), and finally in the Danube-Drava National Park near Drava (UHERKOVICH & ÁBRAHÁM 1995, ÁBRAHÁM & UHERKOVICH 1998).

After that, only occasional samplings took place in the Zselic, during the first half of the 21st century (SZABÓ 2007) and researchers carried out surveys in the framework of the Hungarian Biodiversity Days purposes near Gyűrűfű (ÁBRAHÁM et al. 2013).

One of man's harmful effects on nature is light pollution, which has only been seriously addressed in recent decades. The unnecessary, energy-wasting and environmentally damaging illumination of the evening sky with artificial light sources is called light pollution. It is well known that if there is more light pollution somewhere, the number of light-sensitive species decreases drastically, which can eventually lead to their local disappearance. Nowadays, this phenomenon has reached such proportions that it is hardly possible to find a natural area that is not affected by this negative effect. The International Starry Sky Association was created to search for these areas. If researchers find an area with no or negligible light pollution, the area is awarded the title of International Astronomy Park. This title was won in Europe for the first time by the Zselic Landscape Protection District together with Galloway Park in Scotland on 16th November 2009. Our task was to carry out a status assessment of the current Macrolepidoptera fauna and to compare it with the results of the above-mentioned previous research. For this, in addition to traditional mercury vapor lamps, we used light traps with different types of light sources with the aim of determining which type of lamp has the least effect on insects active at night. The investigation, which lasted for about 3 years, was carried out in Zselic by experts from the Department of Nature Conservation of the University of Kaposvár and the Department of Natural Sciences of the Rippl-Rónai Museum.

Material and methods

Between 1979-1982, Ákos Uherkovich set up a light trap installed in a permanent place to examine the macromoth fauna of Zselic hills (UHERKOVICH 1981a), at Ropolypuszta, behind the buildings and from the edge of the forest approx. 10 meters away. This light trap was powered by a 125 Watt mercury vapor bulb.

In our present research, the sampling area was selected in the Ropoly forest, in the plant communities typical of the area. One permanent, 125 W mercury vapor Jermy-type light trap operated at the buildings, while five portable light traps were placed 100 meters from each other in a dice fives pattern. One light trap was installed in a silver-linden beech, another in a candle-oak association. Three additional traps were installed

in the ecotone zone, on the meeting line of the two plant associations. The coordinates of the light traps are given in Table 1., while their location is in Fig.1.

Table 1: The coordinates of the light traps

Jermy trap	46°15'22.99"N	17°47'10.65"E
TRAP 1	46°15'28.94"N	17°47'6.74"E
TRAP 2	46°15'28.85"N	17°47'11.50"E
TRAP 3	46°15'29.06"N	17°47'2.12"E
TRAP 4	46°15'25.81"N	17°47'7.82"E
TRAP 5	46°15'32.28"N	17°47'6.94"E

The distance of light traps was 1.5 meters from the ground surface. Three different light sources were applied: two traps were equipped with white UV tubes, two others with black UV tubes and one trap had LED strips. Power was provided by a 7 Ah battery. During the two-year sampling period, the traps were operated for five days in each month from April to the end of October. The sampling of the month was chosen depending on the phases of the Moon so that they fall during the period of the lunar eclipse. In some cases, the weather was very unfavorable during the five-day sampling (cool, rainy), so the sampling was shifted to the next 5 appropriate days.

The 5 different light sources (UV tube and UV LED) were changed continuously during the five sampling days in order to operate the light trap for at least one night at each sampling location. With this method, we increased the light spectrum and reduced the differences resulting from the inhomogeneity of the sampling location.

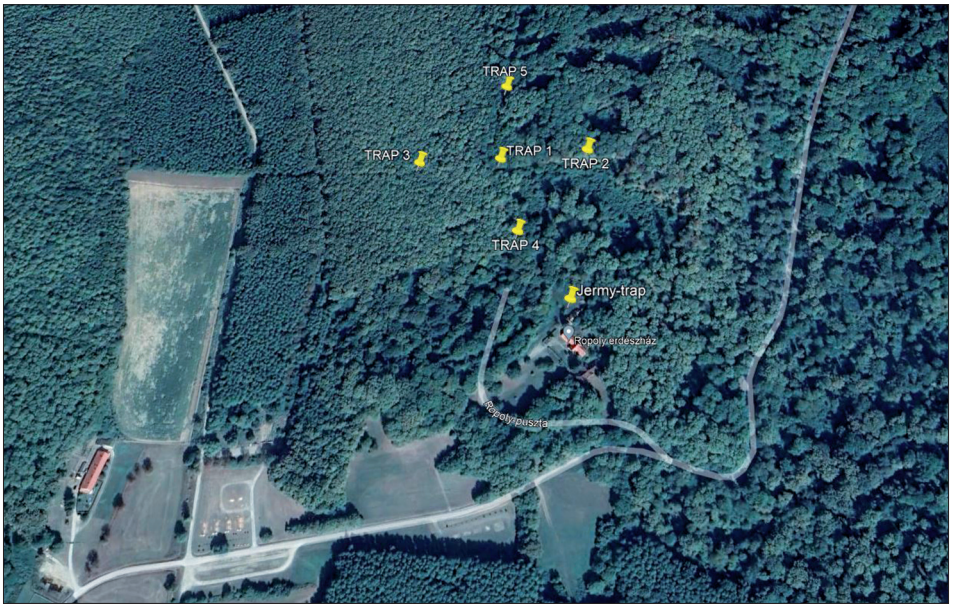


Fig. 1: The sampling area in Zselic in the vicinity of Ropoly

Fig. 2: The light trap used for sampling with a UV tube and battery

Results and discussion

A total of 23,499 individuals of 375 moth species were determined during the 2-year survey. In an annual summarization, for 2019, this means 304 species and 9,761 individuals, and for 2020, 328 species and 14,738 of them. Before the evaluation, it is worth noting that, due to the limited circumstances of the study, there are species groups and periods whose data are missing from the compilation. The collections only took place from April to October, so the data do not include the winter aspect species that were on the wing from November to March. Only light traps were used in the survey, so the species groups that are more sensitive to baits (e.g. *Catocala* sp.) are only included in the data series to a limited extent, as well as those species that cannot be collected successfully by any of the previously described methods (e.g. Plusiinae, Cucullinae) are also in low abundance. Finally, those species that could not be precisely defined due to the lack of an expert were also left out of the final species list (only the easily defined individuals of *Eupithecia* species were identified). Overall, a maximum of 20-25 species were not included in the final species list for these reasons.

Examining the dominance proportions, the 5 dominant species detected in the largest number of individuals were *Cyclophora annularia* (1410 specimens, 5.8%), *Colocasia coryli* (1349 specimens, 5.5%), *Hypomecis punctinalis* (1270 specimens, 5.2%), *Paracolax tristalis* (1182 specimens, 4.9%) and *Eilema lurideola* (790 specimens, 3.2%). The 3 most common species, according to the habitat conditions of the sampling area, are general foliage consumers, whose caterpillars can live on the leaves of practically all native tree and shrub species found around Ropoly. The fourth most common

has the same food plant requirements as the first 3, with the difference that the caterpillars of *Paracolax tristalis* preferred dead, withered leaves. It is interesting that the lichen-consumer species *Eilema lurideola* is the fifth most abundant. The *Eilema* species appeared in an outstanding number of individuals (1954 individuals, 8%), which can probably be traced back to the relatively significant lichen flora of the area. A total of 6001 individuals of the 5 most common species were caught by the traps, which is 24.5% of all collected individuals. At the other end of the line of dominance are the most vulnerable species caught in the lowest number of individuals, that is, closest to disappearing from the area. We detected a total of 141 species of which less than 5 individuals were collected by the light traps in 2 years. This is more than 37% of the total number of species, which is an extremely high rate, meaning that practically every third species that were still present in the area at the time of the study is most likely on the verge of extinction.

Over the course of 2 years, the light traps operating in Ropoly collected 9 protected and 1 strictly protected (SP), also Natura 2000 species (Magyar Közlöny 2015). These and their specimens numbers are as follows: *Eriogaster rimicola* (45), *Perconia strigillaria* (1), *Drymonia velitaris* (13), *Polypogon gryphalis* (95), *Idia calvaria* (4), *Diachrysia chryson* (4), *Arytrura musculus* (SP 2), *Naenia typica* (1), *Euplagia quadripunctaria* (81), *Tyria jacobaeae* (2).

Based on the light trap data, 4 of these species definitely still have a significant population in Ropoly (*Eriogaster rimicola, Drymonia velitaris, Polypogon gryphalis, Euplagia quadripunctaria*). Among them, *Eriogaster rimicola* and *Polypogon gryphalis* are species with a significant population at the national level. *Drymonia velitaris* is a species that becomes significantly more common as a result of the general warming of the climate, and occurs in warmer oak forests, almost throughout Transdanubia. *Euplagia quadripunctaria* is a common and not an endangered species on a national level at all: it occurs in all larger forested areas (except for the Great Hungarian Plain).

Climate change has significant negative effects primarily for species that require coolness and moisture. Until the 1980s, such species, which still had a significant population in all Hungarian mid mountains and cooler hilly areas (including Zselic), show a significant decline after the 2000s. The few faunistic researches of the last decade have not yet shown this process quantified in an exact way, but the individual and unique samplings clearly show that viable populations of these submontane species currently only survive in our coldest landscape units (Őrség, Soproni Mts, Kőszegi Mts, Magas Bakony Mts, Bükk Mts, Mátra Mts). They have almost completely disappeared from the Hungarian mountainous and hilly areas (including from Zselic) (e.g. *Proserpinus proserpina, Abraxas sylvata, Paradarisa consonaria, Xanthorhoe biriviata, Perizoma bifaciata, Larentia clavaria, Diachrysia chryson, Autographa jota, Naenia typica, Callimorpha dominula*).

Among the species found in the materials of the light traps, the following species are considered valuable from a faunistic and a nature conservation point of view.

Eriogaster rimicola ([Denis & Schiffermüller] 1775) - It has a single generation in autumn, imagoes on the wing in September and October. Its host plants are native oak species (*Quercus* sp.), primarily *Quercus cerris*. It occurs over almost the entire width of the central and southern parts of Europe, very locally in Western and absent in Northern Europe. It is more widespread in the Eastern Mediterranean and also occurs in the Middle East (Leraut 2006). Its Hungarian habitats are dry, hilly and mountainous Pannonian-Balcanic *Quercus cerris-Quercus petraea* woodlands, where usually it is generally widespread but rare. However, it is considered common in the Zselic hills (Vojnits et al. 1991). Protected species in Hungary.

Drepana curvatula (Borkhausen 1790) – Imago flies in May and late July and early August. The food plants are *Alnus* and *Betula* sp. so its typical occurrences are associated to different types of more extensive alder woodlands everywhere. It is common in the central and northern parts of Europe and its area continues through Asia to Japan (LERAUT 2006). Habitats in Hungary are hilly and mountainous alder tree stands. The largest populations live in South and West Transdanubia (VOJNITS et al. 1991). Several oligophagous willow (*Salix* sp.), poplar (*Populus* sp.) and alder (Alnus sp.) consuming species also occur in the studied area, which are considered endangered and valuable (*Aethalura punctulata, Cyclophora pendularia, Geometra papilionaria, Colobochyla salicalis, Acronicta alni*).

Drymonia velitaris (Hufnagel 1766) – The moth has only one generation during June-July. Caterpillar food plants are *Quercus cerris* and *Q. pubescens*. It is widespread but not common in Europe, missing the northern and southernmost areas (Leraut 2006). Habitats are warm, dry Pannonian-Balcanic *Quercus cerris*-*Quercus petraea* woodlands and *Quercus pubescens* scrubs in Hungary. The most abundant populations can be found in Southern Transdanubia (VOJNITS et al. 1991). It has become more common in the last decade (probably in connection with climate change). Protected species in Hungary.

Cepphis advenaria (Hübner 1790) – It has only one generation, that flies in the first half of summer, during June-July. Its food plants are various fresh forest herbs: *Actaea spicata* and *Melampyrum* sp. in the studied area. In Europe, it is absent only from the Mediterranean archipelago and the Balkan peninsula, elsewhere it is widespread in the Palaeartic zone as far as Japan, but in the southern part of its range it is highly sporadic and rare (LERAUT 2009). In Hungary, it is also strongly associated with wet, humid forests (beech woodlands, riverine and swamp woodlands) (VOJNITS 1980). Habitat-drying and degradation decrease the remaining populations. It occurs in the cooler forest habitats of the Hungarian mountains and hilly areas, and is very local and rare species.

Perconia strigillaria (Hübner 1787) – It has only one generation and the imago flies for a relatively short period, in the end of May. In Hungary, its host plant is mainly *Cytiscus scoparius*. It is known in most of Europe and Central Asia but is a very local species (LERAUT 2009). It was previously documented in *Calluna* heaths of the western and northeastern part of Hungary. In Southern and Central Transdanubia, its host plant was speading in parallel many new recording places and abundant populations became known (VOJNITS 1980). Protected species in Hungary.

Polypogon gryphalis (Herrich-Schaffer, 1851) – A European moth species with a very narrow distribution area. Its patchy area extends from Southeastern France through the southern part of the Alps to Western Ukraine (LERAUT 2019). In Hungary, it is known from few places, mainly Transdanubia. This species is rare everywhere, but populations are characterized by a fluctuating trend. During the summer, only one generation is on wing. The charateristic habitats are rich fens and riverine and swamp woodlands. The biology of caterpillar is poorly known, it probably feeds dried leaves and plant debris (GOZMÁNY 1970). Protected species in Hungary.

Idia calvaria ([Denis & Schiffermüller] 1775) – A species found in Central and Southern Europe, in the east as far as the Urals (LERAUT 2019). In Hungary, it prefers different thermophilous *Quercus* woodlands in hilly and mountainous areas. Populations are usually low. A single generation flies in June-July, rarely a partial one develops at the end of summer. Its caterpillar is known as a decomposer and mushroom-consumer (GOZMÁNY 1970). Protected in Hungary.

Diachrysia chryson (Esper 1789) - Its populations are in decline throughout Western Europe, threatened with extinction in many countries (Great Britain, Germany) - otherwise, widespead in Palaeartic zone as far as Japan (LERAUT 2019). It is also generally

widespread in Hungary, we know a large number of its occurrence data mainly from Hungarian mountainous regions, and also from some suitable lowland habitats (Nyírség, Szatmár, Dráva-plain). As a result of global warming, it has disappeared from its former locations in the plains and hills. The caterpillar's host plant is *Eupatorium cannabinum* and *Salvia* sp., and it rests on the underside of the leaves during the day. The adult flies in July-August in mountainous area at montane ravines, rocky forests, limestone beech woodlands, tall-herb vegetations of stream banks, where its host plant can be found in larger numbers. Its populations are endangered by changing the natural or seminatural stream valleys. Critically endangered and protected species in Hungary (Gozmány 1970).

Arytrura musculus (Ménétriés, 1859) – A very rare species having a disjunct distribution: this species is widespread in the Pacific areas of East Asia, the Amur region, Korea, and Japan. It also occurs, but much more sporadically in the Caucasus Mts, and Eastern and Central-Eastern Europe. It lives in some populations in Europe, Russia, Ukraine, Romania, Hungary and recently found in the northern part of the Mediterranean (Croatia, Italy). Earlier it was a rarity in Hungary. Currently, there are relatively abundant in the willow bogs of Southern Nyírség. It was the only known occurrence at Little Balaton for a long time in South Transdanubia, then in the 2000s it was found in several places: Sumony (Németh & Szabóky 1998), Gyűrűfű (Uherkovich & Ábrahám 2007) and the Drava valley and adjacent areas (Malgay & Brunner 2011). The increasing number of collecting sites suggests that the species is spreading. Adults of the species fly from the middle of June to the middle of July, and strongly attracted to artificial light. It is likely that it is a wandering moth species because some specimens were caught in places where the nearest suitable habitats were 2-3 kilometers away. In lab conditions, caterpillar feeds on the leaves of *Salix cinerea*. A species associated with willow bogs (mainly willow carrs, riverine willow scrubs), but its exact ecological needs are unknown. Natura 2000 species, and highly protected in Hungary (Haraszthy 2014).

Atypha pulmonaris (Esper 1790) - Its area extends in the wide middle band of Europe from northern Spain in the east and south to the Caucasus and Asia Minor (*Leraut* 2019). It is also widespread in Hungary and can be found in many places, mainly in the fresh forests of Hungarian hilly and mountainous regions - beech woodlands, hornbeam woodlands, oak-hornbeam woodlands. Its host plants are *Pulmonaria* sp. In the last decade, probably due to the global warming, it has become rarer. Imagoes on wings during May-June (Gozmány 1970).

Apamea aquila Donzel 1837- It has sporadic distribution in western and northern part of Europe (missing in the south), and also known from a slightly related area in Central Asia, and then in Eastern Asia again (Leraut 2019). In Hungary, it is a very rare species that occurs in habitat of montane ravines, tall-herb vegetations of stream banks, limestone beech woodlands, riverine and swamp woodlands. Caterpillar feeds on *Molinia* sp.

Pabulatrix pabulatricula (Brahm 1791) – It occurs mainly in Central and Eastern Europe, but its area extends to Japan. It has already disappeared from many places in Western Europe (e.g. the British Isles) (Leraut 2019). Many faunistic data are known from Hungary, but the populations are always low and sporadic. Adults fly during the summer. Caterpillars live on different Poaceae species, typically on *Molinia* sp. (Gozmány 1970). A valuable species in decline.

Cleoceris scoriacea (Esper 1789) – It is found in many places in the Mediterranean, through Asia Minor to the Middle East. It is a very local and rare species in the northern part of its area, and already become extinct in Germany (Leraut 2019). It used to be a rare species in Hungary, but in recent years (probably due to the abandonment of grape and fruit plantations in the foothills and climate change), its faunistic data increased. At

the same time, it is also a local and sporadic species that occurs in dry oak woodlands, groves, steppe meadows at the foothills, thermophilous *Quercus* woodlands, *Quercus pubescens* scrubs, closed, mixed steppic oak woodlands. Its only host plants are sand lily species (*Anthericum* sp.). The imago flies during August-September (RONKAY & RONKAY 2006).

Xestia castanea (Esper 1798) – An Atlanto-Mediterranean moth that is widespread in almost the entire area of Europe, as far as Asia Minor, but almost everywhere is local and sporadic (LERAUT 2019). Host plants are *Calluna vulgaris, Vaccinium* sp., *Genista* sp., *Cytisus scoparius*. In the past, only a few populations of it were known in Hungary, mainly from the North Hungarian Mountains and Western Transdanubia, but in the last decade (similarly to the species *Perconia strigillaria*) the faunistic data increased. It was also found in several places in the Zselic hills, where its caterpillars most likely develop on *Cytisus scoparius, Genista* species, or perhaps on *Quercus cerris*. It has only one generation per year, imagoes on wings from the end of August to the beginning of October (Ronkay & Ronkay 2006).

Naenia typica (Linnaeus 1758) – Widespread everywhere in Europe, except for the northernmost and Mediterranean areas, spreading to Central Asia, but common only in the northern regions (LERAUT 2019). It was found in a realtively lot of places in Hungary associated with wet gallery forests, stream valleys, where caterpillars develop on small dicotyledons, but it shows a significant decrease, probably due to climate change. Its single generation flies from mid-June to August (RONKAY & RONKAY 2006). Protected and endangered species in Hungary.

Tyria jacobaeae (Linnaeus 1758) - It can be found in certain parts of North America and in almost the entire territory of Europe except for the north. Its area spreads to Central Asia. Due to oligophagous species, it is very local everywhere (LERAUT 2006). Generally distributed in Hungary, but it is rare in the Great Plain. The host plants of the caterpillars are *Senecio* sp., mainly *Senecio jacobaea*. Adults are on wings in May-June and active also during the hot days. Imagoes are characterized by slow, fluttering and short-distance flight. Habitats are dry, warm, south-facing grassy meadows and hillsides in the hilly and lower mountain regions of Hungary. Some populations are relatively high, but the species decreasing in general. It is protected and highly endangered due to the construction of industry and housing of dry meadows and agressive spreading of alien plants.

Table 1: List of samples collected in 2019-2020

Family	Species	2019	2020	Total
LASIOCAMPIIDAE	*Malacosoma neustria* (Linnaeus, 1758)	7	7	14
	Eriogaster rimicola (Denis & Schiffermüller, 1775)	8	37	45
	Lasiocampa trifolii (Denis & Schiffermüller, 1775)	2	2	4
	Lasiocampa quercus (Linnaeus, 1758)	1	26	27
	Dendrolimus pini (Linnaeus, 1758)	4	3	7
	Phyllodesma tremulifolia (Hübner, 1810)		2	2
	Euthrix potatoria (Linnaeus, 1758)	1	3	4
	Gastropacha quercifolia (Linnaeus, 1758)		5	5
	Odonestis pruni (Linnaeus, 1758)	8	7	15

Family	Species	2019	2020	Total
SPHINGIDAE	*Agrius convolvuli* (Linnaeus, 1758)		1	1
	Sphinx ligustri Linnaeus, 1758	2		2
	Hyloicus pinastri (Linnaeus, 1758)		1	1
	Laothoe populi (Linnaeus, 1758)		2	2
	Mimas tiliae (Linnaeus, 1758)	16	15	31
	Smerinthus ocellata (Linnaeus, 1758)		2	2
	Deilephila elpenor (Linnaeus, 1758)		1	1
SATURNIIDAE	*Antherea yamamai* (Guérin-Méneville, 1861)	29	76	105
DREPANIDAE	*Drepana curvatula* (Borkhausen, 1790)	22	8	30
	Drepana falcataria (Linnaeus, 1758)	13	12	25
	Sabra harpagula (Esper, 1786)	31	23	54
	Watsonalla cultraria (Fabricius, 1775)	93	76	169
	Watsonalla binaria (Hufnagel, 1767)	36	50	86
THYATIRIDAE	*Thyatira batis* (Linnaeus, 1758)	88	150	238
	Tethea or (Denis & Schiffermüller, 1775)	1	1	2
	Tethea ocularis (Linnaeus, 1767)		1	1
	Ochropacha duplaris (Linnaeus, 1761)	2	17	19
	Habrosyne pyritoides (Hufnagel, 1766)	71	141	212
	Cymatophorima diluta (Denis & Schiffermüller, 1775)	43	9	52
GEOMETRIDAE	*Geometra papilionaria* (Linnaeus, 1758)		1	1
	Comibaena bajularia (Denis & Schiffermüller 1775)		3	3
	Hemistola chrysoprasaria (Esper, 1795)	1	4	5
	Jodis lactearia (Linnaeus, 1758)	21	24	45
	Hemithea aestivaria (Hübner, 1789)	14	51	65
	Idaea muricata (Hufnagel, 1767)	14	14	28
	Idaea rusticata (Denis & Schiffermüller, 1775)		1	1
	Idaea dilutaria (Hübner, 1799)	1		1
	Idaea fuscovenosa (Goeze, 1781)		1	1
	Idaea humiliata (Hufnagel, 1767)	1		1
	Idaea politaria (Hübner, 1799)	3	3	6
	Idaea subsericeata (Haworth, 1809)	1	5	6
	Idaea dimidiata (Hufnagel, 1767)	16	28	44
	Idaea trigeminata (Haworth, 1809)	8	5	13
	Idaea biselata (Hufnagel, 1767)	109	160	269
	Idaea nitidata (Herrich-Schäffer, 1861)	1		1
	Idaea emarginata (Linnaeus, 1758)	1		1
	Idaea aversata (Linnaeus, 1758)	44	77	121
	Idaea degeneraria (Hübner, 1799)	2	8	10

Family	Species	2019	2020	Total
	Idaea straminata (Borkhausen, 1794)	1	1	2
	Idaea deversaria (Herrich-Schäffer, 1847)	2		2
	Scopula immorata (Linnaeus, 1758)	10	1	11
	Scopula caricaria (Reutti, 1853)		20	20
	Scopula umbelaria (Hübner, 1813)	1		1
	Scopula nigropunctata (Hufnagel, 1767)	77	61	138
	Scopula virgulata (Denis & Schiffermüller, 1775)		6	6
	Scopula incanata (Linnaeus, 1758)	1	1	2
	Scopula immutata (Linnaeus, 1758)	4	3	7
	Scopula floslactata (Haworth, 1809)		6	6
	Rhodostrophia vibicaria (Clerck, 1759)		2	2
	Timandra comae Schmidt, 1931	70	37	107
	Cyclophora pendularia (Clerck, 1759)	1	1	2
	Cyclophora annularia (Fabricius, 1775)	603	807	1410
	Cyclophora ruficiliaria (Herrich- Schäffer, 1855)	191	380	571
	Cyclophora quercimontaria (Bastelberger, 1897)	34	1	35
	Cyclophora porata (Linnaeus, 1767)	5	2	7
	Cyclophora punctaria (Linnaeus, 1758)	127	160	287
	Cyclophora subpunctaria (Zeller, 1847)	3		3
	Cyclophora linearia (Hübner, 1799)	100	46	146
	Xanthorhoe biriviata (Borkhausen, 1794)	1		1
	Xanthorhoe designata (Hufnagel, 1767)	1	4	5
	Xanthorhoe spadicearia (Denis & Schiffermüller, 1775)	13	3	16
	Xanthorhoe ferrugata (Clerck, 1759)	60	23	83
	Xanthorhoe quadrifasciata (Clerck, 1759)	14	77	91
	Xanthorhoe fluctuata (Linnaeus, 1758)		14	14
	Catarhoe rubidata (Denis & Schiffermüller, 1775)	1		1
	Catarhoe cuculata (Hufnagel, 1767)		3	3
	Epirrhoe alternata (Müller, 1764)	70	124	194
	Euphyia unangulata (Haworth, 1809)	27	24	51
	Euphyia biangulata (Haworth, 1809)		2	2
	Costaconvexa polygrammata (Borkhausen, 1794)		1	1
	Camptogramma bilineata (Linnaeus, 1758)	20	17	37
	Mesoleuca albicillata (Linnaeus, 1758)		17	17
	Cosmorhoe ocellata (Linnaeus, 1758)	3	7	10
	Eulithis pyraliata (Denis & Schiffeller, 1775)	2	28	30
	Ecliptopera silaceata (Denis & Schiffermüller, 1775)	188	124	312
	Chloroclysta siterata (Hufnagel, 1767)	2	5	7

Family	Species	2019	2020	Total
	Thera variata (Denis & Schiffermüller, 1775)		1	1
	Electrophaes corylata (Thunberg, 1792)	1	3	4
	Colostygia pectinataria (Knoch, 1781)	25	22	47
	Horisme vitalbata (Denis & Schiffermüller, 1775)	1	2	3
	Horisme corticata (Treitschke, 1835)		3	3
	Horisme tersata (Denis & Schiffermüller, 1775)	1	10	11
	Horisme radicaria (De La Harpe [1855])	2	1	3
	Melanthia procellata (Denis & Schiffermüller, 1775)	21	58	79
	Philereme transversata (Hufnagel, 1767)		2	2
	Epirrita dilutata (Denis & Schiffermüller, 1775)	3	23	26
	Perizoma alchemillata (Linnaeus, 1758)	14	97	111
	Perizoma lugdunaria (Herrich-Schäffer, 1855)	3	11	14
	Perizoma bifaciata (Haworth, 1809)		2	2
	Gymnoscelis rufifasciata (Haworth, 1809)	14	5	19
	Chloroclystis v-ata (Haworth, 1809)	68	50	118
	Eupithecia expallidata Doubleday, 1856	5	4	9
	Eupithecia linariata (Denis & Schiffermüller, 1775)	1		1
	Eupithecia assimilata Doubleday, 1856		1	1
	Eupithecia silenicolata Mabille, 1867		1	1
	Aplocera plagiata (Linnaeus, 1758)	1	1	2
	Aplocera efformata (Guenée, 1857)	2		2
	Euchoeca nebulata (Scopoli, 1763)	53	85	138
	Hydrelia flammeolaria (Hufnagel, 1767)	4	6	10
	Minoa murinata (Scopoli, 1763)	1	1	2
	Asthena albulata (Hufnagel, 1767)	26	202	228
	Asthena anseraria (Herrich-Schäffer, 1855)		2	2
	Abraxas sylvata (Scopoli, 1763)		1	1
	Lomaspilis marginata (Linnaeus, 1758)	4	7	11
	Ligdia adustata (Denis & Schiffermüller, 1775)	72	224	296
	Macaria alternata (Denis & Schiffermüller, 1775)	32	28	60
	Macaria notata (Linnaeus, 1758)	30	11	41
	Macaria liturata (Clerck, 1759)	1	1	2
	Chiasmia clathrata (Linnaeus, 1758)	5	4	9
	Cepphis advenaria (Hübner, 1790)	3	8	11
	Plagodis dolabraria (Linnaeus, 1767)	120	149	269
	Plagodis pulveraria (Linnaeus, 1758)	14	41	55
	Opisthograptis luteolata (Linnaeus, 1758)	1	1	2
	Epione repandaria (Hufnagel, 1767)	1	5	6

Family	Species	2019	2020	Total
	Apeira syringaria (Linnaeus, 1758)	7	9	16
	Ennomos quercinaria (Hufnagel, 1767)	71	127	198
	Ennomos fuscantaria (Haworth, 1809)	3		3
	Ennomos erosaria (Denis & Schiffermüller, 1775)	5	9	14
	Ennomos autumnaria (Werneburg, 1859)	13	12	25
	Selenia tetralunaria (Hufnagel, 1767)	47	155	202
	Selenia lunularia (Hübner, 1788)	5	14	19
	Selenia dentaria (Fabricius, 1775)	6	33	39
	Artiora evonymaria (Denis & Schiffermüller, 1775)	2	2	4
	Crocallis elinguaria (Linnaeus, 1758)	1	1	2
	Ourapteryx sambucaria (Linnaeus, 1758)		1	1
	Colotois pennaria (Linnaeus, 1761)	9	28	37
	Angerona prunaria (Linnaeus, 1758)	75	66	141
	Lycia hirtaria (Clerck, 1759)	4		4
	Biston betularia (Linnaeus, 1758)	7	28	35
	Peribatodes rhomboidaria (Denis & Schiffermüller, 1775)	133	137	270
	Alcis repandata (Linnaeus, 1758)	3	2	5
	Hypomecis punctinalis (Scopoli, 1763)	315	955	1270
	Hypomecis roboraria (Denis & Schiffermüller, 1775)		12	12
	Fagivorina arenaria (Hufnagel, 1767)	10	15	25
	Ascotis selenaria (Denis & Schiffermüller, 1775)	7	2	9
	Ectropis crepuscularia (Denis & Schiffermüller, 1775)	152	234	386
	Parectropis similaria (Hufnagel, 1767)	64	81	145
	Aethalura punctulata (Denis & Schiffermüller, 1775)	2	14	16
	Ematurga atomaria (Linnaeus, 1758)	5	2	7
	Cabera pusaria (Linnaeus, 1758)	3	27	30
	Cabera exanthemata (Scopoli, 1763)	4	30	34
	Lomographa temerata (Denis & Schiffermüller, 1775)	2	7	9
	Lomographa bimaculata (Fabricius, 1775)	43	152	195
	Campaea margaritata (Linnaeus, 1767)	181	253	434
	Siona lineata (Scopoli, 1763)		1	1
	Perconia strigillaria (Hübner, 1787)	1		1
NOTODONTIDAE	*Harpyia milhauseri* (Fabricius, 1775)	1	5	6
	Stauropus fagi (Linnaeus, 1758)	23	80	103
	Drymonia ruficornis (Hufnagel, 1766)	38		38

Family	Species	2019	2020	Total
	Drymonia dodonaea (Denis & Schiffermüller, 1775)	12	14	26
	*Drymonia obliterat*a ((Esper, 1785)	114	351	465
	Drymonia velitaris (Hufnagel, 1766)	9	8	17
	Drymonia querna (Denis & Schiffermüller, 1775)	16	20	36
	Gluphisia crenata (Esper, 1785)	3	3	6
	Pterostoma palpina (Clerck, 1759)	1	2	3
	Spatalia argentina (Denis & Schiffermüller, 1775)	20	82	102
	Ptilodon cucullina (Denis & Schiffermüller, 1775)	10	70	80
	Ptilodon capucina (Linnaeus, 1758)	12	84	96
	Phalera bucephala (Linnaeus, 1758)	22	41	63
	Clostera pigra (Hufnagel, 1766)	2	3	5
	Clostera curtula (Linnaeus, 1758)	1	2	3
EREBIDAE	*Calliteara pudibunda* (Linnaeus, 1758)	51	128	179
	Euproctis similis (Fuessly, 1775)	214	175	389
	Lymantria monacha (Linnaeus, 1758)	89	86	175
	Lymantria dispar (Linnaeus, 1758)	31	21	52
	Arctornis l-nigrum (Müller, 1764)	18	21	39
	Orgyia antiqua (Linnaeus, 1758)	1	9	10
	Spilosoma lutea (Hufnagel, 1766)	11	157	168
	Spilosoma lubricipeda (Linnaeus, 1758)	9	22	31
	Hyphantria cunea (Drury, 1773)		2	2
	Phragmatobia fuliginosa (Linnaeus, 1758)	20	7	27
	Arctia caja (Linnaeus, 1758)	1		1
	Arctia villica (Linnaeus, 1758)		1	1
	Diacrisia sannio (Linnaeus, 1758)	1		1
	Callimorpha dominula (Linnaeus, 1758)	1		1
	Euplagia quadripunctaria (Poda, 1761)	28	67	95
	Tyria jacobaeae (Linnaeus, 1758)		2	2
	Miltochrista miniata (Forster, 1771)	236	305	541
	Thumatha senex (Hübner, 1808)		3	3
	Pelosia muscerda (Hufnagel, 1766)	12	21	33
	Lithosia quadra (Linnaeus, 1758)	312	60	372
	Eilema palliatella (Scopoli, 1763)	12		12
	Eilema depressa (Esper, 1787)	79	41	120
	Eilema lurideola (Zincken, 1817)	581	209	790
	Eilema griseola (Hübner, 1803)	6	57	63
	Eilema complana (Linnaeus, 1758)	69	196	265
	Dysauxes ancilla (Linnaeus, 1767)	5	3	8

Family	Species	2019	2020	Total
	Catephia alchymista (Denis & Schiffermüller, 1775)		1	1
	Dysgonia algira (Linnaeus, 1767)		3	3
	Euclidia glyphica (Linnaeus, 1758)	1		1
	Catocala promissa (Denis & Schiffermüller, 1775)	6	12	18
	Catocala nymphagoga (Esper, 1787)	6		6
	Catocala electa (Vieweg, 1790)		1	1
	Catocala elocata (Esper, 1787)	1		1
	Catocala hymenaea (Denis & Schiffermüller, 1775)	1	1	2
	Catocala fulminea (Scopoli, 1763)		1	1
	Catocala nupta (Linnaeus, 1767)	2	5	7
	Arytrura musculus (Ménétriés, 1859)	2		2
	Lygephila craccae (Denis & Schiffermüller, 1775)	2	3	5
	Eublemma purpurina (Denis & Schiffermüller, 1775)		1	1
	Colobochyla salicalis (Denis & Schiffermüller, 1775)	2	5	7
	Laspeyria flexula (Denis & Schiffermüller, 1775)	22	27	49
	Trisateles emortualis (Denis & Schiffermüller, 1775)	88	72	160
	Parascotia fuliginaria (Linnaeus, 1761)	3	1	4
	Schrankia costaestrigalis (Stephens, 1834)	1		1
	Rivula sericealis (Scopoli, 1763)	85	30	115
	Hypena rostralis (Linnaeus, 1758)	6	4	10
	Hypena proboscidalis (Linnaeus, 1758)	207	361	568
	Scoliopteryx libatrix (Linnaeus, 1758)	2	1	3
	Idia calvaria (Denis & Schiffermüller, 1775)	3	1	4
	Paracolax tristalis (Fabricius, 1794)	365	817	1182
	Herminia grisealis (Denis & Schiffermüller, 1775)	112	299	411
	Herminia tarsipennalis (Treitschke, 1835)	10	40	50
	Herminia tarsicrinalis (Knoch, 1782)	492	213	705
	Polypogon gryphalis (Herrich-Schäffer, 1851)	17	78	95
	Polypogon tentacularia (Linnaeus, 1758)	6	13	19
	Pechipogo strigilata (Linnaeus, 1758)	18	36	54
	*Zanclognatha lunal*is (Scopoli, 1763)	108	180	288
NOCTUIDAE	*Abrostola triplasia* (Linnaeus, 1758)	43	46	89
	Abrostola tripartita (Hufnagel, 1766)		1	1
	Macdunnoughia confusa (Stephens, 1850)	9	6	15
	Diachrysia chryson (Esper, 1789)	4		4
	Diachrysia chrysitis (Linnaeus, 1758)	9	13	22

Family	Species	2019	2020	Total
	Autographa gamma (Linnaeus, 1758)	14	21	35
	Protodeltote pygarga (Hufnagel, 1766)	225	445	670
	Deltote bankiana (Fabricius, 1775)	1	3	4
	Acontia lucida (Hufnagel, 1766)		4	4
	Aedia leucomelas (Linnaeus, 1758)	1	1	2
	Colocasia coryli (Linnaeus, 1758)	217	1132	1349
	Diloba caeruleocephala (Linnaeus, 1758)	1	1	2
	Craniophora ligustri (Denis & Schiffermüller, 1775)	45	43	88
	Acronicta rumicis (Linnaeus, 1758)	7	8	15
	Acronicta alni (Linnaeus, 1767)		1	1
	Acronicta cuspis (Hübner, 1813)	1	2	3
	Acronicta aceris (Linnaeus, 1758)		7	7
	Acronicta auricoma (Denis & Schiffermüller, 1775)		2	2
	Moma alpium (Osbeck, 1778)	25	48	73
	Tyta luctuosa (Denis & Schiffermüller, 1775)		1	1
	Calophasia lunula (Hufnagel, 1766)		1	1
	Amphipyra berbera Rungs, 1949	1		1
	Amphipyra pyramidea (Linnaeus, 1758)	27	20	47
	Amphipyra tragopoginis (Clerck, 1759)	5		5
	Amphipyra livida (Denis & Schiffermüller, 1775)	1	7	8
	Asteroscopus sphinx (Hufnagel, 1766)	2	4	6
	Allophyes oxyacanthae (Linnaeus, 1758)	19	32	51
	Eucarta amethystina (Hübner, 1803)	11	19	30
	Eucarta virgo (Treitschke, 1835)	3	4	7
	Pyrrhia umbra (Hufnagel, 1766)	2	3	5
	Heliothis peltigera (Denis & Schiffermüller, 1775)	1		1
	Helicoverpa armigera (Hübner, 1808)	63	18	81
	Cryphia algae (Fabricius, 1775)	21	7	28
	Pseudeustrotia candidula (Denis & Schiffermüller, 1775)	4	11	15
	Spodoptera exigua (Hübner, 1808)	1		1
	Elaphria venustula (Hübner, 1790)	28	87	115
	Caradrina morpheus (Hufnagel, 1766)	10	22	32
	Caradrina aspersa (Donzel, 1837)		3	3
	Caradrina kadenii Freyer, 1836	1	1	2
	Hoplodrina blanda (Denis & Schiffermüller, 1775)	9	27	36
	Hoplodrina octogenaria (Goeze, 1781)	2	9	11
	Hoplodrina superstes (Ochsenheimer, 1816)	2		2

Family	Species	2019	2020	Total
	Hoplodrina respersa (Denis & Schiffermüller, 1775)	1		1
	Hoplodrina ambigua (Denis & Schiffermüller, 1775)	16	10	26
	Charanyca trigrammica (Hufnagel, 1766)	1	6	7
	Rusina ferruginea (Esper, 1785)	9	24	33
	Athetis gluteosa (Treitschke, 1835)		2	2
	Proxenus lepigone (Möschler, 1860)	2	1	3
	Dypterygia scabriuscula (Linnaeus, 1758)	2	34	36
	Trachea atriplicis (Linnaeus, 1758)	23	43	66
	Polyphaenis sericata (Esper, 1787)	3	29	32
	Thalpophila matura (Hufnagel, 1766)	2		2
	Actinotia polyodon (Clerck, 1759)	1	1	2
	Phlogophora meticulosa (Linnaeus, 1758)	1	4	5
	Euplexia lucipara (Linnaeus, 1758)	47	35	82
	Auchmis detersa (Esper, 1787)	1		1
	Hydraecia micacea (Esper, 1789)		1	1
	Globia sparganii (Esper, 1790)		2	2
	Eremobina pabulatricula (Brahm, 1791)	1	2	3
	Apamea monoglypha (Hufnagel, 1766)		1	1
	Apamea epomidion (Haworth, 1809)		2	2
	Apamea aquila Donzel, 1837		2	2
	Apamea scolopacina (Esper, 1788)	16	11	27
	Mesapamea secalis (Linnaeus, 1758)	8	15	23
	Mesoligia furuncula (Denis & Schiffermüller, 1775)	1		1
	Litoligia literosa (Haworth, 1809)	4		4
	Oligia latruncula (Denis & Schiffermüller, 1775)	3		3
	Oligia versicolor (Borkhausen, 1792)		1	1
	Oligia strigilis (Linnaeus, 1758)		4	4
	Episema tersa (Denis & Schiffermüller, 1775)	1		1
	Cleoceris scoriacea (Esper, 1789)	1		1
	Ipimorpha retusa (Linnaeus, 1761)		1	1
	Cosmia trapezina (Linnaeus, 1758)	137	30	167
	Cosmia affinis (Linnaeus, 1767)		1	1
	Cosmia pyralina (Denis & Schiffermüller, 1775)	1		1
	Tiliacea aurago (Denis & Schiffermüller, 1775)	6	3	9
	Tiliacea sulphurago (Denis & Schiffermüller, 1775)	9	6	15
	Tiliacea citrago (Linnaeus, 1758)	2	8	10
	Lithophane ornitopus (Hufnagel, 1766)	9	2	11
	Eupsilia transversa (Hufnagel, 1766)	1	5	6

Family	Species	2019	2020	Total
	Conistra vaccinii (Linnaeus, 1761)	7	50	57
	Conistra rubiginea (Denis & Schiffermüller, 1775)		2	2
	Conistra erythrocephala (Denis & Schiffermüller, 1775)		11	11
	Agrochola circellaris (Hufnagel, 1766)	4	44	48
	Agrochola nitida (Denis & Schiffermüller, 1775)	24	20	44
	Agrochola macilenta (Hübner, 1809)		1	1
	Agrochola helvola (Linnaeus, 1758)	1	2	3
	Agrochola humilis (Denis & Schiffermüller, 1775)	3		3
	Agrochola litura (Linnaeus, 1758)	2	3	5
	Atypha pulmonaris (Esper, 1790)	22	6	28
	Dryobotodes eremita (Fabricius, 1775)		1	1
	Blepharita satura (Denis & Schiffermüller, 1775)	39	43	82
	Mesogona acetosellae (Denis & Schiffermüller, 1775)		1	1
	Mythimna turca (Linnaeus, 1761)	42	62	104
	Mythimna albipuncta (Denis & Schiffermüller, 1775)	12	82	94
	Mythimna ferrago (Fabricius, 1787)	23	13	36
	Mythimna vitellina (Hübner, 1808)	3	4	7
	Mythimna l-album (Linnaeus, 1767)	3	6	9
	Mythimna impura (Hübner 1808		1	1
	Senta flammea (Curtis, 1828)	1		1
	Hadula trifolii (Hufnagel, 1766)	1	1	2
	Sideridis rivularis (Fabricius, 1775)	3	3	6
	Polia nebulosa (Hufnagel, 1766)		2	2
	Mamestra brassicae (Linnaeus, 1758)	2	5	7
	Melanchra persicariae (Linnaeus, 1761)	9	29	38
	Lacanobia thalassina (Hufnagel, 1766)	2		2
	Lacanobia oleracea (Linnaeus, 1758)	14	18	32
	Lacanobia w-latinum (Hufnagel, 1766)		5	5
	Hadena capsincola (Denis & Schiffermüller, 1775)	5	3	8
	Orthosia cerasi (Fabricius, 1775)	11		11
	Orthosia incerta (Hufnagel, 1766)	2		2
	Egira conspicillaris (Linnaeus, 1758)	4		4
	Tholera decimalis (Poda, 1761)	1	11	12
	Euxoa segnilis (Duponchel, 1836)		1	1
	Agrotis exclamationis (Linnaeus, 1758)	4	27	31
	Agrotis ipsilon (Hufnagel, 1766)	1		1
	Agrotis segetum (Denis & Schiffermüller, 1775)	10	15	25

Family	Species	2019	2020	Total
	Axylia putris (Linnaeus, 1761)	108	153	261
	Ochropleura plecta (Linnaeus, 1761)	23	25	48
	Noctua pronuba Linnaeus, 1758	62	128	190
	Noctua orbona (Hufnagel, 1766)	20	7	27
	Noctua interposita (Hübner, 1790)	104	26	130
	Noctua comes Hübner, 1813	4	6	10
	*Noctua fimbriata (*Schreber, 1759)	81	82	163
	Noctua janthina (Denis & Schiffermüller, 1775)	5	4	9
	Noctua janthe (Borkhausen, 1792)	10	17	27
	Noctua interjecta Hübner, 1803	1	11	12
	Xestia c-nigrum (Linnaeus, 1758)	55	26	81
	Xestia triangulum (Hufnagel, 1766)	15	52	67
	Xestia ditrapezium (Denis & Schiffermüller, 1775)	3		3
	Xestia rhomboidea (Esper, 1790)	29	10	39
	Xestia xanthographa (Denis & Schiffermüller, 1775)	4	8	12
	Xestia baja (Denis & Schiffermüller, 1775)	12	8	20
	Xestia castanea (Esper, 1798)	10	3	13
	Eugnorisma depuncta (Linnaeus, 1761)	47	69	116
	Naenia typica (Linnaeus, 1758)		1	1
NOLIDAE	*Meganola kolbi* (Daniel, 1935)	1	1	2
	Meganola albula (Denis & Schiffermüller, 1775)	47	27	74
	Meganola strigula (Denis & Schiffermüller, 1775)	5	13	18
	Nola aerugula (Hübner, 1793)	3	18	21
	Nola confusalis (Herrich-Schäffer, 1847)	9	6	15
	Nola cristatula (Hübner, 1793)	4	55	59
	Nola chlamitulalis (Hübner, 1813)	5		5
	Bena bicolorana (Fuessly, 1775)	1		1
	Pseudoips prasinana (Linnaeus, 1758)	18	44	62
	*Nycteola asiatic*a (Krulikovsky, 1904)	1	2	3
	Nycteola siculana (Fuchs, 1899)		1	1
No of specimens:		**9761**	**14738**	**24499**

Acknowledgement

We acknowledge the financial support of Széchenyi 2020 under the EFOP-3.6.2-16-2017-00014. We would like to express our gratitude to Adrián Czékus and Máté Zsolt Otártics for helping in operating light traps.

References

ÁBRAHÁM L.1990: Nattán Miklós nagylepke-gyűjteménye (Lepidoptera) a pécsi Janus Pannonius Múzeumban. – A Janus Pannonius Múzeum Évkönyve 34(1989):63-71.

ÁBRAHÁM L.1992a: Boronka-melléki Tájvédelmi Körzet nagylepkefaunájának természetvédelmi feltárása I. (Lepidoptera). – Dunántúli Dolgozatok Természetudományi Sorozat 7: 241-271.

ÁBRAHÁM L.1992b: A Zselici Tájvédelmi Körzet Macrolepidoptera faunájának ismeretéhez (Lepidoptera). – Somogyi Múzeumok Közleményei 9:293-306.

ÁBRAHÁM L. 2016: Nagylepke fauna felmérése a Baláta-tó Természetvédelmi Területen (Lepidoptera: Macrolepidoptera). - A Kaposvári Rippl-Rónai Múzeum Közleményei 4: 69-90.

ÁBRAHÁM L., UHERKOVICH Á. 1993: A Zselic nagylepkéi (Lepidoptera) I. Bevezetés és faunisztikai alapvetés. – A Janus Pannonius Múzeum Évkönyve 38:47-59.

ÁBRAHÁM L. UHERKOVICH, Á. 1998: A Dráva mente nagylepke faunája és jellegzetes élőhelyei (Lepidoptera). – Dunántúli Dolgozatok Természetudományi Sorozat 9:359-385.

ÁBRAHÁM L., UHERKOVICH Á. 2001: Somogy megye nagylepke faunájának katalógusa (Lepidoptera: Macrolepidoptera). – Natura Somogyiensis 1:375-376.

ÁBRAHÁM L. UHERKOVICH Á. & SZEŐKE K. 2009: Nagylepke fauna felmérése a Biodiverzitás Napok alkalmából a zselici Gyűrűfűn (Lepidoptera: Macrolepidoptera) - Survey on the butterfly and larger moth (Lepidoptera: Marcrolepidoptera) fauna of Gyűrűfű Biodiversity Days (SW Hungary). – Natura Somogyiensis 13:169-178.

GOZMÁNY L. 1970: Bagolylepkék I. – Magyarország Állatvilága 11. füzet XVI. kötet, Akadémiai Kiadó, Budapest, p. 1-151.

HARASZTHY L. (szerk.) 2014: Natura 2000 fajok és élőhelyek Magyarországon. - Pro Vértes Közalapítvány, Csákvár, p. 338-342.

KOVÁCS L. 1954: Új fajok és fajváltozatok a magyar nagylepkefaunában. – Folia entomologica hungarica 7:53-64.

KOVÁCS L. 1956: A magyarországi nagylepkék és elterjedésük II. – Folia entomologica hungarica 9:89-140.

LERAUT P. 2006: Moths of Europe Saturnids, Lasiocampids, Hawkmoths, Tiger Moths. – N.A.P. Editions, France

LERAUT P. 2009: Moths of Europe Geometrid Moths. – N.A.P. Editions, France

LERAUT P. 2019: Moths of Europe Noctuids I. – N.A.P. Editions, France

LERAUT P. 2019: Moths of Europe Noctuids II. - N.A.P. Editions, France

NÉMETH, L. & SZABÓKY, Cs. 1998: A keleti lápibagoly (Arytrura musculus Ménétriés, 1859) és újabb hazai adatai. - Folia entomologica hungarica 59:310-313.

RONKAY G. & RONKAY L 2006: A magyarországi csuklyás-, szegfű- és földibaglyok atlasza (Noctuidae: Cuculliinae, Hadeninae, Noctuinae). – Natura Somogyiensis 8:1-416.

UHERKOVICH Á. 1978: Belső-Somogy és a Zselic határvidékének lepideptorológiai viszonyai (Lepidoptera). – Somogyi Múzeumok Közleményei 3: 503-538.

UHERKOVICH Á. 1981a: A Zselici Tájvédelmi Körzet nagylepkefaunája. – Somogyi Múzeumok Közleményei 4(1):5-24.

UHERKOVICH Á. 1981b: A Zselic nagylepkefaunája I. Vásárosbérc környéke környéke (Lepidoptera). – A Janus Pannonius Múzeum Évkönyve 25 (1980):85-98.

UHERKOVICH Á. 1982. A Zselic nagylepkefaunája II. Délkelet-Zselic (Lepidoplera). – A Janus Pannonius Múzeum Évkönyve 26 (1981):33-50.

UHERKOVICH Á. 1983: A Zselic nagylepkefaunája IV. Kelet-Zselic: Palé környéke (Lepidoptera). – A Janus Pannonius Múzeum Évkönyve 26 (1982):37-50.

UHERKOVICH Á. & ÁBRAHÁM L. 2007: A keleti lápibagolylepke – Arytrura musculus (Ménétriés, 1859) (Lepidoptera: Noctuidae) előfordulása a Zselicben. – Natura Somogyiensis 10:361-363.

SZABÓ G. 2007: Adatok a Dunántúli-dombság nagylepke faunájához (Lepidoptera: Macrolepidoptera). - Natura Somogyiensis 10:331-339.

VARGA Z. (szerk.) 2010: Magyarország nagylepkéi. – Heterocera Press, Budapest.

VOJNITS A. 1980: Araszolólepkék I. – Magyarország Állatvilága 8. füzet XVI. kötet, Akadémiai Kiadó, Budapest, p. 1-157.

VOJNITS A., UHERKOVICH Á., RONKAY L & PEREGOVITS L. 1991: Medvelepkék, szenderek és szövőlepkék. –Magyarország Állatvilága 14. füzet XVI. kötet, Akadémiai Kiadó, Budapest, p. 1-242.

Magyar Közlöny, 158. szám, 66/2015 (X. 26) FM rendelet

Natura Somogyiensis 40: 119-128. Kaposvár, 2023 DOI:10.24394/NatSom.2023.40.119
Submitted: 26.05, 2023; Accepted: 02.06, 2023; Published: 07.06, 2023 www.smmi.hu/termtud/ns/ns.htm

Sawflies (Hymenoptera: Symphyta) from Racha and Kakheti regions of Georgia (Sakartvelo)

George Japoshvili[1,2] & Attila Haris[3]

[1]Institute of Entomology, Agricultural University of Georgia, University Campus at Digomi David Aghmashenebeli Alley, 13th km, Tbilisi, Georgia e-mail: g.japoshvili@agruni.edu.ge
[2]Invertebrate Research Center, Tetritsklebi, Telavi Municipality – 2200, Telavi, Georgia
[3]H-1076 Budapest, Garay u. 19. Hungary e.mail: attilaharis@yahoo.com

Japoshvili, G. & Haris, A.: *Sawflies (Hymenoptera: Symphyta) from Racha and Kakheti regions of Georgia (Sakartvelo).*
Abstract: Thirty-six species of 103 specimens were collected in Racha and Kakheti regions. Faunistic list and zoogeographic analysis are provided. *Aprosthema fusicorne* (Thomson, 1871), *Pristiphora albitibia* (Costa, 1859) and *Pristiphora beaumonti* Zirngiebl, 1957 are new records for the fauna of the country.

Keywords: Caucasus, Hymenoptera, Symphyta, faunistics, new records

Introduction

The present paper is the eight contribution of the authors to the survey of the sawfly fauna of Georgia (Japoshvili and Haris 2022 a,b,c,d, 2023a,b, Supatashvili, Japoshvili and Haris 2022).

The two studied regions are in North Georgia, in the Caucasus Mountains.

Two of them, nameli Laliani: Tetritsklebi and Serodani: Tetritsklebiare located on Gombori pass (North-Eastern Georgia, Kakheti Region) between 1350 and 1400 m altitudes asl. Distance between these two sites is 1.2 km as the crow flies. They are located in the centre of Gombori range, which represents the south-most branch of Greater Caucasus and stretches almost 107 km reaching to Signagi. These sites used by locals as hay meadows, surrounded by highly divers vegetation containing mainly beech forest mixed with wild hazelnut, wild prunus, oak, hornbeam, lime trees. The warm summers are opposed by cold winters, sometimes even with -15 °C. April and May usually bring high precipitations.

Onchevi: Organenli, Onchevi: Shola and Onchevi: Tloisi are located in Racha region, Oni Municipality between 1050 and 1150 m altitudes asl. In the heart of the Georgian Great Caucasus. These three sites of Racha (Oni Municipality), are located on right slopes of river Jejora canyon, and their meadows hold divers vegetation. They are surrounded by beech forest dominantly mixed with wild hazelnut, wild pear, oak and hornbeam Their climate is generally moist and characterized by Mediterranean influences. Summer is warm, but winter is cold, with -10 °C generally with intense snowfalls. April and May are also characterized by high precipitation.

ISSN 1587-1908 (Print); ISSN 2062-9990 (Online)

Material and methods

The sawfly material was collected by using Malaise traps located between 1 000 and 1 400 m altitude above sea level in 2 different regions of North Georgia. Malaise traps were erected at 07. 06. 2022 they operated till 4th of July 2022. The sampling strategy was not designed to obtain quantitative data (for example, traps were not installed during the most active periods for Symphyta due to logistic reasons, and also traps were operated for varying lengths of time), but rather to get a snapshot knowledge of the sawfly diversity of the region.

For identification, and for host-plant data, ZHELOCHOVTSEV's (1988) work on the sawflies of the European part of the former USSR, the handbook of LACOURT (2020) on the identification of the European Symphytans, the monograph of BENSON (1968) on the Turkish sawflies fauna, and Gussakovskij's (1935, 1947) monographs on the sawflies of the former USSR were used. We also consulted recent revisions (GYURKOVICS and HARIS 2014, HARIS 2006, PROUS et al. 2017) to confirm the identifications of particular taxa. The general distribution of species are reported based on ROLLER and HARIS (2008), TAEGER et al. (2006), SUNDUKOV (2017). The nomenclature used in this paper, follows the latest monograph of European sawflies (LACOURT 2020) with special concern for the subfamily Nematinae to address the conclusions of PROUS et al. (2014). The higher classification of Symphyta, applied in this work, follows the Hymenoptera part of Fauna Europaea (ACHTERBERG 2013). Host plant records are given according to MACEK et al. (2020).

Laliani: Tetritsklebi, 41.860324° N, 45.334031° E, 1 374 m asl. (Fig.1)
Onchevi: Organenli, 42.570681° N, 43.495862° E, 1 053 m asl.
Onchevi: Shola, 42.558516° N, 43.519035° E, 1 156 m asl. (Fig. 2)
Onchevi: Tloisi, 42.559317° N, 43.512821° E, 1 072 m asl.
Serodani: Tetritsklebi, 41.853950° N, 45.320529° E, 1 331 m asl. (Fig. 3)

Results

Argidae

Aprosthema fusicorne (Thomson, 1871): Serodani: Tetritsklebi, 21. 06. - 04. 07. 2022, 1 female. Sporadic, West Palaearctic species. Larva on *Vicia cracca*.

Tenthredinidae

Selandrinae

Nesoselandria morio (Fabricius, 1781): Onchevi: Shola, 06-17. 06. 2022, 2 females. Frequent. Host plants: *Brachytecium reflexum, Ceratodon purpureus, Chenopodium album, Dicranum scoparium, Fragaria vesca, Hedwigia ciliata, Myosotis arvensis, Plagiomnium cuspidatum, Plagiothecium denticulatum, Polygonum aviculare, Polytrichum commune, Pseudobryum cinclidiodes, Sanionia uncinata, Stellaria media, Veronica chamaedrys* and *V. officinalis*. Holarctic.

Fig.1: Landscape at Laliani: Tetritsklebi, 1374 m asl.

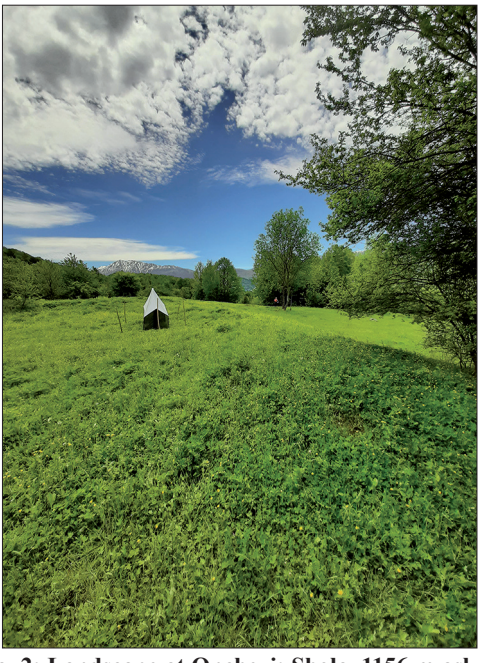


Fig. 2: Landscape at Onchevi: Shola, 1156 m asl.

Allantinae

Allantus (*Emphytus*) *cinctus* (Linné, 1758): Laliani: Tetritsklebi, 22. 06. - 04. 07. 2022,1 male; Onchevi: Organenli, 07-17. 06. 2022, 2 females; Serodani: Tetritsklebi, 21. 06. - 04. 07. 2022, 2 males. Common. Host plants: *Rosa* and *Fragaria* spp. Holarctic.

Allantus (*Emphytus*) *cingulatus* (Scopoli, 1763): Onchevi: Organenli, 07-17. 06. 2022, 2 females, 2 males. Frequent, Euro-Siberian species. Host plants: *Rosa* and *Fragaria* spp.

Allantus (*Emphytus*) *didymus* (Klug, 1818): Onchevi: Organenli, 07-17. 06. 2022, 5 males; Onchevi: Tloisi, 07-17. 06. 2022, 3 males; Serodani: Tetritsklebi, 21. 06. - 04. 07. 2022, 1 male. Frequent,West-Palaearctic species. Host plants: *Rosa* and *Fragaria* spp.

Allantus (*Emphytus*) *togatus* (Panzer, 1801): Laliani: Tetritsklebi, 22. 06. - 04. 07. 2022, 1 male. Sporadic, Palaearctic species. Larva on *Betula, Quercus* and *Salix* spp.

Allantus (*Emphytus*) *viennensis* (Schrank, 1781): Onchevi: Organenli, 07-17. 06. 2022, 1 female. Sporadic, West Palaearctic species introduced to USA. Larva on *Rosa* spp.

Ametastegia (*Protemphytus*) *carpini* (Hartig, 1837): Onchevi: Organenli, 07-17. 06. 2022, 1 female. Frequent. Holarctic. Host plants: *Geranium* spp.

Ametastegia (*Protemphytus*) *perla* (Klug, 1818): Onchevi: Shola, 06-17. 06. 2022, 1 male. Host plants: Salix sp., it is also recorded from *Quercus* and *Populus* spp. Sporadic, West Palaearctic species.

Ametastegia (*Protemphytus*) *tenera* (Fallén, 1808): Serodani: Tetritsklebi, 21. 06. - 04. 07. 2022, 1 female. Holarctic. Frequent. Larva on *Rumex* spp.

Athalia circularis (Klug, 1815): Onchevi: Shola, 06-17. 06. 2022, 2 females. Frequent. Host plants: *Arctium lappa, Ajuga reptans, Veronica beccabunga, V. longifolia, V. officinalis, Alliaria petiolata, Glechoma hederacea, Melampyrum, Capsella* and *Lycopus* spp. Palaearctic. This colour variation was known earlier as forma *cordatoides* Priesner, 1928.

Athalia cordata Serville, 1823: Laliani: Tetritsklebi, 22. 06. - 04. 07. 2022, 1 female. Frequent, West Palaearctic species. Host plants: *Ajuga* spp., *Antirrhinum majus. Misopates* spp., *Plantago* spp., *Veronica* spp,

Athalia rosae ssp. *ruficornis* Jakowlew, 1888: Onchevi: Organenli, 07-17. 06. 2022, 1 female. Common, East Palaearctic species. Larva on *Brassicaceae*.

Taxonus sticticus (Klug, 1817): Laliani: Tetritsklebi, 22. 06. - 04. 07. 2022, 3 males; Onchevi: Organenli, 07-17. 06. 2022, 1 male; Onchevi: Shola, 06-17. 06. 2022, 2 males; Onchevi: Tloisi, 07-17. 06. 2022, 1 female. Frequent, West Palaearctic species. Larva on *Rosa* spp.

Heterathrinae

Caliroa cothurnata (Serville, 1823): Onchevi: Organenli, 07-17. 06. 2022, 1 female. West Palaearctic. Frequent. Larva on *Quercus* spp.

Metallus albipes (Cameron, 1875): Onchevi: Shola, 06-17. 06. 2022, 1 female. Frequent, Palaearctic species. Larca on *Rubus* spp., especially on *Rubus idaeus*.

Metallus lanceolatus (Thomson, 1870): Onchevi: Tloisi, 07-17. 06. 2022, 1 female. Sporadic. Palaearctic, introduced to USA. Larva inside the leaves of *Geum urbanum* and G. rivale.

Blennocampinae

Halidamia affinis (Fallén, 1807): Onchevi: Organenli, 07-17. 06. 2022, 1 female; Onchevi: Shola, 06-17. 06. 2022, 2 females; Onchevi: Tloisi, 07-17. 06. 2022, 3 females. Frequent. Host plants: *Galium aparine, G. odoratum* and *G. molugo*. West Palaearctic, introduced to North America.

Fig.3: Landscape at Serodani: Tetritsklebi, 1331 m asl.

Eutomostethus ephippium ssp. *vopiscus* (Konow, 1899): Onchevi: Organenli, 07-17. 06. 2022, 3 females. Ponto-Caspian species. Common. Hostplants: *Poaceae*.

Monardis plana (Klug, 1817): Onchevi: Shola, 06-17. 06. 2022, 1 female. Sporadic, West Palaearctic species. Larva on *Rosa* spp.

Tenthredininae

Macrophya (*Macrophya*) *diversipes* (Schrank, 1782): Laliani: Tetritsklebi, 22. 06. - 04. 07. 2022, 1 female; Onchevi: Organenli, 07-17. 06. 2022, 5 females. Frequent, Palaearctic species. Larva on *Fragaria* and *Rubus* spp.

Macrophya (*Macrophya*) *hamata* ssp. *caucasicola* Muche, 1969: Onchevi: Tloisi, 07-17. 06. 2022, 1 female. Frequent, Ponto-Caspian subspecies. Host plant unknown.

Macrophya (*Macrophya*) *sanguinolenta* (Gmelin, 1790): Onchevi: Organenli, 07-17. 06. 2022, 1 female; Onchevi: Shola, 06-17. 06. 2022, 1 female; Onchevi: Tloisi, 07-17. 06. 2022, 1 female; Serodani: Tetritsklebi, 21. 06. - 04. 07. 2022, 1 female. Frequent, Palaearctic species. Larva on *Galenopsis, Senecio* and *Veronica*.

Rhogogaster (*Rhogogaster*) *scalaris* (Klug, 1817): Onchevi: Organenli, 07-17. 06. 2022, 1 female. Frequent, Holarctic species. Polyphagous, larva mainly on *Rosaceae*, such as *Agrimonia eupatoria, Sanguisorba minor, Fragaria, Filipendula, Rosa* and *Rubus* spp.; further confirmed host plants are *Ranunculus repens* and *Alnus* spp.

Tenthredopsis litterata (Geoffroy, 1785): Onchevi: Organenli, 07-17. 06. 2022, 4 females. Frequent. Larva on *Agrostis, Dactylis* and *Calamagrostis* spp. West Palaearctic.

Tenthredopsis nassata (Linné, 1767): Onchevi: Organenli, 07-17. 06. 2022, 1 female; Onchevi: Tloisi, 07-17. 06. 2022, 1 female. Frequent, Palaearctic species. Larva on *Poaceae*, like *Dactylis glomerata, Deschampsia cespitosa, Avenella flexuosa* and *Lolium perenne*.

Tenthredopsis viridis Zhelochovtsev, 1941: Onchevi: Shola, 06-17. 06. 2022, 1 male; Onchevi: Tloisi, 07-17. 06. 2022, 1 female. Ponto-Caspian species. Sporadic. Host plant unknown.

Nematinae

(The nomenclature of this part follows the proposed changes in nomenclature of the last monograph on sawflies written by LACOURT 2020)

Cladius pectinicornis (Geoffroy, 1785): Onchevi: Organenli, 07-17. 06. 2022, 5 males, 2 females; Laliani: Tetritsklebi, 22. 06. - 04. 07. 2022, 1 female. Holarctic. Common. Host plants: *Alchemilla, Filipendula, Fragaria, Potentilla, Sanguisorba, Rosa* and *Rubus* spp.

Pristiphora albitibia (Costa, 1859): Laliani: Tetritsklebi, 22. 06. - 04. 07. 2022, 1 female. Sporadic, Palaearctic species. Larva on *Vicia cracca, V. hirsuta* and *V. tetrasperma*.

Pristiphora armata (Thomson, 1863): Onchevi: Organenli, 07-17. 06. 2022, 5 males. Frequent, Palaearctic species. Larva on *Crataegus* spp.

Pristiphora beaumonti Zirngiebl, 1957: Laliani: Tetritsklebi, 22. 06. - 04. 07. 2022, 1 female. Holomediterranean - Ponto-Caspian species. Sporadic. Hostplant unknown.

Pristiphora pallidiventris (Fallén, 1808): Onchevi: Organenli, 07-17. 06. 2022, 1 female. Frequent. Larva on *Geum, Potentilla, Rubus* and *Filipendula* spp. Holarctic.

Pteronidea myosotidis (Fabricius, 1804): Onchevi: Organenli, 07-17. 06. 2022, 2 females, 1 male; Onchevi: Shola, 06-17. 06. 2022, 2 males; Onchevi: Tloisi, 07-17. 06. 2022, 2 females, 2 males. Common. Larval hosts: *Onobrychis, Vicia* and *Trifolium* spp. also *Lathyrus pratensis*. Palaearctic.

Stauronematus platycerus (Hartig, 1840): Onchevi: Shola, 06-17. 06. 2022, 1 female. Sporadic, Palaearctic species. Larva on *Populus tremula, P. alba, P. nigra* and *P. balsamifera*.

Cephidae

Calameuta (*Calameuta*) *grombczewskii* (Jakowlew, 1891): Onchevi: Shola, 06-17. 06. 2022, 2 females. Ponto-Caspian, Central Asian species. Sporadic. Host plant unknown.

Cephus spinipes (Panzer, 1800): Onchevi: Organenli, 07-17. 06. 2022, 1 female; Onchevi: Shola, 06-17. 06. 2022. 2 females; Onchevi: Tloisi, 07-17. 06. 2022, 1 female. Common, Palaearctic species. Host plants: *Dactylis glomerata, Phleum pratense* and other *Poaceae*.

Discussion

Frequent species

The most frequent species is *Pteronidea myosotidis* (Fabricius, 1804) and *Allantus didymus* (Klug, 1818) with 9 collected specimens.

Table: Zoogeographic distribution of sawflies

Zoogeographical area	Number of species	%
Ponto-Caspian-Central Asian	1	2.8%
Ponto-Caspian	3	8.3%
Holomediterran-Ponto-Caspian	1	2.8%
East Palaearctic	1	2.8%
West Palaearctic	10	27.8%
Palaearctic	12	33.3%
Eurosiberian	1	2.8%
Holarctic	7	19.4%

The zoogeographic origin of the collected sawflies was evaluated (Table 1). Most of the species have wide geographic distribution, i.e. Holarctic, Palaearctic, West Palaearctic, East Palaearctic and Eurosiberian; their proportion is 86%. The so called characteristic components are the species with limited distribution areas: Ponto-Caspian, Holomediterran-Ponto-Caspian and Ponto-Caspian-Central Asian. These species are: *Calameuta grombczewskii* (Jakowlew, 1891), *Eutomostethus ephippium* ssp. *vopiscus* (Konow, 1899), *Pristiphora beaumonti* Zirngiebl, 1957, *Macrophya hamata* ssp. *caucasicola* Muche, 1969 and *Tenthredopsis viridis* Zhelochovtsev, 1941. Their proportion is 14%. Similar proportions (12-13%) were experienced during our investigations in the different regions of Caucasus (Japoshvili and Haris 2022b,c and d).

Identification of *Aprosthema fusicorne* (Ths.) caused some difficulties, which detailed as follows.

According to Lacourt 2020:

"Wings smoky but with apex lighter, veins and stigma dark brown. *A. fusicorne* (Thomson, 1871)

Wings strongly smoky, uniform, veins and stigma black. *A. austriacum* (Konow, 1892)"

Enslin (1912-18) provides more detailed analysis:

"Flügel schwärzlich getrübt, die Spitze jedoch klarer, Geäder und Stigma dunkelbraun. Beine rotgelb, die Hüften, Trochanteren, die breite Basis der vorderen und die schmale Basis der Hinterschenkel schwarz, die Spitze der Hintertibien schwarz, die Spitze der vorderen Tarsenglieder gebräunt, die der hintersten schwarz. Drittes Fühlerglied gegen die Basis stark verengt. *A. fusicorne* (Thomson, 1871)

Flügel völlig gleichmäßig schwärzlichgrau getrübt, die Spitze keine Spur heller; Geäder und Stigma schwarz. Beine schwarz, die Knie, Tibien und die Basis der Tarsen rotgelb, die Spitze der vier hinteren Tibien jedoch geschwärzt; an den Hinterschenkeln manchmal nur die Basis schwarz.Drittes Fühlerglied an der Basis kaum verengt. *A. austriacum* (Konow, 1892)"

MÓCZÁR and ZOMBORI (1973) separate the 2 closely related species as follows:

'Wings smoky but with apex lighter, veins and stigma dark brown. Legs dominantly reddish yellow; hind legs (entirely?), apices of tibiae and tarsi black. Third antennal segment strongly narrowed basally. *A. fusicorne* (Thomson, 1871)

Wings strongly smoky, uniform, veins and stigma black. Middle and hind legs, furthermore apices of tibiae and tarsi blackish. Third antennal segment not narrowed at all basally. *A. austriacum* (Konow, 1892)"

The Caucasian specimen has wings uniformly smoky (like *A. austriacum*), extensivelly yellow legs which are nearly entirely yellow, black are only base of coxae and small spots on fore and middle trochanters and on base of fore and middle femora (like *A. fuscicorne*) and antennal base strongly narrowed as 5 : 3 (median width : basal width of 3rd antennal segment) (like *A. fuscicorne*).

VIKBERG (2004) checked some *Aprosthema* species. He found, their colour and morphology were subject to changes according to which (spring or summer) generation they belonged. Probably, these 2 names represent only one species. However, we need confirmation for this.

References

ACHTERBERG, C. 2013: Hymenoptera in Fauna Europaea version 2.6.2. http://www.faunaeur.org. Last checked: 03. 05. 2023.

BENSON, R. B. 1968: Hymenoptera from Turkey, Symphyta. - Bulletin of the British Museum (Natural History). Entomology series, London 22(4): 111-207. https://doi.org/10.5962/bhl.part.9952

ENSLIN, E. 1912-18: Die Tenthredinoidea Mitteleuropas I-07. - Deutsche Entomologische Zeitschrift, Berlin [1912](Beiheft 1-7): 1-790.

GUSSAKOVSKIJ, V. 1935: Insectes Hyménoptéres, Chalastogastra 1. - Fauna SSSR, Moskva, Leningrad, Academie des Sciences de l'URSS, Moscou, Leningrad 2(1): 1-453.

GUSSAKOVSKIJ, V. 1947: Insectes Hyménoptéres, Chalastogastra 2. - Fauna SSSR, Moskva, Leningrad, Academie des Sciences de l'URSS, Moscou, Leningrad 2(2): 1-235.

GYURKOVICS, H. and HARIS, A. 2014: The genus Tenthredopsis Costa, 1859 in Hungary (Hymenoptera: Symphyta). - Natura Somogyiensis 24: 99-124. https://doi.org/10.24394/NatSom.2014.24.99

HARIS, A. 2006: Study on the Palaearctic Pristiphora species (Hymenoptera: Tenthredinidae). - Natura Somogyiensis 9: 201-277. https://doi.org/10.24394/NatSom.2006.9.201

JAPOSHVILI, G. and HARIS, A. 2022a: New Monoctenus Dahlbom, 1835 (Hymenoptera: Symphyta) species from Georgia. - Natura Somogyiensis 38: 23-28. https://doi.org/10.24394/NatSom.2022.38.23

JAPOSHVILI, G. and HARIS, A. 2022b: Sawflies (Hymenoptera: Symphyta) of Kintrishi National Park, southwest Georgia (Sakartvelo). - Annals of Agrarian Science 20: 12-27.

JAPOSHVILI, G. and HARIS, A. 2022c: Sawflies (Hymenoptera: Symphyta) from North-Western Georgia (Sakartvelo). - Caucasiana 1: 41-49. https://doi.org/10.3897/caucasiana.1.e83640

JAPOSHVILI, G. and HARIS, A. 2022d: Sawflies (Hymenoptera: Symphyta) from North-Western Georgia (Sakartvelo) (Part II). - Natura Somogyiensis 39: 35-46. https://doi.org/10.24394/NatSom.2022.39.35

JAPOSHVILI, G. and HARIS, A. 2023a: Sawflies (Hymenoptera: Symphyta) from the high altitudes of Caucasus in Kintrishi Nature Reserve, Georgia (Sakartvelo). - Annals of Agrarian Science 23: xxx In print

JAPOSHVILI, G. and HARIS, A. 2023b: Third contibution to the sawflies (Hymenoptera:Symphyta) of Kintrishi Nature Reserve (Georgia, Sakartvelo). - Annals of Agrarian Science 23: xxx In print

Lacourt, J. 2020: Sawflies of Europe: Hymenoptera of Europe 2 N. A. P. Editions. - Verriéres-le-Buisson 876 pp.

Macek, J., Roller, L., Beneš K, Holý K., Holuša, J. 2020: Blanokřídlí České a Slovenské republiky II. Širopasí - Academia Praha. 669 pp.

Móczár, L. and Zombori, L. 1973: Tenthredinoidea - Levéldarázs-alkatúak I. - In: Fauna Hungariae, Akadémiai Kiadó, Budapest, 111, 11(2), 128 p.

Prous, M., Blank, S. M., Goulet, H., Heibo, E., Liston, A., Malm., T., Nyman. T., Schmidt, S. Smith, D. R., Vårdal, H., Viitasaari, M., Vikberg, V., Taeger., A. 2014: The genera of Nematinae (Hymenoptera,Tenthredinidae). - Journal of Hymenoptera Research 40: 0-69. https://doi.org/10.3897/JHR.40.7442

Prous, M., Kramp, K., Vikberg. V., Liston, A. 2017: North-Western Palaearctic species of Pristiphora (Hymenoptera, Tenthredinidae). - Journal of Hymenoptera Research 59: 1-190. https://doi.org/10.3897/jhr.59.12656

Roller, L and Haris, A. 2008: Sawflies of the Carpathian Basin, History and Current Research. - Natura Somogyiensis 11. Kaposvár, 261. pp. https://doi.org/10.24394/NatSom.2008.11.2

Sundukov, Y. 2017: Suborder Symphyta - Sawflies and wood wasps. In: Lelej A.S. (Ed.). Annotated catalogue of the Hymenoptera of Russia. Volume I. Symphyta and Aculeata. - Proceedings of the Zoological Institute RAS. Supplement 6: 20-117. https://doi.org/10.31610/trudyzin/2017.supl.6.5

Supatashvili, A., Japoshvili, G. and Haris, A. 2022: Some important records on sawflies (Hymenoptera: Symphyta) from the Entomological Collection of Agricultural University of Georgia (Sakartvelo) identified by Dr. Ermolenko. - Natura Somogyiensis 39: 47-58. https://doi.org/10.24394/NatSom.2022.39.47

Vikberg, V. 2004: Seasonal head dimorphism and taxonomy of some European species of Aprosthema (Hymenoptera: Symphyta: Argidae). - Beiträge zur Entomologie 54(1): 107-125. https://doi.org/10.21248/contrib.entomol.54.1.107-125

Zhelochovtsev, A 1988: Otryad Hymenoptera - Pereponchatokrylye, Podotryad Symphyta - Sidyachebryukhie, 7-234. - In: Medvedev, K.H. (ed.) Opredelitel nasekomykh evropeiskoi chasti SSSR, Vol. 3 Hymenoptera, Part 6, Nauka, Leningrad.