

**First record of *Cybocephalus nipponicus* in Hungary  
(Coleoptera: Cybocephalidae)**

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**Abstract** – Native in southern and eastern Asia and the South Pacific, but introduced into other parts of the world, *Cybocephalus nipponicus* Endrödy-Younga, 1971 (Coleoptera: Cybocephalidae) is reported from Hungary based on specimens collected in Budapest, Hungary, representing a new country record for the species. This is likely a recent introduction, the level of establishment is unknown. With 3 figures.

**Key words** – Cucujoidea, Diaspididae, introduced species, scale insects

## INTRODUCTION

The family Cybocephalidae (Coleoptera: Cucujoidea) is a small assemblage of minute (0.5–2.5 mm long) beetles with ca. 150 described species in eight genera – the majority belongs to the genus *Cybocephalus* Erichson, 1844 (HISAMATSU 2013, SMITH & CAVE 2006a). Both larvae and adults are predators, preying mainly on armoured scale insects (Hemiptera: Diaspididae). The group was recognised either as a subfamily of Nitidulidae or a distinct family, its taxonomic history was discussed in the introductory parts of CLINE *et al.* (2014) and HISAMATSU (2013). Molecular phylogenetic studies (CLINE *et al.* 2014, BOCAK *et al.* 2014, ROBERTSON *et al.* 2015) support recognition of the group as a separate family.

Until now, four species of the family have been recorded from Hungary (ENDRÖDY-YOUNGA 1968, JELÍNEK & AUDISIO 2007): *Cybocephalus fodori* Endrödy-Younga, 1965, *C. politus* (Gyllenhal, 1813), *C. pulchellus* Erichson, 1845

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and *C. rufifrons* Reitter, 1874 (occurrence of the last species within present-day Hungary needs confirmation). In the summer of 2015 and the autumn of 2016 and 2017, a fifth species, the scale picnic beetle *Cybocephalus nipponicus* was found in four localities of urban Budapest, the capital city of Hungary.

#### CYBOCEPHALUS NIPPONICUS IN HUNGARY

On 15 October 2017 the second author (BK) posted photos of a distinctively patterned minute beetle on the website Ízeltlábúak.hu operated by him (“izeltlábúak” means “arthropods”). The original post is found at <<https://www.izeltlabuak.hu/talalat/14626>>, and shows a specimen observed on a yellow-washed wall of the Békásmegyér housing estate in District III, Budapest. The voucher (Figs 1–2) was donated to the Hungarian Natural History Museum (HNHM), where OM identified it as *Cybocephalus nipponicus*.

The third author (DK) collected beetles in parks and avenues of different locations in Budapest by beating foliage of field maple (*Acer campestre* L.) as part of his three-years PhD research project (Arthropod community of urban maple trees). In November 2017, several samples of beetles (mainly small-sized, hairy Coccinellidae) were passed on to OM for identification. Individuals of *C. nipponicus* were found in three samples. Seven specimens were collected in Rákóczi tér [square], which is a small (less than one hectare) park around a subway station in District VIII of Budapest, covered by ornamental trees, small shrubs, grassy patches and concrete surfaces and surrounded by multi-storey buildings and roads with heavy traffic. One specimen was collected in Hunyadi tér [square], which is also a small (about one hectare) park in District VI, with vegetation similar to that of Rákóczi tér and also with a small food market. One specimen was collected in the Buda Arboretum of the Szent István University in District XI, which is a 7.5-hectare botanical garden around the buildings of the university, surrounded by roads and old villas with gardens.

*Material* – HUNG., Budapest, XI. kerület [district], Budai Arborétum, N 47.480389°, E 19.036833°, *Acer campestre*, 29.VII.2015, leg. Dávid Korányi (1 male, HNHM); HUNG., Budapest, VI. kerület [district], Hunyadi tér [square], N 47.505917°, E 19.066722°, *Acer campestre*, 14.X.2016, leg. Dávid Korányi (1 female, HNHM); HUNG., Budapest, VIII. kerület [district], Rákóczi tér [square], N 47.492722°, E 19.072167°, *Acer campestre*, 27.IX.2017, leg. Dávid Korányi (4 males, 3 females, HNHM); HUNG., Budapest, III. ker. [district], Békásmegyér, Heltai Jenő tér [square], sárga házfalról [from yellow-washed house wall], N 47.597887°, E 19.057460°, 15.X.2017, leg. Balázs Károlyi (1 male, HNHM).

## DISCUSSION

*Distribution* – *Cybocephalus nipponicus* was redescribed and its bionomics and distribution were reviewed by SMITH & CAVE (2006a, b) and HISAMATSU (2013, see also references therein). The species is indigenous in East (Korea, China, Japan), South (India, Sri Lanka) and Southeast Asia (Thailand, Singapore) and in Micronesia (Palau, Mariana Islands) (ENDRŐDY-YOUNGA 1971, JELÍNEK & AUDISIO 2007). As a biological control agent against various armoured scale insect species it was deliberately introduced from Korea and Thailand to the eastern United States (several times), where it has been established and currently is widely distributed (SMITH & CAVE 2006a, b). Other documented events of human-mediated introduction include the one from Florida to the West Indies (SMITH & CAVE 2007), from Thailand to Taiwan (SMITH & BAILEY 2007, SONG *et al.* 2012) and South Africa (LABUSCHAGNE *et al.* 1996). The species was also found in Hawaii, but its introduction must have been accidental (EWING 2004).

In Europe, *C. nipponicus* was recorded for the first time from Italy (LUPI 2002). Although unpublished, the species was observed in France, according to a post on the forum Le Monde des insectes <<https://www.insecte.org/forum/viewtopic.php?t=149434>> that shows a photo of the unmistakable male of *C. nipponicus* from 21 November 2015. These records may be results of unintentional introduction.

The same holds for the Hungarian records. The source of introduction is unknown; the four known occurrences in urban environment (in areas of the highest population density in Budapest, Fig. 3) suggest that the species might have been accidentally brought in with ornamental plants infested with diaspidid scales.

*Prey species* – Thirteen diaspidid species were listed as hosts of *C. nipponicus* by SMITH & CAVE (2006a), and further four were added by SONG *et al.* (2012). In a no-choice host-specificity test adults fed also on one species each of Asterolecaniidae, Coccidae and Pseudococcidae, but no oviposition took place on these scales (SONG *et al.* 2012). Adults were observed devouring eggs of citrus red mite, *Panonychus citri* (McGregor, 1916) (Acari: Tetranychidae), but ovaries of such female adults remained undeveloped, and were unable to lay eggs (TANAKA & INOUE 1980). Consequently, the life cycle of *C. nipponicus* can apparently be completed only with feeding on armoured scale species.

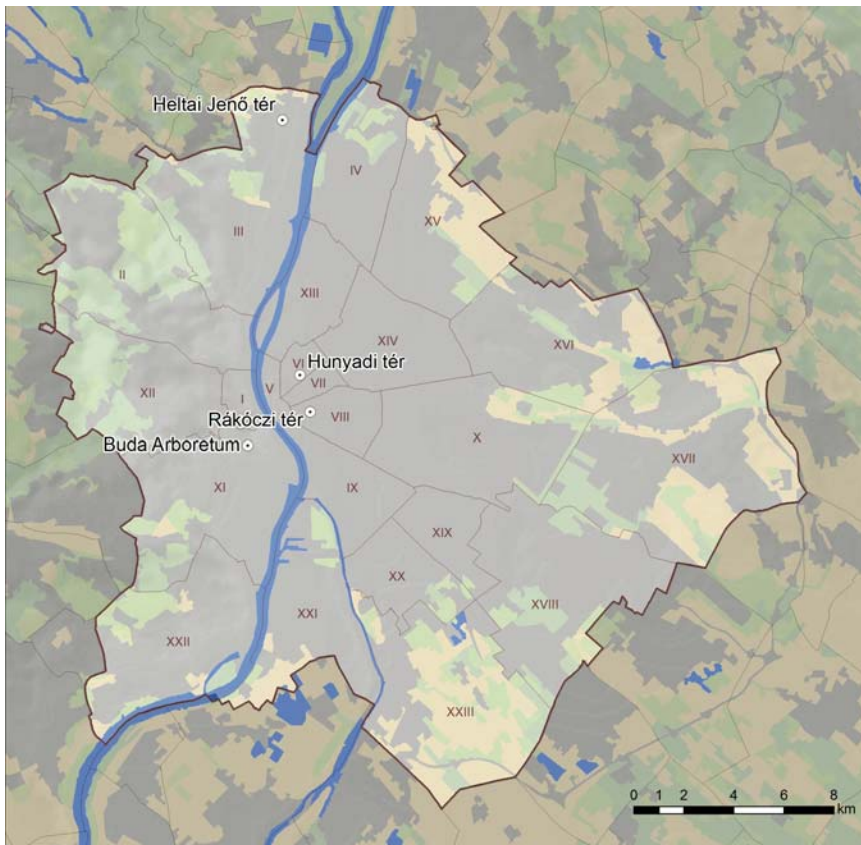
The hosts of *C. nipponicus* in Hungary are unknown as yet. DK found the euonymus scale, *Unaspis euonymi* (Comstock, 1881) on wintercreeper, *Euonymus fortunei* (Turcz.) Hand.-Maz. near the maple trees in Rákóczi tér; this diaspidid might be a prey species of the beetle. *Unaspis euonymi* was the first scale species against which *C. nipponicus* was released in the United States (DREA & CARLSON 1988).



1



2



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**Figs 1–3.** *Cybocephalus nipponicus* Endrődy-Younga, 1971: 1 = live male, 2 = mounted male (scale 0.2 mm), 3 = known occurrences in Budapest

*Identification* – *C. nipponicus* may be quite easily distinguished from its congeners occurring in Hungary. The male colour pattern is distinctive (Figs 1–2): head and pronotum are yellow and elytra are black (frons of male *C. politus* and *C. rufifrons* is yellowish red, but their pronotum is black, except ill-defined yellowish translucent lateral margins). Females of all species are unicoloured black dorsally, but the punctural interspaces of pronotum and elytra on *C. nipponicus* are smooth and glossy (interspaces, especially on elytra, are microreticulated and alutaceous on the other species). Some male specimens of *C. nipponicus* have dark brown to black pronotum (HISAMATSU 2013), but the smooth interspaces separate them from its congeners in Hungary.

The proposed Hungarian name of *C. nipponicus* is japán pajzstetvézbogár (meaning Japanese scale-hunting beetle).

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## REFERENCES

- CLINE A. R., SMITH T., MILLER K., MOULTON M. & WHITING M. 2014: Higher phylogenetics of Nitidulidae: assessment of subfamilial and tribal classifications, and formalization of the family Cybocephalidae (Coleoptera: Cucujoidea). – *Systematic Entomology* **39**: 758–772. <https://doi.org/10.1111/syen.12084>
- BOCAK L., BARTON C., CRAMPTON-PLATT A., CHESTERS D., AHRENS D. & VOGLER A. P. 2014: Building the Coleoptera tree-of-life for >8000 species: composition of public DNA data and fit with Linnaean classification. – *Systematic Entomology* **39**: 97–110. <https://doi.org/10.1111/syen.12037>
- DREA J. J. & CARLSON R. W. 1988: Establishment of *Cybocephalus* sp. (Coleoptera: Nitidulidae) from Korea on *Unaspis euonymi* (Homoptera: Diaspididae) in the eastern United States. – *Proceedings of the Entomological Society of Washington* **90**: 307–309.
- ENDRÓDY-YOUNGA S. 1968: Monographie der paläarktischen Arten der Familie Cybocephalidae (Coleoptera: Clavicornia). – *Acta zoologica Academiae scientiarum hungaricae* **14**(1–2): 27–115.
- ENDRÓDY-YOUNGA S. 1971: Neue Ergebnisse bei der Bearbeitung der paläarktischen und orientalischen Cybocephaliden (Coleoptera: Clavicornia). – *Acta zoologica Academiae scientiarum hungaricae* **17**(3–4): 243–249.
- EWING C. P. 2004: New records and taxonomic updates for adventive sap beetles (Coleoptera: Nitidulidae) in Hawai`i. – *Bishop Museum Occasional Papers* **79**: 42–47.
- HISAMATSU S. 2013: A review of the Japanese Cybocephalidae (Coleoptera: Cucujoidea). – *Zootaxa* **3616**: 253–267. <https://doi.org/10.11646/zootaxa.3616.3.3>

- JELÍNEK J. & AUDISIO P. 2007: Nitidulidae Latreille, 1802. – In: LÖBL I. & SMETANA A. (eds): *Catalogue of Palaearctic Coleoptera. Vol. 4. Elateroidea–Derodontoidea–Bostrichoidea–Lymexyloidea–Cleroidea–Cucujoidea*. Apollo Books, Stenstrup, pp. 459–491.
- LABUSCHAGNE T. I., DANEEL M. S. & DE BEER M. 1996: Establishment of *Aphytis* sp. (Hymenoptera: Aphelinidae) and *Cybocephalus binotatus* Grouvelle (Coleoptera: Nitidulidae) in mango orchards in South Africa for control of the mango scale, *Aulacaspis tubercularis* Newstead (Homoptera: Diaspididae). – *Yearbook South African Mango Growers' Association* **16**: 20–22.
- LUPI D. 2002: *Cybocephalus nipponicus* Endrödy-Younga (Coleoptera, Cybocephalidae) on *Diaspis echinocacti* (Bouche) in Liguria. – *Bollettino di Zoologia Agraria e di Bachicoltura* **34**(3): 463–466.
- ROBERTSON J., ŚLIPINIŃSKI A., MOULTON M., SHOCKLEY F. W., GIORGI A., LORD N. P., MCKENNA D. D., TOMASZEWSKA W., FORRESTER J., MILLER K. B., WHITING M. F. & MCHUGH J. V. 2015: Phylogeny and classification of Cucujoidea and the recognition of a new superfamily Coccinelloidea (Coleoptera: Cucujiformia). – *Systematic Entomology* **40**: 745–778.  
<https://doi.org/10.1111/syen.12138>
- SMITH T. R. & BAILEY R. 2007: A new species of *Cybocephalus* (Coleoptera: Cybocephalidae) from Taiwan and a new distribution record for *Cybocephalus nipponicus*. – *The Coleopterists Bulletin* **61**(4): 503–508.  
[https://doi.org/10.1649/0010-065X\(2007\)61\[503:ANSOCC\]2.0.CO;2](https://doi.org/10.1649/0010-065X(2007)61[503:ANSOCC]2.0.CO;2)
- SMITH T. R. & CAVE R. D. 2006a: The Cybocephalidae (Coleoptera) of America North of Mexico. – *Annals of the Entomological Society of America* **99**(5): 776–792.  
[https://doi.org/10.1603/0013-8746\(2006\)99\[776:TCCOAN\]2.0.CO;2](https://doi.org/10.1603/0013-8746(2006)99[776:TCCOAN]2.0.CO;2)
- SMITH T. R. & CAVE R. D. 2006b: The life history of *Cybocephalus nipponicus* a predator of the cycad aulacaspis scale, *Aulacaspis yasumatsui* (Homoptera: Diaspididae). – *Proceedings of the Entomological Society of Washington* **108**: 905–916.
- SMITH T. R. & CAVE R. D. 2007: The Cybocephalidae (Coleoptera) of the West Indies and Trinidad. – *Annals of the Entomological Society of America* **100**(2): 164–172.  
[https://doi.org/10.1603/0013-8746\(2007\)100\[164:TCCOTW\]2.0.CO;2](https://doi.org/10.1603/0013-8746(2007)100[164:TCCOTW]2.0.CO;2)
- SONG S.-Y., TAN C.-W. & HWANG S.-Y. 2012: Host range of *Cybocephalus flavocapitis* and *Cybocephalus nipponicus*, two potential biological control agents for the cycad aulacaspis scale, *Aulacaspis yasumatsui*. – *Journal of Asia-Pacific Entomology* **15**: 595–599.  
<https://doi.org/10.1016/j.aspen.2012.06.001>
- TANAKA M. & INOUE K. 1980: Biology of *Cybocephalus nipponicus* Endrödy-Younga (Cybocephalidae) and their role as a predator of Citrus red mites, *Panonychus citri* (McGregor). – *Bulletin of the Fruit Tree Research Station D* **2**: 91–110.