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Species of the genus *Agriotes* Eschscholtz, 1829 occurring in Hungary (Coleoptera: Elateridae)

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Abstract – Eleven species of the genus *Agriotes* Eschscholtz, 1829 (Coleoptera: Elateridae: Elaterinae: Pomachiliini) occurring in Hungary are recognised, briefly discussed, and illustrated. It is demonstrated that previous records of *Agriotes sordidus* (Illiger, 1807) from Hungary were based on misidentification, therefore this species is deleted from the list of the Hungarian fauna.

Key words – click beetles, pests, plant protection, faunistics, identification

INTRODUCTION

The Elateridae (Coleoptera) fauna of Hungary is well studied. A checklist was provided by Mertlik & Merkl (2005); Németh (2017) summarised the subsequent changes. Since the latter paper, Mertlik (2021) reported one additional species, *Dicronychus testaceus* (Fabricius, 1792) and Nagy *et al.* (2023) published the first Hungarian record of *Agriotes sordidus* (Illiger, 1807).

The genus *Agriotes* Eschscholtz, 1829 is represented by approximately 150 species in the Palaearctic Region and by 40 species in the Nearctic Region (Cate 2007, Johnson 2002). Species of the genus known from Hungary were enumerated by Kuthy (1897) and Horion (1953); later, Mertlik & Merkl (2005) and Németh (2017) recognised eleven species in the country. The present paper provides a brief review of the species occurring in Hungary.

This study was based on the examination of thousands of specimens of *Agriotes* species from Hungary and other countries of Europe. Since identification of Elateridae based on morphological characters is often problematic due to infraspecific variability (Mertlik *et al*. 2017), study of the male genitalia is usually necessary for reliable identifications. It is to be stressed, however, that the genus has a number of unresolved taxonomic problems, and in some cases both classical taxonomy and phylogenetic analysis have their limits in distinguishing *Agriotes* species (Staudacher *et al*. 2010).

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The species of *Agriotes* reported from Hungary are briefly diagnosed and discussed below. Species are listed in alphabetical order. Label data of the illustrated specimens are given verbatim, with necessary explanations in square brackets.

Abbreviations – HNHM = Hungarian National Museum Public Collection Centre – Hungarian Natural History Museum, Budapest; PCRK = private collection of Robin Kundrata, Olomouc; PPID = Plant Protection Institute, University of Debrecen.

SPECIES

Agriotes acuminatus (Stephens, 1830) (Figs 1–3)

Body length 6–8 mm. Colouration variable, usually dark brown, posterior pronotal edges and elytra sometimes partly yellowish. Lateral margins of posterior pronotal angles covered by carina in dorsal view. Pronotum shiny, with sparse punctuation, slightly wider than long, narrowed anteriorly, elytra 2.8–3 times longer than pronotum. Aedeagus as in Figs 2–3. Common in the montane forests zone in Hungary.

Material photographed – Montenegro, Bar distr., Mt. Vrsouta, Sutorman, mixed forest, swept and beaten, 42°9'18.32"N, 19°5'52.81"E, 1–2.VI.2014., leg. V. Dusanek, R. Kundrata & T. Németh, det. T. Németh 2014 (PCRK).

Agriotes brevis Candèze, 1863 (Figs 4–6)

Body length 6–8 mm. Dark brown, pronotum and elytra partly rusty brown. Pronotum shiny, punctuation sparse, as wide as long in males, wider than long in females. Aedeagus as in Figs 5–6, penis and parameres straight, penis with almost straight edges, wider than paramere, apex slightly rounded, parameres widest at midlength. Common all over Hungary.

Material photographed – Croatia, Istria, Savudnia Mts., 5 km NW Buje, 100 m., swept, 20.V.2012., leg. A. Kotán, det. T. Németh 2015 (HNHM).

Agriotes lineatus (Linnaeus, 1767) (Figs 7–12)

Body length 8–11 mm. Brownish black, odd elytral intervals paler, therefore elytra with more or less contrasting longitudinal bands. Pronotum usually as long

as or slightly longer than wide. Most of the identification keys (Laibner 2000, Leseigneur 1972, Platia 1994) refer to the ratio of pronotum to distinguish this species from the very similar *Agriotes proximus* Schwarz, 1891 (Figs 25–27), although specimens with transverse (i.e., wider than long) pronotum occurs in populations of *A. lineatus* (Fig. 10). Staudacher *et al.* (2010) found these two species molecularly indistinguishable, questioning their separate species status. The aedeagus of *A. lineatus* (Figs 8, 9, 11 & 12) has parameres with less sharp but nevertheless distinct hook, and a noticeably wider and shorter penis, while *A. proximus* has paramere hooks thinner and sharper, less developed, and a distinctly more elongated penis (Figs 26–27). Figures of the aedeagus of the two species presented by Laibner (2000: figs 337–338) reflect the characters mentioned above, while the figures of Platia (1994: fig. 38) show the opposite situation. Common in wet meadows in Hungary.

Material photographed – Hungary, Bács-Kiskun megye [= County], Dunatetétlen, Böddi-szék, szikes tópart [= shore of saline pond], alkonyati hálózás [= swept at sunset], 2017.VI.22., leg. Németh T. & Szénási V., det. T. Németh 2017 (HNHM) (Figs 7–9); Bulgaria, Sofia prov., Sofia, Vitosha Mt., meadow, swept, 4.VI.2015., leg. P. Brůha, J. Mertlik, T. Németh & B. Zbuzek, det. T. Németh 2015 (PCRK) (Figs 10–12).

Agriotes medvedevi Dolin, 1960
(Figs 13–15)

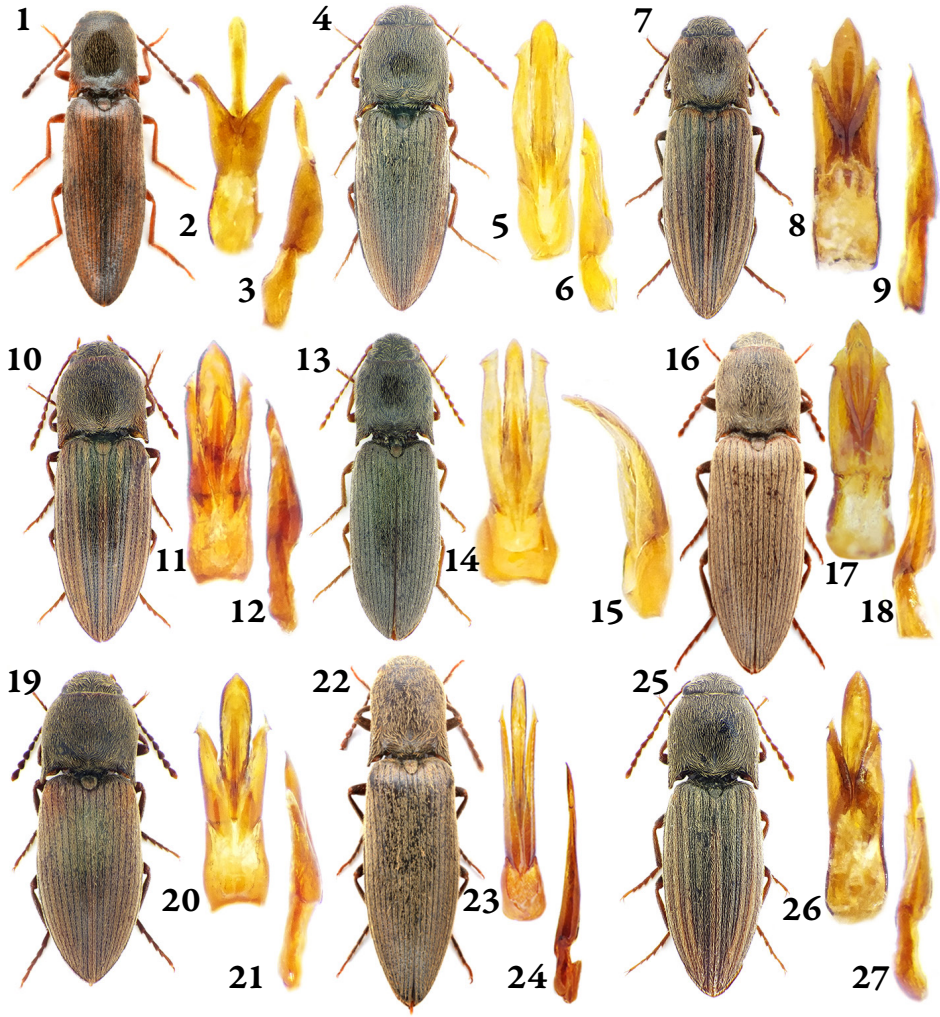
Body length 8–10 mm. Blackish brown, elytra brown, antennae and legs paler brown. Pronotum distinctly longer than wide, densely punctate. Aedeagus as in Figs 14–15, penis and parameres curved, apical tooth of paramere distinct, parameres slightly narrowed at apical third, widest at midlength. Rare in Hungary, occurs in saline areas, active on the vegetation and the ground at sunset.

Material photographed – Hungary, Bács-Kiskun megye [= County], Dunatetétlen, Böddi-szék, szikes tópart [= shore of saline pond], alkonyati hálózás [= swept at sunset], 2017.VI.22., leg. Németh T. & Szénási V., det. T. Németh 2017 (HNHM).

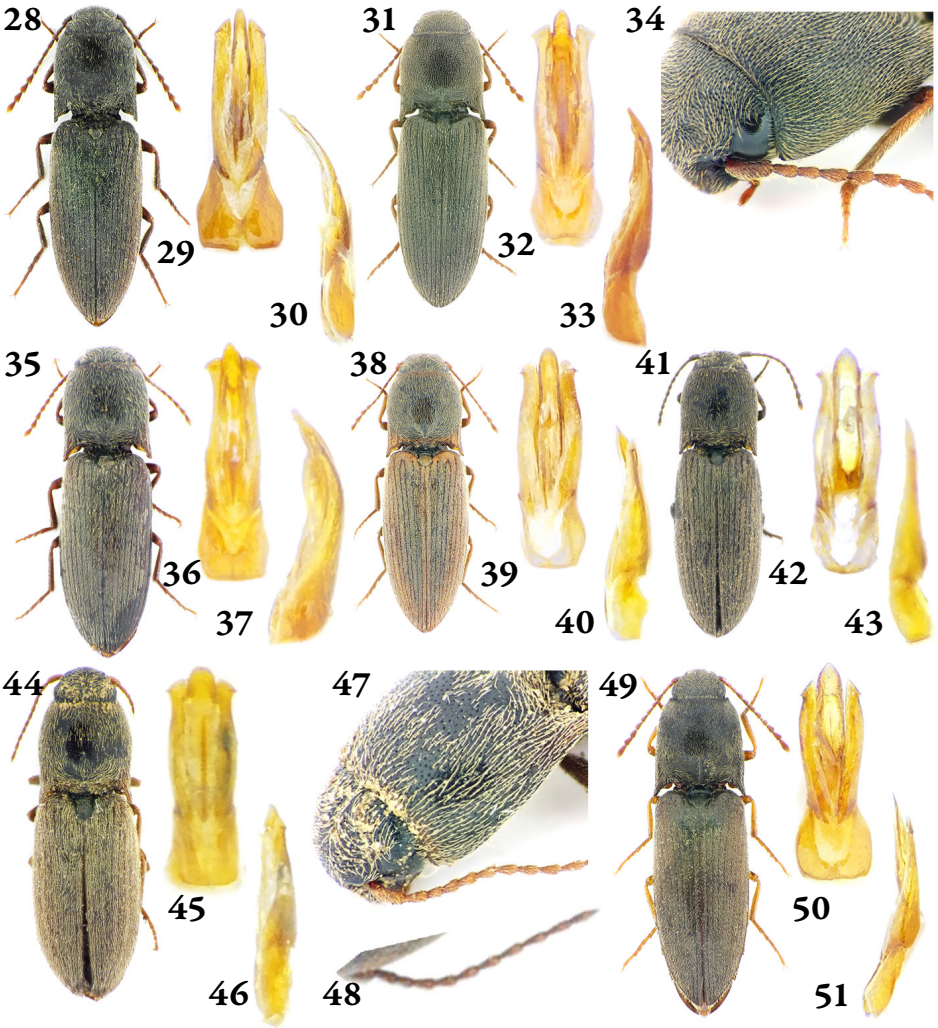
Agriotes modestus Kiesenwetter, 1858
(Figs 16–18)

Body length 10–13 mm. Blackish brown, elytra paler. Aedeagus as in Figs 17–18, penis and parameres straight, not curved. Occurs in open sandy habitats in Hungary.

Material photographed – Hungary, Pest m. [= county], Tatárszentgyörgy, Vitéz-sori-buckák, fényre [= at light], 2017.VI.20., leg. Németh T., Seres G. & Szénási V., det. T. Németh 2017 (HNHM).



Figs 1–27. Males of *Agriotes* species, 1–3 = *A. acuminatus* (Stephens, 1830), 1 = dorsal view, 2 = aedeagus, dorsal view, 3 = aedeagus, lateral view; 4–6 = *A. brevis* Candèze, 1863, 4 = dorsal view, 5 = aedeagus, dorsal view, 6 = aedeagus, lateral view; 7–12 = *A. lineatus* (Linnaeus, 1767), 7 = specimen from Hungary, dorsal view, 8 = aedeagus, dorsal view, 9 = aedeagus, lateral view, 10 = specimen from Bulgaria, dorsal view, 11 = aedeagus, dorsal view, 12 = aedeagus, lateral view; 13–15 = *A. medvedevi* Dolin, 1960, 13 = dorsal view, 14 = aedeagus, dorsal view, 15 = aedeagus, lateral view; 16–18 = *A. modestus* Kiesenwetter, 1858, 16 = dorsal view, 17 = aedeagus, dorsal view, 18 = aedeagus, lateral view; 19–21 = *A. obscurus* (Linnaeus, 1758), 19 = dorsal view, 20 = aedeagus, dorsal view, 21 = aedeagus, lateral view; 22–24 = *A. pilosellus* (Schönherr, 1817), 22 = dorsal view, 23 = aedeagus, dorsal view, 24 = aedeagus, lateral view; 25–27 = *A. proximus* Schwarz, 1891, 25 = dorsal view, 26 = aedeagus, dorsal view, 27 = aedeagus, lateral view
(photos by Tamás Németh)



Figs 28–51. Males of *Agriotes* species, 28–30 = *A. rufipalpis* (Brullé, 1832), 28 = dorsal view, 29 = aedeagus, dorsal view, 30 = aedeagus, lateral view; 31–37 = *A. sordidus* (Illiger, 1807), 31 = specimen from Italy, dorsal view, 32 = aedeagus, dorsal view, 33 = aedeagus, lateral view, 34 = head and pronotum, dorsolateral view; 35 = specimen from Spain, dorsal view, 36 = aedeagus, dorsal view, 37 = aedeagus, lateral view; 38–48 = *A. sputator* (Linnaeus, 1758), 38 = specimen from Hungary dorsal view, 39 = aedeagus, dorsal view, 40 = aedeagus, lateral view, 41= specimen No. 1 from Hungary (PPID), dorsal view, 42 = aedeagus, dorsal view, 43 = aedeagus, lateral view, 44 = specimen No. 2 from Hungary (PPID), dorsal view, 45 = aedeagus, dorsal view, 46 = aedeagus, lateral view, 47 = head and pronotum, dorsolateral view, 48 = antennomeres of *Agriotes* specimen figured in Nagy *et al.* (2023); 49–51 = *A. ustulatus* (Schaller, 1783), 49 = dorsal view, 50 = aedeagus, dorsal view, 51 = aedeagus, lateral view (photos by Antal Nagy (Fig. 48) and Tamás Németh (Figs 28–47, 49–51))

Agriotes obscurus (Linnaeus, 1758)
(Figs 19–21)

Body length 7–10 mm. Dark brown, elytra paler. Pronotum 1.2–1.3× as wide as long, clearly convex dorsally and laterally, elytra 2.1–2.3× as long as wide. Aedeagus as in Figs 20–21, penis and parameres straight, not curved. Common in Hungary, especially in wet meadows.

Material photographed – Hungary, Borsod-Abaúj-Zemplén m. [= County], Kishuta, Kemence-patak-völgye, kopogtatva [= beaten], 2018.V.21., leg. Németh T., det. T. Németh 2017 (HNHM).

Agriotes pilosellus (Schönherr, 1817)
(Figs 22–24)

Body length 13–17 mm. Body conspicuously elongate, black or brownish with grey pubescence. Aedeagus as in Figs 23–24, penis and parameres distinctly elongate, straight, not curved. Common in forest edges and clearings in Hungary.

Material photographed – Slovakia, Divin, Ružiná, swept, 14–16.V.2018., leg. A. Kotán, det. T. Németh 2017 (HNHM).

Agriotes proximus Schwarz, 1891
(Figs 25–27)

Body length 8–11 mm. Brownish black, odd elytral intervals paler, therefore elytra with more or less contrasting longitudinal bands. Pronotum wider than long. Aedeagus as in Figs 26–27. Very similar to *A. lineatus* (Linnaeus, 1767); see discussion under the latter species. Halophilous species, not common in Hungary.

Material photographed – Hungary, Békés m. [= County], Békéscsaba, Gerla-Marói-erdő, hálózva [= swept], 2016.V.12., leg. Deli T., det. T. Németh 2018 (HNHM).

Agriotes rufipalpis (Brullé, 1832)
(Figs 28–30)

Body length 7–9 mm. Black, sometimes elytra paler laterally with darker suture. Pronotum distinctly longer than wide, densely punctate. Aedeagus as in Figs 29–30, penis and parameres curved, apical tooth of paramere small, edges of parameres parallel, parameres widest at midlength. Restricted to saline areas in Hungary.

Material photographed – Hungary, Békés m. [= County], Gyula, Pej-rét, "Csalomon" feromoncsapda [= pheromone trap], 2016.VII.2., leg. Márkus A., det. T. Németh 2016 (HNHM).

Agriotes sordidus (Illiger, 1807)
(Figs 31–37)

Body length 7–11 mm, blackish. Pronotum slightly longer than wide or as wide as long, dull, densely punctate. Aedeagus as in Figs 32–33, 36–37, penis and parameres strongly curved, apical tooth of paramere distinct, parameres widest at midlength. Second antennomere as long as or slightly longer than third. Erroneously reported from Hungary by Nagy *et al.* (2023) based on misidentified specimens (see below); no correctly identified material has been seen from Hungary.

Material photographed – Italy, Sicily, Ris. Nat. Orientata Bosco della Ficuzza, from beneath bark, 5.X.2015., leg. P. Nemes & T. Németh, det. T. Németh 2015 (HNHM) (Figs 31–34); Spain, Logrono, Canales de la Sierra, 1987.VI.9., leg. Podlussány, det. G. Platia 2013 (HNHM) (Figs 35–37).

Remarks on identification – A serious agricultural pest widely distributed in Europe (Cate 2007). A morphologically very variable species (Platia 1994). Authors used various, occasionally contradicting characters to separate it from other small, brownish, externally similar species of the genus. Laibner (2000: 197) considers the following characters as diagnostic: pronotum as wide as long or wider than long; antenna of male reaching posterior angle of pronotum; penis and parameres curved. Platia (1994: 226) recognises the following features: pronotum as wide as or slightly wider than long; antenna not reaching posterior angles of pronotum; second antennomere slightly longer than third, their combined length longer than fourth antennomere; lateral margins of pronotum subparallel or arched, with deep punctures, intervals between punctures usually very small. Leseigneur (1972: 316) lists the following diagnostic characters: pronotum about as long as wide, roughly punctate, intervals between punctures about as long as diameter of punctures; second antennomere as long as third; aedeagus not sinuate. Among the species of *Agriotes* occurring in Hungary, *A. brevis*, *A. medvedevi*, *A. rufipalpis*, *A. sputator* and *A. ustulatus* are highly similar to *A. sordidus* in colour and structure; reliable identification of this species is only possible based on the male genitalia.

Lehmhus & Niepold (2013) reported morphologically unusual, conspicuously small and brown specimens from Germany, identified by molecular markers. These specimens nevertheless exhibit the typical curved aedeagus of *A. sordidus*. Lehmhus & Niepold (2013) suggested that these specimens represent accidentally introduced populations of *A. sordidus* from other regions. Clarification of the taxonomic status of these unusual specimens would require further study.

Remarks on the Hungarian record – Nagy *et al*. (2023) reported this species as new to Hungary based on 26 specimens collected by pheromone traps. The photo accompanying the record (Nagy *et al*. 2023: fig. 2), however, shows a specimen with shiny pronotum and with a second antennomere that is clearly longer than the third (Fig. 48). Both of these character states suggest that the illustrated specimen may not be *A. sordidus*. A. Nagy (PPID) kindly provided 20 specimens for my request in order to clear up the identity of this species; all of these were unlabelled and unmounted males (Figs 41–47) from unknown localities in Hungary, but nevertheless identified as *A. sordidus* by members of the research team in PPID. These specimens are consistent with the above-mentioned photo (Nagy *et al*. 2023: fig. 2), and their direct examination, including that of the genitalia, concluded that they undoubtedly represent specimens of *A. sputator*. Thus, the Hungarian occurrence of *A. sordidus* reported by Nagy *et al*. (2023) was evidently based on misidentification and their records pertain to *A. sputator*. Due to the lack of any reliable voucher specimen of *A. sordidus* from Hungary the species is to be deleted from the list of the Hungarian fauna.

Agriotes sputator (Linnaeus, 1758)
(Figs 38–48)

Body length 6–9 mm. Dark brown, pronotum and elytra partly rusty brown. Pronotum longer than wide in males, as long as wide in females, shiny between punctures, sparsely punctate. Second antennomere distinctly longer than third (Figs 47–48). Aedeagus as in Figs 39–40, 42–43, 45–46, penis and parameres straight, not curved, about as wide as paramere, slightly narrowed anteriorly, its apex sharper, parameres widest at midlength. Very common in Hungary, occurs in open habitats all over the country.

Material photographed – Hungary, Pest m. [= County], Farmos, Ökörjárási-dűlő, homoki gyep [= sandy steppe], talajcsapda [= pitfall trap], 2017.III.28., leg. Németh T., det. T. Németh 2017 (HNHM) (Figs 38–40); specimen no 1. from the collection of PPID, misidentified as *A. sordidus* by Nagy *et al*. (2023), det. T. Németh 2024 (PPID) (Figs 41–43); specimen no 2. from the collection of PPID, misidentified as *A. sordidus* by Nagy *et al*. (2023), det. T. Németh 2024 (PPID) (Figs 44–47); Hungary, Pápa, Vinár, 2022.V.19., combined *A. rufipalpis/A. sordidus* sex pheromone trap, det. T. Németh 2024 (PPID) (Fig. 48).

Agriotes ustulatus (Schaller, 1783)
(Figs 49–51)

Body length 7–12 mm. Colouration variable, blackish, elytra dark brown to pale yellowish. Pronotum longer than wide, shiny, flat, posterior keels of

pronotum distinct. Aedeagus as in Figs 50–51, parameres slightly curved, widest at anterior third. Common in Hungary, active in summer, often visits flowering plants.

Material photographed – Hungary, Békés m. [= County], Gyula, Városerdő, 2008.VI.29., leg. Márkus A., Németh T., Rahmé N. & Szelenczey B., det. T. Németh 2009 (HNHM).

*

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