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RARE ENDEMIC DARKLING BEETLE *HEDYPHANES NYCTERINOIDES* FALDERMANN, 1837 (COLEOPTERA: TENEBRIONIDAE) FROM DAGESTAN AS AN INDICATOR OF HALOPHYTIC BIOTOPES

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Abstract. Aim. In this work, we aimed to study the distribution and habitat of rare Caucasian tenebrionid beetle *Hedyphanes nycterinoides*, as well as to identify reasons for the population reduction and to develop a basis for its protection. **Methods.** Materials from the largest collection of the Zoological Institute RAS (St Petersburg) along with the authors' fieldwork data were used for mapping the past and current distribution of the species, as well as for studying its habitat and possible trophic relations. **Results.** The taxonomic history of *H. nycterinoides* is complicated due to the loss of the type material. This taxon is currently interpreted as a separate species. *H. nycterinoides* is distributed across Piedmont Dagestan and Intermountain Dagestan (Russia); however, all known specimens were collected only in the 19th-20th centuries (the last record is dated 1984). The population of *H. nycterinoides* from Intermountain Dagestan is likely to have died out due to the filling of the Irganay reservoir in 2008. Only one present-day population from the arid Rubas valley in Southern Dagestan is known. The species inhabits saline soils (solonetz, solonchak) and feeds on saltworts. It is active in April–May in the evening or in the daytime provided it is cloudy. **Conclusions.** We recommend that *H. nycterinoides* be included in the list of threatened species of Dagestan as an indicator of the state of halophytic plant communities from the hilly landscapes of the Eastern Caucasus. The main factors of the contemporary population reduction include overgrazing and filling of reservoirs.

Keywords: rare Tenebrionidae, *Hedyphanes*, North Caucasus, halophytic plant communities, conservation.

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РЕДКАЯ ЭНДЕМИЧНАЯ ЧЕРНОТЕЛКА *HEDYPHANES*
NYCTERINOIDES FALDERMANN, 1837 (COLEOPTERA:
TENEBRIONIDAE) ИЗ ДАГЕСТАНА – ИНДИКАТОР
ГАЛОФИТНЫХ БИОТОПОВ

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Резюме. Цель работы – разработка основы для охраны редкого кавказского жука-чернотелки *Hedyphanes nycterinoides* после изучения его распространения, местообитаний и причин ухудшения состояния популяции. **Методы.** Для картирования прошлого и современного ареала вида, исследования его местообитаний и трофических связей были использованы материалы крупнейшей коллекции Зоологического института РАН, сборы и наблюдения авторов в природе. **Результаты.** Таксономическая история вида сложна и запутанна в результате утери типового материала. В настоящее время этот таксон интерпретируется как самостоятельный вид. *Hedyphanes nycterinoides* распространен во Внешнегорном и Внутригорном Дагестане, но все известные экземпляры были собраны в XIX-XX веках (последняя находка датируется 1984 годом). Популяция вида из Внутригорного Дагестана возможно вымерла после наполнения Ирганайского водохранилища в 2008 году. Известна только одна современная популяция из аридной долины реки Рубас в Южном Дагестане. Вид населяет засоленные почвы (солонцы, солончаки) и питается солянками, активен в апреле-мае, вечером или днем в пасмурную погоду. **Выводы.** *Hedyphanes nycterinoides* рекомендован для включения в Красную книгу Дагестана как индикатор состояния галофильных растительных сообществ в холмистых ландшафтах Восточного Кавказа. Основные факторы деградации популяции – перевыпас и заполнение водохранилищ. **Ключевые слова:** редкие Tenebrionidae, *Hedyphanes*, Северный Кавказ, галофитные растительные сообщества, охрана.

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INTRODUCTION

Species of the genus *Hedyphanes* Fischer von Waldheim, 1820 (Coleoptera: Tenebrionidae: tribe Helopini) are widely distributed in Turkey, the Caucasus, Iran, Iraq, Central Asia, Kazakhstan and Afghanistan [1]. Taxonomic revision of the genus is presented in a series of papers [1-6] and a larva of one species is described by Gilyarov and Svetova (1963) in [7]. Bionomics and trophic relations of the most species have not yet been studied. The species of the genus are phytophagous unlike most lichen-feeding Helopini [8; 9].

Two species of this genus are found on the territory of Russia: *H. coerulescens* Fischer von Waldheim, 1821, known by several records from Astrakhan Region and Bashkortostan in the border areas of Kazakhstan [1; 10] and *H. nycterinoides* Faldermann, 1837, found only in Dagestan [5]. Landscape-biotopical distribution of the former is well studied in Central Asia and



Kazakhstan [11-16], whereas the latter was entered only in faunistic checklists, catalogues [5; 17] and some mentioned taxonomic works.

According to our study, the state of the population of *H. nycterinoides* is catastrophic and requires research along with urgent conservation measures.

MATERIALS AND METHODS

In this study, we used materials from the collection of the Zoological institute RAS, St Petersburg (ZIN), as well as the results of our previous fieldwork (beetles are deposited in the private collection of M.V. Nabozhenko, Makhachkala, CN).

RESULTS AND DISCUSSION

Hedyphanes nycterinoides Faldermann, 1837 (fig.1-4)

Taxonomic history. *Hedyphanes nycterinoides* was described as being from Transcaucasia without giving a distinct locality [18]. Type specimens of this species are lost, therefore, various authors interpreted its status according to their own understanding. Motshulsky [19] synonymized it with *Hedyphanes laticollis* Fischer von Waldheim in Ménériés, 1832. Allard [20] considered *H. nycterinoides* as separate species, however later he [21] included this taxon in his checklist as the junior synonym of *H. laticollis*. Seidlitz [22] interpreted *nycterinoides* as a separate species but listed a very wide distribution (Derbent – locality of *H. nycterinoides*; Iran, Shahrud – locality of *H. seidlitzii* Reitter, 1914; Elisabethpol (now Azerbaijan, Gyanja) – locality of *H. tagenioides* Faldermann in Ménériés, 1832 and *H. laticollis*), therefore the taxon was mixed. Reitter [23; 24], who considered *H. nycterinoides* to be an independent species, recorded it for Derbent, the Aras valley and Transcaucasia (locality of three species *H. tagenioides*, *H. laticollis* and *H. mannerheimi* Faldermann, 1837), therefore *nycterinoides* sensu Reitter, 1922 was also a mixed taxon. Medvedev [10] listed *H. nycterinoides* as the separate species, found only in Dagestan. Nabozhenko [2] decreased the status of the species to subspecies *H. laticollis nycterinoides*, however later Abdurakhmanov and Nabozhenko [5] returned a species rank to this taxon.

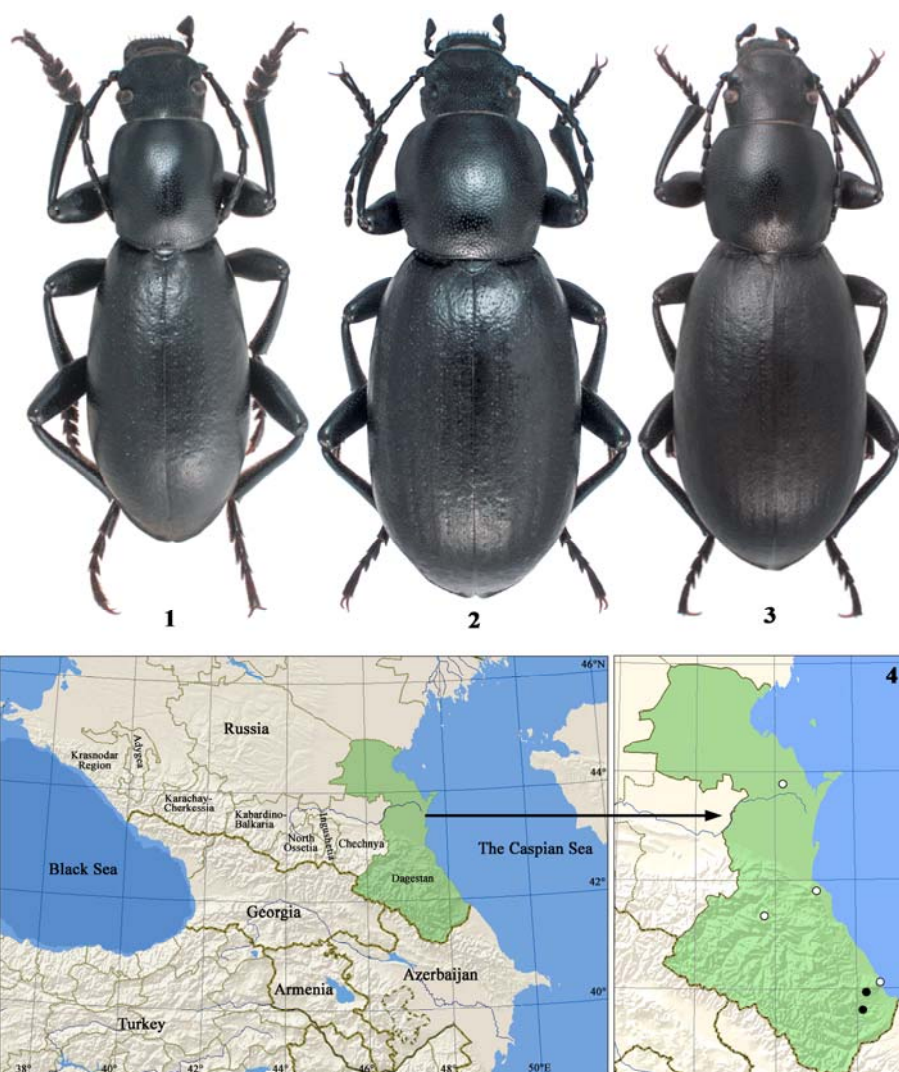
Type material. Not found, probably lost.

Type locality: “Transcaucasia”.

Material (all from Dagestan Republic, Russia). 2 ♀ (ZIN) with Cyrillic labels: “Kizlyrsk. okr., Kirichenko, 20.V.1925.” and “Alexandriyskaya, Terekli-Mekteb” (now Kizlyar District, Alexandriyskaya, 43°54'27"N, 47°07'51"E); 1 ♀ (ZIN): foothills SW Makhachkala, 10.04.1985, V. Yanushev; 1 ♂ (ZIN) with a Cyrillic label: “Dagestan, Untsukul Distr. Irgnay, hydroelectric power station, 1984, B. Saypulaeva”; 2 ♂♂ (ZIN) with labels: “Derbend”, “k [coll.]. Rybakov”; 1 ♂, 1 ♀ (ZIN): with a label “Tabasaran [Distr.], Maraga, 29.04.00”; 2 ♂♂ (CN): Tabasaran Distr., arid hills, right bank of the Rubas River, opposite Sirtych, 41°48'N, 48°04'E, 24.04.2017, leg. M.V. Nabozhenko, A.A. Teymurov.

Redescription, comparison (keys) and figures are given by Nabozhenko in [2] and by Abdurakhmanov, Nabozhenko in [5]. Populations can have a weak bluish shade (figs 1-2) or be completely black (Kizlyar distr.) (fig. 3); females have the pronotum widest before the middle (fig. 2) or at the middle.

Distribution (fig. 4). Piedmont Dagestan (Kizlyar Distr., hills near the Caspian sea, arid hills in the Rubas valley) and Intermountain Dagestan (Untsukul arid mountain valley). The species was collected only in the 19th-20th centuries despite intense research which has been conducted in Dagestan since 1990s [25]. The last record is dated 1984. Two males collected in 2017 were found 33 years later. The arid Rubas valley is the southernmost border of the range of *H. nycterinoides* and the only known present time locality of the species. The population of *H. nycterinoides* from the Untsukul arid mountain hollow died out. The species was collected in the valley of the Avarian Koysu River, which was then flooded with the Irganay reservoir.



Figs.1-4. *Hedyphanes nycterinoides*, habitus and distribution.

1 – male, population having bluish colour, Rubas valley; 2 – the same, female;
3 – female, population having black body, Terek valley; 4 – map of distribution

Рис.1-4. *Hedyphanes nycterinoides*, габитус и распространение.

1 – самец, популяция с синеватым оттенком, долина р. Рубас; 2 – то же, самка;
3 – самка, популяция с черными покровами, долина р. Терек; 4 – карта распространения

Habitats (fig. 5). The species inhabit saline soils on hills, piedmont plains and in arid intermountain hollows. It is active in the spring (April-May), in the evening or in the daytime in cloudy weather and feeds on saltworts (*Bassia sedoides* (Pall.) Aschers, *Kalidium foliatum* (Pall.) Moq., *Salsola ericoides* M. Bieb., *Salsola soda* L., *Camphorosma lessingii* Litv., *Salsola tragus* L., suffrutescent *Climacoptera crassa* (M. Bieb.) Botsch. *Halothamnus glaucus* (M. Bieb.) Botsch., *Petrosimonia oppositifolia* (Pall.) Litv.). Vegetation in the Rubas valley consists of dominated sagebrush-saltwort suffrutescent and small-frutescent communities. Species composition in these communities varies with the degree and nature of soil salinization; the projective cover ranges within 20-70%. Typical associations include *Artemisia-Kalidium* (with *K. foliatum*), *Artemisia-Salsola* (with *S. ericoides*), *Artemisia-Halothamnus* (with *H. glaucus*), *Artemisia-saltwort* with annual halophytes (*Climacoptera crassa*, *Salsola soda*, *Petrosimonia oppositifolia* etc.).



**Fig.5. Habitat of *Hedyphanes nycterinoides* in the Rubas valley:
Artemisia-saltwort plant association (Dagestan: Tabasaran District)
Рис.5. Местообитание *Hedyphanes nycterinoides* в долине р. Рубас:
полынно-солянковая ассоциация (Дагестан: Табасаранский район)**

Factors in the reduction of the micropopulations and the range of the species. The main cause of the population extinction in the Untsukul arid hollow was construction of the Irganay hydroelectric power station and filling of the Irganay reservoir, which destroyed the halophytic plant communities in the valley of the Avarian Koysu River. Overgrazing threatens the population from the arid Rubas valley (Southern Dagestan). The most halophytic habitats are degraded and trampled by sheep that cement the soil, which affects successful oviposition and subsequent development of larvae.

Measures for conservation of the species in Southern Dagestan. It is necessary to identify several areas in the Rubas valley with preserved halophytic plant communities and to prohibit grazing or to limit grazing in spring (during copulation and oviposition). The allocation of protected areas will save the population of rare *H. nycterinoides*, the entire complex of halobiontic insects (including darkling beetles from the genera *Centorus* Mulsant, 1854 and *Phora* Germar, 1836), as well as rare plants growing in the area: *Iris acutiloba* C.A. Mey., *Iris taurica* Lodd., *Iris notha* Bieb., *Traunsteinera globosa* (L.) Rchb., *Orchis simia* Lam., *Orchis papilionacea* ssp. *schirwanica* (Woronow) Soó, *Bongardia chrysogonum* (L.) Spach., *Matthiola caspica* (N.Busch) Grossh., *Jasminum fruticans* L. etc.

CONCLUSIONS

Populations and distribution of the rare Dagestanian (east of the North Caucasus) endemic darkling beetle *Hedyphanes nycterinoides* have decreased significantly due to an intensive grazing load and filling of the Irganay reservoir in 2008. The only known population of this species is from the Rubas valley (Southern Dagestan). Being distributed in halophytic plant communities, the species, as well as halophytic plant communities in this area, need urgent protection measures.



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Maxim V. Nabozhenko collected materials on insects, prepared the entomological parts of the manuscript and some of the illustrations; Abdulgamid A. Teymurov and Zarema I. Soltanmuradova collected materials on plants, prepared the botanical parts of the manuscript and some of the illustrations. The authors are equally responsible for plagiarism and self-plagiarism.

Conflict of interest

The authors declare no conflict of interest.

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