

A new *Neodualius* from Serbia (Coleoptera: Carabidae: Trechinae)

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Taxonomy, new species, Coleoptera, Carabidae, Trechinae, *Duvalius*, *Neodualius*, Palearctic Region, Serbia

Abstract. A new species of *Duvalius* Delarouzeé, 1859, *D. (Neodualius) gocensis* sp. nov. from the Mount Goč in northern part of Kopaonik Mountains, western Serbia is described, illustrated and distinguished from related species.

INTRODUCTION

The genus *Duvalius* Delarouzeé, 1859 is one of the megadiverse groups of the Trechini with about 350 described species (Belousov 2017). The genus is traditionally divided in eight subgenera: *Biharotrechus* Bokor, 1922, *Duvalius* s. str., *Eudualius* Jeannel, 1928, *Hungarotrechus* Bokor, 1922, *Neodualius* G. Müller, 1913, *Paradualius* Knirsch, 1924, *Platyduvalius* Jeannel, 1928, *Trechopsis* Peyerimhoff, 1908 and *Typhlodualius* Húrka & Pulpán, 1980.

This subgeneric division of *Duvalius* is currently considered as questionable (Quéinnec & Ollivier 2021) due to the preliminary results of recent phylogenetic studies (Faille et al. 2018, pers. comm.).

Serbian *Duvalius* fauna were object of intensive research in last decades, which resulted in discovery and description of many new species. There were also several attempts to group these new and previously described species in a few new genera, which resulted in subsequent discussions (Janák & Moravec 2008, Lohaj et al. 2013, Čurčić et al. 2013) and finally these genera were synonymised with various subgenera of *Duvalius* (Belousov 2017, Quéinnec & Ollivier 2021).

The subgenus *Neodualius* as redescribed by Jeannel (1928) was defined as a: “*groupe d’espèces, remarquables par la grosseur démesurée de leur tête, l’atrophie totale de l’oeil et la persistance à sa place d’un trait préoculaire très développé, enfin par l’effacement presque constant des sillons frontaux*” [a group of species, remarkable for the disproportionate size of their head, the total atrophy of the eye and the persistence in its place of a very developed preocular line, and finally for the almost constant effacement of the frontal furrows]. Janák & Moravec (2008) already mentioned that the subgenus *Neodualius* should be grouped at least in two different species groups, but which are not described to avoid creating another inconsistency in the genus *Duvalius*. Quéinnec & Ollivier (2021) discussed again the species included currently in *Neodualius* and stated that: “*all the species currently included within the subgenus probably forms a paraphyletic assemblage*”.

In the following paper a new species of *Duvalius* (*Neoduvalius*) found on Mount Goč in Serbia is described. The DNA of one specimen was successfully extracted; the results can be used for future molecular studies.

MATERIAL AND METHODS

Dry-mounted specimens were studied under an MBS 10 binocular stereomicroscope and a Motic BA 410E-T compound microscope. Habitus images were taken with a Canon EOS 700D in combination with a Canon MP-E65 1-5x macro lens. Images of morphological details were taken with a Canon EOS 700D camera mounted on a Motic BA 410E-T compound microscope in transmitted or diffused reflected light. Resulting images were focus stacked using Zerene Stacker and then postprocessed in Paint.Net, Paint, XnView and Live Photo Gallery. Measurements were taken with the stereomicroscope using an ocular scale.

For the extraction of the paratype a protocol described in Faille et al. (2010) was followed; extraction was non-destructive, using the DNeasy Tissue Kit (Qiagen GmbH, Hilden, Germany). Extracted exemplar was then mounted on a card, with the genitalia stored in water-soluble resin (DMHF) on a transparent card pinned beneath the specimen. Aedeagus of the holotype was embedded in Euparal.

Locality labels for the material examined are cited in the original version and marked with quotation marks (“ ”).

The material examined is deposited in the following collection:
JJRC coll. Jiří Janák, Rтынě nad Bílinou, Czech Republic.

Abbreviations: HT- holotype, PT- paratype, AL- mean length of both antennae, HW- greatest width of head, HL- greatest length of head measured from the base of neck to apices of clypeus, MTL- mean length of metatarsus (without claws), PW- greatest width of pronotum, PL- length of pronotum measured along the midline, PBW- greatest width of pronotum base, EW- greatest width of elytra, EL- length of elytra measured along the suture from deepest puncture of humeral angle to the elytral apex. Total body length was measured from apical margin of mandibles in closed position to apices of elytra. Length of antennomeres was measured as greatest length of each segment. For details and examples of measurement see Hůrka et al. (1989).

TAXONOMY

Duvalius (*Neoduvalius*) *gocensis* sp. nov. (Figs. 1-22)

Type locality. Western Serbia, North part of Kopaonik Mountains, Mount Goč.

Type material. Holotype (♂): “SERBIA occ. 27.5.2023 / N Kopaonik Mts. Mt. Goč / 43.56602N, 20.86622E, beech / J. Janák lgt., 950 m, forest”, “HOLOTYPUS *Duvalius* (*Neoduvalius*) *gocensis* sp. nov. J. Janák det. 2025” (JJRC). Paratype (1 ♂): same data as the holotype with additional labels: “DNA extraction code: SMNS-L 2395” and “PARATYPUS *Duvalius* (*Neoduvalius*) *gocensis* sp. nov. J. Janák det. 2025” (JJRC).

Diagnosis. Anophthalmous species with eyes reduced to oval area without ommatidia, having external striae on elytra weak but not erased, with protibiae deeply furrowed, two discal setiferous punctures on elytra, first discal puncture situated between second puncture and third puncture of anterior umbilicate series, temples and interstices of elytra glabrous; aedeagus with median lobe elongated in lateral view, with a small basal bulb, the copulatory piece bifid.

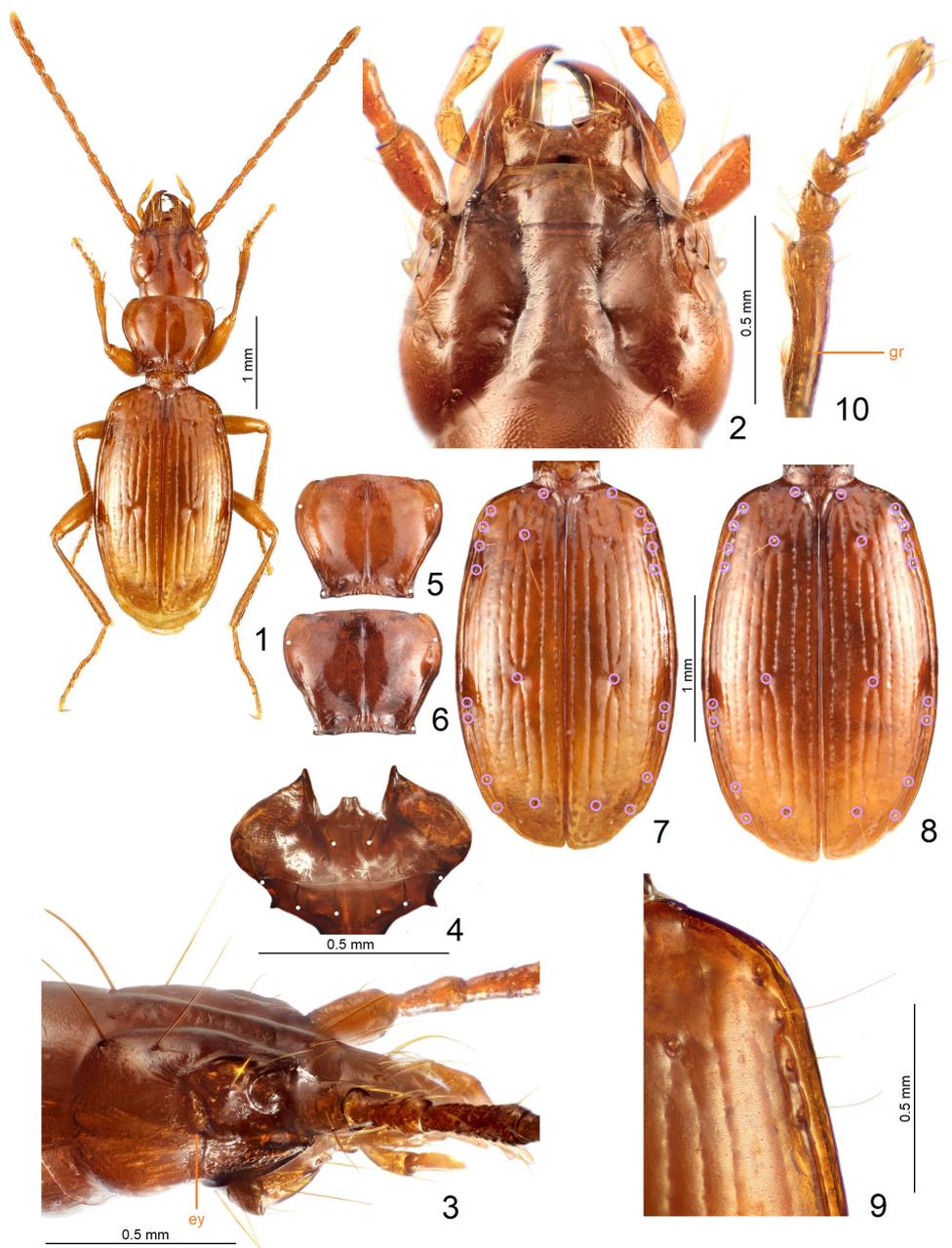
Description. Total body length 4.6-4.7 mm. Body moderately elongate (Fig. 1). Colour light or darker reddish-brown, palps yellow. Body with the usual long setae of *Duvalius*. Head, pronotum and elytra glabrous, (Figs. 2, 3, 9). Vertex smooth, with shallow remnants of microsculpture between frontal furrows, whole surface with scattered micropunctures (Fig. 2), neck with very fine isodiametrical microsculpture. Pronotum with distinct isodiametric microsculpture in anterior impression, remaining surface with very fine microsculpture consisting of isodiametric or slightly transverse meshes, here and there only with remnants of it. Elytra with fine microsculpture consisting of transverse waves and with scattered micropunctures (Fig. 9).

Head (Fig. 2) wide (HW/HL HT = 1.24, PT = 1.28), moderately narrower than pronotum (PW/HW = HT = 1.17, PT = 1.20). Eyes very small, flat, reduced to whitish (HT) or dark (PT) narrow oval area, without ommatidia (Fig. 3, *ey*). Frontal furrows entire, becoming narrower and deeper in middle part and here rounded (PT) or forming obtuse angle (HT). Temples moderately convex, glabrous, without setae (Fig. 2). Front supraorbital seta situated far behind posterior edge of eye (Fig. 2). Antennae very long and slender, slightly longer than elytra (AL/EL HT = 1.15, PT = 1.08). Length ratios of the antennomeres of holotype: 1:15 : 1.00 : 1.40 : 1.25 : 1.25 : 1.25 : 1.15 : 1.10 : 1.10 : 1.05 : 1.50. Labrum largely emarginated (Fig. 2). Mentum with 2 punctures (Fig. 4, white dots), middle prominence very short, far not reaching lateral parts, wide with two very short inconspicuous protrusions apically, submentum with 6 punctures (Fig. 4, white dots).

Pronotum cordate, moderately to markedly convex and moderately transverse (PW/PL HT = 1.24, PT = 1.29), distinctly narrowed toward base (PW/PBW HT = 1.62, PT = 1.54), lateral sides shortly sinuate before posterior angles, posterior angles slightly acute, slightly prominent (Figs. 5-6). Middle furrow deep and connected at the base with oval-shaped basal furrow, anteriorly terminating in anterior impression. Basal impressions large and very deep. Basal margin slightly emarginated in middle (Figs. 5-6). Lateral groove wide, in basal quarter narrowed. Chaetotaxy of pronotum with anterior seta situated slightly anteriorly of widest part of pronotum (Figs. 5-6, white dots), basal seta just before posterior angle (Figs. 5-6, white dots).

Elytra (Figs 7-9) moderately narrow, elongate, oval (EL/EW HT = 1.66, PT = 1.65), about three times as long as pronotum (EL/PL HT = 3.06, PT = 3.16) and distinctly wider than it (EW/PW HT = 1.49, PT = 1.48), slightly flattened along suture, shoulders slightly prominent, basal impressions very deep. Lateral gutter moderately wide, all striae well visible, first three striae deeper, external striae finer, consisting of well visible punctures. Internal interstriae slightly convex. Apical stria deep and connected with the fifth stria.

Chaetotaxy of elytra (Figs. 7-8, pink circles): two discal setiferous punctures: first puncture situated in third stria between second and third puncture of anterior umbilicate



Figs. 1-10. *Duvalius (Neoduvalius) gocensis* sp. nov. 1-5, 7, 9, 10- holotype, 6, 8- paratype. 1- habitus; 2- head; 3- head lateral (ey- eye); 4- mentum and submentum; 5, 6- pronotum; 7, 8- elytra; 9- anterior part of right elytron; 10- protarsus (gr- groove). Scales: 1mm: 1; 0.5 mm: 2, 10; 3; 4; 5-8; 9.



Figs. 11-18. *Duvalius (Neoduvalius) gocensis* sp. nov. 11, 13, 15, 17-holotype, 12, 14, 16, 18- paratype. 11, 12- aedeagus lateral; 13, 14- apical part of aedeagus lateral; 15, 16- apical part of aedeagus dorsal; 17, 18- aedeagus dorsal. Scales: 0.5 mm: 11, 12; 17, 18. 0.1 mm: 13, 14; 15, 16.

series, second puncture in connection of third and fourth striae behind middle of elytral length, far anteriorly of first puncture of middle umbilicate series. Preapical puncture situated in second stria. Anterior (posthumeral) umbilicate series situated at inner margin of lateral gutter, punctures equidistant (HT), or second and third punctures slightly more distant (PT). Distance between anterior and median umbilicate series more than twice as long as the length of anterior series. Legs long and slender. Metatarsus moderately long and narrow ($EL/MTL = HT\ 2.22, PT = 2.36$). First segment slightly longer than segments 2 and 3 combined. Protibia with setae on inner side and distinctly grooved on outer side (Fig. 10, *gr*).

Male: protarsus with widened first two segments (Fig. 10), first segment about 1.3-1.5 times as long as wide; aedeagus 0.97 mm long (HT, PT), with basal bulb relatively small,

median lobe in lateral view elongate, from basal constriction slightly widened to maximal width situated in apical fifth and then pointed (Figs. 11-14), in dorsal view narrow, almost parallel, with rounded apex (Figs. 15-18), copulatory piece (internal plate) elongate, with deep basal gutter in dorsal view, slightly to markedly widened to apical half and then narrowed apically, in apical quarter divided in two distinct lobes (Figs. 15-16), in lateral view with visible lines of basal gutter in basal third, slightly widened to second third and then narrowed apically (Figs. 13-14), internal sac covered by small scales (Figs. 13-16). Male abdominal sclerite not examined.

Female: unknown.

Differential diagnosis. The new species is included among *Neoduvallius* species with 2 pairs of discal setae, with copulatory piece bifid, protibia with a longitudinal furrow, eyes rudimentary, but without visible ommatidia, hind pronotal angles not prominent and the head rounded medially near *D. cvijici* (Jeannel, 1923), from which it differs externally by glabrous temples, much smaller head in relation to pronotum, more ovoid elytra and shorter antennae. *D. gocensis* sp. nov. differs from *D. cvijici*, and from all other *Duvallius* species by characteristic elongated, basally deeply emarginated and apically bifid copulatory piece of the aedeagus.

The “provisional key for the identification of Serbian *Neoduvallius* taxa” published by Ćurčić et al. (2022), can be modified as follows:

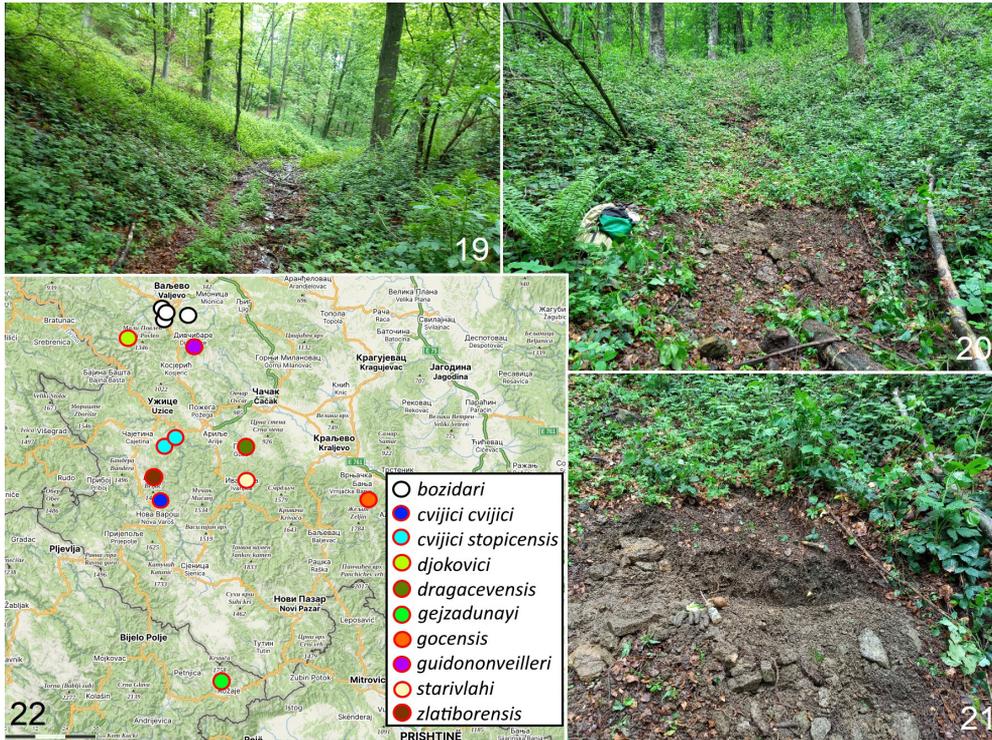
1. Cheeks smooth, with ommatidia, elytra with 3-4 pairs of discal setae, copulatory piece unifid2
2. Cheeks with short hairs, with no ommatidia, elytra with 2 pairs of discal setae, copulatory piece bifid (in one case trifid) 3
3. Cheeks smooth, without ommatidia, elytra with 2 pairs of discal setae, copulatory piece bifid
..... *D. gocensis* sp. nov.

Etymology. The name of the new species is derived from the type locality - Mount Goč.

Bionomics. Both type specimens were collected in very wet soil under relatively small stones near a spring of a small brook in a beech forest at height of about 950 m a. s. l. (Figs. 19-21).

Distribution. *Duvallius (Neoduvallius) gocensis* sp. nov. is distributed in Mount Goč situated in northern part of Kopaonik Mountains in western Serbia (Fig. 22).

Discussion. I placed the new species tentatively to the subgenus *Neoduvallius* even if this subgenus is currently very heterogenous, definitely not well characterised and some species included currently in the subgenus do not share all characters of the *Neoduvallius* as summarised by Quéinnec & Ollivier (2021): “*The Neoduvallius subgenus was previously defined by: i) the eyeless condition, ii) the head, pronotum and elytra glabrous, iii) a large head with deep but short frontal furrows, iv) a pronotum with anterior angles salient and a wide marginal gutter, v) the elytral disc with 3 to 4 (exceptionally 5) setae on the third*



Figs. 19-22. Type locality of *Duvalius (Neodualius) gocensis* sp. nov.; 19- brook below the place where the specimens were collected; 20, 21- details of the place. 22. Distribution of *Duvalius (Neodualius)* species in Serbia and Montenegro.

stria, vi) the elytral striae punctuated, vii) the protibiae grooved on the external side, viii) the aedeagus with large basal bulb and median lobe slightly bent". Copulatory piece of *Neodualius* is very diverse: unifid, bifid or trifid. It seems that there are several groups of more or less closely related species. These groups differ each other and can represent natural groups. The formal division of *Neodualius* into these groups does not seem reasonable to me at present. Only a thorough revision supported by both morphological and molecular studies can according to my view help to understand relationships of among *Duvalius* species and to redefine subgeneric division of the genus and species groups.

The main reason why to include currently *D. gocensis* sp. nov. to *Neodualius* is a bifid copulatory piece. Other supporting characters are: eyes small, represented by small oval fields without visible ommatidia, head, pronotum and elytra (except for usual long macrosetae) glabrous, elytra with 2 discal setae, elytral striae punctuated, protibiae grooved on the external side, aedeagus with median lobe slightly bent.

ACKNOWLEDGEMENTS. I am obliged to Jiří Háva (Únětice u Prahy, Czech Republic) for his help with improving the final version of the manuscript. Special thanks are due to Arnaud Faille (Staatliches Museum für Naturkunde, Stuttgart) for extraction of the paratype and comments to an earlier version of the manuscript.

REFERENCES

- BELOUSOV I. A. 2017: Tribe Trechini Bonelli, 1810, pp. 357-455. In: LÖBL I. & LÖBL F. (Eds.): *Catalogue of Palaearctic Coleoptera. Volume I. Revised and updated edition. Archostemata-Myxophaga-Adephaga*. Leiden, Boston: Brill, 1443 pp.
- ĆURČIĆ S. B., ĆURČIĆ B. P. M. & VRBICA M. 2013: Some Trechine ground beetle taxa from the Balkan peninsula (Coleoptera: Carabidae: Trechini). *Archives of Biological Sciences, Belgrade* 65(4): 1675-1686.
- ĆURČIĆ S., PAVIČEVIĆ D., VESOVIĆ N. & KURAICA M. 2022: *Duvalius djokovici* (Coleoptera, Carabidae, Trechini), a new subterranean ground beetle species from western Serbia. *Annales Zoologici Fennici* 59: 215-229.
- FAILLE A., BOURDEAU C. & FRESNEDA J. 2010: A new species of blind Trechinae from the Pyrenees of Huesca, and its position within *Aphaenops* (sensu stricto) (Coleoptera: Carabidae: Trechini). *Zootaxa* 2566(1): 49-56.
- FAILLE A., CASALE A., HERNANDO C., SALAH AÏT MOULOUD & RIBERA I. 2018: Tectonic vicariance versus Messinian dispersal in western Mediterranean ground beetles. *Zoologica Scripta* 47: 565-581.
- HŮRKA K., JANÁK J. & MORAVEC P. 1989: Neue Erkenntnisse zu Taxonomie, Variabilität, Bionomie und Verbreitung der slowakischen und ungarischen *Duvalius*-Arten (Coleoptera, Carabidae, Trechini). *Acta Universitatis Carolinae, Biologica* 33: 353-400.
- JANÁK J. & MORAVEC P. 2008: Drei neue *Duvalius*-Arten aus Bulgarien und Serbien (Coleoptera: Carabidae: Trechinae). *Klapalekiana* 44: 1-19.
- JEANNEL R. 1928: Monographie des Trechinae. Monographie comparée et distribution géographique d'un groupe de Coléoptères. (Troisième Livraison). Les Trechini cavernicoles. *L'Abeille* 35: 1-808.
- LOHAJ R., ČEPLÍK D. & LAKOTA J. 2013: A new species of the genus *Duvalius* sg. *Neoduvalius* from Montenegro with taxonomical remarks on the genus *Duvalius* (Coleoptera, Carabidae, Trechini). *ZooKeys* 278: 91-104.
- QUÉINNEC E. & OLLIVIER E. 2021: *Duvalius (Neoduvalius) lohaji* n. sp., a new remarkable subterranean taxon of the isotopic Trechini lineage from Dinaric karst, Bosnia and Herzegovina (Coleoptera: Carabidae: Trechinae). *Zootaxa* 4942(2): 173-192.

Received: 16.11.2025

Accepted: 10.12.2025

Printed: 31.3.2026