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## New record of *Glomeris hexasticha* Brandt, 1833 (Diplopoda: Glomerida: Glomeridae) from the Lilyaksko Plateau, North-Eastern Bulgaria

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**Abstract:** *The present article reports on the first record of *Glomeris hexasticha* Brandt, 1833 in the area of Lilyaksko Plateau in North-eastern Bulgaria. The species has been found in three of the researched habitats in the region: LP1 – deciduous forest of common hornbeam (*C. betulus*); in LP2 – coniferous forest of black pine (*P. nigra*) and in the located nearby Meadow 1 (LP4), covered with wild wheat grass and single shrubs of common rosehip (*R. canina*). The research of the Myriapoda fauna of the Lilyak Plateau was conducted from May 2017 to April 2018 and *G. hexasticha* was established only in the period May – August 2017, and a total of 55 individuals (17 males, 17 female) were collected. The largest number of individuals (24) were registered in June 2017 (17 in LP1, 2 in LP2, and 5 in LP4).*

**Keywords:** ****Glomeris hexasticha*, Lilyak Plateau, Myriapoda, Diplopoda, Glomerida.***

## Introduction

The Lilyaksko Plateau is located in the eastern sub-area of the Mysia hill-plateaus plain. To the south and west it is surrounded by the valleys of the Cherni Lom River and the Siva River, to the east of the Targovishte decrease and to the north by the Valley of the Kuzularsko Ravine. The relief is of a plateau with a flattened middle part, sloping north and steep southern and eastern slopes [1]. The plateau is located in the Moderate-Continental Climate Region, the region of Ludogorie and Dobrudzha [2]. The climate is characterized by warm summer and cold winter, a great annual amplitude of air temperature, spring-summer maximum and minimum winter rainfall, with annual, relatively stable snow cover. The average air

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temperature in the warmest month (July) is 20-21°C, and in the coldest (January) it is –1 to –2°C. The average monthly relative air humidity is the highest in the period November–January and the lowest in the period July–August [3, 4].

The vegetation of the plateau includes: mixed forests of common hornbeam (*Carpinus betulus* L.), maple (*Acer sampestre* L.), etc.; mixed forests of common hornbeam (*C. betulus* L.) and oak (*Quercus cerris* L.) in some places with durmast (*Quercus dalechampii* Ten.), maple (*A. campestre* L.), etc.; mixed woods of durmast (*Q. dalechampii* Ten.) and hornbeam (*Carpinus orientalis* Mill.) which in places have occurred as secondary vegetation; mixed forests of oak (*Q. cerris* L.), durmast (*Quercus frainetto* Ten.) and hornbeam (*C. orientalis* Mill.), also occurring in secondary locations; Additionally planted white acacia (*Robinia pseudoacacia* L.); mesophytic grass formations dominated by meadow fescue (*Festuca pratensis* Huds.), rough meadow grass (*Poa sylvicola* Guss.), meadow foxtail (*Alopecurus pratensis* L.), perennial ryegrass (*Lolium perenne* L.), redtop (*Agrostis stolonifera* L.), and other xerothermic grass formations dominated by yellow bluestem (*Bothriochloa ischaemum* (L.) Roberty), bulbous bluegrass (*Poa bulbosa* L.), perennial bunchgrass (*Chrysopogon gryllus* (L.) Trin.), etc. [5]. In the recent studies of the flora composition of the higher plants on the Lilyak Plateau, 782 species were described, referring to 378 genera and 81 families, with the majority of them (769 species) being spontaneously distributed [6].

The soil cover of the Lilyaksko Plateau is comprised predominantly of heavy clayey black earth soils, dark gray and gray forest soils, eroded leached black earth soils and eroded gray forest soils, while in the valleys of the rivers the soils are alluvial-meadow [7].

So far, the myriapodic fauna of the Lilyaksko Plateau has not been studied.

*Glomeris hexasticha* Brandt, 1833 is a Central European species (CEU), known in Albania, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Continental Italy, Macedonia, Moldova, Poland, Romania, Central European Russia, Slovakia, Slovenia, Switzerland, Serbia, Kosovo, Vojvodina and Montenegro, Ukraine, European and Asian Turkey [8] (Fig.1).

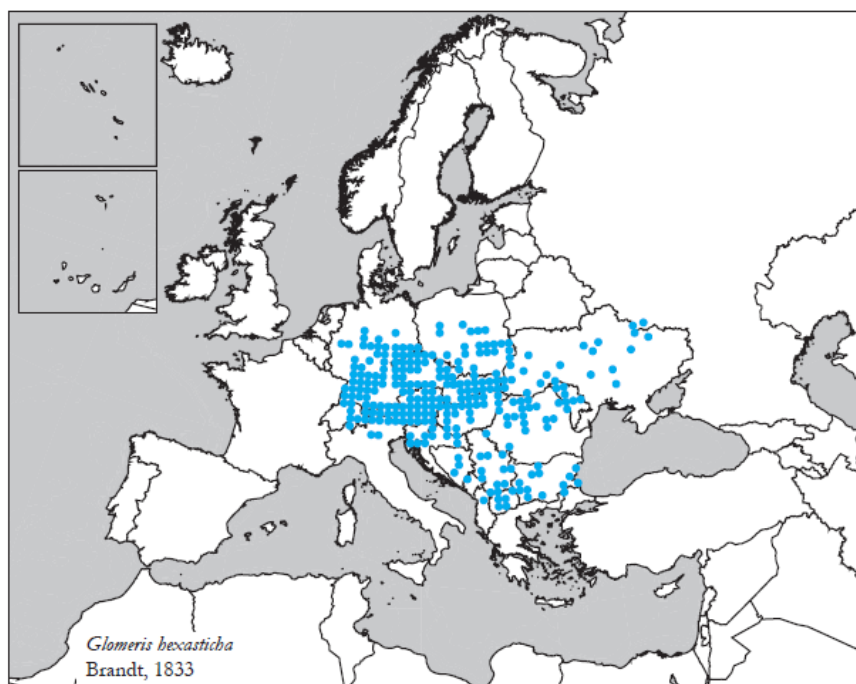


Fig.1. Distribution map of *G. hexasticha* in Europe [8]

Up to now *G. hexasticha* (Fig. 2) has been reported in Vitosha Mountain (Dragalevtsi, 950 m altitude) and the West Balkan Ridge (a cave near the village of Beli izvor, Vratsa) [9]; in Rila Mountain (at 1000-1300 m alt.) and Vitosha Mountain [10]; in the Central Balkan Ridge (peak Botev) and Strandzha Mountain [11]; in Vitosha Mountain (Knyazhevo and Boyana, 500-1500 m alt.) and the Western Rhodopes Mountains (Lepenitsa cave, near Velingrad) [12]; in the Western Balkan Ridge (Vratsa), the Rila Monastery and the South coast of the Black Sea (Ropotamo, Tsarevo, Atia and Asparuhovo, Bourgas District) [13], in the Western Rhodopes Mountains (Stoikite, Ostrets and Beglika) [14]; in middle Sredna Gora Mountain [15]; in the Central Danubian plain (the village of Grivitsa and the village of Beglez, Lovech, 150-250 m alt.), Pirin Mountain (Betolovo area, near Razlog, 1200 m alt.) and Vitosha Mountain (Chuipeetlovo village, 1150 m alt., under the peak Selimitsa, 1305 m alt., the village of Zheleznitsa, 1050 m alt., under the Ostritsa peak, 1630 m alt.) [16]; oak-hornbeam forests near the village of Prasad, Bourgas [17] and the Lozen Mountain [18] (Fig. 3).



Fig. 2. *Glomeris hexasticha* Brandt, 1833

(Photos: Viktor Vasilev)

Up to the present study the areas in North-eastern Bulgaria where *G. hexasticha* has been reported are: in the outskirts of Varna, Golden Sands, Aladzha Monastery and Dolni Chiflik [12], Shumen Plateau [19] and Madara Plateau [20] (Fig. 3).

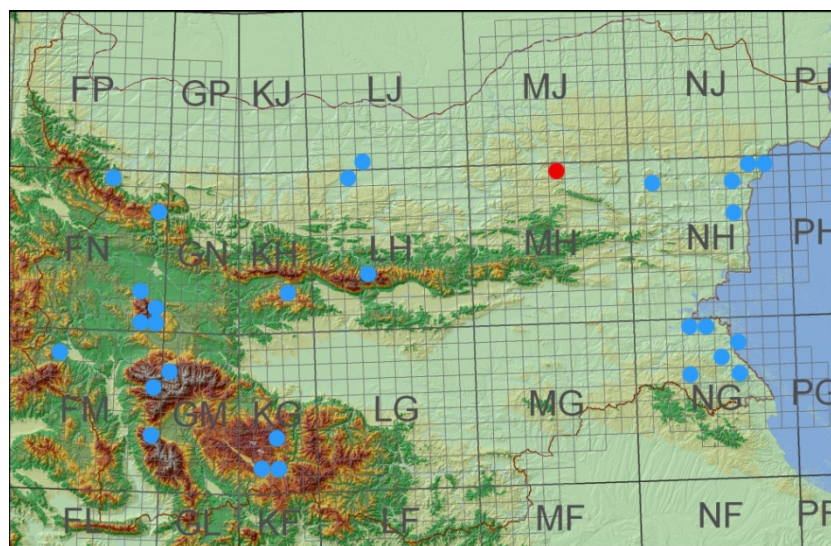


Fig. 3. Distribution map of *Glomeris hexasticha* Brandt, 1833 in Bulgaria (blue symbols referring to previous data, red symbol referring to present data)

## Material and Methods

The surveys of the Myriapod fauna of the Lilyaksko Plateau were conducted in the period May 2017 and April 2018 in 5 sampling sites: Deciduous forest (LP1) dominated by Common Hornbeam (*C. betulus* L.) (GPS coordinates: N 43.173205, E 26.280121, 408 m alt.); Coniferous forest (LP2) dominated by black pine (*P. nigra* J.F.Arnold) (GPS coordinates: N 43.173449, E 26.281272, 340 m alt.); Mixed deciduous coniferous forest (LP3) of black pine (*P. nigra*) and white birch (*Betula pendula* Roth) (GPS coordinates: N 43.162424, E 26.295482, 204 m alt.) and two open lawns – Meadow1 (LP4) (GPS coordinates: N 43.173649, E 26.281423, 331 m alt.) and Meadow 2 (LP5) (GPS coordinates: N 43.173383, E 26.284549, 260 m alt.) covered with wheat grass and single shrubs of common rosehip (*Rosa canina* L.) (Fig.4). The material was collected through pitfall traps, 10 pieces per site, reported on a monthly basis.



Fig. 4. Map of the research area with the location of the sampling sites

## Results and Discussion

*G. hexasticha* Brandt, 1833 (Diplopoda: Glomerida: Glomeridae) is reported on the Lilyaksko Plateau, Northeastern Bulgaria (Fig.3) for the first time. In this area, the species is found in 3 of the studied habitats: LP1 – Deciduous forest of common hornbeam (*C. betulus*); in LP2 – Coniferous black pine forest (*P. nigra*) and in the nearby Meadow 1 (LP4), which is covered with wheat grass and single shrubs of common rosehip (*R. canina*) (Fig. 4). In the survey conducted from May 2017 to April 2018, a total of 55 individuals (38 male, 17 female) were collected, and the species was found only in the period May – August 2017. The largest number of individuals (24) were registered in June 2017 (17 in LP1, 2 in LP2, and 5 in LP4).

*G. hexasticha* is a polytopic species that inhabits mainly woods on more acidic substrates and it can be found in the soil and deadwood. Most of the data for Central Europe are collected in mountainous and subalpine habitats, however, though rarely the species is reported from caves and open habitats of up to about 2400 m alt. [8]. In Bulgaria *G. hexasticha* is found at an altitude of 0 to 1630 m. It is reported from caves, open mountain habitats (meadows), deciduous forests dominated by oak trees; common durmast; common durmast and oak and mixed forests of common durmast and black pine, in which it occurs predominantly in the layer of decomposition and fragmentation of the foliage, in rotting wood and under the stones of limestone areas [15,16]. In Ukraine, this species is registered in a variety of habitats, predominantly in forest habitats with thick foliage, where a massive appearance of juvenile individuals was observed in the second half of the period September and October [21]. *G. hexasticha* is a mesothermal, mesohygrophilic and troglone/troglophile species. In the region of the Shumen Plateau it is registered only in forest habitats: the Bukaka reserve – deciduous forest, dominated by beech (*Fagus sylvatica moesiaca* K. Malý), mixed deciduous coniferous forest of common beech (*Fagus sylvatica* L.), common hornbeam (*C. betulus*), black pine (*P. nigra*) and white pine (*Pinus sylvestris* L.) and pine forest dominated by black pine (*P. nigra*) [19]. On the Madara Plateau, *G.*



*hexasticha* is found in coniferous forests of black pine (*P. nigra*) and white pine (*P. sylvestris*); deciduous forests dominated by Oriental hornbeam (*C. orientalis*) or by oak (*Q. cerris*), common hornbeam (*C. betulus*) and maple (*A. campestre*); mixed deciduous-coniferous forests of white pine (*P. sylvestris*) and black pine (*P. nigra*) with the presence of big-leaf lime-tree (*Tilia platyphyllos* Scop.), common hornbeam (*C. betulus*), oak (*Q. cerris*) and white birch (*B. pendula*), as well as in open meadows, dominated by wheat and steppe grass with single shrubs and trees [20].

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