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The deepest living woodlouse in the Czech Republic
Nejhlouběji žijící stínka v České republice

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Abstrakt: Stínka větší (*Protracheoniscus major*) byla poprvé doložena ze Slezska v České republice. Zde uvádíme její nález z aktivního černouhelného dolu Darkov z Karvinska, kde byla zastižena v hloubce 770 m pod povrchem. Její rozšíření ve střední Evropě je spojeno s lidskou činností; je nacházena ve sklepech a budovách.

Abstract: *Protracheoniscus major* was recorded for the first time in Silesia, the north-eastern part of the Czech Republic. Here we report its finding in the Darkov Mine – active black coal mine in which this species was found in a depth of 770 m under surface. Its distribution in Central Europe is connected with human activities, as found in cellars and buildings.

Keywords: Agnaridae, Isopoda, Oniscidea, synanthrope

INTRODUCTION

Terrestrial isopod *Protracheoniscus major* (Dollfus, 1903) was described as inhabitant of Poland, Romania, Russia and Central Asia (Dyduch 1903). Its actually known distribution stretches from south-eastern Germany to Kazachstan and Iran (Bragina & Khisametdinova 2018, Eshaghi et al. 2015). In the Czech Republic, where its north-western border of distribution extends, its presence is connected to buildings only (Flasarová 1997). It was found for the first time in 1887 by Hladik in Prague and later on, in 1891, by Fiala in Karlín, Prague and in Pilsen (see Strouhal 1929). Strouhal (1929) tried to synonymize *Porcellio domesticus* Hellich, 1872 (described only superficially by Frič in 1872 based on report of Hellich from Poděbrady) with *P. major*. Nevertheless, Frankenberger (1944) rejected this synonymy and supposed that it was more probably an orange specimen of *Porcellionides pruinosus* (Brandt, 1833). Summarising, until now, *P. major* was reported from the Czech Republic from Bohemia (western part of the Czech Republic): Prague, Pilsen (Strouhal 1929), Teplice, Bořislav, Cítoliby and Zlonice (Flasarová 1991, 1995).

MATERIAL

Czech Republic, Silesia: Darkov Mine (49°49´48˝ N, 18°31´31˝ E), Jáma Mír 5, the ninth floor, depth 770 m under surface, 5 males, 5 females, 15 juveniles, 21.v.2015, P. Kočárek leg., I. H. Tuf coll.

DISCUSSION

There are known many cave inhabiting species of woodlice in the world. The deepest caves are known from western Caucasus from Abchazia as reaching depths more than 2,000 m. These Caucasian caves are inhabited by sev-

eral troglobiont woodlice species described by Borutzky in fortieth until seventieth of the past century (e.g. Borutzky 1962). European caves with high diversity of cavernicolous woodlice are known e.g. in Italy, Malta, Romania or mainly in Balkan Peninsula (see Bedek et al. 2011, Horvatović 2014).

A measuring of depth of species occurrence in caves is rather complicated, the depth and morphology of most caves are not well described. Therefore, the records of cavernicolous species usually contain information beside the name of cave only about the distance of collecting site from the entrance (e.g. Skoupá 2018). Nevertheless, for example the species of the genus *Alpioniscus* Racovitza, 1908 was found in the depth of 1,390 m, in the Lukina Jama cave, the Croatian deepest cave (Jana Bedek *pers. com.*). The deepest findings of isopods from Caucasian and Crimean caves come from depths of ca 600 and 500 m, respectively (Ilya Turbanov *pers. com.*).

In Czech Republic, terrestrial isopods were reported from caves in the Chýnovský karst (Dvořák 2002), Hranický karst (Tuf et al. 2008, Tajovský et al. 2013), Moravský karst (Mlejnek & Tajovský 2008, Skoupá 2018) and Dyleňský karst (Dvořák & Dvořáková 2015). Although the Hranická propast abyss (Hranický karst) and the Býčí skála cave (Moravský karst) are the deepest cave systems in the Czech Republic (442.5 m and 200 m, respectively), they are far from the depth of the Darkov Mine, where the shaft go to the depths over one kilometer.

The population of *Protracheoniscus major* was found during zoological research in the ninth floor of the Darkov Mine. This floor was active mining area in the time of research. The species was observed at many sites throughout service corridors in horizontal length about 200 m, usually under coal lumps and other small lying objects. The substrate in corridors was composed by fine fractions of coal dust artificially mixed with the milled limestone,

Fig. 1: Carcass of Brown rat surrounded by woodlice Protracheoniscus major. *Photo © P. Kočárek, 2015*
Obr. 1: Pozůstatky potkana obklopeného stínkami většími. Snímek © P. Kočárek, 2015

Fig. 2: Male and juveniles of Protracheoniscus major *covered by fine coal dust. Photo © P. Kočárek, 2015*
Obr. 2: Samec a juvenilní jedinci stínky větší pokrytí jemným uhelným prachem. Snímek © P. Kočárek, 2015

which binds the coal dust to reduce the risk of explosion. Air temperature varied between 26.0 and 27.8°C in the time of research, air humidity on the surface of substrate varied between 66.1 and 72.0%. The air continuously flew in the corridors due to active ventilation system (measured air flow was 2.5 $m.s^{-1}$). We collected several living specimens and we established their breeding in the laboratory conditions.

The highest population densities were observed around the waste bins. Besides that, we observed some specimens under the mummified carcasses of Brown rat – *Rattus norvegicus* (Berkenhout, 1769). Woodlice were observed both in illuminated as well as in dark parts of the corridors. Two species of invertebrates, House

Fig. 3: Female (above) and male (below) of woodlouse Protracheoniscus major *in laboratory breeding based on animals collected in mine 2.5 years before. Photo © I. H. Tuf, 2018*
Obr. 3: Samice (nahoře) a samec stínky větší (dole) z chovu důlní populace o dva a půl roku později. Snímek © I. H. Tuf, 2018

cricket – *Acheta domestica* (Linnaeus, 1758) and Silverfish (*Lepisma saccharina* Linnaeus, 1758) and abovementioned rats were observed together with *P. major* at the same sites. Exploitation of dead bodies of all above mentioned species and garbage dropped here by miners are the only possible food for woodlice.

Terrestrial isopods are mainly detritovorous; they consume dead organic matter, mainly plant remnants. Nevertheless, cave inhabitants are usually able to extend or modify they food niche and to exploit less usual sources, such as bat guano, microbial biofilms, decaying timber etc. Among species of the genus *Protracheoniscus* Verhoeff, 1917 of the family Agnaridae, there are numerous species inhabiting Asian deserts and semideserts as well as dry Mediterranean environment. Perhaps ability to exploit limited food sources is synapomorphy for this genus, which enables *P. major* lives in another extreme habitats such caves or deep mines. In addition, our breeding woodlice in laboratory after the transportation from the depth of the coal black mine consumed vegetables and leaves as well as offered pieces of flesh.

The higher temperature in coal mine (around 28 °C) seems to be important factor for high abundances of *P. major* too. High temperatures are common during summer in Western Asia, as well as inside the European buildings. Our laboratory breeding thrives for more than 2.5 years in temperature about 25°C too. It is remarkable that all four animal species found in the Darkov Mine are typical synanthropic found frequently in cities – cosmopolitan (silverfish, rat) and or with origin probably in Western Asia (cricket, *P. major*), in our latitudes preferring high temperature typical in heated buildings.

On the other hand, *Protracheoniscus politus* (C. Koch, 1841), the only congeneric species in the Czech Republic, predominates in forests with developed humus layers, but inhabits also quarries, caves, meadows, steppes, gardens, greenhouses or cellars (Mišurcová 2007). Both species were redescribed recently in details (Tomescu et al. 2016).

It is possible that *P. major* inhabits also some localities aboveground in Silesia and Moravia, most probably buildings that we should consider as possible sources for the settlement of even specific habitat like the Darkov Mine. More attention should be paid to research on such sites in future.

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