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First reliable records of *Sphaerium nucleus* (Mollusca: Bivalvia: Sphaeriidae) in the Czech Republic

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Abstract. First reliable records of *Sphaerium nucleus* (Studer, 1820) from the Czech Republic are presented. The species has been neglected for a long time, because of its conchological similarity to *S. corneum* (Linné, 1758). Notes to the anatomy of both species are added.

Distribution, anatomy, Mollusca, Bivalvia, Sphaeriidae, Palaearctic region

INTRODUCTION

Sphaerium nucleus (Studer, 1820) has long been regarded as a subspecies or infrasubspecific unit of *S. corneum* (Linné, 1758), defined by conchological (more tumid shells with broad umbones) and ecological (preference for temporary habitats) characters. Strong evidence for the distinctness of *S. nucleus*, supported by some newly revised anatomical (type of kidney) and conchological (broad hinge plate, dense porosity) characters, is presented mainly by Korniushin (1994, 1996, 2001). Recently *S. nucleus* has been recognized as a distinct species by many authors, e.g., by Falkner (2000), who also indicates some peculiarities of its biology, namely a relatively long life span of 2–3 years and low juvenile mortality, both probably connected with living in an unpredictable environment.

Sphaerium nucleus or "*Sphaerium corneum* f. *nucleus*" has recently been reported from neighbouring countries (Falkner 2000, Mildner 2000, Piechocki 1989). Authors of the check-list (Falkner et al. 2001) even mention the Czech Republic among the countries with occurrence of this species. However, this was apparently done without revision of any material. The Czech authors referring to "*S. corneum* var. *nucleus*" (e.g., Uličný 1892, Ložek 1956) based their determination on only a few shell characters, where no attention was given to the anatomy. Therefore it is not possible to adapt these records as true *S. nucleus*. In the last 50 years distinction between the species (or subspecies according to the previous system) of the "*Sphaerium corneum* group" has been somewhat omitted and thus no record of *S. nucleus* in the Czech Republic/Czechoslovakia has been made (e.g., Beran 2002).

MATERIAL AND METHODS

In the summer of 2003 and 2004, localities in the Czech Republic with the typical habitats of *S. nucleus* (small more or less stagnant water bodies with dense vegetation) were visited. The numbers of quadrates used in the faunistic grid map are according to the publication of Zelený 1972. The field collections were made using a bowl-shaped sieve. The living animals were observed for a short time (1–2 hrs), then killed and fixed in 70% ethanol or 3% formaldehyde (the specimens preserved in formaldehyde were not suitable for dissections). The

dissections were carried out and both anatomical and conchological characters were observed under a stereomicroscope at a magnification 25 or 50 times. For examining the shell characters, the separate valves were put in 5% natrium hypochlorite (as recommended by Araujo & Korniushin 1999) to dissolve the organic layers.

COLLECTION SITES

(Fig. 1)

(1) Water ditch (width at the collection site ca. 1 m, depth 0.5 m) with nearly stagnating water, muddy bottom and edges covered with water plants; approx. 2 km SE of Tvrdonice, S Moravia, CZ-7268, N 48° 44' 58"; E 17° 00' 14" [GPS]; 15 specimens examined.

(2) Small drain (width 0.5 m, depth 0.5 m) with slowly running water and muddy bottom, partly covered with water plants; near the pond Kačák, Poodří Protected Landscape Area, ca. 1.5 km SE of Studénka, CZ-6274, N 49° 42' 23"; E 18° 05' 15" [GPS]; 15 specimens examined.

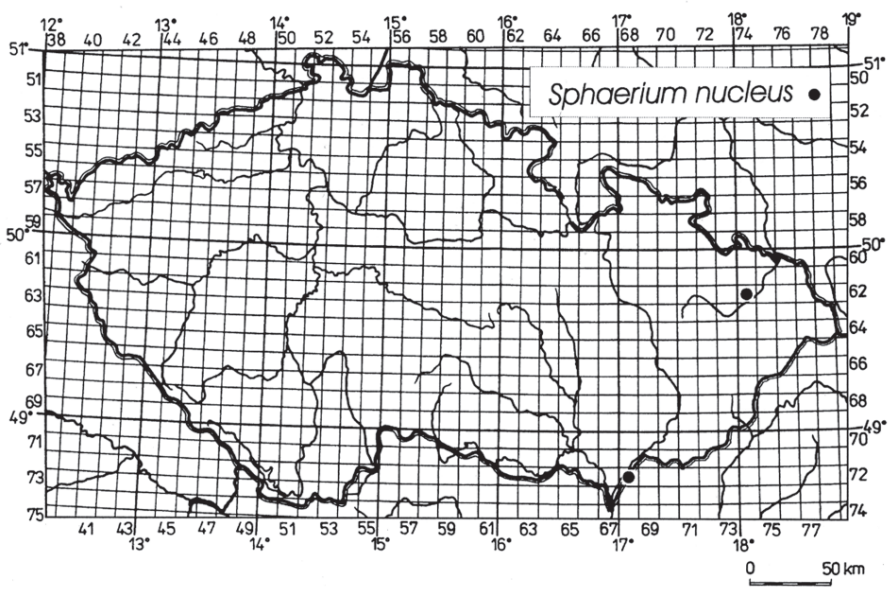


Fig. 1. Localities where *S. nucleus* (Studer) was found.

(3) Small pools (length and width of the largest one ca. 15 and 3 m respectively, max. depth 0.7 m) with dense vegetation cover, Litovelské Pomoraví Protected Landscape Area, near the railway ca. 1.5 km E of Moravičany, CZ-6267, N 49° 45' 04"; E 16° 59' 47" [GPS]; 2 specimens examined.

RESULTS

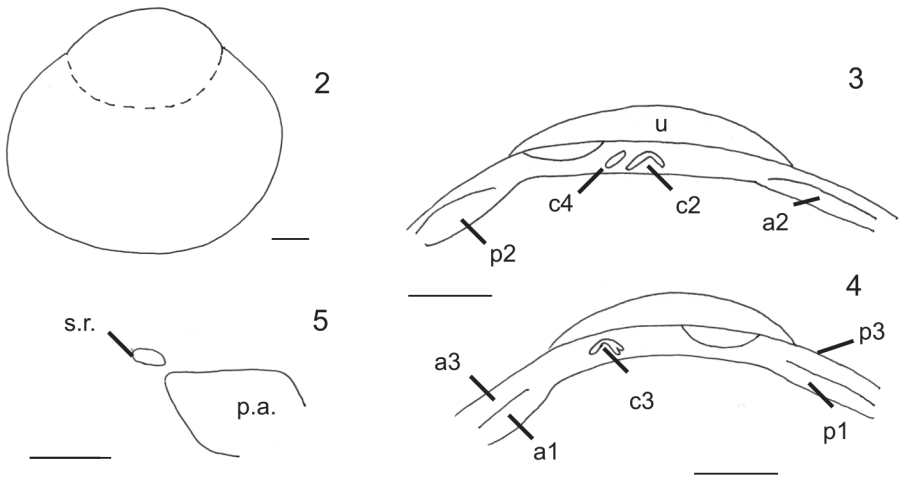
Altogether 32 specimens were examined, and all of them possessed the main characters of *Sphaerium nucleus* (according to Korniushin 1994, 2000): comparatively small shells, nearly oval in outline, with broad umbones and hinge plate, scars of upper siphonal retractors separated from those of posterior adductors, pores in the shell apparently more numerous (although a statistical compar-

ison was impossible due to lack of material) and more evenly distributed than in *S. corneum*, dorsal lobe of nephridium of the closed type. Of the other anatomical structures, attention was paid mainly to the arrangement of the alimentary tract, siphonal muscles and brood pouches. The alimentary tract is not markedly different from that of *S. corneum* (the main characters are the same as those indicated in the literature, e.g., Korniushin & Glaubrecht 2001) – the stomach is stretched in the posterior direction, its transition into the midgut is not marked, major typhlosole (t1) forms two loops in the stomach, minor typhlosole (t2) runs towards the relatively narrow sorting area. The intestine forms a complicated coil with 2 loops. The number of brood pouches per 1 demibranch is up to 5, each containing usually 2–3 embryos or larvae. As in the case of porosity, more material needs to be examined in order to evaluate the intra- and interspecific variability in this character.

DISCUSSION

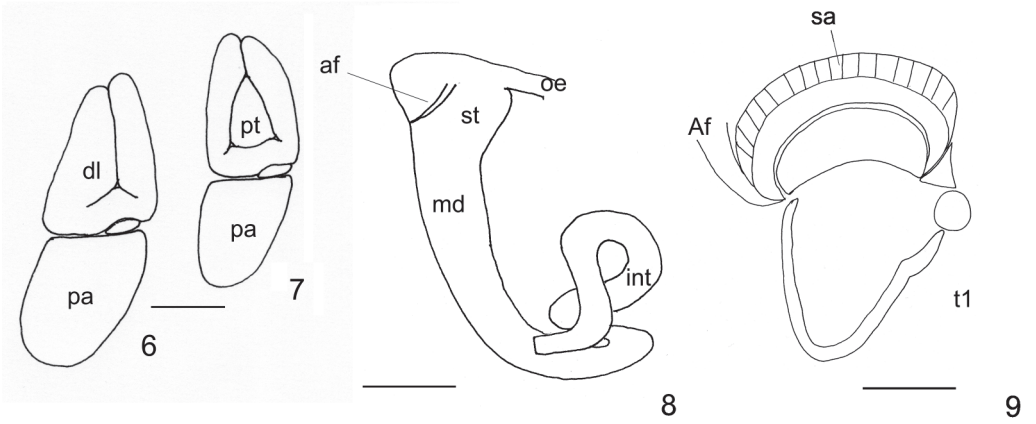
This is the first time *Sphaerium nucleus* is being reported from the Czech Republic as a distinct species and its main characters, previously stated as constant throughout the Palaearctic region, proved to apply to the populations from this country. However, in certain types of biotopes this species could be much more common. There is thus a need to examine all material from swamps, bogs, ditches and other temporary habitats more thoroughly and, possibly, revise older museum collections.

It is also remarkable that both in the Poodří Protected Landscape Area and Tvrdonice *S. nucleus* is found in localities not far from these in which *Anisus vorticulus* (Troschel, 1834) (Horsák 2000, Beran & Horsák 1998), *Pisidium pseudosphaerium* (Favre, 1927) and *Pisidium globulare* (Clessin,



Figs 2–5. *S. nucleus* (Studer). 2 – shell in lateral view; 3 – scars of posterior adductor and siphonal retractor; 4 – detail of hinge plate from left valve; 5 – detail of hinge plate from right valve; u = umbo, c2, c3,c4 = cardinal teeth, a1, a2, a3 = anterior lateral teeth, p1, p2, p3 = posterior lateral teeth, p.a. = scar of posterior adductor, s. r. = scar of siphonal retractor. Scale 1 mm.

1873) (Horsák & Neumanová 2004) were reported. The occurrence of *A. vorticulus* and *S. nucleus* in the same habitats has already been noticed by Falkner (2000). Therefore, the occurrence of those species in the same malacocenoses can be assumed to be a common phenomenon.



Figs 6–9. 6–7 – dorsal lobe of nephridium – *S. nucleus* (Studer). 6 – closed type of nephridium; 7 – *S. corneum* (Linné) – open type; dl = dorsal lobe, pt = pericardial part of the nephridial tubule, pa = posterior adductor. 8–9 – *S. nucleus* 8 part of alimentary tract in lateral view (coil of intestine not in its natural position); 9 inner structure of the stomach; oes = oesophagus, st = stomach, md = midgut, af = anterior fold, sa = sorting area, t1 = major (anterior) typhlosole, int = intestine. Scale 1 mm.

A c k n o w l e d g e m e n t s

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REFERENCES

Beran L. 2002: [Aqautic molluscs of the Czech Republic, distribution and its changes, habitats, dispersal, threat and protection]. *Sbor. Přírodověd. Klubu v Uherském Hradišti* **Suppl**. **10**: 1–258 (in Czech).

Beran L. & horsák M. 1998: Aquatic molluscs (Gastropoda, Bivalvia) of the Dolnomoravský úval lowland, Czech Republic. *Acta Soc. Zool. Bohem*. **62**: 7–23.

Falkner G. 2000: Sphaerium (Nucleocyclas) nucleus in Bayern. *Heldia* **3**: 11–18.

Falkner G., Bank R. A. & von Proschwitz T. 2001: CLECOM-Project. Check-list of the non-marine molluscan species-group taxa of the states of Northern, Atlantic and Central Europe (CLECOM I). *Heldia* **4**: 1–76.

Horsák M. 2000: [The first record of *Anisus vorticulus* (Troschel, 1834) in the Poodří Protected Landscape Area] *Čas. Slez. Muz. Opava* (*A*) **49**: 95–96 (in Czech).

Horsák M. & Neumanová K. 2004: Distribution of Pisidium globullare Clessin, 1873 in the Czech Republic with notes to its ecology and morphological characters. *J. Conchol.* **38**: 373–381.

GLÖER P. & MEIER-BROOK C. 2003: *Süsswassermollusken. 13. neubearbeitete Auflage.* Hamburg: Deutscher Jugendbund für Naturbeobachtung, 134 pp.
KORNIUSHIN A.V. & GLAUBRECHT M. 2001: Phylogenetic analysis based on the morphology of viviparous freshwater clams of the family Sphaeriidae (Mollusca, Bivalvia, Veneroida). *Zool. Scr.* **31**: 415–459.
KORNUISHIN A.V. 1994: Review of the European species of the genus Sphaerium. *Ruthenica* **4**: 43–60.
KORNUISHIN A.V. 1996: *Bivalve Molluscs of the Superfamily Pisidioidea in the Palaeaarctic Region*. Kiev: Schmalhausen Institute of Zoology, 175 pp (in Russian, English summary).
KORNIUSHIN A.V. 2001: Taxonomic revision of the genus Sphaerium s. l. in the Palaearctic region, with some notes on the North American species. *Arch. Molluskenk.* **129**: 77–122.
LOŽEK V. 1956: *Klíč československých měkkýšů* [*Key of the Czechoslovak Molluscs*]. Bratislava: Vydavatelstvo SAV, 437 pp (in Czech).
MILDNER P. 2001: Bemerkungen zur Faunistik der Sphaeriidae Karntens. *Carinthia* **112**: 437–447.
PIECHOCKI A. 1989: The Sphaeriidae of Poland (Bivalvia, Eulamellibranchia). *Ann. Zool.* **42**: 249–320.
ULIČNÝ J. 1892–1895: *Měkkýši čeští* [*Molluscs of Bohemia*]. Praha: Klub přírodovědecký, 208 pp (in Czech).
ZELENÝ J. 1972: [Entwurf einer Gliederung der Tschechoslowakei für faunistische Forschung]. *Zpr. Čs. Společ. Entomol. ČSAV* **8**: 3–16 (in Czech, Germ. abstr.).