



First record of *Neolentinus lepideus* f. *ceratoides* (*Gloeophyllales*, *Basidiomycota*) in Novosibirsk Region

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Abstract

Deviant form of wood-decaying basidiomycete *Neolentinus lepideus* was found in western Siberia, the rare sterile form *N. lepideus* f. *ceratoides* was found in the Novosibirsk Region. The description and an illustration of taxon is provided. The sterile form does not produce a hymenophore. It is formed under conditions of darkness on wood constructions in caves, grottos, mines, cellars, basements and under the floor. Sterile bodies of the fungus of horn appearance have a clavarioid morphotype. They are coral-like branched, with elongated rounded sprouts extending from the common trunk, which under normal conditions would have given a stipe. The caps with lamellar hymenophore, which would appear on normal fruiting bodies, are completely absent. Monstrose forms in *Neolentinus* species represents morphological modifications of fruiting bodies, associated with disturbance of normal morphogenesis under dark or shady conditions.

Key words – morphological variability – monstrose forms – sterile forms – Lentinoid fungi – distribution – ecology

Introduction

Some basidiomycetes can to grow in dark, e.g. in basement of houses, cellars, caves, grottos, with deviating from the optimum parameters of the habitat. Temperature and humidity in these habitats can be suitable for development of fruiting bodies, but their illumination is weak or completely absent. In these conditions, the xylotrophic fungi which develop on decaying timber wood remnants (as boards, beams, logs, produce a devoid of hymenium and often totally sterile bodies of deviating morphology. This is connected to disturbance of normal morphogenesis under dark conditions, particularly to circadian rhythm of the growing aerial mycelium (Salichos & Rokas 2010).

Similar phenomena were first recorded in the underground galleries of thermes of the village of Bagnères-de-Luchon in the south-west of France and the town of Courmayeur in the Vallée d'Aoste, Italy (Holmskjöld 1799, Lamarck & De Candolle 1805). New species of *Ramaria ceratoides* Holmsk. and *Clavaria thermalis* Lam. et DC. have been described. These were a sterile forms of *Neolentinus lepideus* (Fr.) Redhead et Ginns (*Gloeophyllales*, *Basidiomycota*), related to lentinoid fungi, known in Russia as the “railroad ties fungus”.

In nature, this fungus colonizes a dead wood predominantly of coniferous trees, where produces a brown rot (Fig.1). In the south of Western Siberia, the *N. lepideus* grows on fallen logs and stumps of *Pinus sylvestris*. Sometimes it can be found on *Populus tremula*, *Abies sibirica*, *Pinus sibirica*, *Larix sibirica*, *Betula pendula*. It often can be found in cities, on railroad ties.



Fig. 1 – Fruiting body of *Neolentinus lepideus* – a typical lentinioid form differentiated into pileus and stipe. – Bars = 5 mm. Photos by V. Vlasenko.

Some other species of fungi are also able to grow in the absence of light. These were found in the underground galleries of thermes of the village of Bagnères-de-Luchon (Montagne 1856, Roumeguere 1879, Martin-Sans 1924a, Marra 2001).

All these were predominantly orthotropic fungi of thelephoroid or cantharelloid morphotype, i.e. *Cantharellus melanoceras* Mont., *Thelephora terrestris* Ehrh., *Th. palmata* (Scop.) Fr., *Th. anthocephala* (Bull.) Fr., *Cotylidia pannosa* (Sowerby) D.A. Reid. Roumeguere called these forms as *f. cryptarum*, *f. anomala*, *f. thermalis* and *f. resupinata* – the last one was described for a prostrate form of *Lenzites betulina* (L.) Fr. (Roumeguere 1879, Martin-Sans 1924a). Also, on the door in the cave the myxomycete named as *Stemonitis fourcadii* Roum. was found (Martin-Sans 1924b). Taxonomically, these names were not validly published. *S. fourcadii* is actually *Stemonitis fusca* Roth, in Roemer et Usteri (Buchet 1928).

The sterile form of *Neolentinus lepideus* was described by the Danish botanist J Th. Holmskjöld in the book “Beata ruris otia fungis Danicis” as an independent species of *Ramaria ceratoides* (Holmskjöld 1799). The fungus was referred to the genus *Ramaria*, since the fruit bodies of this morphological form resembled clavarioid fungi. He also sketched this fungus for the first time.

CH. Persoon (Persoon 1828) has transferred this species to *Agaricus polymorphus* var. *ceratoides* (Holmsk.) Pers. Later, it became clear that *Agaricus polymorphus* var. *ceratoides* represents a monstrose form of *Lentinus lepideus*, growing in conditions of elevated temperature and humidity (Fries 1838, Pegler 1983). Similar monstrose forms were described in the genus *Lentinus* as a variety *L. lepideus* var. *ceratoides* (Holmsk.) P. Karst. (Karsten 1879).

Clavaria thermalis can be regarded as a heterotypic synonym of *Ramaria ceratoides*. The name was introduced in 1805 by J-B. Lamarck and AP. De Candolle in 2nd vol. of “Flore française” as a clavarioid fungus of thermal springs “Clavaire des bains chauds” (Lamarck & De Candolle 1805). It was found on rotten beams in a basement, where the hot springs of Courmayeur were draining.

In 1985, a new genus *Neolentinus* (type *Lentinus kauffmanii* AH. Sm.) was segregated from *Lentinus* (Redhead et al. 1985) on the basis of produced rot character (brown rot), and the *Neolentinus lepideus* (Fr.) Redhead et Ginns was introduced there. According to molecular phylogenies, the genus *Neolentinus* belongs to the order *Gloeophyllales*, unlike other species of the genus *Lentinus*, connected to *Polyporales* (Hibbet et al. 2007).

For the sterile form of *N. lepideus*, a new combination *Neolentinus lepideus* (Fr.) Redhead et Ginns f. *ceratoides* (Holmsk.) Bondartseva, Zmitr. et Zarudnaya was made and material epitypification was performed (Bondartseva et al. 2016).

Materials & Methods

Species of fungi were identified, morphological and anatomical characters were studied. Herbarium material CSBS SB RAS “Herbarium of vascular plants, lichens and fungi” (NSK), Novosibirsk, was used. Stereomicroscope Carl Zeiss Stemi DV4 and light microscope Carl Zeiss Axiolab RE were used to the species identification. Detailed study of the anatomical and morphological features was performed on a light microscope Carl Zeiss Axioskop-40 and stereo microscope Carl Zeiss Stereo Discovery V 12. For photographing fruiting bodies and habitats of fungi we used a Panasonic-Lumix DFC-XZ7 camera.

Results

Sterile form of *N. lepideus* f. *ceratoides* does not produce a spores and develops under dark conditions. It can sometimes be found on timber buildings as caves, grottos, mines, cellars, basements and under the floor.

Sterile fruiting bodies have a horn form, outwardly resembling clavarioid fungi, and bear several elongated, round coral-branched branches extending from a common trunk, which under normal conditions would have given a stipe. At the same time, the caps with lamellar hymenophore, which would appear on normal fruiting bodies, are completely absent.

In many cases, a peculiar rudiment are small sterile sprouts are formed near the base of a stipe of *N. lepideus*. Such an elongated primordia can also be found in well-developed fruit bodies (Sowerby 1803: P. 382, tab. CCCLXXXII, ut *Agaricus tubaeformis* Schaeff.).

Neolentinus lepideus (Fr.) Redhead et Ginns, 1985, Trans. Mycol. Soc. Japan 26 (3): 357.

Forma *ceratoides* (Holmsk.) Bondartseva, Zmitr. et Zarudnaya, 2016, Mikol. Fitopatol. 50 (3): 196.

≡ *Ramaria ceratoides* Holmsk., 1799, Beata Ruris Otia Fungis Danicis 1: 101. ≡ *Agaricus polymorphus* var. *ceratoides* (Holmsk.) Pers., 1828, Mycol. eur. (Erlanga) 3: 52. ≡ *Lentinus lepideus* var. *ceratoides* (Holmsk.) P. Karst., 1879, Bidr. Känn. Finl. Nat. Folk 32: 246. = *Clavaria thermalis* Lam. et DC., 1805, Flore française 2: 101.

Iconography – Holmskjöld, 1799: P. 101, ut *Ramaria ceratoides*; Bondartsev, 1956: P. 59, tab. XI, B, 3, ut *Lentinus lepideus* f. *ceratoides*.

Studied material – *Lentinus lepideus* (Fr.) Fr., Novosibirsk Region, cellar, on decaying wood, 1967. NSK 1013001 (Fig. 2).

Description – Fungal bodies sterile, monstrose, of clavarioid form, without pileus, hymenophore and stipe. They consist of clustered divaricate extended roundish branches, growing from a common base, or individual, developing from a separate primordia. Individual sprouts can be once–twice branched. Surface of such bodies is sterile, subtomentose, near basal parts rusty brown to cinnamon, in apical parts pale to cream. In areas of contact with the substrate and at the base of branches the fungal surface is covered with a layer of melanized brown hyphae (Fig. 3). Hyphal system is dimitic with presence of pseudoskeletal and skeletal hyphae. Generative hyphae 2.5–4 µm in diam., thin-walled, regularly branched. Pseudoskeletal hyphae 2–6 µm in diam., thick-walled, regularly branched, giving up near surface the clavate to utriform pseudocystidia 8–10 µm wide. Skeletal hyphae 8–9 µm in diam., unbranched, fibrous, thick-walled to subsolid, predominate in superficial tissues.



Fig. 2 – Fruiting body of *Neolentinus lepideus* f. *ceratoides* from Novosibirsk Region. – Bars = 10 mm. Photos by V. Vlasenko.

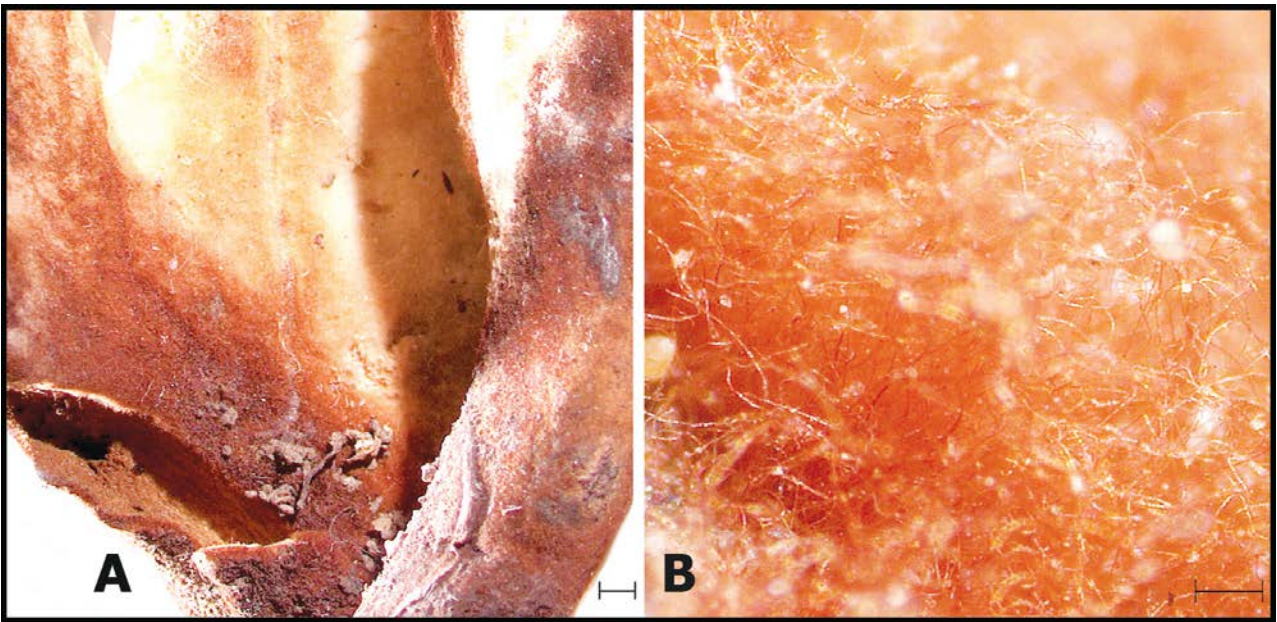


Fig. 3 – Fruiting body of *Neolentinus lepideus* f. *ceratoides* from Novosibirsk Region. Surface with melanized brown hyphae. – A. Scale bar = 1 mm. – B. Scale bar = 0.1 mm. Photos by V. Vlasenko.

Distribution in Russia – Leningrad Region, Gatchina district, Siversky village, under the floor of bathhouse, coll. GI. Zarudnaya, 20 IX 2015, LE 287614, epitype (Fig. 4).

Notes – The specimen from Novosibirsk Region was found during the revision of herbarium materials of the laboratory of the lower plants of the CSB SB RAS. Data on the label are recorded by NV. Perova. The author of the collection and identification is not known. Probably a specimen was found in Novosibirsk City.



Fig. 4 – Fruiting body of *Neolentinus lepideus* f. *ceratoides* from Leningrad Region, epitype, in LE herbarium. Scale bar = 10 mm. Photos by V. Vlasenko.

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