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Record of Cerebella sp. in Czech Republic and of Cerebella andropogonis in Brazil

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Dedicated to Prof. R. F. N. Langdon

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Cerebella sp. is reported from spike of *Festuca arundinacea* colonized by *Claviceps purpurea* in Trutnov, Czech Republic (1998). Spores were 2–3 celled with stalk cell, brown, with smooth cell walls and sized 11.1–13.9 × 12.0–14.5 μm. Rarely, 4-celled spores about 21 × 12 μm were found. Sporodochia were formed in cultures on potato carrot agar and corn-steep agar. *Cerebella andropogonis* Ces. was collected on *Brachiaria* sp. colonized by *Claviceps sulcata* at Sete Lagoas (Minas Gerais, Brazil 1996). Spores were 2–7 celled, with stalk cell, dark brown, sized 15–22 × 14–20 μm, their cell wall was slightly verrucose or smooth and thicker than that of Trutnov sample.

Key words: *Cerebella*, *Claviceps*, micromycetes, Czech Republic, Brazil

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Cerebella sp. byla nalezena v květu *Festuca arundinacea* kolonizovaném *Claviceps purpurea*. (Trutnov, ČR, 1998). Spóry o velikosti 11.1–13.9 × 12.0–14.5 μm byly 2–3 buněčné, s bazální buňkou, hnědé, s hladkými bunččnými stěnami. Vzácně se vyskytovaly čtyřbuněčné spóry (cca 21 × 12 μm). Kultury na bramboro-mrkvovém agaru a půdě s kukuřičným výtažkem sporulovaly. Sporodochia *Cerebella andropogonis* Ces. byla nalezena na trávě *Brachiaria* sp. napadené *Claviceps sulcata* (Sete Lagoas, Minas Gerais, Brazílie, 1996). Spóry byly 2–7 buněčné s bazální buňkou, tmavohnědé, o rozměrech 15–22 × 14–20 μm. Jejich buněčná stěna byla slabě drsná nebo hladká a silnější než u trutnovského vzorku.

INTRODUCTION

Cerebella is dematiaceous hyphomycetous genus without known teleomorph. Type species *Cerebella andropogonis* forms typical black convoluted (hence the generic name) sporodochia on the developing sclerotia, sphacelia or honeydew droplets of various *Claviceps* species (Langdon 1955; Ellis 1971). Its morphology resembles that of *Epicoccum*, so that Schol-Schwarz (1959) suggested transfer of *C. andropogonis* into this genus as *Epicoccum andropogonis*. However, this combination was not accepted by later authors.

The marked black sporodochia indicate well the occurrence of ergot species that could otherwise pass unnoticed. Although Tulasne (1856) already recognized

Cerebella as an ergot hyperparasite, there are numerous literature records, even the recent ones, that consider *Cerebella* plant parasite (McDonald 1923; Lenné 1990).

Cerebella collections were found in herbaria under different species and generic names, sometimes also misplaced among Ustilaginales. Langdon (1952, 1955) made a detailed revision of the herbarium collections of *Cerebella* and found that it is only one species that colonizes different ergots in different parts of world. He described it as species typical for all tropics and subtropics.

European collections originate mostly from southern regions. *Cerebella andropogonis* was first collected in Italy on *Andropogon tener* (Rabenhorst Herbar. Mycol. – ii. 284). There are two Voss' collections on *Molinia coerulea* near Ljubljana (today's Slovenia) in 1878 that are deposited at Kew Herbarium as isotypes (180827 and 180828) labeled *Sorosporium vossianum*. All these specimens were later revised by Langdon (1955) as *Cerebella andropogonis*, with conidia size range 15–22 × 13–18 μm. A record was made in Romania (1980) on ergotized *Cynodon dactylon* (Herbarium Mycologicum Romanicum, Constantinescu and Negrean Fasc. – 60 2968).

In the North America, *Cerebella* distribution was concentrated on the states surrounding Mexican Gulf (in the USA in states of AL, AR, FL, GA, KS, LA, MD, MS, NC, OK, SC, TX and VA) and did not exceed 40 N of latitude (Sprague 1950; Parris 1959; Anonymus 1960).

One of the samples that were mentioned in Langdon's studies but not revised was the collection of Picbauer (1938) under the name *Cerebella moravica* Picb. (Moravia, Czech Republic). As the source journal is not widely available, the original Latin description is presented:

Cerebella moravica Picbauer 1938

Stromatibus pulvinatis, cerebriformibus (tremellaceiformibus), thallo lichenis Synechoblasti vel Leptogii similibus, 2–5 mm diam., brunneo-atris. Glomerulis globosis vel subglobosis, primo unicellularibus, deinde segmentatis, ac e 2–5 segmentis compositis, 13–15.5 μ diam, rarius ovoideis, plerumque 23 μ longis ac 15.5 μ latis, brunneololuteolis, ad septa plus minusve constrictis, levibus vel minute asperulis. Cellulis irregularibus a lateribus mutua pressione angulatis, supra convexis.

Habitat ad spicas vivas *Alopecuri aequalis* Sobol. Ad oppidum Kroměříž Moraviae. Mense septembre profesor Ignatius Zavřel legit.

The fungus was observed on *A. aequalis*, most probably colonized by *Claviceps purpurea* and its desription falls well with *C. andropogonis* except for the spore size.

Present paper describes *Cerebella* sp. from the outskirts of the town Trutnov (northeastern part of Bohemia, Czech Republic) in comparison to *C. andropogonis* specimen from Brazil, typical of species.

Materials and Methods

Herbarium specimens examined:

Cerebella sp. – from sphacelial stage of *C. purpurea* on *Festuca arundinacea*, Trutnov, Czech Republic August 1998, coll., isol. and det. S. Pažoutová; *Cerebella andropogonis* – on sphacelial stage of *C. sulcata* colonizing *Brachiaria* sp., Sete Lagoas, Minas Gerais, Brazil, June 1997, coll. and det. S. Pažoutová according to Ellis (1971).

Isolate examined:

Cerebella sp. – as above. The pure culture was isolated from the spores plated on potato dextrose agar and is deposited at the Institute of Microbiology, Prague.

Cerebella sp. isolate was maintained on RK agar slants (g/l: sucrose 30, corn steep (60%) 20, KH_2PO_4 20, agar 20, pH 6.50) and subcultured every 5–6 months. The plate cultures were incubated on potato dextrose agar, potato carrot agar and RK agar. The formation of spores was induced by exposition to UV-light from common germicidal tubes for 1–2 weeks. The microscopical conidia measurements were done under oil immersion (objective 90x, eyepiece 12.5x).

Results

Cerebella sp.

The fungus was found in August 1998 on ergotized (*C. purpurea*) spikes of tall fescue (*Festuca arundinacea*) on the open and dry meadow between the railway and the Zvonková street in Trutnov, Zelená louka. The grass was ergotized only weakly, mostly *Lolium* sp. and some plants of *Festuca arundinacea*, *Elytrigia repens* and *Dactylis* sp. were colonized. In the area of approx. 100 × 200 m, only single occurrence of *Cerebella* was found.

Description

The species forms the typical black convoluted sporodochium (Fig. 1). Our observation revealed only smooth brown spores (Fig. 2), constricted at the septa,

often with stalk cell attached. The spore consisted mainly from 2–3 cells, rarely from 4 cells. The spore dimensions were 11.1–13.9 × 12–15.5 μm, four-celled spores were 20–23 × 11–13 μm. The morphology of conidiophores and conidiation corresponded to that depicted in Ellis (1971).

Colonies on PDA after 7 days in 24 °C were 4.5–5 cm in diameter, with grey-white dispersely lanose mycelium, and intense reddish-brown pigmentation of agar. No formation of sporodochia was observed.

Colonies on potato carrot agar after 7 days in 24 °C were 5–5.5 cm in diameter, pale grey-brown, with reddish-brown agar pigmentation. Mycelium was dispersely lanose with some white to grey vertical synnemata. Small nonconvoluted sporodochia were formed in sectors and circles. The size and shape of spores was identical to the one found on plant specimen.

Colonies on RK agar were 4 cm in diameter, compact, covered by white-grey fluffy mycelium tinged grey-green, especially around the circular sporodochia. The sporodochia were cerebriform, like the natural ones. However, spores were 2–5 celled and their dimensions were 10–15 × 15.2–22.9 μm

Shortly after the isolation, we were able to induce sporulation of *Cerebella* sp. only in potato-carrot agar cultures using UV-light. Sporulation was more intensive on the plates with thinner medium layer. The conidia were identical to these from original sporodochium on natural substrate. However, cultures maintained for one year on RK slants sporulated readily without exposition to UV light on potato carrot agar as well as on RK agar, but no sporulation occurred on potato dextrose agar. The sporulation in cultures grown initially in 24 °C was also stimulated by the transfer to 10 °C.

Cerebella andropogonis Ces. 1851

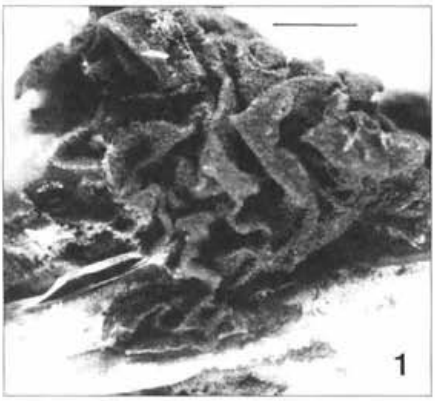
Botan. Ztg. 9: 669

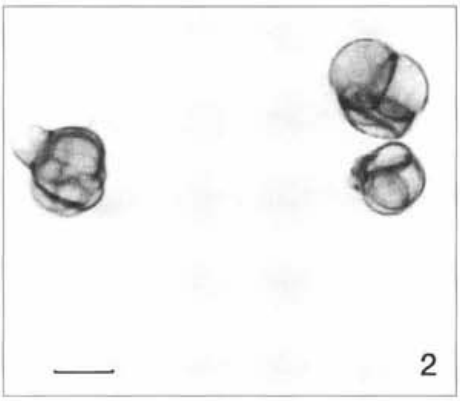
The spores from sporodochium (Fig. 4) of the Brazilian specimen were sized 15–22 × 14–20 μm and dark brown, their cell wall was thicker than in the Czech sample and 5–7 celled spores were no exception (Fig. 5). Their appearance was smooth or slightly verrucose, the conidiophore morphology was identical to that described in Ellis (1971).

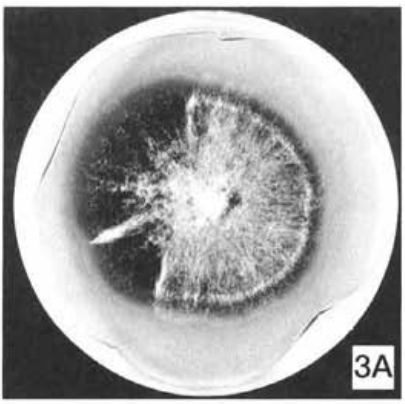
Unfortunately, the spores of Brazilian sample were no more capable of germination so no comparison of the cultures has been possible.

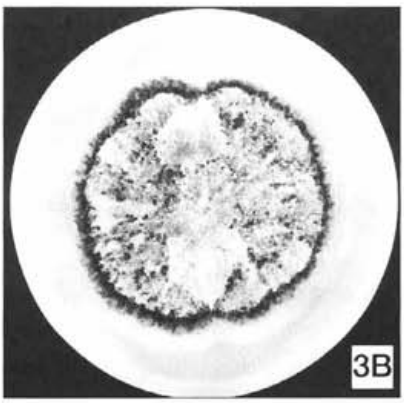
DISCUSSION

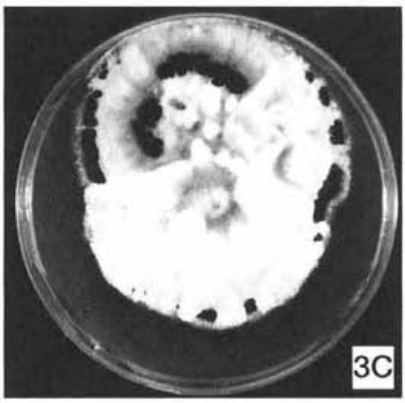
The Brazilian specimen is typical example of *C. andropogonis*. Langdon's review (1955) mentioned Brazilian record already from 1937 together with records



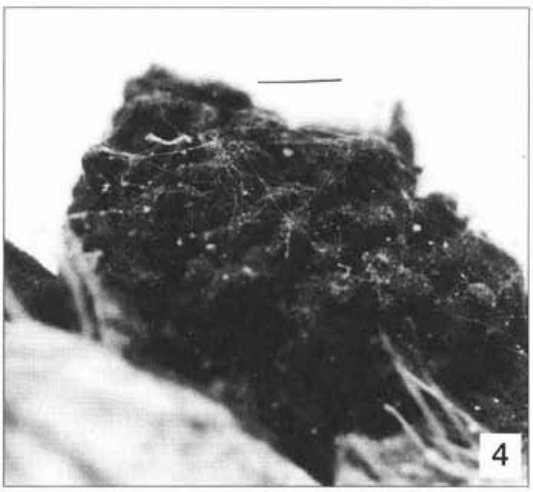


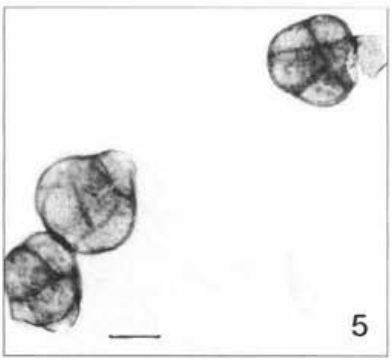






Figs. 1–3 *Cerebella* sp.
1. Sporodochium on ergotized fescue spikelet. Scale = 2 mm. **2.** Spores from sporodochium. Scale = 10 μm. **3.** Morphology of colonies (1 wk old) on potato dextrose agar (A), potato carrot agar (B) and RK agar (C) (90 mm in diam.). Note small black sporodochia formed radially and in sectors on PCA and compact circles of sporodochia on RK agar.





Figs. 4–5 *Cerebella andropogonis* Ces.
4. Sporodochium on ergotized *Brachiaria* spikelet. Scale = 2 mm. **5.** Spores from sporodochium. Note the single conidium of *Claviceps sulcata*. Scale = 10 μm.

from further South American countries. The specimen was included in this study for direct comparison of spore morphology.

The question may be raised whether the genus *Cerebella* is monotypic or not. Langdon (1955) commented on *C. moravica* and two other specimens that were unavailable for his study that "although from their descriptions they may well be *C. andropogonis*, confirmation or otherwise of this has not been possible" but did not reject their species status. Formally, the Picbauer's description meets International Code of Botanical Nomenclature standards for valid species description made before 1958, where the existence of type is not mandatory, so on this basis it cannot be rejected. Also there are differences in spore size and the unusual locality where it was found.

Both Czech collections (*C. moravica* and *Cerebella* sp.) have smaller spores than *Cerebella andropogonis* (summarized range given by Langdon is 15–30 × 13–22 μm). Picbauer (1938) found the spores of *C. moravica* 2–5 celled, mostly 13–15.5 μm in diameter, only rarely elongated (23 × 15.5 μm), smooth or slightly rough and brown-yellowish in color. Spores of *Cerebella* sp. were similar. Langdon (1955) supposed that specimens with spores under 15 μm and with attached stalk

cells are immature. The conidia in our cultures, however, did not increase their size after longer incubation. From the comparison of spores formed on potato carrot and RK plates it is obvious, that the nutrients influence the spore size substantially. Therefore, the spore size seems to be of limited taxonomic value in *Cerebella*. It may well be speculated that *C. purpurea*, producing less honeydew in comparison with *Claviceps* species from the warm regions does not support full development of *Cerebella* conidia.

On the other side, there are more differences between typical *C. andropogonis* morphology and the appearance of the Czech specimens. The cell walls of *Cerebella* sp. conidia were thinner than in the Brazilian sample of *C. andropogonis* and on the drawings in Ellis (1971). Picbauer neither commented about the thickness of the cell walls of his specimen nor any picture was included, but the difference of our fungus from *C. andropogonis* from Brazil is clearly visible. Also, Langdon (1952) observed verruculose and smooth spores in *Cerebella* collections, the latter occurring mainly in the cultures. Czech specimens of *Cerebella* sp. had smooth or mostly smooth spores.

It may well be possible that Picbauer's and our fungus are the same species *C. moravica*, different from *Cerebella andropogonis*. Unfortunately, the type specimen does not exist in the herbarium of Picbauer (catalogued at present in Moravské zemské muzeum, Brno, BRNM) so that the direct comparison of both fungi is no more possible. Therefore we classify our collection only on generic level as *Cerebella* sp.

Another comment is related to the present locality. It is well known, that southern Moravia is a place, where some of the species common only in the southern regions of Europe can be found. From this point of view, the first record of *Cerebella* near Kroměříž in 1938 was expectable. However, the present record is about 200 km more to the north and in higher altitude. The relationship to the climate warming is suspected.

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