

RHIZOCALYX ABIETIS PETRAK, THE PERFECT STATE OF RHIZOTHYRIUM ABIETIS NAUMOFF

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Rhizocalyx abietis Petrak is reported from Quebec on dead foliage of balsam fir (*Abies balsamea*). The genetical relationship between *R. abietis* and *Rhizothyrium abietis* Naumoff is established and a description of the perfect state given.

On signale la présence du *Rhizocalyx abietis* Petrak dans le Québec sur du feuillage mort de sapin (*Abies balsamea*). L'auteur démontre les affinités génétiques entre ce champignon et le *Rhizothyrium abietis* Naumoff et présente une description de son stade parfait.

Rhizocalyx abietis, the type species of the genus *Rhizocalyx* Petrak, was described by Petrak in 1928 (3) from a specimen collected in the USSR on the foliage of Siberian fir (*Abies sibirica* Ldb.). The fungus was found on needles in association with *Rhizothyrium abietis* Naumoff. On the basis of this evidence, Petrak assigned *Rhizothyrium abietis* as the imperfect state of *Rhizocalyx abietis*. Experimental proof of the relationship, however, was not established.

Rhizocalyx abietis was recently collected in Quebec on dead, attached foliage of balsam fir (*Abies balsamea* (L.) Mill.) in association with *Phaeocryptopus nudus* (Peck) Petrak, *Rhizothyrium abietis*, and an unidentified Discomycete. The genetical relationship proposed by Petrak between *Rhizocalyx abietis* and *Rhizothyrium abietis* was confirmed by means of monospore cultures. Single spore isolates of *Rhizocalyx abietis* and *Rhizothyrium abietis* are identical, both producing the same type of conidia.

The imperfect state of *R. abietis* was recently illustrated and described in detail by Darker (1). The perfect state is known only from Petrak's description. Although relatively complete, the original diagnosis according to Petrak (3) is based on immature apothecia. In this paper, the generic diagnosis of *Rhizocalyx* is amended and a description of the perfect state of *R. abietis* given.

RHIZOCALYX Petrak. *Hedwigia*, 68: 233-234, 1928.

STATUS CONIDICUS: *Rhizothyrium* Naumoff *Bull. Soc. Mycol. Fr.* 30: 429, 1915.

Apothecia superficial, solitary or subcespitose, black, coriaceous, glabrous, stipitate, obconical; disc black, concave or plane; ectal excipulum of parallel rows of thin-walled, agglutinated hyphae; medullary excipulum of thick-walled, isodiametric cells; exterior zone of stipe of elongated cells; hypothecium of isodiametric cells; asci 8-spored, cylindrical-clavate, stipitate, thickened at the apex, the pore blued in iodine; ascospores uniseriate or biseriate, hyaline, aseptate to several septate, ellipsoid to clavate; paraphyses filiform, septate, simple or branched, the tips light olive-brown, somewhat clavate, agglutinated and forming an epithecium; conidial fruiting bodies superficial, applanate, suborbicular, astomous, with a clypeus and columella; conidia acrogenous, hyaline, phragmosporous; conidiophores simple, septate, originating under the clypeus from columella.

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TYPE SPECIES: *R. abietis* Petrak.

Rhizocalyx abietis Petrak. Hedwigia, 68: 234–235, 1928 (Figs. 1–3).

STATUS CONIDICUS: = *Rhizothyrium abietis* Naumoff Bull. Soc. Mycol. Fr. 30: 429, 1915.

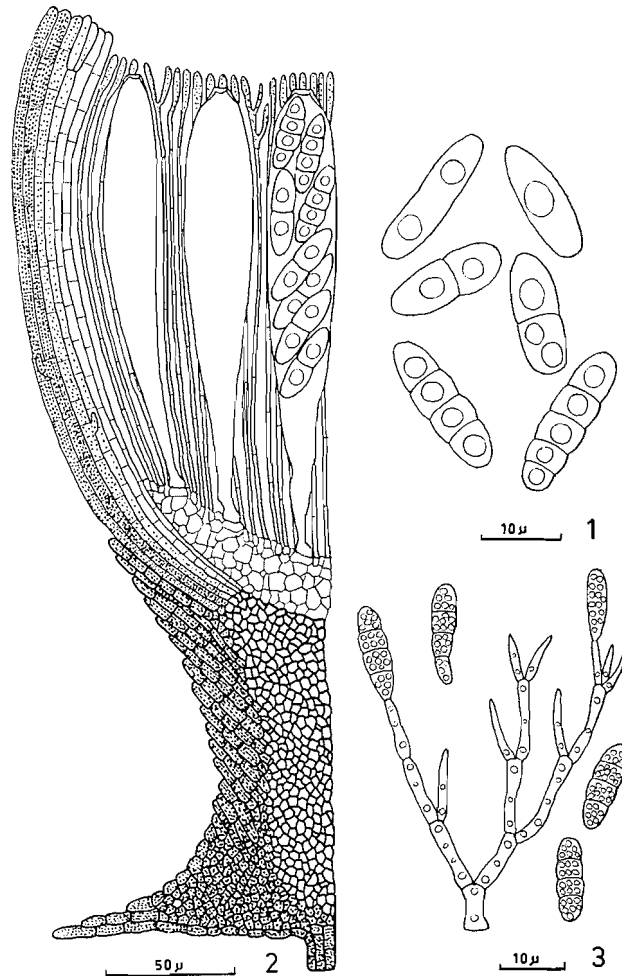
Apothecia superficial, predominantly hypophyllous but occasionally epiphyllous, solitary or occasionally gregarious and subcespitose, 100–320 μ in diameter, 190–250 μ in height, black, coriaceous, glabrous, stipitate, at first cylindrical, becoming obconical, circular in outline, margin even, erect; stipe 60–100 μ long, expanded at the base and attached to host by a centrally located hyphal cord; disc black, slightly concave or plane; ectal excipulum 15–35 μ thick, composed of rows of thin-walled, agglutinated, granular, light olive-brown hyphae 2–3 μ in diameter lying parallel to its surface; medullary excipulum composed of thick-walled, light olive-brown, isodiametric cells measuring 3–7 μ ; exterior zone of the middle and upper part of stipe consisting of rows of dark brown, thick-walled hyphae 2–4 μ in diameter lying at a very low angle to the surface; exterior of the lower part of stipe composed of thick-walled hyphal filaments measuring 2–4 μ in diameter and radiating from a central core of isodiametric cells; hypothecium up to 30 μ thick, composed of hyaline, thin-walled, isodiametric, subangular cells 3–12 μ in diameter; asci 8-spored, cylindric-clavate, stipitate, truncate-conical and thickened at the apex, the pore blued in iodine, 65–115 \times 10–16 μ ; ascospores uniseriate or occasionally biseriata in the upper part of ascus, hyaline, aseptate to 4-septate, slightly constricted at the septa in recently collected specimens, becoming smooth in older ones, ellipsoid to elliptic-fusiform or clavate, straight or slightly curved, with one to five large oil globules, 9.1–28.0 \times 3.5–6.3 μ ; paraphyses filiform, simple or branched, septate, 1.4–2.1 μ in diameter, tips light olive-brown, somewhat clavate, agglutinated, forming an epithecium.

SPECIMENS EXAMINED: all on *Abies balsamea*: Parc des Laurentides, Quebec, QFB¹ 19,134; Saint-Cyprien, Quebec, QFB 19,135; Saint-Louis-de-Gonzague, Quebec, QFB 19,136; Saint-Cyprien, Quebec, QFB 19,137; Saint-Camille, Quebec, QFB 19,138; Blandford, Quebec, QFB 19,139.

In culture, *R. abietis* grows very slowly. On 3% malt agar at 15 °C, colonies attain a diameter of 22–25 mm (four replicates) in 4 weeks. Mat is gray to reddish brown, crust-like, relatively hard and brittle, with sparse, very short aerial mycelium and superficial, minute, pustule-like sporodochia. Margin is even, appressed. Reverse unchanged.

Hyphae of the aerial mycelium are subhyaline, infrequently branched, relatively straight, and range in diameter from 1 to 3 μ . They are often aggregated in loosely united strands and covered with drops of a gelatinous substance. Submerged hyphae are relatively straight and vary in color from subhyaline to golden-brown and in diameter from 1 to 5 μ . Conidia (Fig. 3) are acrogenous, hyaline to golden-yellow, clavate to cylindrical, straight or slightly curved, 1- to 3-septate, somewhat constricted at the septa, guttulate, 17.5–24.5 \times 4.9–5.6 μ in size. Clustered together in sporodochia, conidiophores are branched, with each branch terminating in one to three phialides measuring 10–25 \times 2.1–4.9 μ .

¹Herbarium abbreviations from Lanjouw and Stafleu (2).



FIGS. 1-3. *Rhizocalyx abietis*. FIG. 1. Ascospores. FIG. 2. Vertical section through an apothecium. FIG. 3. Conidiophore and conidia formed in culture.

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