

CLAVICEPS FROM ZIZANIA<sup>1</sup>

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## Abstract

The nomenclatorial status of the species of *Claviceps* occurring on *Zizania* has been uncertain for several years because although its perfect state has been known since 1915 it has been imperfectly described and placed in the wrong genus. A detailed description of this fungus is presented and a new combination for this species is proposed.

The perithecial state of *Claviceps* from wild rice, *Zizania aquatica* L. and *Z. palustris* L., was first obtained and briefly described by Fyles in 1915 (3). From the measurements of the asci, ascospores, and conidia as well as from infection experiments she was convinced that this was a species distinct from the common *Claviceps purpurea* (Fr.) Tul. Evidently she intended to prepare a formal description and propose a name in a later publication but she failed to do so. However, in a bulletin on wild rice (4) published 5 years later she referred to this fungus as *Spermoedia zizaniae* without describing it further.

The genus *Spermoedia* was erected by Fries (2) and his description was based on the sclerotial state. Léveillé (5) observed the conidial state, assumed it to be a distinct fungus, and erected the genus *Sphacelia* for it. It was Tulasne (7) who established the connection between the sclerotial, conidial, and perithecial states and erected the genus *Claviceps*. The latter name was generally accepted and the names of the two imperfect states have fallen into disuse.

By using the generic name *Spermoedia* Fyles was in error since she used a generic name which was based on the imperfect and not the perfect state of the fungus. A generic name, *Claviceps* Tul., was available for the perfect state and according to the International Code of Botanical Nomenclature Article 59 'The first legitimate name or epithet applied to the perfect state takes precedence'. It is perfectly clear that Fyles intended to name the perfect state but she followed Seaver (6), who at that time used the name *Spermoedia* to describe all three states of *Claviceps* spp.

The name *Spermoedia zizaniae* Fyles was not accepted and in future references this fungus was cited either as a species of *Claviceps* on *Zizania* or as an undetermined species. Some authors continued to retain it in *C. purpurea* (Fr.) Tul.

Further evidence that the *Claviceps* from *Zizania* is a distinct species was presented by Brown (1). He reported that the strain from *Zizania aquatica* L. did not infect cereals and other grasses and its sclerotia have the characteristic of floating in water. Wright (8) obtained and described the perfect and imperfect states and performed infection experiments. Conidia from *Zizania aquatica* L. var. *angustifolia* Hitchc. did not infect cereals which are common

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hosts of *C. purpurea* Tul. and conidia from four grasses did not infect the wild rice. From these experiments and from his measurements he concluded that the *Claviceps* from *Zizania* was a distinct species. However, he did not name it and his thesis has never been published.

The present work was stimulated by the fact that good material of the perfect state of the fungus was obtained and it supported the view that this species was distinct from *C. purpurea*. Fyles' study of this fungus was carried out here at Ottawa but her material was not preserved. References to this fungus have been made difficult by its uncertain status and it was thought desirable to redescribe it and place it on a sound nomenclatural basis. It is considered that *Spermoedia zizaniae* Fyles is not a *nomen nudum* because in publishing it Miss Fyles referred to her earlier description where she did not name it. Hence a new combination in *Claviceps* is proposed based on *Spermoedia zizaniae* Fyles and the new material is designated as a neotype.

The sclerotia were collected in the summer of 1957 near Sheffield, N.B., by W. G. Dore. They were abundant on *Z. aquatica* L. var. *interior* Fassett. They were germinated in the spring of 1958 and again in February 1959. In the first year the perithecial stromata were abnormal and very few matured. In June 1958 a number of sclerotia, from the same collection, were placed in sterile water and kept in the refrigerator at 0° C until the beginning of November. Then they were transferred to dishes with sterile sand and kept in the greenhouse at a temperature of 10–15° C. The sclerotia started to germinate in the middle of January and several perithecial heads were mature by February 20, 1959. My description is based on this material. Conidia adhering to the surface of the sclerotia were used for the measurements and the drawings. My measurements of the conidia are not in agreement with those of Fyles and Wright. Whether this is due to the fact that they made their measurements from the honeydew stage and the conidia were not fully mature is not certain. There is close agreement in the measurements of the asci and the ascospores. Fyles (3) reported: conidia 9–12 × 2.5–3.5 μ; stromata up to 50 mm high; perithecia 250–325 × 150–160 μ; asci 200–215 × 4 μ; ascospores 150–180 μ three-septate. Wright (8) reported: sclerotia 6–16 mm long, 3–7 mm wide; conidia 6.8–15.9 × 3.4–5.6 μ; perithecia 225–326 × 93–202 μ; asci 140–203 × 3.4–4.5 μ; ascospores 109–171 × 0.5–1 μ three-septate.

The experimental evidence accumulated leaves no doubt that the *Claviceps* from *Zizania* is a distinct species. It differs from *C. purpurea* in the morphology of the sclerotia and perithecial stromata, size of sclerotia, conidia, asci, and ascospores, and also in host specificity. The same holds true in comparisons with any of the known species of *Claviceps*.

***Claviceps zizaniae* (Fyles) comb. nov.**

*Spermoedia zizaniae* Fyles

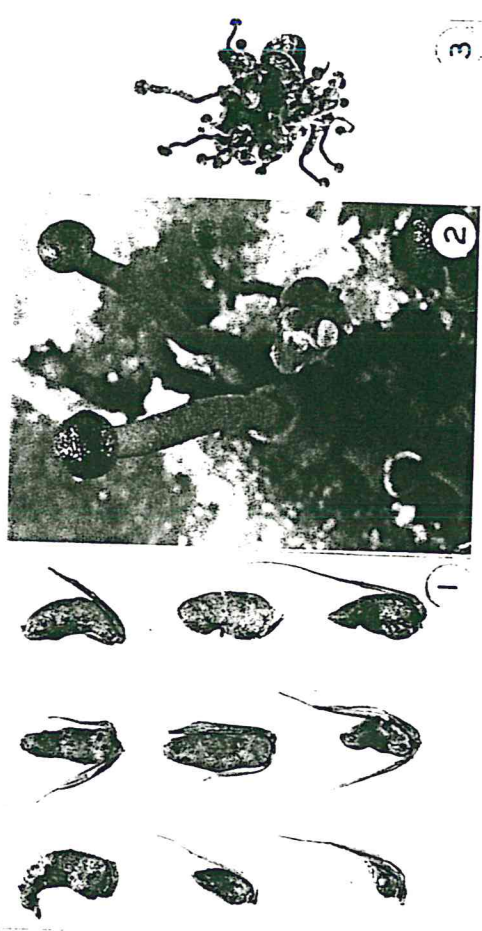
Sclerotia (Fig. 1) cylindrical often pointed or curved at one end, few reniform, 5–16 mm in length, 3–6 mm in diameter, 'light drab' to 'hair brown' and uneven on the surface, 'light vinaceous lilac' within. Conidia (Fig. 4) very variable in size and shape, oblong-elliptical, reniform, some close to pyriform,

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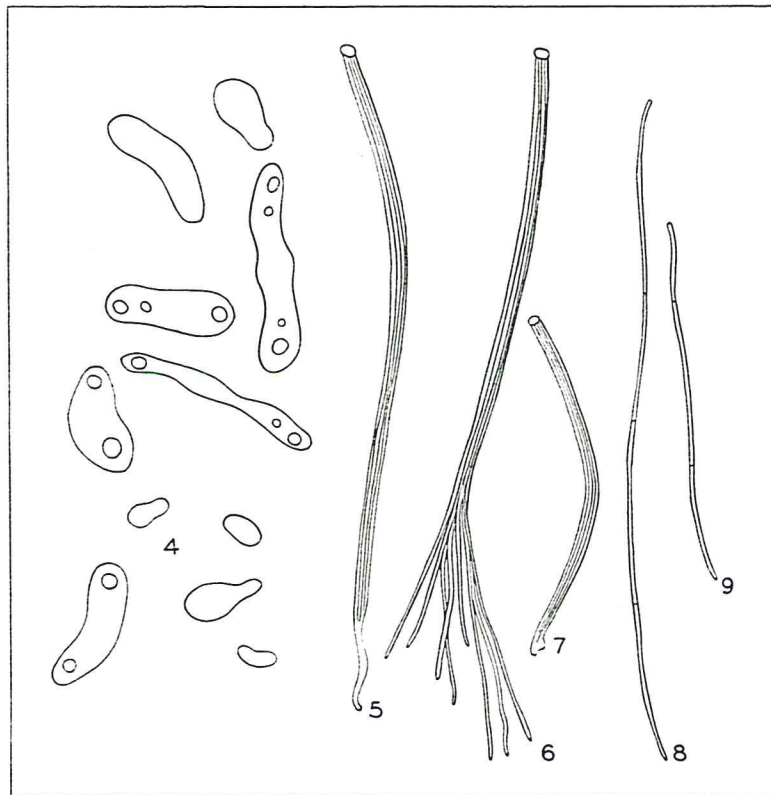
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PLATE I



FIGS. 1-3. *Claviceps zizantiae*. Fig. 1. Sclerotia natural size. Fig. 2. Perithecial heads enlarged X4.5. Fig. 3. Perithecial stromata natural size.

hyaline with two or more oil drops; (6.5)8–30×3–6  $\mu$ , perithecial stromata several from a sclerotium (Fig. 3); stalks 5–25 mm in height, 1 mm in diameter, 'tawny' some 'light vinaceous lilac' when young, glabrous, often becoming horny and twisted when dry; heads (Fig. 2) more or less spherical 1–3 mm in diameter, 'tawny' to 'russet', rough punctate with the darker 'Mars brown' perithecial ostioles; perithecia embedded in the outer part of the head, the ostioles projecting beyond the surface, 200–330  $\mu$  in length, 90–200  $\mu$  in diameter; asci (Figs. 5, 6, 7) cylindric, flexuous, rounded above, with a hyaline cap, narrowed below and often curved, eight-spored, 110–226×3.5–4.5  $\mu$ ; ascospores hyaline (Figs. 8, 9), filiform, three-septate 115–190×0.5–1  $\mu$ .



FIGS. 4–9. *Claviceps zizaniae*. Fig. 4. Conidia ×1000. Figs. 5–9. Asci and ascospores ×500. Fig. 6. Ascus ruptured liberating eight ascospores.

*Host*.—In the ovaries of *Zizania aquatica* L. and *Z. palustris* L.

*Specimen examined*.—DAOM 56855, sclerotia on *Z. aquatica* L. var. *interior* Fassett, collected about two miles NW. of Sheffield, N.B., by W. G. Dore (17042), September 9, 1957, perithecia produced February 1959. Neotype.

### Acknowledgments

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