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ZELLEROMYCES STEPHENSII

AN INTERESTING MEMBER OF THE GASTEROID RUSSULALES FROM EUROPE[1]

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Abstract: *Zelleromyces stephensii* was collected near Etzel, Switzerland. Taxonomic notes on morphological features, distribution, and vascular plant associates are provided. *Zelleromyces stephensii* is compared with other species of *Zelleromyces* from North America.

Résumé: *Zelleromyces stephensii* a été récolté en Suisse près d'Etzel dans le canton de Schwitz. Sa morphologie, sa distribution géographique, son association avec des plantes vasculaires et sa taxonomie sont discutées ici. *Zelleromyces stephensii* est comparé avec des espèces nordaméricaines du genre *Zelleromyces*.

Zusammenfassung: *Zelleromyces stephensii* wurde in der Schweiz auf dem Etzel, Kanton Schwyz gefunden. Die Morphologie des Pilzes, seine geographische Verbreitung, Vergesellschaftung mit Gefässpflanzen sowie seine Taxonomie werden besprochen. *Zelleromyces stephensii* wird mit weiteren nordamerikanischen Vertretern der Gattung *Zelleromyces* verglichen.

[1]Funded in part by the USDA Forest Service, Pacific Northwest Research Station, Corvallis, Oregon 97331 U.S.A.

Hypogeous fungi form sporocarps at or below the surface of the ground and are therefore often rarely observed or collected. Taxonomic notes on hypogeous fungi, including fresh morphological features, distribution, associated soil types and vascular plant associates, are irreplaceable in establishing a proper systematic perspective for these fungi. Recently *Zelleromyces stephensii* (Berk.) A. H. Smith was collected by the junior author near Etzel, Switzerland. Although known throughout Europe, it appears that *Z. stephensii* has only been reported briefly in the literature from Switzerland (Froidevaux and Schwärzel 1977). The present paper provides detailed descriptive information on *Z. stephensii* in order to more carefully characterize this species of gasteroid Russulales. It is hoped that additional ecological information on the species, including fruiting period, host range and associated soil type, will result from data presented here.

Colour nomenclature and coding is taken from the Methuen Handbook of Colour (Kornerup and Wanscher 1981). Herbarium names are abbreviated according to Lanjouw and Stafleu (1964).

Zelleromyces stephensii (Berk). A. H. Smith, Mycologia 54: 635 (1962).
Hydnangium stephensii Berk., Ann. Mag. Nat. Hist. 13: 352 (1844).
Octaviania stephensii (Berk.) Tul., Fung. Hypog. 78 (1851).
Arcangeliella stephensii (Berk.) Z. & D. in Dodge, Ann. Mo. Bot. Gard. 18: 463 (1931).

Basidiomes 1.5-3 cm diam., subglobose, ellipsoid, or irregularly flattened and depressed, often fused together into compound, lobed structures; with a small basal knot of mycelium or sterile base at the point of attachment. **Peridium** orange red (8A-8, 8B-8) when young, darkening to brownish red (8C-8) or reddish brown (8D-8) and mottled with darker areas in age, pale red (7A-3) to greyish red (7B-4) below and in crevices; drying light brown (6D-6); smooth, unpolished at first, subtomentose below, polished above with age; 0.5-0.7 mm thick in section, usually slightly thicker below. **Gleba** labyrinthoid, of unfilled, ellipsoid or irregular chambers, 2-4 per mm at maturity, smaller when young; orange white (6A-2), pale orange (6A-3) to reddish white (7A-2) young, dull red (8B-4) to greyish red (8B-5) in age; drying greyish orange (5B-4). **Tramal plates** 70-300 µm thick, with a broad hymeno-

phoral trama and poorly developed subhymenial layers, loosely joined, easily movable fresh. **Columella** present, thin, evident only in young gasterocarps, partially percurrent from a small sterile base, dendritic; brownish red (8C-8). **Laticiferous elements** abundant in both hymenophoral trama and lower layer of the peridium, cylindrical to swollen and contorted, 7-11 µm diam., thin-walled, with yellowish refractive contents in KOH; exuding a latex when cut, latex milky white, thin, abundant from around peridium and near columella, also present in tramal plates. **Spores** 9.5-16(18) x 8.4-13.5(15.5) µm (excl. orn.), Q= 1.18; orthotropic to subheterotropic, subglobose to broadly ellipsoid, thin-walled; ornamentation of isolated verrucae and cylindric spines 0.5-1.5 µm high, frequently recurved, spines absent or infrequent near the hilar appendix; subhyaline to dull ochraceous in KOH, weakly amyloid overall in Melzer's reagent, verrucae amyloid, individual spines only partially amyloid, or frequently nonamyloid; hilar appendix 1.5-3 x 0.5-1 µm, tapering or attached to a straight, thin-walled segment of sterigmal appendage, often with a broad terminal hilar scar. **Basidia** 37-50 x 14-17 µm, inflated-clavate, bearing 2, 3 or 4 spores; sterigmata 6-13 µm long, cylindrical, straight or slightly bowed, often constricted near the hilar appendix. **Cystidia** none. **Hymenophoral** trama regular or nearly so, of interwoven sub-parallel hyphae, 3-5 µm; laticiferous hyphae abundant. **Subhymenial layer** present but poorly developed, 1-3 cells thick, cells angular, 15-20 x 7-9 µm. **Peridiopellis** a trichodermial palisade of clavate to subulate, often mucronate dermatocystidia, 10-30 x 2-4 µm, arising from a thin epithelium of tightly interwoven, inflated and irregularly shaped cells; hypodermium thick, of loosely interwoven, cylindrical to slightly inflated hyphae, 3-7 µm, laticiferous hyphae abundant, periclinally arranged. (Figs. 1-6).

Material examined

Switzerland: Etzel, hypogeous under *Picea abies*, 12 Aug. 1984, O.K. Miller, Jr. 20180, (VPI).

England: Leigh Woods, Bristol, Aug. 1844, Broome, (K), Holotype; Bristol, Lloyd 7192 (BPI).

Germany: Saar, Rubenheim, hypogeous in calcareous soil under *Carpinus*, *Acer*, *Crataegus*, 27 Aug. 1970, G. Gross 386 (M); Saar, Merzig, hypogeous in calcareous soil, under *Cornus*, *Populus*, *Pinus*, 14 Nov. 1970, G. Gross 4168 (M); Saar, Merzig, hypogeous in calcareous soil under *Pinus*, *Populus*, 4 Nov. 1972, V. Demoulin 4619 (UC).

The hypogeous or erumpant basidiomes grow in small clusters. *Zelleromyces stephensii* undoubtedly forms an ectomycorrhizal symbiosis with particular tree hosts. To the authors' knowledge, no experiments have confirmed its ability to form ectomycorrhizae in pure culture. *Zelleromyces stephensii* has been reported under both conifers and hardwoods (Gross 1980, Froidevaux and Schwärzel 1977), however, it is unusual for a particular species in the genus to be mycorrhizal with both conifer and hardwood tree hosts. More thorough observations are required to determine its ectomycorrhizal hosts and host range. *Zelleromyces stephensii* is distinguished by spores that are weakly amyloid to nearly pseudoamyloid with unconnected verrucae and blunt or recurved, rarely totally amyloid spines, together with the trichodermial peridiopellis, filamentous hypodermium, and abundant laticiferous hyphae in the hymenophoral trama and hypodermium. *Zelleromyces stephensii* is apparently endemic to Europe and has been reported from England, Germany, France, Belgium, Czechoslovakia, and Romania (Hawker 1954, Smith 1962, Pegler and Young 1979, Gross 1980, Jülich 1984, Pázmány and Laszlo 1985). Collections examined from North America and labeled as *Z. stephensii* (= *Arcangeliella stephensii*, *Octavianina stephensii*) are misidentified and are *Z. gilkeyae* Singer and Smith, which has larger spores with isolated, uniform, blunt spines and no verrucae. *Zelleromyces ravenelii* (B. & C.) Singer and Smith (= *Arcangeliella ravenelii* (B. & C.) Dodge, *Octaviania ravenelii* Lloyd, *Hydnangium stephensii* var. *ravenelii* Berkeley, *Octaviania stephensii* var. *ravenelii* B. & C.) is a similarly colored species from North America which was once thought to be a variety of *Z. stephensii*, but has heavily amyloid, reticulate ornamentation on the spores.

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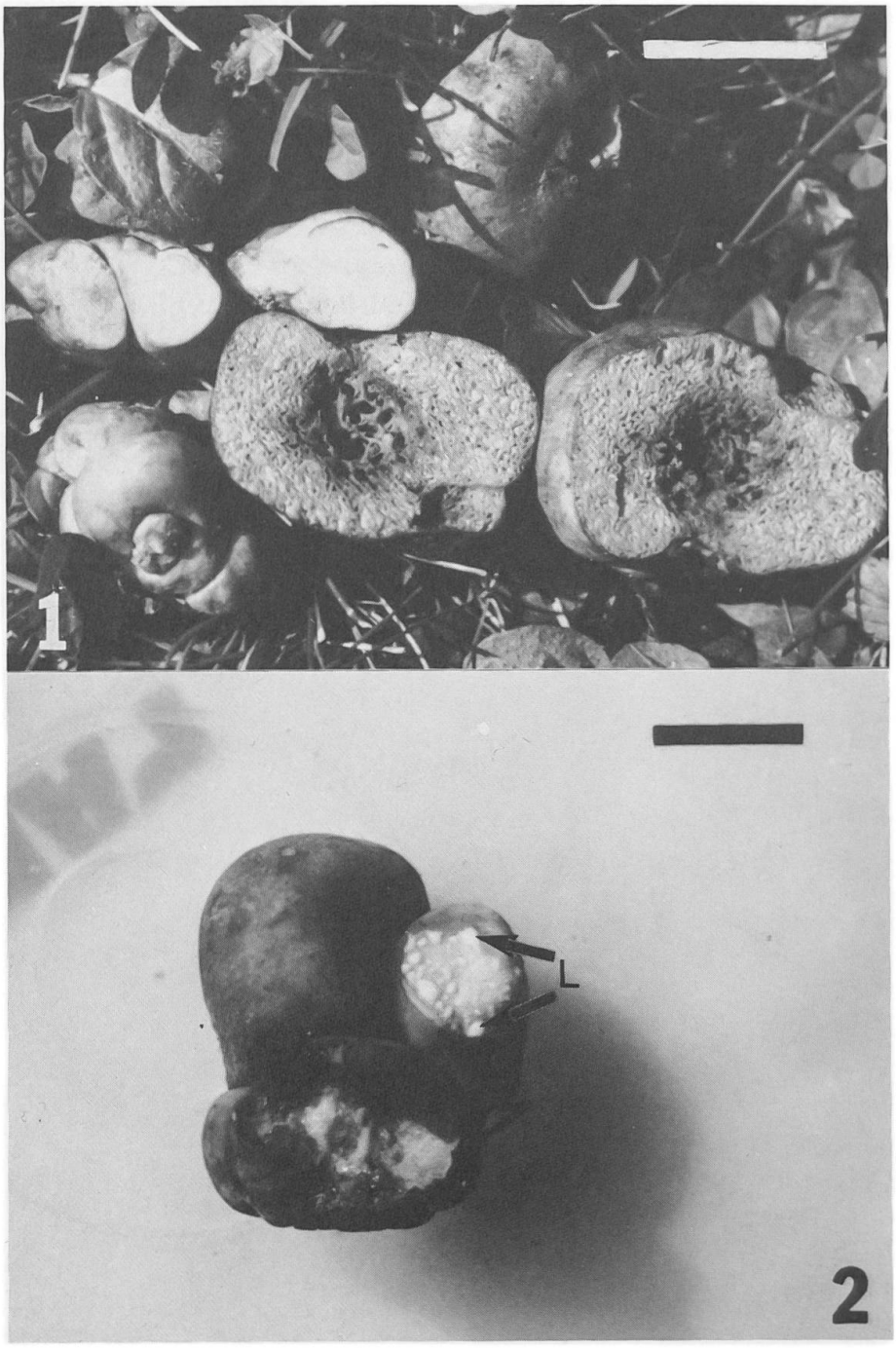
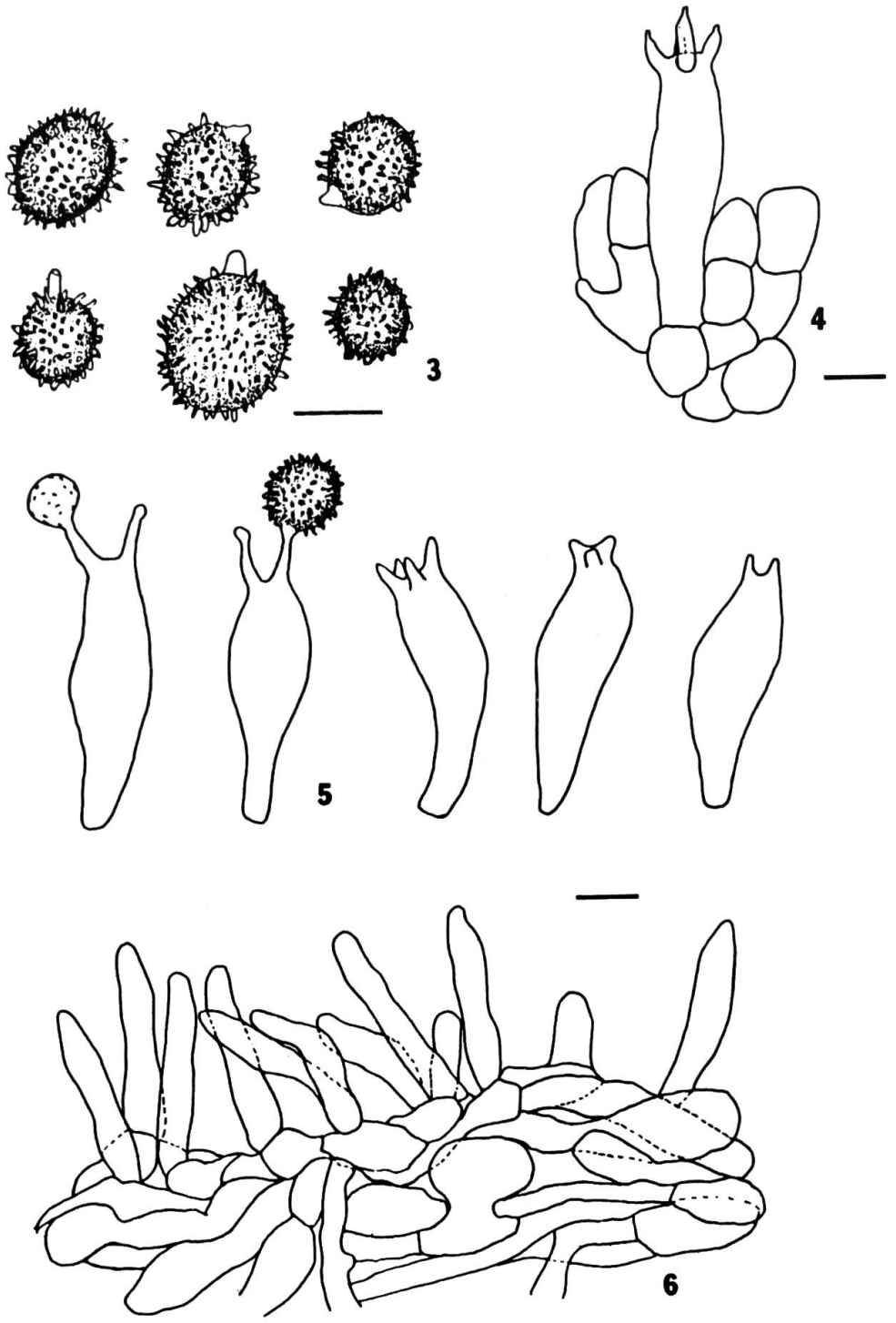


Figs. 1-2. ***Zelleromyces stephensii*** basidiomes (OKM 21180). Bars = 1 cm. **1.** Habit. **2.** Freshly cut to show abundant latex (L).



Figs. 3-6. Microscopic details of ***Zelleromyces stephensii*** (OKM 21180). Bars = 10 µm. 3. Spores mounted in Melzer's reagent. 4. Four-spored basidium and portion of subhymenial zone. 5. Two-, three-, and four-spored basidia. 6. Section of peridiopellis showing dermatocystidia and tightly interwoven epithelium.