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TYPE STUDIES AND NOMENCLATURAL CONSIDERATIONS  
IN THE GENUS SPARASSIS

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## SUMMARY

Type specimens and authentic specimens of eight putative species of Sparassis were examined. Two species are recognized; S. crispa and S. spathulata. Synonymy is proposed.

## INTRODUCTION

In a study of the cultural and morphological characters of Sparassis radicata Weir and related species, Martin and Gilbertson (1976) showed that the fungus known as S. radicata in North America was actually nonspecific with S. crispa Wulf.: Fr., and what has long been known as S. crispa in eastern North America must be called by a

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different name. They carried their study no further with respect to species circumscriptions and nomenclatural considerations in the genus Sparassis.

More recently, Kreisel (1983) studied Sparassis specimens named S. laminosa, S. nemecii, and S. brevipes from Europe and concluded that they represent one species that should be called S. brevipes. However, no authentic or type specimens were cited as having been examined.

In this work, we have examined the 8 available type or authentic specimens of the 11 described species of Sparassis and Stereum caroliniense Cke. et Rav. in an attempt to resolve taxonomic and nomenclatural problems in the genus.

Type or authentic specimens of the following were studied: S. crispa, S. herbstii Peck, S. laminosa Fr., S. nemecii Pilát, S. radicata Weir, S. spathulata Schw.: Fr., S. tremelloides Berk., and S. simplex D. A. Reid and Stereum caroliniense. Neither type nor authentic specimens of Sparassis brevipes Krombh., S. foliacea St. Amans, and S. kazachstanicus Schwarzman were available for study.

#### MATERIALS AND METHODS

We examined specimens microscopically with a Ziess WL microscope as hand sections and/or as squash mounts in a drop of 2% KOH mixed with a drop of 1% aqueous phloxine, with Melzer's reagent (Ainsworth, 1971) to determine amyloidity or dextrinoidity (if no reaction, indicated as Melzer's -) and with lactophenol aniline blue (Ainsworth, 1971) to detect cyanophily. Herbarium abbreviations are taken from Holmgren and Keuken (1974).

#### NOTES ON TYPE SPECIMENS

Sparassis brevipes Krombh., Nat. Abbild. Besch. Schw., t. 22, fig. 4. 1834.

The type specimen is not extant according to information from PR.

We believe that the name S. brevipes should be considered a nomen dubium because only pictures and a description are available to serve as type. Until an appropriate type specimen of S. brevipes is found, the Krombholz concept cannot be known with certainty, but having concluded that S. spathulata is probably the oldest name for S. brevipes, more precise typification of S. brevipes is obviated.

Stereum caroliniense Cke. et Rav., J. Mycol. 1:130. 1885.

United States: No. 4104 (Holotype) sent to Ravenel by Dr. Thos. F. Wood of Wilmington, North Carolina, Aug. 1885 (K).

This specimen is nonspecific with Sparassis spathulata.

Sparassis crispa Wulf.: Fr., Syst. Mycol. 1:464. 1821.

There is no Wulfen specimen available in UPS. Only one specimen of Fries' at UPS is labeled S. crispa. It was collected by Th. M. Fries in 1869, so it was not available to Fries when he sanctioned S. crispa. We are now attempting to decide on an appropriate specimen to serve as neotype. When those studies are complete, S. crispa will be neotypified.

In the interim, the Fries specimen will represent the present concept of S. crispa. It possesses small, pale to cream-colored and azonate, flabellae extending from the central core of the basidiocarp. Hyphae system monomitic. Tramal hyphae 4-15  $\mu\text{m}$  diam, thin- to somewhat thick-walled, mostly clamped, with scattered broad refractive hyphae up to 15  $\mu\text{m}$  diam; basidiospores broadly ellipsoid, sometimes flattened adaxially, thin-walled, hyaline, 5.5-6  $\mu\text{m}$  diam, with a large central guttule.

Specimens examined: As S. crispa -- Sweden: Uppsala, Kungsparken, 1869. Th. M. Fries (UPS). As S. radicata -- Holotype, U.S.A.: Idaho; Priest River, Sept. 1916, on roots of Douglas-fir [Pseudotsuga menziesii], Weir 9822; Sept. 29, 1966, on P. menziesii, OKM 4817 (both CFMR) - Oregon; Detroit Nov. 1, 1909, on P. menziesii, FP 1758 (CFMR).

Many authors list basidiospore lengths of 5-7  $\mu\text{m}$  or 6-7  $\mu\text{m}$ . Our study of collections from North America, Europe, and Japan confirms a range of 5-6.5  $\mu\text{m}$ , excluding the apiculus. We were unable to find longer spores. This is important because S. spathulata basidiospores are 6-8 (-9)  $\mu\text{m}$  long with a mean of 7  $\mu\text{m}$ . It is possible, therefore, to separate the two species on spore length alone in poorly preserved specimens.

Excellent illustrations of S. crispa basidiocarps are found in Dähncke and Dähncke (1979) and Jahn (1979), and under S. radicata in Martin and Gilbertson (1976) and Miller (1972). However, only Martin and Gilbertson (1976) pictures the radiating base, characteristic of this species. It is not a characteristic feature of S. spathulata.

Sparassis foliacea St. Amans, Fl. Agen., p. 541, t. 11. 1821.

A type specimen for this name cannot be located.

Sparassis herbstii Peck, Bull. Torrey Bot. Club 22:207. 1895.

The type specimen (NYS) agrees well with the neotype specimen of S. spathulata (PH).

Specimen examined: U.S.A.: Pennsylvania, Trexlertown, Wm. Herbst, no number or date (Holotype, NYS).

Sparassis kazachstanicus Schwarzman, Flora Spor. rast. Kaz. 4:154. 1964.

The type specimen of S. kazachstanicus was not made available for study, and we have not been able to interpret the description to represent one of the two species recognized in this work. Its true identity must await examination of the type. The same situation exists with the genus Sparassiella Schwarzman and its type S. longistipitata Schwarzma, which appears similar to Sparassis spp.

Sparassis laminosa Fr., Antechn. Sverige Atl. Svamp, ed. I, p. 57. 1836.

The specimens cited have both the macro- and micro-morphology of S. spathulata. To date, we know of no specimen that could be used as neotype. However, the Polish specimen is probably a good representative of the Friesian concept. It is in good condition and was determined by Fries.

Specimens examined: Czechoslovakia: Moravia, ad terrain spud Fagus et Abies, 51870, 13 VIII 59 (PR); ad basim Abietis, 611164, 3 VIII 63 (PR); Hradec prope Opava, ad radicis trunci emortui Abietis albae, 710448, 5 IX 1969 (PR). All annotated as S. nemecii by Pouzar. Poland: Silesia, Kretschmar, no number, no date (UPS).

Sparassis nemecii Pilát et Vesely, Ann. Mycol. 31:56. 1933.

The type and several specimens examined under this name possess the large thick, zonate flabellae typical of S. spathulata. Micromorphology is also that of S. spathulata. In addition, the junior author observed the species fruiting in Czechoslovakia and noted it to be identical to S. spathulata in the United States.

Specimens examined: Czechoslovakia: sub Fago, Jánský Lázně, Montes Corcontici, 1932-X, 168606 (Holotype, PR). See also specimens cited under S. laminosa.

Sparassis radicata Weir, Phytopathology 7:166. 1917.

As indicated by Martin and Gilbertson (1976) in their description of the type specimen, it is nonspecific with S. crispa. Their Arizona isolates of S. radicata were genetically compatible with European isolates of S. crispa. We agree with Gilbertson (1981) that S. radicata is a synonym of S. crispa.

Specimens examined: United States: Idaho, Priest River, on roots of Douglas-fir [Pseudotsuga menziesii (Mirb.) Franco], Weir 9822 (Holotype, CFMR). See S. crispa, also.

Sparassis simplex Reid, Trans. Brit. Mycol. Soc. 41:439. 1958.

This species is based on a poorly developed specimen with only a single flabelliform basidiocarp. The macro- and micromorphology agree with those of S. spathulata. The junior author has observed this type of fruiting of S. spathulata in the southeastern United States. We consider S. simplex to be a synonym of S. spathulata.

Specimen examined: England: Box Hill, Surrey, on Pinus debris under Calluna, P.K.C. Austwick, no number, 2. Oct. 1955 (Holotype, K).

Sparassis spathulata Schw.: Fr., Elench. Fung., p. 227. 1828. = Merisma spathulatum Schw., Schr. Nat. Ges. Leipzig 1:110. 1822.

The neotype specimen possesses flabellae up to 2 cm broad, concentrically zonate, varying from pale yellow to light brown, and brittle on drying.

Hyphal system monomitic; context hyphae of two types: 1). (1)4-10(-12)  $\mu\text{m}$  diam, hyaline, smooth, simple septate with walls up to 2.5  $\mu\text{m}$  thick; and 2). (2-)6-15(-20)  $\mu\text{m}$  diam, thin-walled to firm-walled, smooth, simple septate, with refractive contents staining strongly in phloxine and Melzer's reagent; subhymenium hyphae thin-walled, hyaline, smooth, compact, agglutinated, nodose-septate or simple-septate; hymenium poorly preserved; cystidia not evident; basidia not found; basidiospores ellipsoid to somewhat adaxially flattened, 6-7.5(-9) x 4-5.5  $\mu\text{m}$ , hyaline, thin-walled, smooth, Melzer's -, acyanophilous.

Specimens examined: As S. spathulata: United States: Pennsylvania, no location, no-date, Schweinitz s.n. (K); Maryland, FP 103936, on Pinus virginiana Mill., Laurel (CFMR); North Carolina, Salem, L. v. S [chweinitz] (PH) (neotype, here designated); Salem-Beth[lehem] [PA], 1005-2 Syn. Fung., Epic. 3 (PH); South Carolina, M. A. Curtis, herb. E. Fries (UPS); ad terram, autumnno, legit Ravenel, herb. E. Fries (UPS): as Stereum caroliniense, holotype (K): as Sparassis crispa: Maryland, Laurel, on Pinus, JL 240, and under Quercus, JL 221; Beltsville, FP 103936 (CFMR); South Carolina, Patrick, on Pinus, FP 105840 (CFMR): as Sparassis herbstii, holotype (NYS): as Sparassis laminosa: Poland, Silesia (UPS); Czechoslovakia, 51870 (PR); 611164 (PR); 710448 (PR): as Sparassis nemecii holotype (PR): as Sparassis simplex holotype (K).

The specimens cited agree well with the proposed neotype. Miller (1972) illustrated S. spathulata as S. crispa. Jahn (1979) also illustrated S. spathulata (called S. laminosa) in Europe. The macroscopic characteristics agree well with S. spathulata observed by the junior author in Europe.

Sparassis tremelloides Berk., Grevillea 2:6. 1873.

The specimen examined possesses longitudinally septate basidia and appears to be an immature specimen of Tremella reticulate (Berk.) Farlow. No basidiospores were found. Information on the packet agrees with that in the original description. Therefore, this specimen is being designated neotype.

Specimen examined: South Carolina, M. A. Curtis 1380. Neotype, ex K, isotype in FH.

## CONCLUSION

This study revealed two species of Sparassis in North America and Europe; S. crispa and S. spathulata. The organism which has been commonly called Sparassis crispa in North America should be called S. spathulata. All the other Sparassis epithets that we recognize and Stereum caroliniense can be placed in synonymy with either S. crispa or S. spathulata. Our conclusions regarding the synonymy of S. spathulata are based entirely on morphological considerations. In Europe, the names S. nemecii and S. laminosa, ones we believe are synonyms of S. spathulata, are deeply rooted and will probably continue to be used. Confrontations of single spore isolates from specimens representing these concepts with those from specimens of S. spathulata are needed to support or refute our interpretation of the morphological data.

Until it is thus refuted, we believe the synonymy for Sparassis species is as follows:

<u>Sparassis crispa</u>	<u>Sparassis spathulata</u>
= <u>Sparassis radicata</u>	= <u>Stereum caroliniense</u>
	= <u>Sparassis herbstii</u>
	= <u>Sparassis laminosa</u>
	= <u>Sparassis nemecii</u>
	= <u>Sparassis simplex</u>

S. brevipes, S. foliacea, and Elvella ramosa Schaeffer, the earliest name that probably applies to S. crispa, can only be interpreted from descriptions. For reasons of priority or devalidation in Fries sanctioning work (1821), none of these names is a competing epithet.

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