A NEW CHROOGOMPHUS FROM GREAT BRITAIN

O. K. MILLER* & ROY WATLING

ABSTRACT. A new species of the agaric genus *Chroogomphus* (Singer) O. K. Miller is described from Britain: *C. corallinus* O. K. Miller & R. Watling.

Mrs. Dorothy Fieldhouse sent a collection of a curious agaric to one of us (R.W.) in October 1968; it did not agree with any known species recorded for Great Britain. The dry cuticle and coloured pileus-trama, which became deep amyloid in Melzer's reagent, combined with the decurrent lamellae, subfusiform grey basidiospores and long cystidia left no doubt that it was a species of *Chroogomphus*. It was *C. helveticus* (Singer) Moser as interpreted by some continental authors and it was to this species that Watling (1969) previously referred the collection.

Subsequently, because of slight differences between the British material and notes on recently collected material of *C. helveticus* from Switzerland, part of the collection was sent to O. K. Miller. Re-study of the rather badly preserved type of *C. helveticus* (at MICH) indicated that it could not be referred to this taxon (see observations below). Meanwhile Mrs Fieldhouse in 1969 obtained additional material from the Leicestershire site and further notes on coloration. A study of these specimens confirmed our earlier findings of 1968 and added further information concerning this fungus. Because of very important differences we propose to describe the following new species:—

Chroogomphus corallinus O. K. Miller & R. Watling, **sp. nov.** Fig. 1.

Pileus 17–70 mm latus, e fere conico vel umbonata ad maturus convexo-umbonatus, margine incurvo in maturitate expanso, siccus, fibrillosus, ferrugineus, corallinus vel armeniacus; lamellae decurrentes, subdistantes, initio olivaceae tum vinaceae; stipes 50–80 mm longus, 20–35 mm crassus, deorsum attenuatus, siccus, ochraceus; velum arachnoideum, fibrillosum, ferrugineo-fulvum; caro firma, pallide rufula, prope basim citrea; sporae 17·5–23 × 5·5–6·5 μm, subfusiformes vel angusto-ellipsoideae, in cumulo olivaceo-cinereae; cystidia 60–180 × 9·5–28·5 μm, subventricosa, tenuitunicata vel raro crassitunicata (2 μm); hyphae pilei amyloideae.

Type. England: Leicestershire, Loughborough, 9 xi 1969, leg. *D. Fieldhouse, R. Watling* 6182 (holo. E.)

Pileus 17–70 mm broad, nearly conic to sharply umbonate, convex umbonate in age, margin incurved, expanding only at maturity, dry to slightly greasy, matted with fibrils, appearing woolly, rust-colour to dark saffron with a mixture of coral, apricot or brick-colour, darker at the disc and red colours intensifying after picking, becoming vinaceous or even purple. *Lamellae* decurrent, subdistant, olivaceous at first then flushed vinaceous to 'Indian Red' or 'Raw Umber', lamellulae sometimes intervenose. *Stipe* 50–80 mm long, 20–35 mm wide, tapering downward (5 mm at base), dry,

* Forest Disease Laboratory, United States Department of Agriculture, Laurel, Maryland, U.S.A.

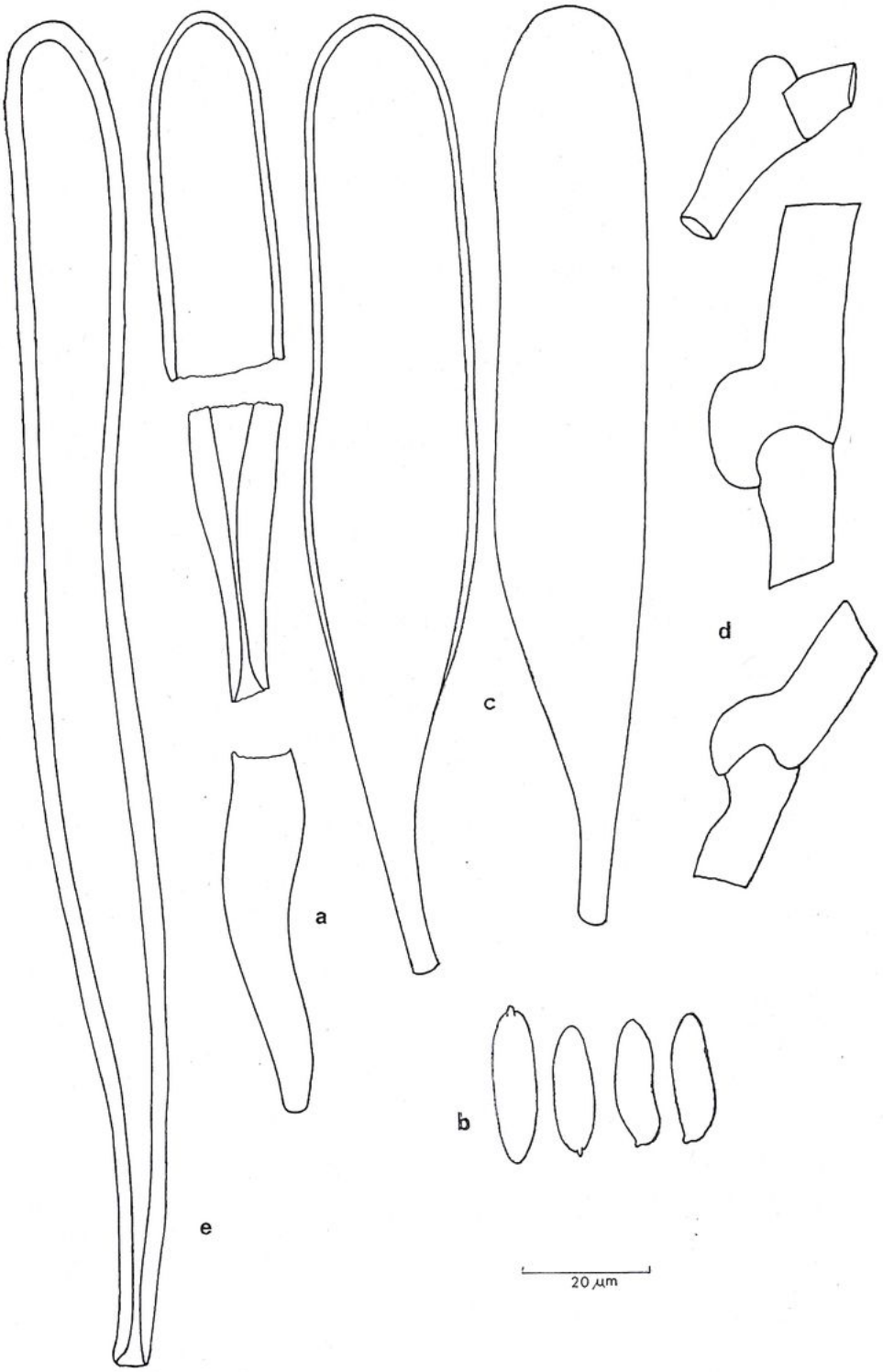

FIG. 1. a–d, *Chroogomphus corallinus:* a, basidium; b, basidiospores; c, cystidia; d, clamp-connections in the hyphae at the base of the stipe. e, *Chroogomphus tomentosus:* cystidia. Magnifications as indicated.

ochre then sienna or flushed with the colours of the pileus, veil arachnoid collapsing on stipe at maturity to give ochraceous fibrillose squamules which darken, lower half sienna darkening to rusty tawny. *Flesh* pale sienna in pileus, stronger colour when wet, similar in stipe except for the lower part which is very bright ochre or lemon-yellow ± flushed with olivaceous, red to blood-red when injured or on drying, and orange to apricot about the insect holes; Amm—reddish purple to blood red, FeS—dark olivaceous, MI—blue black, Ethanol—red; (fresh notes made by Dorothy Fieldhouse). Taste and smell pleasant.

Basidiospores 17·5–23 × 5·5–6·5 μm, subfusiform in profile, long, elliptical in face-view, thin-walled, deep red in Melzer's reagent; grey-olivaceous in deposit. *Basidia* 50–60 × 8·0–12·0 μm, clavate, thin-walled, 4-spored, with yellowish contents in Melzer's reagent. *Pleurocystidia & cheilocystidia* scattered, similar, 60–180 × 9·5–28·5 μm, broadly fusiform, thin-walled rarely thick-walled (± 2 μm), hyaline or faintly yellowish in Melzer's reagent. *Pileal-surface* a thin layer of yellowish to hyaline hyphae, 2·5–12·0 μm diam., intermixed with scattered amyloid hyphae. *Pileus- & gill-trama* of dark amyloid (deep purple) hyphae 6·0–12·0 μm diam., thin-walled, simple-septate, loosely interwoven; no clamps seen in the fruit-body. Small patches of pink mycelium clinging to stipe-base contained darkly amyloid hyphae, 6–12 μm diam. with scattered large clamp-connections (fig. 1, d); incrusted amyloid material was often seen on individual cells.

Habit, habitat, and distribution. Scattered on the ground in mixed woods containing *P. sylvestris* and exotic conifers including *Pinus nigra*. Fruiting in September and October. Known only from Loughborough, Leicestershire where it has been collected by John and Dorothy Fieldhouse in 1968 and 1969.

Observation. We have studied the type of *C. helveticus* (Sing.) Moser, which is located at the University of Michigan Herbarium. This very small, fragile species has very few amyloid cells in the cuticle and trama of the pileus and lamellae, and has thin-walled cystidia. *C. helveticus* is most closely related to *C. leptocystis* (Singer) O. K. Miller. *Chroogomphus tomentosus* (Murr.) O. K. Miller is closely related to *C. corallinus*; both are robust with similar general coloration, basidiospore size, and amyloid reactions. However, *C. tomentosus* (Miller, 1964) has very numerous thick-walled (2–6μm wide) cystidia (fig. 1e) and more orange coloration to the pileus and stipe. *C. corallinus* has scattered to infrequent thin-walled, rarely thick-walled (1–2 μm wide) cystidia (fig. 1c) and more red coloration to the pileus and stipe. *C. tomentosus* is known only from the Pacific northwest and Hokkaido, Japan, while our new species is as yet known only from Great Britain; plate 234 in Romagnesi (1962), however, resembles our fungus closely. All these species have filamentous, dry cuticles and are members of Section *Floccigomphus* (Imai) O. K. Miller (Miller, 1964).

Acknowledgments

The authors would like to express their appreciation to Miss Edith K. Cash for her help in the preparation of the Latin description. Dr. Kent McKnight of the National Fungus Collections, Beltsville, Maryland, U.S.A.,

and Dr. John Palmer of the Forest Disease Laboratory very kindly read and criticised the manuscript.

References

MILLER, O. K., Jr. (1964). Monograph of Chroogomphus (Gomphidiaceae). *Mycologia* 56: 526–549.

ROMAGNESI, H. (1962). *Petit Atlas des Champignons*. Bordas.

WATLING, ROY (1969). Records of Boleti and notes on their taxonomic positions: III. *Notes R.B.G. Edinb.* 29: 395–397.

Floral Ecology* The first edition of Kugler's "Blütenökologie" was published in 1955 and represented the first comprehensive compilation of the subject since Knuth's "Handbuch der Blütenbiologie". Since then there has been much progress in the development of flower ecology. One can recall the new knowledge about scent-gathering bees, pollination by bats, or the research on the UV-patterns on flowers. The publishing of the second edition was urgently needed in order that the mere botanist or interested layman might see the problems and the recent position of flower ecology resulting from the multitude of contributions in botanical and zoological literature.

The results of "sense physiology" and "Verhaltensforschung" of the pollinators and of plant physiology and morphology have naturally been placed in the foreground. It is very satisfactory that in all subjects, every speculative viewpoint has been completely omitted; for example, in the last chapter "Evolution of Pollination", evolution from the primary "Windblütler" to the more specialized forms has been shortly and carefully dealt with without much reference to "Stilelemente" or "Gestalttypen". The author warns us again and again of too hasty conclusions and points out that until there are unequivocal answers further research must be done in many cases.

Floral morphologists of previous years often erroneously interpreted pollination mechanisms through lack of enough criticism and too teleological a viewpoint. Recent experimental flower ecology as well as physiological investigations have widened largely the horizons of our knowledge of pollination mechanisms through causal-analytical methods. Flower ecology has become in fact a valid field of research together with other branches of botany.

A few critical observations are however needed. The opinions expressed about some of the classical flower biologists, especially K. Sprengel, are rather one-sided. Sprengel, in fact, was not all that speculative; the only illustration from Sprengel's classical work, without any explanation, is not in the correct place. The third phase of flower ecology, the experimental phase, did not first begin with the works of V. Frisch and his school as is suggested, yet the results of this school stand rather in the foreground. On page 238 the author himself has been a victim of misinterpretation of morphological functions. Species of *Campanula* are not autogamous throughout, although the bending down of the stigma which thus comes in touch with the pollen on the style may be interpreted as an indication of autogamy. All *Campanula* species hitherto studied are mostly allogamous. Plain but instructive drawings, (sometimes too simple), many photographs and a thorough literature index supplement the text.

J. DAMBOLDT

* Kugler, Hans. Blütenökologie, second revised and enlarged edit., 347 illustr., 345 pp., Gustav Fischer Verlag, Stuttgart. 1970. 48 DM.