

OBSERVATIONS ON THE BOLBITIACEAE: 20 New British species of *Conocybe*

ROY WATLING

ABSTRACT. The following new species of *Conocybe* subgen. *Conocybe* are described: *C. abruptibulbosa*, *C. inocybeoides*, *C. lenticulospora*, *C. murinacea* and *C. rubiginosa*. The new combination, *C. hadrocystis* (Kits van Waveren) Watling is also made.

INTRODUCTION

During the preparation of the forthcoming part of the *British Fungus Flora* which covers the three genera constituting the Bolbitiaceae, the *New British Check List of Agarics and Boleti* (Dennis, Orton and Hora, 1960) was found to be deficient in several areas. Since its publication several additions have been made to the list and some new species have been found. Several corrections also have to be made. An earlier part of this series (Observations 19) goes some way to satisfying these deficiencies by validating many existing *nomina nuda*. The present article describing five new species continues this task.

Colours used in the descriptions follow the *Colour Identification Chart to the Flora of British Fungi*, HMSO, Edinburgh (1969).

CONOCYBE SUBGEN. CONOCYBE

Conocybe abruptibulbosa Watling, sp. nov., Fig. 1B, 2A & 3A-E.

Sect. *Conocybe*.

Pileus 19-42 mm, convex dein plano-convexus, ochraceus vel alutaceus, non-striatus, senectute interdum ad discum rugulosus, jove sicco sordide cremeus vel pallide alutaceus vulgo ad discum obscuriore. Stipes 36-48 × 2-5 mm, subaequalis, ad basim incrassatus vel marginato-bulbosus, supra albus, infra ochraceus, pruinatus. Sporae 8-9.5 × 4.5-5.5 μm, ellipsoideae, poro germinativo. Basidia tetrasporigera. Cystidia aciei lamellarum lecythiformia, 18-25 × 8.5-9.5 μm, capitulis 4.5-5.5(-6) μm. Cystidia stipitis similia. Cellulae cuticulae pilei pyriformes vel sphaeropedunculatae.

Typus: Scotland, Midlothian, Cramond, 23 vii 1961, Watling G92 (holo. E).

Pileus 19-42 mm, broadly convex then expanding, becoming plano-convex and finally plano-concave with deeply upturned margin, matt, dull ochraceous or tan-coloured with a very slight brownish tinge at the disc drying (D), dirty cream-colour (putty-colour) or buff slightly tinged ochraceous, usually rugulose when fresh to almost halfway (rarely striate and then only at the margin). Stipe 36-48 × 2-5 mm, equal or tapered upwards or downwards from a distinct almost emarginate bulb, white at apex, ochraceous below, entirely white pruinose. Gills slightly adnate, but separating on expanding, not crowded, brittle, rust-coloured with white margin when mature. Flesh drying whitish ochraceous, pale pallid in pileus,

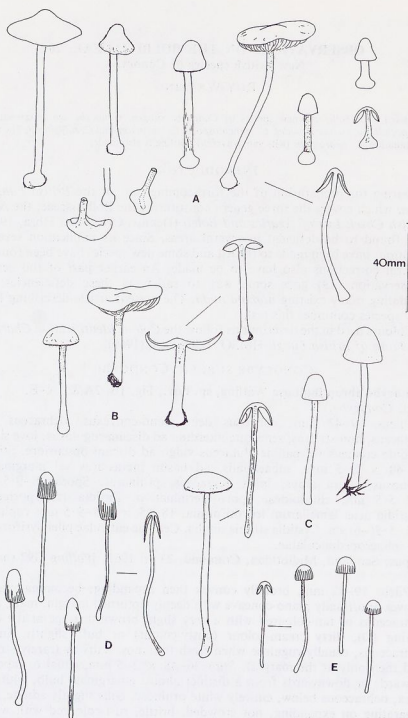


FIG. 1. Habit-sketches of type collections: A, *Conocybe inocybeoides*; B, *C. abruptibulbosa*; C, *C. murinacea*; D, *C. rubiginosa*; E, *C. lenticulospora*.

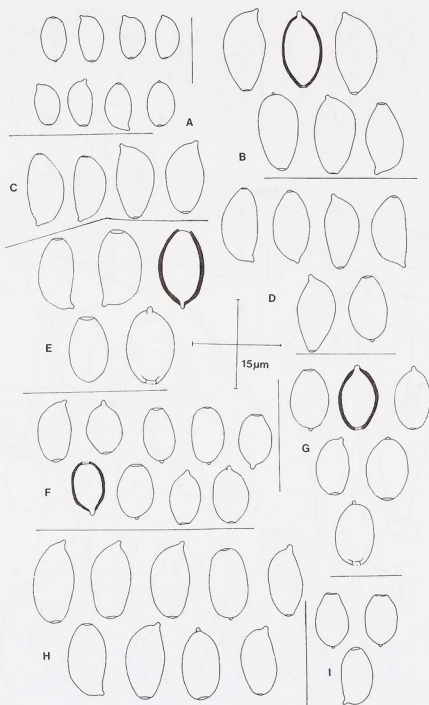


FIG. 2. Basidiospores: A, *Conocybe abruptibulbosa*; B-D, *C. inocybeoides* (B, type; C, Romagnesi's collection of *C. bulbifera* f. *bispore*; D, collection from N. Legon); E, *C. bulbifera*, Kauffman's type; F, *C. lenticulospora*, type; G, *C. murinacea*, type; H, *C. rubiginosa*, type; I, *C. lenticulospora*, specimen grown in the laboratory.

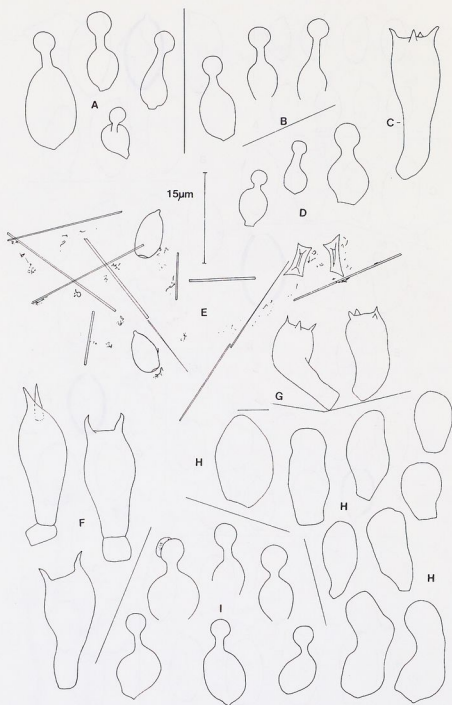


FIG. 3 Basidia, cheilo- and caulocystidia of *Conocybe* spp. A-E, *C. abruptibulbosa*: A & B, cheilocystidia; C, basidium; D, caulocystidia; E, crystals formed in ammoniacal mounts of gills (A, C, D & E from type collection; B from Watling G 1825). F, H & I, *C. inocybeoides*: F, basidia; H, caulocystidia; I, cheilocystidia. G, *C. bulbifera*, basidia.

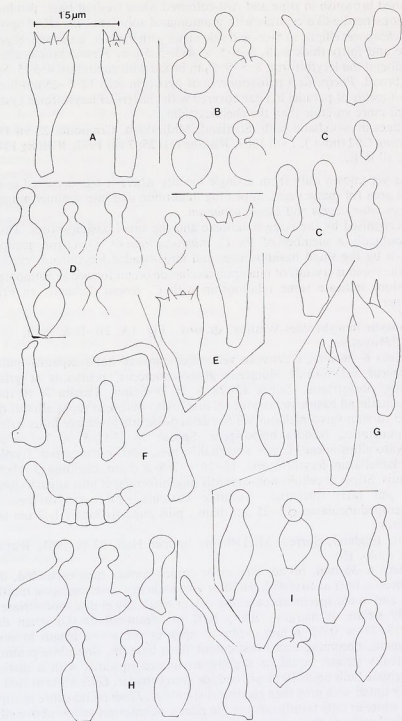


FIG. 4. Basidia, cheilo- and caulocystidia of *Conocybe* spp. A-C, *C. murinacea*: A, basidia; B, cheilocystidia; C, caulocystidia. D-F, *C. lenticulospora*: D, cheilocystidia; E, basidia; F, caulocystidia. G-I, *C. rubiginosa*: G, basidia; H, caulocystidia. I, cheilocystidia.

flushed brownish in stipe and rust-coloured when fresh at base; producing copious needle-like crystals with ammoniacal solutions. *Basidia* 4-spored. *Basidiospores* elliptic in face- and side-views with distinct, large central germ-pore and fairly thick wall, $8\cdot5\text{--}9\cdot5 \times 4\cdot5\text{--}5\cdot5 \mu\text{m}$. *Pleurocystidia* absent; *cheilocystidia* lecythiform, $8\cdot5\text{--}9\cdot5 \mu\text{m}$ broad with capitulum $4\cdot5\text{--}5\cdot5\text{--}(6) \mu\text{m}$ broad. *Pileipellis* a palisadoderm of pyriform cells $12\cdot5\text{--}25 \mu\text{m}$ broad. *Stipitopellis* of parallel hyphae covered with clusters of lecythiform cystidia much more variable than the cheilocystidia.

Edges of woodland path. Scotland, Midlothian, Cramond, 23 vii 1961, Watling G92 (holo.); 1 viii 1969, Watling G1825; 7 viii 1972, Watling 13499, etc., all in E.

As yet known only from a single locality where it has occurred over a wide area for many years, appearing in autumn and late summer amongst *Ranunculus ficaria* and *Geum urbanum*.

Recognised by the large basidiome and the small basidiospores. This is undoubtedly a member of the *C. magnicapitata* P. D. Orton group as shown by the small basidiospores and large-headed lecythiform cystidia, but the copious crystals of mucopolysaccharide origin formed in ammoniacal solutions indicate some relationship with *C. tenera* (Schaeff. ex Fries) Kühner.

***Conocybe inocybeoides* Watling, sp. nov., Fig. 1A, 2B-D & 3F-I.**
Sect. *Pilosellae*.

Pileus 6–36 mm, e convexo vel conico-convexo haud expansus pallide ochraceus vel sordide alutaceus griseo-canescens, pruinatus et griseo-tinctus, non-striatus. Stipes 13–78 \times 0.75–6 mm, (basim > 10 mm), subaequalis ad basim incrassatus vel marginato-bulbosus supra albidus dein vulgo sursum fulvo-mellinus vel ferrugineo-tinctus, juventate totus striatus vel punctatus. Basidia bisporigera. Sporae $14\cdot5\text{--}17\cdot5 \times 7\cdot5\text{--}8 \mu\text{m}$, elongato-ellipsoideae, leviter amygdaliformes, poro germinativo. Cystidia aciei lamellarum lecythiformia, $18\text{--}26 \times 7\cdot5\text{--}8\cdot5 \mu\text{m}$, capitulis (3–)3.5–4 μm latis. Stipes et cellulis non-capitatis (lageniformia) et pilis angustis longis 1–2 μm latis obtectus. Cellulae cuticulae pilei pyriformes vel sphaeropedunculatae, 12–25 μm diam., pilis angustis longis 1–2 μm latis obtectus.

Typus: England, Surrey, Mickleham, Juniper Hall, 22 ix 1961, Watling G215 (holo. E).

Pileus 6–36 mm, broad, convex or conico-convex then expanded, dull ochraceous buff at first with pallid or greyish hoary covering, soon mottled sepia and in old specimens pale rust-colour especially at disc, non-striate or faintly striate at margin, finally buff or cream-colour (D) when dry. Stipe 13–78 \times 0.75–6 mm, white at apex or for whole length in some specimens, becoming tinted rust-colour from base up, flocculose pruinose or streaky striate, equal or slightly attenuated upwards with a distinct emarginate bulb up to 10 mm broad, or even broader. Gills white at first or faintly tinted with grey then reddish rust-colour. Flesh pallid ochre in stipe-base, white or only faintly coloured in pileus, ochraceous yellow above gills. Basidia 2-spored. Basidiospores slightly amygdaliform in side-view, elliptic in face-view, with large central germ-pore, $14\cdot5\text{--}17\cdot5 \times 7\cdot5\text{--}8 \mu\text{m}$. Pleurocystidia absent; cheilocystidia lecythiform $7\cdot5\text{--}8\cdot5 \mu\text{m}$ broad, neck

up to $3.5\text{ }\mu\text{m}$ long with capitulum (3-) $3.5\text{--}4\text{ }\mu\text{m}$ broad. *Pileipellis* of pyriform cells intermixed with long, flexuous hair-like cells. *Stiptopellis* of parallel, hyaline hyphae with long hair-like cells and non-capitate cystidia.

On clayey banks and in ruts from vehicles in woodland; various localities in the Mickleham, Gomshall and Shere areas of Surrey. Surrey, Mickleham, Juniper Hall, 22 ix 1961, Watling G215 (holo.), G216, G217, G218, all in E; Coombe Bottom, 21 viii 1976 and 26 ix 1976, legit N. Legon (K).

A distinctive fungus recognised by the very large, bulbous stipe-base, in which it resembles *C. subovalis* [Kühner ex] Kühner & Watling. It differs from that species in shape and size of the basidiospores, stipe-ornamentation and colours of the fresh pileus. In the field it has a resemblance to an *Inocybe*, as indicated by the epithet. Although only found in one area in Britain, i.e. Surrey, it occurs extensively there and is constant in all its characters. *C. inocybeoides* agrees in all ways with Romagnesi's material recorded as *C. bulbifera* Kauffman forma *bispora* (*nomen nudum*) from France (Armainvilliers) of which material has been examined. However the type material of Kauffman's fungus housed in MICH is quite a different species belonging to the *C. pubescens* (Gillet) Kühner complex.

***C. lenticulospora* Watling, sp. nov., Fig. 1E, 2F & I & 4D-F.**

Sect. *Pilosellae*.

Pileus 5-25 mm convexus vel campanulatus umbrinus, spadiceus vel ferrugineo-mellinus vulgo ad discum obscuriore coloratus, striatus. Stipes (10-)20-70 \times 0.5-1.5 mm, subaequalis ad basim leviter incrassatus vel bulbillosus, supra cremeus infra obscuriore vel ochraceo-mellinus, juventate totus pubescento-striatus. Sporae 10-12.5 \times 6-7 \times 7-8.5 μm , ellipsoideae, subhexagoniformes, lentiformes, poro germinativo. Basidia tetrasporigera. Cystidia aciei lamellarum lecythiformia, 17.5-25 \times 7-10 μm , capitulis 3-5 μm latis. Stipes et cellulis non-capitatis (lageniformia vel vesiculosa) et pilis angustis longis 1-2 μm latis obtectus. Cellulae cuticulae pilei pyriformes vel sphaeropedunculatae. Typus: Scotland, Perthshire, Camghouran, 27 x 1964, Watling G540 (holo. E).

Pileus 5-25 mm broad, deeply convex or campanulate or conico-convex, date-brown to dark honey-colour (H) with darker disc, paler or not at the striate margin when fresh, soon drying out and then becoming non-striate and entirely pale ochre, or disc slightly darker, usually becoming strongly pubescent. Stipe (10-)20-70 \times 0.5-1.5 mm, equal or slightly attenuated upwards from a slightly thickened base, cream-colour (D) at apex, pale honey-colour (H) below but darkening from base up with age to become almost concolorous with pileus, very markedly but finely pubescent-striate throughout. Gills adnate, ventricose, fairly crowded, whitish or dirty cream-colour (D) at first then flushed ochraceous honey-colour (H) and finally rust-colour. Flesh thin, concolorous with pileus and stipe, darkening in stipe-base. Basidia 4-spored, clavate, hyaline. Basidiospores lentiform, broadly elliptic and frequently distinctly, although very slightly, angled in face-view, elliptic in side-view or slightly flattened on one side, 10-12.5 \times 6-7 \times 7-8.5 μm with central germ-pore and thick wall. Pleurocystidia absent; cheilocystidia lecythiform, hyaline with narrow distinct neck,

17.5–25 × 7–10 µm, with capitulum 3–5 µm broad. *Pileipellis* a palisadoderm of sphaeropedunculate cells intermixed with long, flexuous, hyaline cells. *Stipitopellis* of parallel only slightly coloured hyphae with groups of vesiculose or lageniform, non-capitate cells intermixed with long, flexuous cells.

On horse dung, Scotland, Perthshire, Camghouran, 27 x 1964, Watling G535, 536, 538–541 (G540, holo. E); *ibid.*, 31 x 1964, 7 x 1967, 20 x 1968 and 1 x 1971, Orton 2551–2555, 2936, 3224; Strathclyde, Isle of Mull, 19 ix 1969, Orton 4125.

Easily recognised by the high proportion of slightly to distinctly angular almost hexagonal basidiospores in a spore-print. *C. antipus* (Lasch) Kühner has more angular basidiospores and the stipe is also covered in lecythiform cells and is rooting. *C. lenticulospora* does not possess a long rooting base.

Métrod (1940) described *C. hexagonospora* to which the present fungus is undoubtedly related, if indeed not conspecific. Métrod's agaric, however, was described with smaller basidiospores (8–9 × 6–7 × 5 µm) and the pileus is reported as having some grey in the colours. It is a *nomen nudum*; material has not been traced (Heim in litt.).

***C. murinacea* Watling, sp. nov., Fig. 1C, 2G & 4A–C.**

Sect. *Pilosellae*.

Pileus 10–33 mm, convexus vel conico-convexus, columbianus, cinereus, violaceo-griseus vel murinus, siccitate pallide griseus vel sordide vinaceo-alutaceus, non-striatus, senectute interdum ad discum rugulosus. Stipes 40–100 × 1.5–2.5(–3) mm, aequalis vel sursum attenuatus, incrassatus vel bulbosus, e pallide cremeo sursum pallide fulvus vel sordide alutaceo pruinoso-striatus. Basidia tetrasporigera. Sporae 10.5–12.5 × 6–7 µm, ellipsoideae. Cystidia aciei lamellarum lecythiformia, 15–25 × 7.5–10(–11) µm, capitulis 3–6 µm latis. Stipes et cellulis lageniformibus vel non-capitatis et pilis angustis longis 1–2 µm latis obtectus. Cellulae cuticulae pilei pyriformes vel sphaeropedunculatae.

Typus: Scotland, Strathclyde, Isle of Mull, Loch na Keal, 7 ix 1968, Watling G1208 (holo. E).

Pileus 10–33 mm, convex or conico-convex, expanding only slightly, pale violaceous black or violaceous grey to mouse-grey, finally drab with darker vinaceous grey disc, drying slate-grey, with flush of fawn or vinaceous buff at centre, non-striate even when fresh, in larger specimens slightly rugulose at centre. Stipe 40–100 × 1.5–2.5(–3) mm, equal, sometimes slightly flexuose, with distinctly swollen or thickened base (up to 5 mm), pale dirty cream-colour (D) throughout then flushed pale fawn or clay-buff from base up, pruinose-striate throughout. Gills adnate with or without tooth, fairly crowded, pale or fairly deep yellow-buff to yellowish cinnamon-colour then ± milky coffee-colour with paler finely flocculose-serrate edge. Flesh concolorous in pileus, buff in stipe and darkening fulvous in stipe-base; taste and smell not distinct. Spore-print fulvous. Basidia 4-spored, cylindric-clavate. Basidiospores 10.5–12.5 × 6–7 µm, elliptic in both face- and side-views, with central germ-pore. Pleurocystidia absent; cheilocystidia 15–25 × 7.5–10(–11) µm with capitulum 3–6 µm broad on distinct long narrow neck. *Pileipellis* a palisadoderm of pyriform to sphaeropedunculate cells. *Stipitopellis* of parallel, hyaline, cylindric hyphae

covered with groups of lageniform or even slightly pointed swollen cells intermixed with long, flexuose, hair-like cells.

On old horse dung, Strathclyde, Isle of Mull, 7 ix 1968, *Watling* G1208 (holo. E); Inverness-shire, Tomich, 2 ix 1971, *Orton* 4127 (E).

Found only in two widely separated localities in Scotland. A very elegant agaric, easily recognised by the tri-coloured basidiome, the grey pileus contrasting with the deep buff or yellowish gills and both with the white or slightly clay-buff stipe. Uncannily like *Panaeolus sphinctrinus* (Linn. ex Fr.) Quélet on first sight but differs in the colour of the gills and spore-print.

'Griseus' means pearly grey; it could be that Moser (1953) had seen this agaric and keyed it out under his provisional name *C. grisea*, although from the data given and synonyms in subsequent editions, it could appear that this epithet was re-introduced for *C. moseri* Watling.

The present fungus has certain similarities with Bulliard's plate 563 of *Agaricus* (*Coprinarius*) *conocephalus* (1791) but the stipe in this species is apparently narrower and more flexuose and the pileus more conical.

C. rubiginosa Watling, sp. nov., Fig. 1D, 2H & 4G-I.

Sect. *Conocybe*.

Pileus 8-19 mm, elongato-convexus vel campanulatus ad marginem lobatus, striatus, pubescentibus, fulvus vel fulvo-ferrugineus. Stipes 48-120 \times 1-1.5(-2) mm, subaequalis vel bulbosus, bicoloratus, albidus vel pallido-ochraceus, sursum obscuriore ferrugineus dein fere totus ferrugineus. Sporae (14-)15-19 \times (7.5-)8-9(-9.5) μ m, ellipsoideae, poro germinativo. Basidia mono- vel bi-sporigera. Cystidia aciei lamellarum lecythiformia, 17.5-20 \times 6-9.5 μ m, capitulis \pm sessilibus 2.5-4.5 μ m latis. Stipes et cellulis similibus capitatis vel non-capitatis et pilis angustis longis 1-2 μ m latis obtectus. Cellulae cuticulae pilei pyriformes vel sphaeropedunculatae.

Typus: Scotland, Perthshire, Drummond Hill, 27 ix 1961, *Watling* G249 (holo. E).

Pileus 8-19 mm broad, campanulate or elongate convex, hardly expanding, with lobed margin, rusty tawny throughout, striate almost to umbonate disc when fresh, entirely minutely pubescent, drying non-striate and ochraceous slightly tinted rusty tawny. Stipe 48-120 \times 1-1.5(-2) mm, equal or attenuated from slightly bulbous to distinctly swollen base, distinctly bi-coloured at first, whitish or slightly ochraceous at apex, reddish brown from halfway to base, darkening with age to become almost uniformly red-brown. Gills adnate, \pm ventricose, rust-coloured when mature with slightly paler, flocculose margin. Flesh thin, concolorous with pileus and stipe; ammonia reaction negative; taste and smell indistinct. Spore-print rusty tawny. Basidia (1-)2- spored. Basidiospores (14-)15-19 \times (7.5-)8-9(-9.5) μ m, elongate elliptic in face- and side-view, thick-walled, with prominent central germ-pore. Pleurocystidia absent; cheilocystidia lecythiform, swollen below (6-9.5 μ m broad) with capitulum up to 4.5 μ m broad on a short neck to almost sessile. Pileipellis a palisadoderm of pyriform cells intermixed with flexuose, hyaline cells. Stipitopellis with both flexuose hairs and lecythiform cystidia especially at stipe-apex.

Amongst herbs in base rich grassland; apparently widespread. Particularly good collections from Scotland, Perthshire, Drummond Hill near Aberfeldy, 27 ix 1961, *Watling* G239-241, G249 (holo. E), G250, G252.

Easily recognised in the field by the bi-coloured stipe and richly coloured striate pileus, and microscopically by the bi-spored basidia.

Distinguished from *C. ambigua* [Kühner ex] *Watling* particularly by size, but also in the shape of the basidiospores. This taxon has been mistaken for *C. tenera* (Schaeff. ex Fries) Fayod '2-spored form' but strictly that species should possess only lecythiform cystidia on the stipe.

CONOCYBE SUBGEN. PHOLIOTINA

Conocybe hadrocystis (Kits van Waveren) *Watling*, **comb. nov.**

Basionym: *C. arrhenii* (Fries) Kits van Waveren var. *hadrocystis* Kits van Waveren in *Persoonia* 6:150 (1970).

The species differs from *C. arrhenii* in the cylindric-clavate or subcapitate to capitate, sometimes flexuous or swollen cheilocystidia. It is easily recognised amongst the annulate species by these capitate cells.

This species is apparently widespread at least in East Scotland and there is material in E from Edinburgh (*Watling* 13500, 9 x 1976). It has also been collected on a pathside at East Lothian, Saltoun Big Wood, Pencaitland, although material was not retained.

Like many annulate species of *Conocybe* it can be found without a ring and then comes close to *C. exannulata* Kühner & *Watling* apud *Watling*; it comes particularly close to '*C. blattaria* forma *exannulata*—la forme à spores grandes d'habitude', Kühner (1935). The latter taxon, however, has slightly although significantly larger basidiospores, (9-)10-11 × 5.5-6.5 μm with thickened wall, as opposed to spores (7.5-)8-10 × 4-4.5(-5) μm in the type variety.

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