

Contribution to the knowledge of the genus *Albatrellus* (Polyporaceae)

I. A conspectus of species of the North Temperate Zone

Príspevek k poznání rodu krásnopórka — *Albatrellus* (Polyporaceae) I. Přehled
druhů severního mírného pásu

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A key is given to the species of the genus *Albatrellus* S. F. Gray (Polyporaceae) of the North Temperate Zone. A short conspectus of the treated species is appended, in which *Albatrellus similis* Pouz. is put into synonymy of *A. subrubescens* (Murrill) Pouz. Validating Latin descriptions are given for two species: *Albatrellus flettii* (Morse) ex Pouz. and *A. sylvestris* (Overh.) ex Pouz.; 5 new combinations are proposed; one new species is described: *Albatrellus avellaneus* Pouz.

Je podán klíč k určení druhů rodu krásnopórka — *Albatrellus* S. F. Gray severního mírného pásu. Je připojen stručný přehled uvedených druhů, kde je *Albatrellus similis* Pouz. zařazen do synonymiky druhu *Albatrellus subrubescens* (Murrill) Pouz. U druhů *Albatrellus flettii* (Morse) ex Pouz. a *A. sylvestris* (Overh.) ex Pouz. je připojen latinský popis, který umožňuje považovat tato jména za platně uveřejněná; je navrženo 5 nových nomenklatorických kombinací a je popsán jeden nový druh: *Albatrellus avellaneus* Pouz.

The genus *Albatrellus* S. F. Gray belongs to the family *Polyporaceae* and forms together with the genus *Grifola* S. F. Gray the special subfamily *Albatrelloideae* Pouz. (see Pouzar 1966), which differs from the other subfamilies by the monomitic hyphal system and by inflated generative hyphae. The majority of the species of this genus are terrestrial and only *Albatrellus hirtus* (M. C. Cooke) Donk belong to the wood-inhabiting fungi.

In the last years, I had the opportunity of studying the species of the genus *Albatrellus* S. F. Gray from several herbaria in Europe, U. S. A. and Canada. The main problem I have met within this genus is that the species of polypores are only very fragmentarily known as regards the characters on which the definition of this genus is based and by which it differs from similar but not closely related genera, such as *Polyporus* Mich. ex Fr. em. Donk, *Laetiporus* Murrill, *Tyromyces* P. Karst., and several others. There soon arose the need to study a greater number of species of *Polyporaceae* which were supposed to belong to this group on account of their macromorphological characters and their ecology. After the study of the anatomical characters, only part of these species were recognized as the members of the genus *Albatrellus* in its modern sense (see preliminary definition of this genus in Pouzar 1966).

The hyphae of the dried specimens are often collapsed and agglutinated and hence the true nature of their morphology is not easily discernible. In such cases, I applied the technique of boiling the sections in lactic acid (with cotton blue), obtaining rather good results. The hyphae were, in most cases, easy to disentangle and also their original width was reached.

The aim of the series of articles which start with this contribution is to give, in a condensed manner, the results based on the study of a large herbarium material (including number of types) and hundreds of carpophores observed in the forests of Czechoslovakia.

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Key to the species

- 1a Clamps on septa of hyphae of pileus context present 2
 1b Clamps on septa of hyphae of pileus context absent 11
 2b Spores distinctly fusiform, inamyloid; carpophores on wood *A. hirtus*
 2b Spores shortly ovoid or ellipsoid, or nearly globose, amyloid or inamyloid; terrestrial fungi 3
 3a Aculeolate hyphal appendages (acanthopendia) present on the felt and on the mycelium covering the stem base; spores with a faintly to distinctly amyloid wall 4
 3b No acanthopendia present on the felt and on the mycelium covering the stem base; spores with a completely inamyloid wall 5
 4a Pileus surface white, whitish, pale-yellow to orange brown without any greenish spots *A. confluens*
 4b Pileus surface whitish to pale orange or orange with small or large spots of blue-green or green colour, sometimes nearly whole pileus is green or merely the pileus margin is bluish-green *A. flettii*
 5a Spores shorter than 5.5 μm 6
 5b Spores longer than 5.5 μm 7
 6a At least some of the hyphae of the context of the stem base close to the surface are provided with thick walls (mostly thicker than 0.5 μm) *A. peckianus*
 6b No hyphae of the context of the stem base close to the surface are provided with thick walls (not thicker than 0.5 μm) *A. syringae*
 7a Spores with fine ornamentation in mesospore 8
 7b Spores without any ornamentation in mesospore (completely smooth) 9
 8a Pileus surface roughly feltily scaly at least at the center, spores roughly ornamented, distributed in Eastern U. S. A. *A. sublividus*
 8b Pileus surface smooth or only very faintly scaly at the center, spores faintly ornamented, distributed in Western U. S. A. *A. sylvestris*
 9a In no part of the carpophore present hyphae with amyloid walls *A. pes-caprae*
 9b At least in some part of carpophore present hyphae with amyloid walls 10
 10a Pileus surface smooth or fibrillous *A. skamanius*
 10b Pileus surface roughly scaly *A. ellisii*
 11a Spores with completely inamyloid wall 12
 11b Spores with amyloid wall (at least part of spores from one carpophore) 17
 12a Pileus surface distinctly hymeniform i.e. composed of densely agglutinated pyriform cells which form a palisade *A. yasudai*
 12b Pileus surface not hymeniform, either not differentiated from pileus context at all or composed of cylindrical or fusiform elements which are not densely agglutinated 13
 13a Majority of spores longer than 5.5 μm *A. cristatus*
 13b Majority of spores shorter than 5.5 μm 14
 14a Pilei yellow when fresh, mostly brick-red after drying, stem mostly rich-branched and carpophore composed of number of pilei *A. dispansus*
 14b Pilei never bright yellow, or not discolour brick-red after drying, stem mostly not branched or only once branched at base, or rarely two or three stems coalescing 15
 15a Stem and pileus, sometimes also pores coloured in fresh state vividly blue or greyish-blue *A. caeruleoporus*

- 15b At least stem not blue or greyish-blue 16
 16a Pileus surface brownish to orange-brown, spores $4.5-5.5-(6) \times$
 $\times 3.6-4.4-(4.8) \mu\text{m}$ *A. avellaneus*
 16b Pileus surface when young white or greyish-blue, later whitish or
 grey-brown, spores $3.8-4.6 \times 3.3-3.5 \mu\text{m}$ *A. ovinus*
 17a Majority of spores longer than $5.5 \mu\text{m}$; pileus surface often greenish
 *A. cristatus*
 17b Spores shorter than $5.5 \mu\text{m}$ 18
 18a Pileus surface covered when young by a grey or blackish felt which later
 sometimes desintegrates to small felty scales 19
 18b Pileus surface not covered by distinctly coloured felt or felty scales as
 compared with the colour of the context; the context or the pores discol-
 our orange-yellow after bruising *A. subrubescens*
 19a Felty scales and felt on pileus surface mouse-grey and form a continuous
 covering of the pileus; carpophores slender *A. cantharellus*
 19b Fibrillous or felty scales on the pileus surface blackish or blackish-
 brown, and cover the surface discontinually, the pale context being seen
 between the scales; carpophores robust *A. tianschanicus*

A conspectus of species

Albatrellus subrubescens (Murrill) Pouz. comb. nov.; basionym: *Scutiger subrubescens* Murrill, Bull. Torrey bot. Club, Lancaster, 67 : 277, 1940; syn.: *Albatrellus similis* Pouz. Folia geobot. phytotax. bohemoslovaca, Praha, 1 : 274, 1966. Distribution: Europe and North America.

Albatrellus tianschanicus (Bond.) Pouz. Folia geobot. phytotax. bohemoslovaca, Praha, 1 : 358, 1966. Distribution: Tian-Shan Mountains in Central Asia (USSR).

Albatrellus cantharellus (Lloyd) Pouz. comb. nov.; basionym: *Polyporus cantharellus* Lloyd, Mycol. Writings, Cincinnati, vol. 4, Letter no. 54, p. 5 (note 221), 1915. Distribution: Japan.

Albatrellus ovinus (Schaeff. ex Fr.) Kotl. et Pouz. Česká Mykol., Praha, 11 : 154, 1957. Distribution: Temperate Zone of the northern hemisphere.

Albatrellus avellaneus Pouz. spec. nov.

Diagn. lat. Carposomata solitaria, simplicia. Pilei 4–10 cm lati, applanati usque infundibuliformes, superficie rugosa usque leviter squamulosa, colore iuventute centro avellaneo, margine albido, mox dilute flavo usque centro aurantiaco-brunneo. Tubuli 3–4 mm longi, pori 0.2–0.5 mm lati, albi usque flavi. Stipites 6–8 cm longi et 1–1.5 cm lati, cylindracei, superficie alba mox ferruginea seu ochracea. Hyphae carnis pilei absque nodis. Sporae $4.5-5.5-(6) \times 3.6-4.4-(4.8) \mu\text{m}$, breviter ellipsoideo-ovoideae, crasse tunicatae, inamyloideae.

Habitat ad terram in acubus.

Holotypus: Prairie Creek State Park, California (U. S. A.), in sylva mixta (*Picea*, *Sequoia*, *Abies*), 5. XII. 1956, leg. A. H. Smith (MICH; Smith 56322).

Description. Pileus 4–10 cm broad, plane with an incurved margin, becoming plane with a spreading margin, shallowly vase-shaped with age; surface unpolished, roughened to slightly squamulose, colour avellaneous on disc and margin, whitish when young, soon flushed yellow to orange-buff over disc, margin irregular, staining yellow. Context thin, 2–4 mm thick in thickest part, staining yellow when cut, no odour or taste.

Tubes 3–4 mm long, white, showing yellow with age, staining yellow, decurrent, pores angular, small, 0.2–0.5 mm in diameter and about 2 per mm.

Stipe 6–8 cm long, 10–15 mm thick, base pointed below in some, equal to clavate, solid, surface white, soon stained rusty to ochraceous, naked.

The pileus surface is formed of a layer of parallel hyphae (resembling somewhat those of the context); they are inflated in part (up to $14.4\ \mu\text{m}$), but with a slightly to strongly amyloid wall (thickened up to $2.2\ \mu\text{m}$) giving rise to the poils 17–55 μm long, of a cylindrical to fusoid shape, (with amyloid walls) which are sometimes narrowing towards the end where there is a small projection 3.3–5.5 μm broad, rounded at the end, with a thick wall to nearly solid, distinctly amyloid. The surface of the stem formed of parallel hyphae, slightly inflated in part, without clamps, with a thin to slightly thickened amyloid wall; inside the hyphae, there are often amyloid, plasmatic granules; the poils which arise from the surface hyphae are 3.8–5.5 μm broad, narrowed at the end with a slightly thickened amyloid wall. The covering of the stem base formed of densely agglutinated hyphae with amyloid walls, some of which form vermicular to cylindrical poils on the surface 3.3–5 μm broad with thickened, amyloid walls. The context of the pileus formed of comparatively densely interwoven, clampless, partly strongly inflated (up to 6–11.8 μm) hyphae with an inamyloid wall, wall, which is only partly thickened up to 1.7 μm . Among the hyphae of the context and the tubes, there are globules of brownish, oleaginous substance with small, hyaline droplets inside. Context of the stem formed of hyphae with inamyloid walls, which are similar to those of the pileus, only some inflated hyphae with walls up to 2.2 μm thick. Very sparse, short segments of hyphae are present, filled with an amyloid substance in stem context. The context of the stem base differs in having more hyphae with thickened walls (0.8–1.9 μm thick), the inflated hyphae are 8.8–12.2 μm broad, the uninflated ones 3.3–5.5 μm , with inamyloid walls. The trama of the tubes formed of parallel hyphae 3.5–4.4 μm broad, clampless with thin, slightly to indistinctly amyloid walls. The subhymenium only slightly developed, consisting of hyphae cca 3.3 μm broad.

Basidia 20–38 μm long, 6.6–7.7 μm broad in the broadest part and 3.3–3.8 μm broad at the base, cylindric-clavate, without a basal clamp. Sterigmata four in number, short, thin, $3.7\text{--}4.1 \times 0.9\text{--}1.1\ \mu\text{m}$. Spores 4.5–5.5–(6) \times 3.6–4.4–(4.8) μm , short ovoid-ellipsoid, thick-walled, with a smooth, inamyloid, indextrinoid and acyanophilous, 0.55–0.8 μm thick wall.

Distribution. Known from a single collection from the Western U. S. A.

Habitat. Terrestrial, growing among the needles of conifers (*Picea*, *Sequoia*, *Abies*).

Notes. *Albatrellus avellaneus* Pouz. is closely related to *Albatrellus ovinus* (Schaeff. ex Fr.) Kotl. et Pouz., but in my opinion, it should be regarded as distinct species. It differs especially by the colour of the pileus which is orange-buff in the center, whereas *A. ovinus* is at most brownish in the center, but never so vividly coloured when fresh. The spores of *A. ovinus* are smaller, 3.8–4.6 \times 3.3–3.5 μm as compared with those of *A. avellaneus*, which measure 4.9–5.5–(6) \times 3.6–4.4–(4.8) μm . Noteworthy is the presence of amyloid, thick-walled poils on the pileus surface, i.e. elements which are rather limited to the stipe-base in several other species of the genus *Albatrellus*, but which are characteristically present also in *Albatrellus ovinus*.

*) As regards the macrofeatures, I largely follow the manuscript notes given kindly at my disposal by Prof. A. H. Smith (Ann Arbor).

Albatrellus caeruleoporos (Peck) Pouz. Folia geobot. phytotax. bohemoslovaca, Praha, 1 : 358, 1966. Distribution: North America and Eastern Asia.

Albatrellus confluens (Alb. et Schw. ex Fr.) Kotl. et Pouz. Česká Mykol., Praha, 11 : 154, 1957. Distribution: Temperate Zone of the northern hemisphere.

Albatrellus flettii (Morse) ex Pouz. spec. nov.

Descr. lat. Carposomata solitaria seu coalescentia, usque 30 cm lata, terricola. Pilei 6–17 cm lati, primo convexi, postea applanati seu centro depressi, margine crenato seu lobato, primo fortiter involuto postea plano, superficie glabra, postea saepe in areolas seu squamas diffusa, colore griseo-coeruleo seu coeruleo-viridi quondam centro palide salmoneo et margine coeruleo-viridi; in rupturis salmonei. Stipites centrales seu excentrici, 7–14 cm longi et 0,6–3,5 cm lati, saepe coalescentes parte basali et basi saepe tuberoso inflati, glabri, albidii, aliquando coeruleo-virides, postea ochracei seu salmonei, vulnerati aurantiaco-ferruginascentes. Caro alba, sapore miti seu amariuscule, odore haud insignis. Carposoma exsiccatum totum aurantiacum vel pallide aurantiacum.

Hyphae monomiticae, crebre fibulatae, ex parte fortiter inflatae in carne pilei et stipitis (inflatae 8,8–14,5 μm , haud inflatae 3,1–4,4 μm latae), cum parietibus satis tenuibus, semper inamyloideae, acyanophilae et indextrinoideae, in hyphis nonnullis basi stipitis substantia fortiter amyloidea plasmatica in forma granularum seu membrana tenui ad partem anteriorem parietis adhaerente apparet. Superficie basi stipitis pili vermiculiformes cum pariete fortiter amyloidea et incrassata raro occurrunt. Ad hyphas tenuiter tunicatas mycelioideae appendices cylindracei, terminales seu raro intercalares, aculeolis cavis ornatae, 17,7–36,5 μm longae et 4,4–6,6 μm latae, sparse occurrunt (acanthopendia). Basidia 15,5–24,4 \times 5,4–6,6 μm clavata, cum quatuor sterigmatibus 2,3–2,8 μm longis. Sporae (3,7)–4–4,7–(5) \times 2,9–3,4–(3,9) μm , breviter ellipsoideae seu ovoideae cum pariete satis tenui, laevi, leviter usque conspicue amyloidea.

Habitat ad terram inter acubus.

Holotypus: Bremerton (Wash.), U. S. A., autumnno 1937, leg. J. B. Flett, det. E. E. Morse (UC 589805).

Species e proxima affinitate *Albatrelli confluens* (Alb. et Schw. ex Fr.) Kotl. et Pouz., quae differt superficie pilei statu vivo coeruleo-viridi seu palide ochraceo cum maculis coeruleo-viridibus. Occurrit in America boreali (parte occidentali).

Protonym: *Polyporus flettii* Morse (nomen haud valide publicatum: absque diagnose latina) Mycologia, New York, 33 : 507, 1941. Distribution: Western parts of North America.

Notes. This species is very closely related to *Albatrellus confluens* (Alb. et Schw. ex Fr.) Kotl. et Pouz., differing by the green or blue-green colour (mostly mere spots) on the pileus. The anatomical construction is identical in both species in every detail and it is impossible to distinguish both species on basis of their microcharacters. The dried specimens of both species are indistinguishable without notes on the colours of fresh material.

There is a peculiar character occurring in both *A. confluens* and *A. flettii*, viz. the cylindrical appendages on the mycelial hyphae covering the stem base. These appendages, called here acanthopendia, are ornamented with hollow, conical spines, being very similar to the acanthophyses of some resupinate and similar fungi. Rarely, the acanthopendium may occur also intercallarily, i.e. the hypha from which it originates, may continue to grow from the opposite end of the acanthopendium.

Albatrellus dispansus (Lloyd) Canfield et Gilbertson, Mycologia, New York, 63 : 965, 1971; syn.: *Polyporus dispansus* Lloyd, Mycol. Writings, Cincinnati, 3 : 192, 1912 (Synopsis stip. pol.); *Polyporus illudens* Overholts, Mycologia, New York, 33 : 95, 1941. The identity of these two species was disclosed already by Imazeki et Toki (1954) and by Canfield et Gilbertson (1971). Distribution: Japan and the Western U. S. A.

Albatrellus cristatus (Schaeff. ex Fr.) Kotl. et Pouz. Česká Mykol. 11 : 154, 1957. Distribution: Temperate Zone of the northern hemisphere.

Albatrellus ellisii (Berk.) Pouz. Folia geobot. phytotax. bohemoslovaca, Praha, 1 : 357, 1966. Distribution: North America.

Albatrellus skamanius (Murrill) Pouz. comb. nov.; basionym: *Scutiger skamanius* Murrill, Mycologia, New York, 38 : 348, 1946. Distribution: North-Western U. S. A.

Albatrellus pes-caprae (Pers. ex Fr.) Pouz. Folia geobot. phytotax. bohemoslovaca, Praha, 1 : 357, 1966. Distribution: Europe and North America.

Albatrellus peckianus (M. C. Cooke) Niemelä, Ann. bot. fennici, Helsinki, 7 : 54, 1970. Distribution: North America.

Albatrellus syringae (Parm.) Pouz. Folia geobot. phytotax. bohemoslovaca, Praha, 1 : 358, 1966. Distribution: Europe.

Albatrellus yasudai (Lloyd) Pouz. comb. nov.; basionym: *Polyporus yasudai* Lloyd, Mycol. Writings, Cincinnati, 4, Letter no. 44, p. 10 (note 59), 1913. Distribution: Japan.

Albatrellus sublividus (Snell) Pouz. comb. nov.; basionym: *Polyporoletus sublividus* Snell, Mycologia, New York, 28 : 467, 1936. Syn.: *Polyporus canaliculatus* Overholts, Mycologia, New York, 33 : 100, 1941 (nomen haud valide publicatum). Distribution: Eastern U. S. A.

Albatrellus sylvestris (Overh.) ex Pouz. spec. nov.

Descr. lat. Carposomata singularia seu 3-4 confluentia. Pileus 6,5-15 cm latus, applanatus, centro depressus, margine involutus, cute tenuiter coactata cum squamulis minoribus seu centro areolata, colore brunneo-flavido, statu vivo margine vulnerata virido-coerulescente; stipes centralis seu excentricus 4,5-6 cm longus et 2-3,2 cm latus, saepe nonnulli confluentes, colore quasi eadem ut in pileo; tubuli 2-7 mm longi (in exsiccato 1,5-2 mm longi); pori brunneoli (in exsiccato obscure olivaceo-brunnei), 2-4 mm lati (in exsiccato 0,7-1,5 mm lati). Caro alba; sapor mitis.

Superficies pilei usque 300 μ m crassa, e hyphis sparse fibulatis, laxe contextis, partim inflatis, 5,5-19 μ m latis, parietibus leviter incrassatis (paries 0,6-0,9 μ m crassa), leviter usque fortiter amyloideis, passim leviter usque fortiter brunneo-incrustatis; pili superficiei sparsi, crasse tunicati (tunica ad 0,9-1,7 μ m incrassata), 4,2-8,2 μ m lati, cum pariete amyloidea; in plasmate cum granulis e substantia amyloidea. Superficies stipitis e hyphis laxe contextis, crebre fibulatis in stratis profundioribus, sparse fibulatis in stratis externis, haud inflatis, cum pariete conspecte tenui, in segmentis brevibus amyloidea, pigmento brunneo-incrustata; intus substantia granuliformis amyloidea in hic hyphis sparse distributa est; pili superficiei stipitis vermiculiformes, fortiter amyloidei 5,5-8,2-(9) μ m lati, crasse tunicati. Superficies basis stipitis e pilis vermiculiformibus, aliquando bifurcatis seu coralloideis, saepe cum pariete undulata seu gibberosa, crasse tunicatis usque solidis, cum pariete fortiter amyloidea. Caro pilei et stipitis e hyphis monomitiscis, laxe intricatis, crebre fibulatis, inflatis, 6-11,1 μ m latis, cum pariete incrassata (0,6-0,7 μ m), inamyloidea et indextrinoidea, acyanophila, et haud inflatis, 3,5-5 μ m latis, tenuiter tunicatis, fibulatis. In carne basis stipitis hyphae minus inflatae (6,6-8,8 μ m), sed cum parietibus crassioribus (usque 1,7-2,2 μ m) adsunt. Trama tubularum e hyphis haud inflatis, 2,2-4,4 μ m latis, tenuiter tunicatis, inamyloideis, fibulatis, partim brunneo-incrustatis. Basidia 35-71 μ m longa, 9,4-12,2 μ m lata parte media et basi 2,7-5,5 μ m lata, cylindraceo-clavata, parte distante cum strangulatione laevi, basi fibulata, tetrasterigmatica; sterigmata 6-9,7 \times 1-2,2 μ m, robusta, leviter arcuata. Sporae 8,8-11,3-(12,3) \times 7,4-9,4 μ m, late ellipsoideae, cum apiculo laterali et pariete incrassata, e stratis tribus composita: exosporo tenui, laevi, mesosporo crasso cum ornamentatione inclusa (e latere visa) e guttulis oleosis, valde lucem frangentibus, globosis seu applanatis, minoribus et e endosporo tenui. Paries sporarum tota inamyloidea, indextrinoidea et acyanophila.

Holotypus: Cowichan Lake, B. C., Canada, sub arbore juvenili *Pseudotsugae menziesii*, VIII. 1929, leg. C. G. Riley, det. L. O. Overholts (DAOM, F 1707).

Species valde affinis et similis *Albatrello sublivido* (Snell) Pouz., a quo differt ornamentatione sporarum subtiliori atque squamulis superficie pilei minoribus.

Protonym: *Polyporus sylvestris* Overholts, Mycologia, New York, 33 : 94, 1941, fig. 5, descr. anglica (nomen haud valide publicatum),

Distribution: Western Canada and the U. S. A. Known from two collections.

Notes. *Albatrellus sylvestris* (Overh.) ex Pouz. is closely related and similar to *Albatrellus sublividus* (Snell) Pouz. and differs only slightly by the finer ornamentation of its spores, by smaller scales on the pileus surface and by its geographic distribution. Some mycologists would consider the mentioned differences to be very weak, but I find it more appropriate to distinguish *A. sylvestris* as a separate species (microspecies) because its characters are rather stable though only very little evident. (See also the more detailed original description of the macrofeatures in Overholts, Mycologia 33 : 94, 1941).

Albatrellus hirtus (M. C. Cooke) Donk Koninkl. Nederl. Akad. Wetenschapp. Proc. Amsterdam, ser. C, 74 : 4, 1971. Syn.: *Polyporus hirtus* Quéél., Mém. Soc. Émul. Montbéliard II., 5 : 356, 1873, *Fomes hirtus* (Quéél.) M. C. Cooke, Grevillea, London, 13 : 118, 1885 non *Polyporus hirtus* (P. Beauv.) ex Fr. Syst. Mycol. 1 : 345, 1821. Distribution: Europe and North America.

Species incertae sedis:

Polyporus violaceo-maculatus Patouillard, Bull. Soc. Mycol. France, Paris, 23 : 72, 1907. Distribution: known only from one collection from China. Note: The anatomical construction not yet fully known.

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