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ON HIMALAYAN SPECIES OF ASTROSPORINA AND INOCYBE (AGARICALES)

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Two species of *Astrosporina* and two species of *Inocybe* from the southern slopes of the Himalayas are described and illustrated. *Astrosporina shoreae* and *I. claviger* are described as new. The new combination *A. calospora* is proposed.

Recently monographs on Indomalayan species of *Astrosporina* Schroet, and *Inocybe* Fr. have been published (Horak, *1979; 1980*). After the edition of the pertinent manuscripts, however, several Indian collections belonging to these agaricoid genera came to my attention. The well annotated material was gathered 1964 by Dr. C. Bas (Leiden) in deciduous and coniferous forests at different localities on the southern slopes of the Himalayas (Uttar Pradesh, Punjab).

Further taxonomic information and references on Himalayan representatives of *Astrosporina* and *Inocybe* are found in Ahmad (*1980*) and Watling & Gregory (*1980*).

Type material of the new species is kept in the Rijksherbarium Leiden (L; isotypes in ZT). If not otherwise stated the magnifications of the figures are: carpophores (nat. size), spores (×2000), basidia (×1000), cystidia (×1000).

1. **Astrosporina shoreae** Horak & Bas, *spec. nov.*—Fig. 1

Pileus –30 mm, conicus dein umbonato-convexus, argillaceus. Lamellae densissima, concolores. Stipes –50 × –2.5 mm, teres, ad basim bulbosomarginatus, argillaceus reflectu carnoso, omnino pruinosus. Sporae 5.5–7 × 4–5 µm, angulatae, subnodosae. Cystidia metuloidea, incrustata, numerosa. Ad terram in silva Shoreae et Malloti. India. Typus: *Bas 4308* (L).

Pileus –30 mm, conical to convex with papillate umbo, becoming plano-convex with umbonate centre; dingy buff to pale argillaceous, often darker around disc; in young carpophores entirely covered with concolorous, appressed to felty hyphae of veil, centre becoming subsquamulose with age, margin fibrillose, not striate or splitting, dry. Lamellae very crowded, narrow (up to 1.5 mm wide), subfree to adnexed; pale argillaceous with reddish tinge, edge entire, concolorous or paler. Stipe –50 × –2.5 mm, cylindrical, equal above, with small but distinct marginate bulb (–5 mm diam.); pale brown with pink or reddish tinge, bulb often white; entirely pruinose, margin of bulb occasionally with whitish, submembranous veil remnants (cp. veil remnants on pileus); dry, solid, single. Context pale brown. Odour and taste aromatic turning to subfetid.

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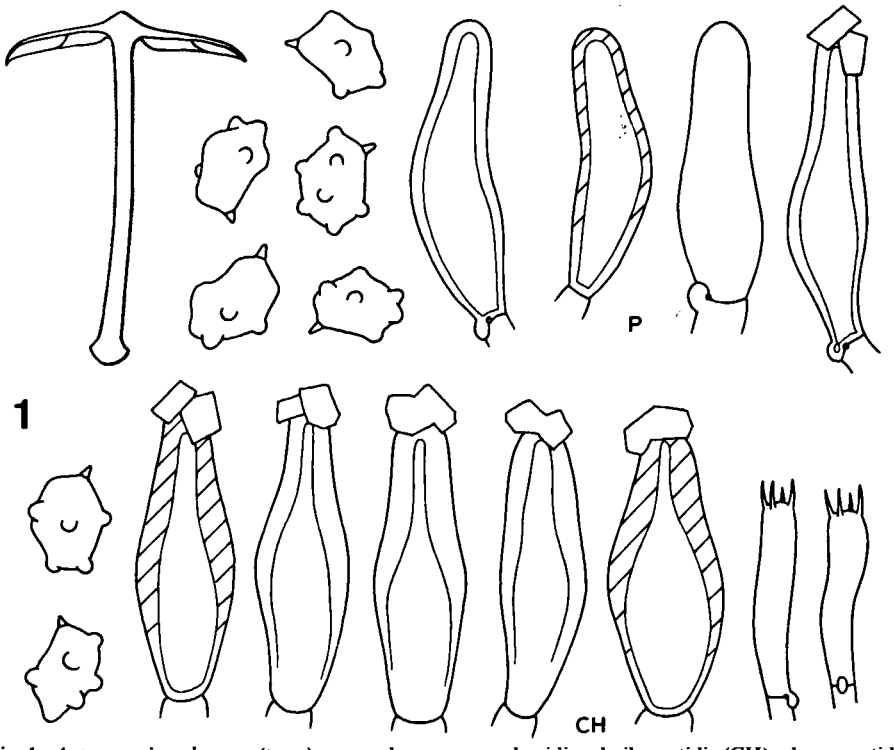

Fig. 1. *Astrosporina shoreae* (type): carpophore, spores, basidia, cheilocystidia (CH), pleurocystidia (P).

Spores 5.6–7×4–5 µm, angular with rather few, small, hemispheric knobs, brown, membrane thin-walled. Basidia 20–25×5 µm, 4-spored. Cheilo-, pleuro-, and caulocystidia 30–45×10–19 µm subfusoid, metuloid (membrane up to 4 µm diam. near apex), yellow-brown (KOH), encrusted with crystals. Clamp connections present on septa.

HABITAT.—On soil (clay, loam) in forest (dominated by *Shorea* sp. and *Mallotus* sp.), 400–600 m a.s.l. India.

MATERIAL.—INDIA: Uttar Pradesh, Dehra Dun, Gachiwala (about 15 km SE. of Dehra Dun), 7.IX.1964, *Bas 4308* (L, holotype; ZT 495, isotype); Rajspur (about 8 km N. of Dehra Dun), 8.IX.1964, *Bas 4313*.

The colour of the carpophores, the rather slender stipe with a bulbous-marginate base and especially the very narrow-crowded lamellae make *Astrosporina shoreae* taxonomically a close relative of *A. angustifolia* Corner & Horak (*1979*) which is a very wide spread species in Indomalayan and Australasian oak forests. Microscopically, however, the two species are well separated by the smaller and much less gibbose spores in the new Himalayan taxon. In addition *A. shoreae* is distinctive by cystidia of yellow-brown colour whereas those of *A. angustifolia* are hyaline.

Both examined collections of *A. shoreae* have been observed in association with *Shorea* (Dipterocarpaceae) and it is likely that this agaric enters ectotrophic mycorrhiza with teak.

2. **Astrosporina calospora** (Quél.) Horak, *comb. nov.*—Fig. 2

Inocybe calospora Quél. apud Bres., Fungi Trid. 1: 19. 1882 (basionym).

Description of the Indian collection:

Pileus –30 mm, broadly conical to convex, mostly with slight papillate umbo, expanded with age; dark brown; covered with reddish brown fibrillose small scales, tips occasionally turned upwards (especially at disc), radially fibrillose towards fibrillose, splitting margin; dry, veil remnants absent. Lamellae crowded to subdistant, free to adnexed, broadly ventricose (up to 5 mm wide); dark umber brown, edge concolorous or paler, subfimbriate.

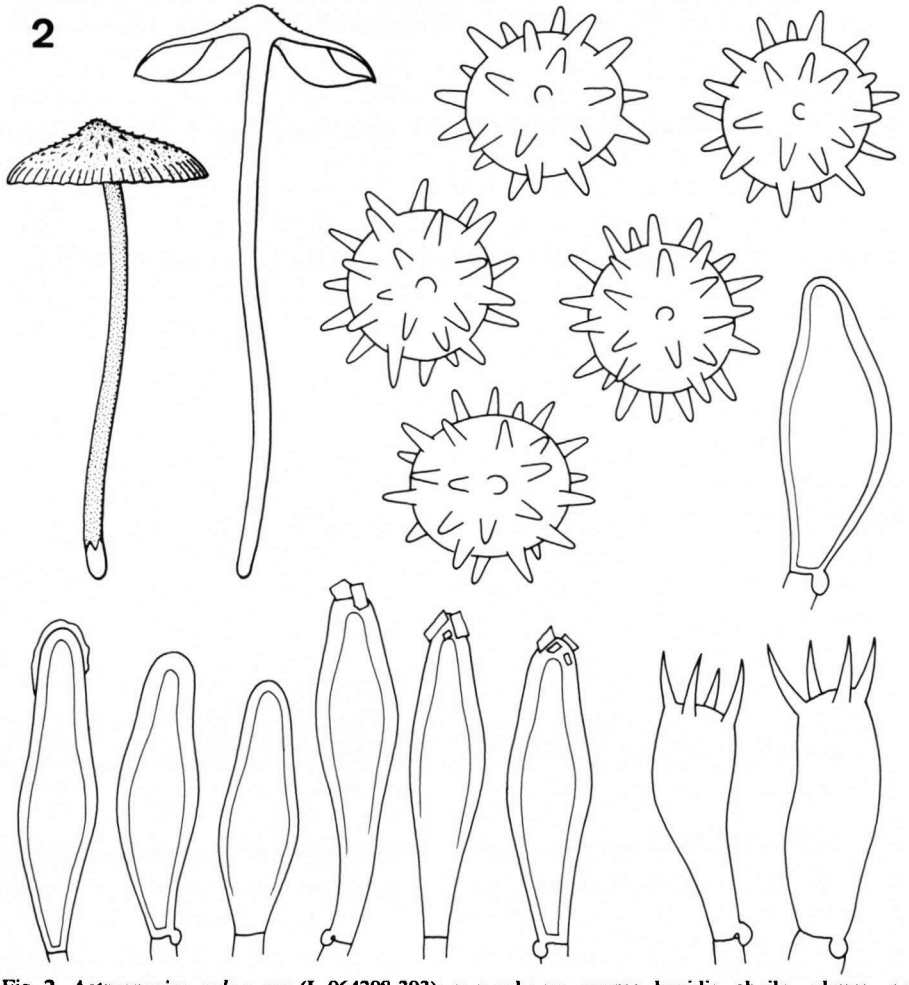

Fig. 2. *Astrosporina calospora* (L 964298.393): carpophores, spores, basidia, cheilo-, pleuro-, and caulocystidia.

Stipe –65 × –2.5 mm, cylindrical, equal, slender; dark vinaceous brown (reminding of *A. asterospora* Quél.); pruinose all over, dry, solid, single. Context whitish in pileus, vinaceous brown in stipe. Odour and taste sourish, herbaceous.

Spores globose (to broadly ovate), 9.5–11 µm (without projections), dendely covered with conical, up to 3.5 µm long projections, brown. Basidia 30–40 × 10–12 µm, 4-spored, sterigmata up to 10 µm long. Cheilo-, pleuro-, and caulocystidia 30–60 × 10–16 µm, fusoid, metuloid, membrane hyaline to pale yellow (KOH), apex beset with small crystals or resinous incrustation or being naked, numerous on stipe. Cuticle a cutis or trichoderm of cylindrical hyphae (4–10 µm diam.), encrusted with yellowish (KOH) pigment. Clamp connections present on septa.

HABITAT.—On soil in forest (*Quercus incana, Rhododendron arboreum*), 1800 m. India, Europe, Japan, U.S.A.

MATERIAL.—INDIA: Uttar Pradesh, Mussooree, Balansar, 14.IX.1964, *Bas 4386* (L 964298.393).

All macroscopic and microscopic characters on the Indian material studied indicate that *Astrosporina calospora* (Quél.) Horak is also present in the temperate *Quercus-Rhododendron* forests covering the Mussooree Hills in Uttar Pradesh. In Eurasia *A. calospora* (Quél.) Horak is not only extending from Europe into the Himalayas but is also reported from U.S.S.R. (Vassilieva, *1973*) and Japan (Kobayasi, *1952*).

Finally this agaric belongs also to the North American mycoflora where – under the synonyms: *Inocybe subfulva* Peck and *I. echinocarpa* Ell. & Ev. – it has been described both from the East and West of the U.S.A. (Heim, *1931*; Horak, unpublished data on type studies).

Among the European representatives *A. calospora* is unique due to its subglobose spores bearing conspicuous spiny or cylindrical projections. In the Indomalayan region, however, there are several taxa which are obviously close to *A. calospora* viz. *A. echinosimilis* Horak (*1979*), *A. gemina* Horak (*1979*) and *A. petchii* (Boedijn) Horak (*1979*). It appears therefore that the centre of evolution for this section of *Astrosporina* has to be sought for in Indomalaya and S.E.-Asia.

3. INOCYBE CALAMISTRATA Fries—Fig. 3

Inocybe calamistrata Fries, Syst. Myc. 1: 256. 1821.

Description of the Indian material:

Pileus –18 mm diam., –13 mm high, conical to broadly conical or parabolical, rarely becoming umbonate-expanded; dark grey-brown with olive tinge in centre, reddish towards not striate margin; especially disc covered with small, erect, concolorous or reddish brown scales, fibrillose near margin; dry, veil remnants absent. Lamellae rather crowded, adnexed, ventricose (up to 3 mm wide); argillaceous, turning dark reddish brown with age, edge albofimbriate. Stipe –95 × –1.8 mm, cylindric, slender equal or slightly tapering towards apex, bulb at base absent; dark olive-grey or dark grey-brown with reddish tinge (especially in young carpophores); apex with white to pale brown-ochraceous floccose pruina, towards base with loose, scattered, concolorous fibrils, tomentum (if present) whitish with pale grey-olive tinge; dry, fistulose, veil remnants none, single. Context pale grey, turning pale brown in cap, concolorous in stipe. Odour and taste not distinctive, or faintly like *Pelargonium*.

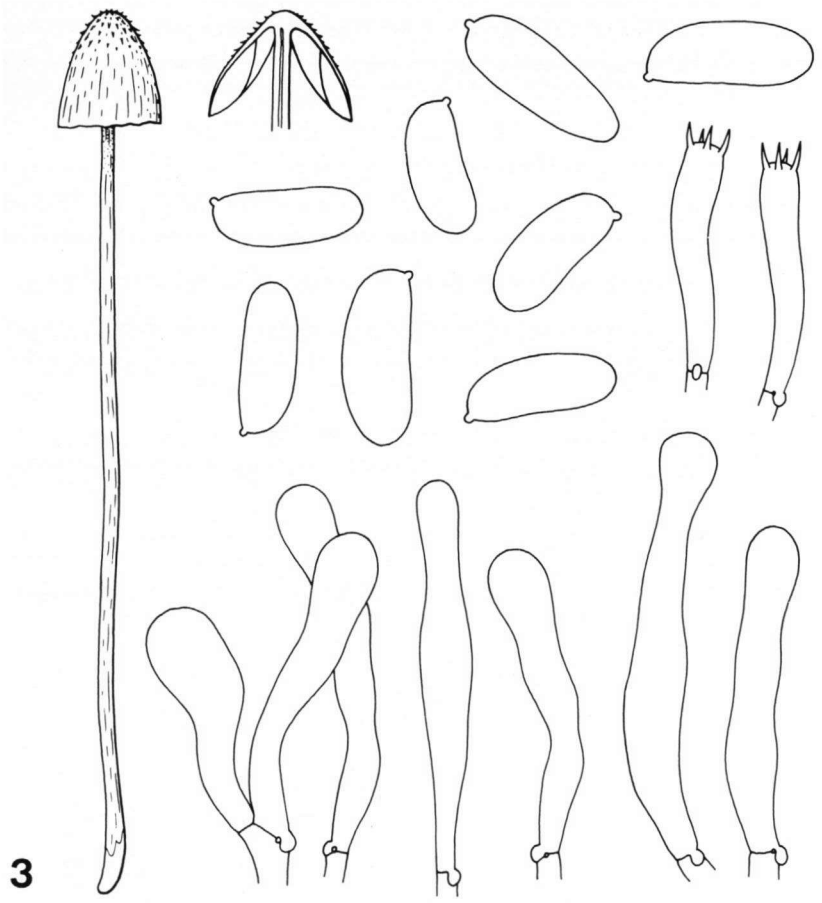

Fig. 3. *Inocybe calamistrata* (L 964298.372): carpophores, spores, basidia, cheilocystidia.

Spore print dark argillaceous brown. Spores 9–12 × 4–5 µm, cylindric-allantoid, slender bean-shaped, brown, smooth, germ pore absent. Basidia 25–35 × 5–7 µm, 4-spored. Cheilocystidia 20–60 × 6–10 µm, clavate to subfusoid-capitate, membrane thin-walled, hyaline, crystals absent. Pleurocystidia none. Caulocystidia scattered, like cheilocystidia. Cuticle a cutis or trichoderm of cylindric hyphae (4–8 µm diam.), strongly encrusted with yellow-brown (KOH) pigment. Clamp connections numerous on septa.

HABITAT.—On soil in forest (*Quercus incana,* intermixed with *Cedrus deodara*), 2300 m a.s.l., India. Widely distributed in the temperate regions of the northern hemisphere.

MATERIAL.—INDIA: Uttar Pradesh, Mussooree, Oak-villa, 16.VIII.1964, *Bas 4393* (L 964298.372).

Except for the rather slender carpophores the Himalayan material agrees in all essential morphological details with *Inocybe calamistrata* Fr. as described from Central Europe (Kühner, *1955*).

This collection taken from mixed *Quercus-Cedrus* forests in the Mussooree Hills represents the first record of *I. calamistrata* Fr. in India (cp. *I. calamistratoides* Horak (*1977*) from New Zealand).

4. Inocybe claviger Horak & Bas, *spec. nov.*—Fig. 4

Pileus –35 mm, ex hemisphaerico umbonato-convexus, pallide ochraceus, albidus (e velo) marginem versus, fibrillosus. Lamellae albidae dein griseo-argillaceae. Stipes –65 × –4.5 mm, cylindricus, bulbosus, albidus dein ochraceus, omnino pruinosus. Sporae 7–8.5 × 3.5–4.5 µm, amygdaliformes. Cystidia ovoideo-clavata, metuloidea, hyalina. Ad terram in silva Cedri et Abietis. India. Typus: *Bas 4187* (L).

Pileus –35 mm, hemispherical becoming conical or convex with broadly umbonate apex, margin remaining strongly incurved also in aged carpophores; ochraceous cream to ochraceous buff, whitish near margin from veil; felty to fibrillose becoming subsquamulose, margin dentate to appendiculate from whitish veil remnants (obvious in young material), dry, margin smooth, not splitting. Lamellae crowded, narrow (up to 2.5 mm wide), subfree to adnexed; whitish at first turning argillaceous-grey, whitish edge subcrenulate. Stipe –65 × –4.5 mm, cylindrical, equal above, base slightly swollen to bulbous (not marginate), –7 mm diam.; white when young turning to pale ochraceous-yellow; pruinose all over, becoming fibrillose towards base (in aged specimens), dry, solid, single. Context white, unchanging. Odour and taste strongly herbaceous, reminding of *Pelargonium*.

Spores 7–8.5 × 3.5–4.5 µm, amygdaliform, brown, smooth, membrane thin-walled, germ pore none. Basidia 20–28 × 5–6 µm, 4-spored. Cheilo-, pleuro-, and caulocystidia 30–55 × 10–22 µm, ovoid-vesiculose to broadly clavate, metuloid (membrane –1.5 µm diam.), hyaline (KOH), incrustation absent but occasionally with resinous cap or crystals at apex. Cuticle a cutis (or trichoderm) of cylindrical hyphae (3–8 µm diam.), membrane subgelatinized, with yellowish, plasmatic pigment. Clamp connections present on septa.

HABITAT.—On soil (loam) in forest (dominated by *Cedrus deodara* and *Abies pindro*), 2000 m a.s.l. India.

MATERIAL.—INDIA: Punjab, Kulu Valley, Manali, Beas River, 20.VIII.1964, *Bas 4187* (L, holotype; ZT 497, isotype).

Inocybe claviger is characterised by the following most distinctive features: entirely pruinose stipe with bulbous base, ovoid to clavate, thick-walled cheilo-, pleuro-, and caulocystidia (encrusting crystals scattered or absent), and small amygdaliform spores (7–8.5 × 3.5–4.5 µm). Owing to these characters *I. claviger* is reminiscent of several rare European species of *Inocybe*. The (for the genus rather unusual) short cystidia are shared with *I. amygdalispora* Métrod (*1955*), *I. brevicystis* Métrod (*1955*), *I. citrinofolia* Métrod (*1955*), *I. ochroalba* Bruylants (*1969*), *I. ovoideicystis* Métrod (*1955*) and/or *I. piricystis* Favre (*1955*). But the small-sized amygdaliform spores in combination with the presence or absence of metuloid caulocystidia distinguish the new Himalayan taxon from all beforementioned species.

Macroscopically *I. claviger* could also be taken for *I. pelargonium* Kühner (*1955b*), however, the cystidia of the latter species distinctly separate the two agarics.

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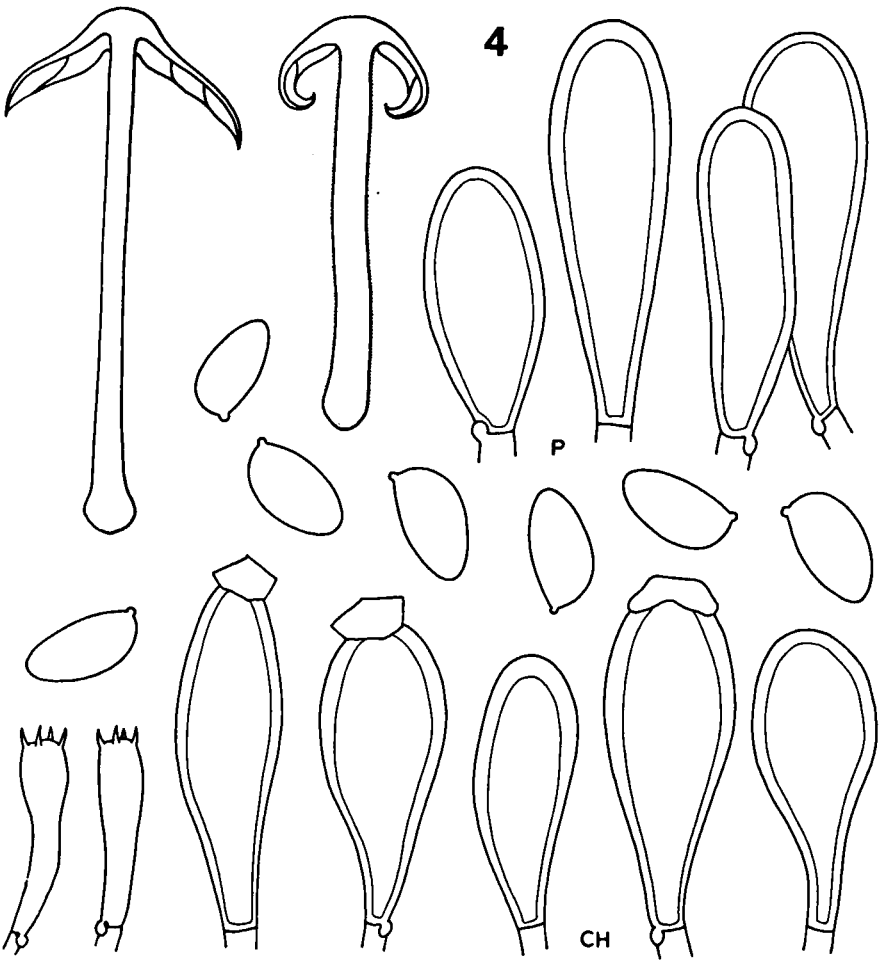

Fig. 4. *Inocybe claviger* (type): carpophores, spores, basidia, cheilocystidia (CH), pleurocystidia (P).

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