

The Family Orbiliaceae in India (Helotiales)

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Abstract. This paper gives complete information of Indian Orbiliaceae. Four species of the genus *Orbilina* are fully described and illustrated, all of which are new records for India, viz. *O. auricolor*, *O. curvatispora*, *O. luteo-rubella*, and *O. xanthostigma*. A key to the species is provided.

Fungi belonging to the family Orbiliaceae are saprophytes characterized by superficial, sessile to sub-sessile, discoid to shallow cupulate ascocarps which are variously brightly coloured, waxy, translucent when fresh, becoming opaque on drying; margin entire to crenate, strongly incurved on drying. Asci small, clavate-cylindrical, J+ or J—, rarely with a branched base and truncate apices. Ascospores small, hyaline, fusoid or ellipsoid, one-celled, smooth. Paraphyses filiform, simple or branched, tips abruptly swollen, strongly agglutinated.

Anatomy of carpophores: Excipulum two layered: ectal excipulum a textura angularis to textura globulosa, cells thin-walled, outer layer sometimes beset with hyphae forming a distinct subiculum; medullary excipulum a densely textura intricata, hyphae narrow, thin-walled; hypothecium indistinct.

This is one of the smallest families of the order Helotiales and their species are mostly found on wood and bark of trees, sometimes on herbaceous angiospermic stems, as bright-coloured, discoid, translucent fructifications.

In India the Orbiliaceae are poorly represented. Only two species of the genus *Orbilina* Fr., i. e. *O. obscura* GHOSH, MUKHERJI & BASAK and *O. sarraziniana* BOUD., were reported by GHOSH, MUKHERJI & BASAK (1964), and TEWARI & PANT (1966) respectively. The former species was transferred to *Pezizella multiguttulata* KAR & PAL (1968), as a nomen novum.

BATRA & BATRA (1963) stated that many species of Orbiliaceae are found in India, but there is no validly published record in the literature. The first definite proof of the presence of this family is *O. sarraziniana* by TEWARI & PANT (1966) from Varanasi (U. P.). Since then four more species of the genus *Orbilina* have been collected which are new records for this country.

Orbilina FRIES 1835

Fl. Scan. 343

Ascocarps small, sessile to subsessile, shallow cupulate to almost plane, variously brightly coloured, subgelatinous, waxy, translucent when fresh, becoming opaque on drying; margin entire. Asci clavate-cylindrical, apices obtuse to truncate, J+ or J—, strongly coherent with the paraphyses. Ascospores elliptic-fusiform to fusoid or reniform, hyaline, smooth. Paraphyses filiform, hyaline, thin-walled, simple or branched, tips abruptly swollen, pear-shaped.

Anatomy: Ectal excipulum a textura angularis to textura subglobulosa, cells hyaline, thin-walled; medullary excipulum compactly arranged textura intricata, sometimes appearing as a textura angularis; hypothecium indistinct.

Type species: *Peziza leucostigma* FR., Summa Veg. Scand. Sect. Post. 357. 1849.

Distribution: World-wide.

This large genus is easily recognised in the field by its waxy, translucent, usually very thin ascocarps. Microscopically it reveals small asci, strongly cohering with the paraphyses, which are abruptly swollen at the tips. *Hyalinia* BOUD., a allied genus of the family differs from *Orbilina* FR., in having a toothed or crenate margin of the ascocarp which is formed by cohering hair-like outgrowths of the ectal excipulum.

Key to species

- | | |
|---|------------------------------|
| 1. Subiculum present; paraphyses not markedly knobbed | 1. <i>O. auricolor</i> |
| 1. Subiculum absent; paraphyses distinctly knobbed. | |
| 2. Ascospores 3.7—6.5 (—7.5) μm long, somewhat reniform | 5. <i>O. xanthostigma</i> |
| 2. Ascospores 6—10 μm long. | |
| 3. Asci up to 50 μm long; ascospores fusoid | 3. <i>O. luteorubella</i> |
| 3. Asci less than 50 μm long; ascospores fusoid to slightly curved or clavate. | |
| 4. Ascospores fusoid to curved | 2. <i>O. curvatispora</i> |
| 4. Ascospores clavate | 4. <i>O. sarraziniana</i> *) |

1. *Orbilina auricolor* (BLOX. ex BERK.) SACC., Syll. Fung. 8: 625. 1889. — Figs. 1—3

Ascocarps up to 3 mm across, up to 0.8 mm it total height, gregarious or solitary, shallow cupulate, translucent, sub-sessile;

*) Not examined.

external surface light yellow, becoming deep yellow on drying, roughened due to the presence of short, white, thin-walled, multi-septate anchoring hyphae, up to $6.5\ \mu\text{m}$ wide, forming a conspicuous subiculum; hymenial surface deep yellow, concave, smooth; margin irregular, even, incurved on drying. Asci $15-30 \times 2.8-5\ \mu\text{m}$, 8-spored, J+, clavate-cylindrical, apices narrow but truncate, tapering below into a short stem-like base, which is expanded like a foot, and arises from a crozier cell. Ascospores $4.5-6.5 (-9) \times 1-1.5\ \mu\text{m}$, biseriata, fusoid or slightly curved, hyaline, thin-walled, one-celled, smooth, aguttulate. Paraphyses up to $1.6\ \mu\text{m}$ wide, filiform, hyaline, thin-walled, non-septate, simple or branched, strongly agglutinated, impregnated with amorphous matter, slightly enlarged at the tips but not marked as in other Orbiliias, the same length as the asci. Ectal excipulum up to $140\ \mu\text{m}$ thick, *textura angularis*, cells hyaline, thin-walled, large, up to $35 \times 18\ \mu\text{m}$, cellular size decreases towards the margin, outer layer beset with conspicuous, hyaline, radiating basal hyphae (as described above) forming a distinct subiculum; medullary excipulum up to $23\ \mu\text{m}$ thick, a compactly *textura intricata*, hyphae thin-walled, septate, narrow, up to $2\ \mu\text{m}$ wide; hypothecium indistinct.

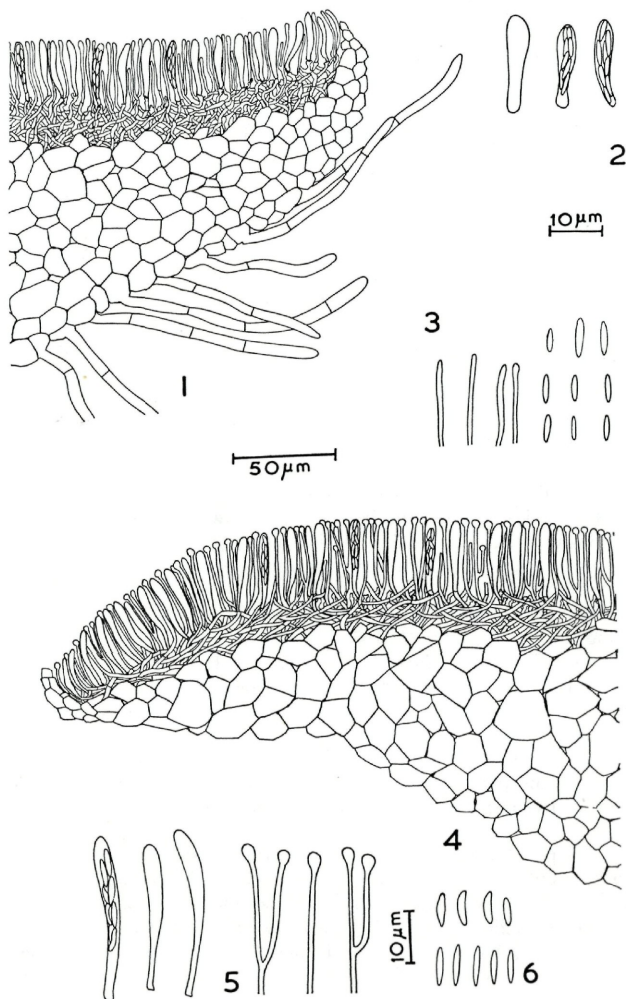
Substrate: On much decayed stems and bark of angiospermic plants.

Material: INDIA: H. SINGH 3426 (PAN), on angiospermic bark, Chandanwari, Pahalgam, J & K, September 3, 1967; H. SINGH 3438 (PAN), on bark, Chandanwari, Pahalgam, J & K, September 3, 1967; H. SINGH 3479 (PAN), on bark, Narkanda, Simla, H. P., October 4, 1967; M. P. SHARMA 11044 (PAN), on much decayed stems of an unidentified angiospermic stem, Batote, J & K, September 8, 1972; M. P. SHARMA 11052 (PAN), on angiospermic bark, Tiffons Top, Nainital, U. P., August 6, 1973.

Distribution: Europe, Asia, Venezuela.

This is the first record of *O. auricolor* from India, where the species appears to be widely distributed in the North Western Himalayas. Morphologically these Himalayan collections are quite within the limits of the species, except that the ascospores are slightly longer in these collections. The species can be easily recognised by the following characters: yellow, cupulate ascocarps, surrounded by conspicuous, hyaline, radiating basal hyphae forming a distinct subiculum; small clavate, J+ asci; fusoid, hyaline ascospores and filiform paraphyses with only slightly enlarged tips.

In most of its features this species is allied to *O. luteorubella* (NYL.) KARST. but differs by having short, white, anchoring hyphae forming a distinct subiculum.



Figs. 1—3. *Orbilia auricolor* (BLOX. ex BERK.): 1. Vertical section of the apothecium passing through the marginal region, showing thin-walled cells of the cetal excipulum beset with hyphae, intertwined medullary excipulum and hymenium. — 2. Asci showing arrangement of the ascospores and paraphyses. — 3. Ascospores

Figs. 4—6. *Orbilia curvatispora* BOUD.: 4. Vertical section of the apothecium passing through the margin. — 5. Asci and paraphyses with swollen tips. — 6. Ascospores

2. *Orbilina curvatispora* BOUD., in Bull. Soc. Mycol. France 4: 80. 1888.—
Figs. 4—6

Ascocarps up to 1.5 mm across, highly gregarious, sometimes solitary, sometimes closely appressed, soft to waxy, discoid to shallow cupulate, translucent when fresh, becoming opaque on drying, sessile, seated on a small base, regular; external surface white to deep-yellow or orange coloured, smooth; hymenial surface concolorous, concave, smooth; margin entire to slightly wavy, inturred on drying. Stipe small, inconspicuous, paler concolorous. Asci 20—38 (—42) \times 2—3.8 μ m, 8-spored, pore blue in MELZER's reagent, clavate-cylindrical, apices narrow but obtuse, tapering below into a small stem-like base. Ascospores 7.5—10 \times 1—1.5 μ m, biserial to irregularly placed, fusoid to distinctly curved, hyaline, thin-walled, one-celled, with oil droplets, smooth, aguttulate. Paraphyses up to 1.2 μ m wide, filiform, hyaline, thin-walled, non-septate, branched at lower levels, apices abruptly swollen, like drum sticks, up to 4.5 μ m wide, almost the same length as the asci. Excipulum two layered; ectal excipulum up to 42 μ m thick, textura angularis with cells thin-walled, hyaline, upto 16 \times 14 μ m wide; medullary excipulum up to 18 μ m thick, textura intricata with narrow hyphae, thin-walled, up to 1.8 μ m wide, hypothecium indistinct.

Substrate: On dead decaying herbaceous angiospermic stems in a slow moving water.

Material: INDIA: M. P. SHARMA 3915 (PAN, TAA), Panjpulla, Dalhousie, H. P., July 21, 1972.

Distribution: Europe, Asia (U. S. S. R.), Venezuela.

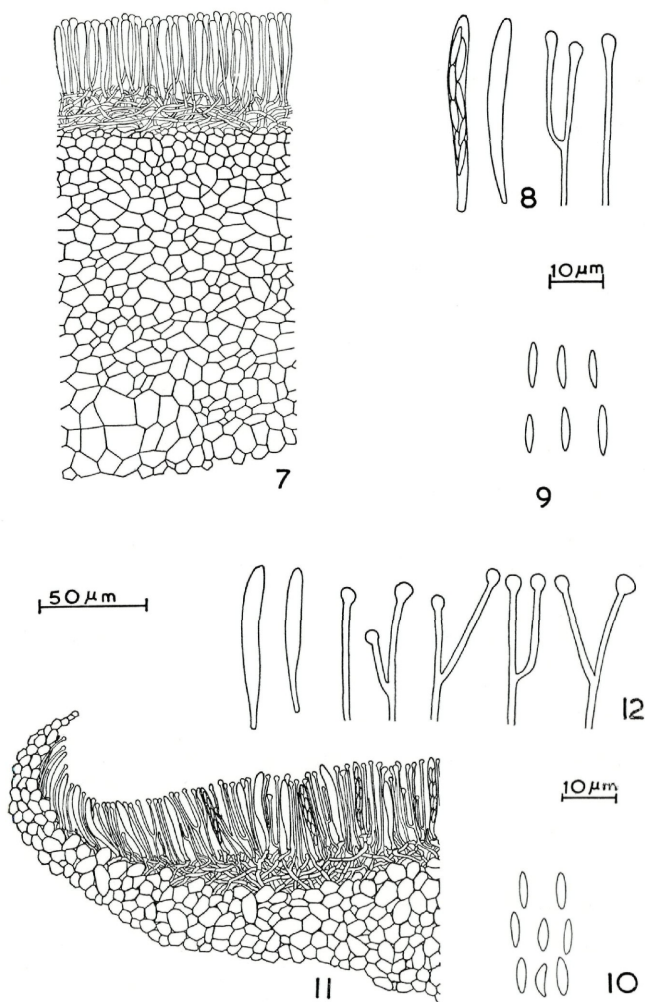
This is the first report for this species from India. It has been encountered only once in the Dalhousie hills during our four years' extensive fungal forays in the North-Western Himalayas. Evidently it is a rare species. Its chief features are: deep yellow to orange, sessile ascocarps; small, clavate-cylindrical, J+ asci; fusoid to curved, one-celled ascospores; and filiform hyaline paraphyses with abruptly swollen tips.

The present collection agrees with the wood inhabiting *O. curvatispora* except, compared with typical collections from Europe (DENNIS, 1968), that the ascocarps are more robust and yellow to orange colour.

Morphologically this species is quite similar to *O. gaillardii* SACC., but differs in having larger and curved ascospores. *O. fici* CASH & CORNER is also a similar fungus but differs in having drab to greyish-olive hymenium.

3. *Orbilina luteorubella* (NYL.) KARST., in Not. Sällsk. Fauna Flora Fennica 11: 248. 1870. — Figs. 7—9

Ascocarps up to 1.5 mm across, up to 0.5 mm in total height, superficial, densely gregarious or solitary, sometimes in coherent



Figs. 7—9. *Orbilia luteo-rubella* (NYL.): 7. Vertical section of the apothecium at mid-point. — 8. Asci and paraphyses. — 9. Ascospores

Figs. 10—12. *Orbilia xanthostigma* (FR.): 10. Ascospores. — 11. Vertical section of the apothecium passing through the margin. — 12. Asci and paraphyses

groups, waxy, translucent when fresh, becoming opaque on drying, sub-sessile, seated on a small base, discoid to shallow cupulate, somewhat raised in the centre; external surface cream coloured, smooth; hymenial surface concolorous, concave, smooth becoming yellow on drying; margin entire, irregular, incurved on drying. Asci $28-45 \times 2$ (-50) $\times 2.8-4.5$ μm , 8-spored, pore not blue in MELZER's reagent, clavate-cylindrical, apices narrow obtuse to truncate, gradually tapering below into a small stem-like base. Ascospores $6-10 \times 1.2-2$ μm , biseriate, narrowly fusoid, hyaline, thin-walled, non-septate, smooth, aguttulate. Paraphyses up to 1.5 μm , filiform, hyaline, thin-walled, non-septate, abruptly swollen at the tips, tips globose to pyriform, up to 3.5 μm wide, strongly cohering together, agglutinated, branched at all levels, in line to sometimes projecting up to 7 μm beyond the tips of asci.

Anatomy: Excipulum two layered; ectal excipulum textura angularis, cells hyaline to light coloured, thin-walled, 29×14 μm wide; the medullary excipulum a loosely arranged textura intricata, hyphae narrow, thin-walled, upto 2 μm wide; hypothecium indistinct.

Substrate: On dead decaying angiospermic wood.

Material: CANADA: R. F. CAIN 30070 (TRT), on wood, Nashville, York Co., Ontario, s. d. — INDIA: H. SINGH 3433 (PAN), on dead wood, Batakote, Pahalgam, J & K, September 2, 1967; H. SINGH 3439 (PAN), on dead wood, Gulmarg, J & K, September 10, 1967; M. P. SHARMA 11089 (PAN), on dead decaying angiospermic wood, Kilbury, Nainital, U. P., August 13, 1973; M. P. SHARMA 11240 (PAN, PRC), Kalatope, Dalhousie, H. P., August 24, 1974.

Distribution: World-wide.

The fungus appears to be widely distributed both in coniferous and mixed forests of the North-Western Himalayas. All above mentioned Himalayan collections are quite typical of the species, which is characterized by its sub-sessile, cream coloured, translucent ascocarps, clavate-cylindrical, up to 50 μm long asci, fusoid, one-celled ascospores and paraphyses with swollen tips strongly glued to the asci. It is interesting to note that this species was reported on decaying fungi from Great Britain (DENNIS, 1960). A Canadian collection examined differs in having narrower asci and in its yellow colour of the hymenium.

4. *Orbilbia sarraziniana* BOUD., in Revue Mycol. 7: 221. 1885.

This species was reported by TEWARI & PANT (1966) from the plains of Varanasi, U. P., on the basis of a single collection (BHUPP 17) on piled-up decaying stems of *Cajanus cajan*. During our extensive fungal forays (1972—1975) in the North-Western Himalayas no collection of this species has been made. Also we could not examine the

material of this species from BHUPP herbarium. It seems to be a rarely occurring fungus in the North-Western Himalayas.

Orbilina sarraziniana is characterized by: small, sessile, discoid, umbrinous or vinaceous ascocarps; clavate-cylindrical, J+, 8-spored asci; 33—45 × 5—8.5 μm ascospores, and filiform paraphyses with swollen tips (after TEWARI & PANT, 1966). TEWARI & PANT's description of the species differs from that of DENNIS (1968) in having larger asci (40 × 4 μm, fide DENNIS), narrower ascospores (6—8 × 0.5 μm) and a different host substrate.

5. *Orbilina xanthostigma* (FR.) FR., Summa Veg. Scand. Sect. Post. 357. 1849. — Figs. 10—12

Ascocarps up to 2 mm across, up to 0.7 mm in total height, gregarious or solitary, soft, fleshy to waxy, shallow cupulate, subsessile, seated on a small flat base, translucent when fresh, becoming tough and opaque on drying; external surface golden yellow, smooth to minutely roughened; hymenial surface concolorous, concave, smooth; margin entire, inturned on drying. Asci 25—38 × 2.5—4.2 μm, pore faintly blue in MELZER's reagent, cylindrical-clavate with truncate apices, truncate, gradually tapering lower down into small swollen base, arising from a crozier cell. Ascospores 3—6.5 (—7.5) × 1—2.5 μm, uniseriate to irregularly biseriate, broadly ellipsoid to reniform, hyaline, thin-walled, smooth, non-septate, biguttulate, guttules disappearing at maturity. Paraphyses up to 1.4 μm wide, filiform, hyaline below, light yellow above, thin-walled, non-septate, coherent, abruptly swollen at the tips, up to 3.5 μm wide, in level with or sometimes projecting up to 8 μm beyond the tips of asci. Ectal excipulum up to 216 μm thick, textura angularis with cells thin to thick-walled, hyaline, up to 25 × 17 μm; medullary excipulum up to 29 μm thick, compactly arranged, textura intricata, sometimes appearing as textura angularis, hyphae narrow, thin-walled; hypothecium indistinct.

Substrate: On dead angiospermic stems.

Material: INDIA: Y. B. GAIKWAD (HCIO, 31591), as *Orbilina acaciae* GAIKWAD, on *Acacia arabica* WILLD., Ahmedpur, Maharashtra, November 14, 1972; M. P. SHARMA 3992 (PAN, TAA), Panjpulla, Gulmarg, J & K, August 26, 1973; M. P. SHARMA 11266 (PAN, PRC), Baloon, Dalhousie, H. P., August 27, 1974.

Distribution: World-wide.

This is the first report of this species from India, where it appears to be rather uncommon. It has been collected from Dalhousie and is also known from a locality in the Kashmir valley. The Indian collections are in most respects similar to *O. xanthostigma* (FR.) FR. but their ascospores are slightly longer and broader. This species is readily

identified by its small, sub-sessile, waxy, golden-yellow ascocarps, clavate-cylindrical, faintly J+ asci, ellipsoid to reniform, biguttulate ascospores and paraphyses with knob-shaped tips. It is also closely allied to *O. leucostigma* (Fr.) Fr., from which it differs in having slightly longer ascospores and in the golden-yellow colour of the ascocarps.

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