

LICHEN GENUS *DIPLOTOMMA* FROM INDIA AND NEPAL

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Abstract

The paper deals with eleven species of the lichen genus *Diplotomma* Flotow from India and Nepal of which *D. himalayense* and *D. megasporum* are new species. *Diplotomma proximatum* (Magnusson) Szat. and *D. sorediatum* (Tuck.) Singh & Awasthi are new reports from India. *D. sorediatum* (Tuck.) Singh & Awasthi has been proposed as a new combination.

Introduction

The lichen genus *Diplotomma* Flotow, was first described by Flotow (1849). Th. Fries (1874) treated it as a section of the genus *Buellia* De Not., in which category it continued to be treated till the middle of this century. It was resurrected as a genus mainly by Szatala (1956), and several lichenologists accept *Diplotomma* as a stabilized genus of physciaceae (Eriksson & Hawksworth, 1987).

Diplotomma is characterised by : Thallus crustose, photobiont *Trebouxia*, apothecia sessile, black, lecideine, proper exciple generally prominent, paraplectenchymatous, asci 8-spored, spores brown, thickwalled, transversely 2-5-septate or becoming submuriform to muriform.

The genus is close to *Buellia* which differs in the constantly, transversely 1-septate spores. Certain taxa of *Diplotomma* also exhibit 1-septate condition in some spores in an apothecium. In such cases the general 2-more septate condition is taken up for deciding the specimens as *Diplotomma*. Eleven species of *Diplotomma* are now known from India. The 39 species of *Buellia* from India have been dealt with by Singh and Awasthi (1981).

Morphology of thallus and apothecia

Thallus crustose, whitish grey to grey brown, smooth to granuloso-verruculose, cra-

cked. It is rarely sorediate as in *D. sorediatum* but isidia are lacking. Hypothallus as a brownish or blackish line delimiting thallus is present or rarely inconspicuous or absent. Thallus is (34-50)-90-200(-360) μm thick. Corticiform layer is indistinct to distinct and hyaline. Algal cells are compact and mostly confined in the upper part. They are spherical and 5-11 μm in diameter.

Apothecia are dark brown to black, usually round, rarely irregular, adnate to sessile, ranging from 0.3-1(-2) mm in size. Margin is usually distinct and prominent. Disc is plane to convex and epruinose. Exciple is proper, lecideine, indistinctly or distinctly cellular (paraplectenchymatous), dark brown to blackish on outer side and pale brown to hyaline on inner side. Epithecium is generally brown to dark brown, K—. Hymenium is hyaline, I+ blue, and not interspersed with the oil globules in the taxa studied though in some other species they are reported to be present. Hypothecium is hyaline. The internal stipe, i.e., the tissue lying below the hypothecium is usually dark-brown to reddish brown or brown above and pallid below. Spores are brown to dark brown, either permanently only transversely 2-5-septate or initially transversely septate and later becoming submuriform to muriform. In the latter case there are 2-5 (-7) transverse septa and 1-3 (-5) vertical septa. Paraphyses are simple to apically branched usually with swollen and brown tips. Pigmentation in the apical cells of the paraphyses is variable in the same apothecium of a spe-

cies Paraphyses are generally adglutinated and not separable easily in water but they get separated in aqueous KOH solution which after the addition of cotton blue become suitable for study.

Key to the species

- 1a. Spores only transversely (1-)2-5-septate 2
- 1b. Either all or some spores both transversely and vertically septate (sub muriform to muriform)..... 6
- 2a. Thallus muscicolous, terricolous or saxicolous 3
- 2b. Thallus corticolous 4
- 3a. Thallus muscicolous or terricolous, whitish grey, K+ yellow (atranorin present), P—.....4. *D. geophilum*
- 3b. Thallus saxicolous, greyish brown, K+ yellow-redbrown crystals, P+ deep yellow (no stictic acid present),7. *D. manipurens*
- 4a. Thallus K+ red crystals, P+ deep yellow (no stictic acid present)6. *D. lauricassiae*
- 4b. Thallus K— or K+ yellow, P— (no stictic acid absent)..... 5
- 5a. Thallus brown to reddish brown, K—.....9. *D. pharcidium*
- 5b. Thallus whitish to grey, K+ yellow.....10. *D. proximum*
- 6a. Thallus sorediate..... 11. *D. sorediatum*
- 6b. Thallus lacking soredia..... 7
- 7a. Thallus saxicolous, K+ yellow-orange red, P+yellow (atranorin & no stictic acid present), spores 15—24 × 9—12µm..... 3. *D. chlorophaeum*
- 7b. Thallus corticolous 8
- 8a. Thallus K+ red, P+ deep yellow to orange red (no stictic acid present).....5. *D. himalayense*
- 8b. Thallus K— or K+ yellow, P— (no stictic acid absent)..... 9
- 9a. Thallus K—,.....2. *D. alboatrum*
- 9b. Thallus K+ yellow..... 10
- 10a. Spores 17.5-25.5 × 7.5-13.5 µm, hymenium 54-90 µm high..... 1. *D. alboatrior*
- 10b. Spores 30-48 × 16-25 µm, hymenium 135-160 µm high.....8. *D. megasporum*

Description

1. *Diplotomma alboatrior* (Nyl.) Szat. ex

Awasthi & Singh comb. nov. Text-fig. 2: 1-6; Pl. 1, fig.1)

- *Lecidea alboatrior* Nyl., Flora 52:71 (1869).
- *Buellia alboatrior* (Nyl.) Zahlbr., Cat. lich. univ. 7: 441 (1931).

— *Diplotomma alboatrior* (Nyl.) Szat., Ann. Hist. Nat. Mus. Nat. Hung. 7: 279 (1956) nom. inval. (Art.33)
Type collection Bengal; Muneehara, on bark, S. Kurz, 167 (Lectotype: H-NYL 9514 !)

Thallus corticolous, crustose, whitish grey, smooth to subverruculose; hypothallus absent. Apothecia black, 0.3—1 mm in diameter, subsessile to sessile; margin prominent; disc concave to plane, rarely convex, pruinose. Exciple dark brown, ± cellular, 36-90 µm thick. Epithecium brown, K—; hymenium 54-90 µm high, not interspersed with oil globules; internal stipe dark brown. Asci 8-spored; spores brown to dark brown, submuriform, ellipsoid, initially transversely 2-5(-6)-septate, later vertically 1-2-septate, 17.5-25.5 × 7.5-13.5 µm; surface ornamented. Thallus K+ yellow, C—, KC—, P—.

TLC—Atranorin and an unidentified yellow brown spot between Rf. class 6 & 7

Diplotomma alboatrior an endemic species is distributed in dry tropical region of India. *D. alboatrum* is closely related to this species but its thallus is K— and the spores are smooth.

Specimens examined—Bihar: Chhota Nagpur forest, Bamiaburu, Awasthi 3 2 (AWAS). (Duplicate expected at H, det. Buellia alboatra by Räsänen).

Madhya Pradesh—Pachmarhi; near Pan-cypool diversion, S.R. Singh 73. 11, 73.17 (LWU); Patharchatta, S.R. Singh 73.55 (LWU); Downfall, S.R. Singh 73.106A (LWU); on way to Dhupgarh, S.R. Singh 73.168 (LWU); on way to Pipariya, S.R. Singh 73. 178, 73.179 (LWU); Purana Pachmarhi; near new hotel, Upreti & Misra 80. 65 (LWU); Chhindwara; Sona Pipri, 2 km from Parasia, Upreti & Misra 80.187 A (LWU); Mandla; Chargaon, 37 km from Mandla city, Upreti & Misra 80.223 (LWU); Rani forest Katra, 8 km from Mandla city, Upreti & Misra 80.278B (LWU); Jabalpur; Kuwan forest, 59 km from Jabalpur city, Upreti & Misra 80.331B (LWU); Shahdol; Amarkantak, Kapil Sangam gaon, 2 km from Amarkantak city, Upreti & Misra, 80.343, 80.344B, 80.376, 80.383 (LWU);

Batayakrishna, 1 km from Amarkantak, Upreti & Misra 80.406 (LWU); Sonemuda, 2 km from Amarkantak, Upreti & Misra, 80.431 (LWU); forest near boxite mines, Upreti & Misra, 80.471 (LWU); Jwaleshwar, 12 km from Amarkantak, Upreti & Misra 80.508, 80.561 (LWU); Hindalco, 2 km from Amarkantak, Upreti & Misra 80.593A (LWU).

Rajasthan—Mt. Abu, Kanerkund area, S.R. Singh 78.155 (LWU).

West Bengal—Muneechara, on bark, S. Kurz 167 (Lectotype: H-NYL 9514); Darjeeling, between Chunabhati and Tindhari, Awasthi & Agarwal 66.128 (LWU); Chuna-bhati, Awasthi & Agarwal 66.135 (LWU).

2. *Diplotomma alboatrum* (Hoffm.) Flotow (Text-fig. 1: 12-15).

Jber. Schles. Ges. Vaterl. Kult.: 130 (1849).

Lichen alboater Hoffm., Enum. lich. eur.: 30 (1784) (Type specimen not seen).

—*Buellia alboatra* (Hoffm.) Branth et Ros-tr., Bot. Tidsskr. 4: 439 t. 3, F.40 (1869); Zahlbr., Cat. lich. univ. 7:433 (1931); Sheard, Lichenologist 2: 255 (1964).

Thallus corticolous, crustose, grey, smooth to verruculose, cracked; hypothallus indistinct or as a brownish line along the margin. Apothecia black, adnate to sessile, 0.3 - 1 mm in diam.; disc plane to convex, epruinose. Exciple dark brown, \pm cellular, 54-72 μ m thick laterally, and 72-90 μ m thick at base. Epithecium brown, K—; hymenium 72-99 μ m high, not interspersed with oil globules; internal stipe dark brown, not well demarcated from exciple. Asci 8-spored; spores submuriform, transversely 2-5-septate and in some vertically 1-septate, ellipsoid, 18-27 \times 5-14 μ m, surface smooth. Thallus K—, C—, KC—, P—.

D. alboatrum determined on the basis of description is closely related to *D. alboatrior* which is distinguished from the former by K + yellow reaction in the thallus and ornamented spores.

Specimen examined—Uttar Pradesh: Tanakpur, Awasthi 536 (Awas.) (duplicate (may be at H.) det. as *Buellia zobotica* by Räsänen.)

3. *Diplotomma chlorophaeum* (Hepp. ex Leighton) Singh & Singh, Bull. bot. Surv. India, 26(142): 62-64 (1984).

—*Lecidea chlorophaea* Hepp. ex Leighton, Lichen Flora Great Brit. ed. 1: 2-328 (1871).

This species has been reported from Manipur, India by Singh and Singh (1984).

D. chlorophaeum is characterised by saxicolous, K + yellow-orange red, P + yellow thallus and 15-24 \times 9-12 μ m, muriform spores. It resembles *D. alboatrum* but the latter is distinguished by negative thallus reactions.

4. *Diplotomma geophilum* (Floerke ex Sommerf.) Szat. ex Awasthi & Singh comb. nov. (Text-fig. 1: 9-13; Pl. 1, fig. 2).

—*Lecidea geophila* Floerke ex Sommerf., Suppl. Flor. Lapp.: 157, 1826); Zahlbr., Cat. lich. univ. 7: 371 (1931) (Type specimen not seen).

—*Buellia geophila* (Floerke ex Sommerf.) Lynge, Med. Gronland, 118(8): 181 (1937); Awasthi, Univ. Colorad. Stud. Biol. 10: 35 (1963); Sheard, Lichenologist 2 (3): 241 (1964).

—*Diplotomma geophilum* (Floerke ex Sommerf.) Szat., Ann. Hist. Nat. Mus. Nat. Hung. 7:279 (1956) comb. inval. (Art. 33).

Thallus muscicolous, whitish grey, in the form of thin crust over mosses and other plant detritus, frequently becoming granulose; hypothallus absent. Apothecia common, black, adnate to sub-sessile, 0.3-1.2 mm in diam.; margin distinct; disc plane to slightly convex, epruinose. Exciple brown to dark brown, \pm cellular on outer side, 36-72 μ m thick, laterally, and 72-117 μ m thick at base. Epithecium brown, K—; hymenium 90-117 μ m high, not interspersed with oil globules; internal stipe brown to dark brown. Asci 8-spored, spores transversely 2-3-septate, ellipsoid, 27-54 \times 9-16 μ m, surface ornamented. Thallus K + yellow, C—, KC—, P—.

TLC: Atranorin.

The taxon is distributed in temperate to alpine regions. Imshaug (1951) considered *B. geophila* conspecific to *Buellia papillata* but the latter is a true *Buellia* possessing—1 septate spores. *D. lauricassiae* has norstictic acid and *D. triphragmium* has oil globules in the hymenium and thus quite distinct from *D. geophilum*.

Specimens examined—East Nepal; Topkegola, Thagalabhanjyang, Awasthi 2359, 2375 (AWAS).

5. *Diplotomma himalayense* Singh & Awasthi sp. nov. (Text-fig. 2:7-11; Pl. 1, fig. 3)

Thallus corticola, crustaceous, effusus, fuscescentus, granulatus vel rimosus, K+ rubescens, P+ flavo-aurantiacus; hypothallus indistinctus. Apothecia nigra, 1-2 mm lata, sessilia; disco plano vel demum convexo, epruinoso. Excipulum fusconigrum; hymenium 108-144 μm altum, haud oleoso-inspersum, I+coerulescens. Asci octospori; sporae fuscae, murales, oblongo-ellipsoidae, (18-) 23-36 μm longae et (11-) 13-18 μm crassae.

Type collection—West Bengal: Darjeeling district, on way from Sandakhpoo to Phalut, alt. ca. 3600 m, on bark of *Rhododendron* tree, June 16, 1967, D. D., Awasthi & M. R. Agarwal 67.414 (Holotype: LWU).

Thallus corticolous, crustose, effuse, brown, rough to granulose, often deeply cracked; hypothallus indistinct. Apothecia common, black, sessile, 1-2 mm in diam.; margin very thick; disc plane to convex, epruinose. Exciple dark brown to black, 99-117 μm thick laterally, and 144-180 μm thick at base, K+deep yellow colouration. Epithecium dark brown, K—; hymenium 108-144 μm high, not inspersed with oil globules; internal stipe dark brown and confluent with exciple. Asci 8-spored; spores brown, muriform with 2-7 transverse and 1-3 longitudinal septa; oblong-ellipsoid (18-) 23-36 \times (11-) 13-18 μm . Thallus K+ red, C—, KC—, P+deep yellow to orange red.

TLC: Atranorin, norstictic acid and an unidentified grey, UV+ spot at Rf. value 0.66.

D. himalayense is subsimilar to *D. megasporum* but the latter lacks norstictic acid in the thallus.

6. *Diplotomma lauricassiae* (Fée) Szat. (Text-fig. 1: 5-8; Pl. 1, fig. 4)

Magy. bot. Lapok, 31: 123 (1932).

—*Lecidea lauricassiae* Fée, *Suppl. Essai, Crypt, Ecorc. officin*: 101 (1837) (Type specimen not seen).

—*Buellia lauricassiae* (Fée) Mull. Arg., *Rev. Mycol.* 9: 85 (1887); *Zahl br., Cat. lich. univ.* 7:451 (1931); *Imsh., Farlowia* 4: 495 (1955).

—*Buellia subramaniyana* Roy Chowdhary, *Bull. bot. Surv. India* 13(3-4): 246 (1971). *Type collection*: West Bengal; 24 Parganas, Septagram, Birati, Roy Chowdhary 350B (CAL: Isotype.).

Thallus corticolous, crustose, whitish

grey to glaucous grey, granulose to verruculose and cracked, verrucae distinct towards centre; hypothallus seen as a black delimiting line along the margin and junction of other thalli. Apothecia common, black, sessile to adnate, 0.3—0.8 mm in diam.; margin distinct; disc plane to rarely convex, epruinose. Exciple pale brown to dark brown, \pm cellular, 27-54(-63) μm thick laterally and 45-72 (-90) μm thick at base. Epithecium brown, K—; hymenium 54-90 μm high not inspersed with oil globules; internal stipe dark brown. Asci 8-spored; spores transversely (1-) 3-4-septate, 14-25(-30) \times 5-9 μm , ellipsoid, dark brown, surface ornamented. Thallus K+ yellow with formation of reddish brown crystals, C—, KC—, P+ deep yellow to orange red.

TLC—Atranorin and norstictic acid.

The taxon *D. lauricassiae* is closely related to *D. proximum*, *D. triphragmium* (Nyl.) Szat. and *D. triphragmioides* (Anzi) Szat. which however are distinguished as follows:

In *D. proximum* exciple is brownish black and thallus lacks norstictic acid. *D. triphragmium* is distinguished by the presence of oil globules in the hymenium and thallus lacks norstictic acid. In *D. triphragmioides* exciple is brown to black and thallus K+ yellow, C+ red and lacks norstictic acid.

The isotype (No. 350B) of *Buellia subramaniyana* Roy Chowdhary was found (unlike what has been stated by Roy Chowdhary 1971) to be K+ P+, spores 1-3-septate, 14-22 \times 5-9 μm and conforming in all respects to *D. lauricassiae* and therefore has been considered as conspecific to the latter.

Specimens examined—Assam: North Lakhimpur cinnatoriah, Mehrotra 8084 A (AWAS). West Bengal: 24 Parganas; Septagram Birati, Roy Chowdhary 350 B (isotype of *Buellia subramaniyana*) and 366 (CAL); Chougde, Roy Chowdhary 1409, 1429 (CAL); Calcutta 866 Kurz s.n. (H-NYL 10278) annotated as *Lecidea triphragmia* NYL, and reported so by Nylander (1867, p. 5). Thus *D. triphragmium* does not occur in India as this lone specimen belongs to *D. lauricassiae*. Sri Lanka (Ceylon) Perudeniya 1879, Almquist s. n. (H-NYL 10272) annotated as *Lecidea triphragmia* Nyl.

7. *Diplotomma manipurens* (Singh & Singh) Singh & Singh *Bull. bot. Surv. India*, 26 (1&2): 62-64 (1984).

—*Buellia manipurensis* Singh & Singh, *Geophytology*, **12** (1) : 128-129 (1982).

This species has been reported from Manipur, India by Singh & Singh (1982, 1984). *D. manipurensis* is characterised by saxicolous, K + yellow-red, P + deep yellow thallus and transversely 3-septate, brown, 18-27 (-36) × 7-11 μm spores. It resembles *D. lauricassiae* but the latter is corticolous.

8. *Diplotomma megasporum* Singh & Awasthi sp. nov. (Text-fig. 2: 16-20; Pl. 1, fig. 5)

Thallus corticola (ramulicola), crustaceous, fuscescentus, laevigatus vel rimosus, K + flavus, C—, KC—, P—; hypothallo indistincto. Apothecia atra, 0.3—1 mm diam.; disco plano, epruinoso. Epithecium fuscescentus; hymenium (90-) 135-160 μm altum, haud oleosoinpersum. Asci octospori; sporae submurales vel murales, 30-48 × 16-25 μm.

Type collection—West Bengal: Darjeeling district, Sandakhpoo, alt. ca. 3570m, on twigs, June 15, 1967 D. D. Awasthi and M. R. Agarwal 67.400 (Holotype : LWU).

Thallus corticolous (ramulicolous), crustose, dusty grey, continuous to cracked; hypothallus indistinct. Apothecia black, adnate to sessile 0.3—1 mm in diam.; margin prominent; disc plane, epruinose. Exciple brown to dark-brown, ± cellular, 54-90 μm thick laterally and 90-160 μm thick at base. Epithecium brown, K—; hymenium (90-) 135-160 μm high, not interspersed with oil globules, internal stipe inconspicuous. Asci 8-spored; spores submuriform to muriform with 4-7 transverse and 1-3 longitudinal septa, oblong-ellipsoid, 30-48 × 16-25 μm in size; brown to dark brown, walls much thickened; surface smooth. Thallus K + yellow, C—, KC—, P—.

TLC : Atranorin.

D. megasporum resembles *D. alboatrior* but the latter has smaller (17.5—25.5 × 7.5—13.5 μm) spores. It is similar to *D. himalayense* but the latter possesses norstictic acid in the thallus.

Other specimen examined—Madhya Pradesh: Chhindwara, Sonapipri, 2 km away from Parasia, on bark of *Ficus* tree, Jan. 20, 1980 Upreti & Misra 80.187 B (LWU)

9. *Diplotomma pharcidium* (Ach.) Choisy *Bull. Mens. Soc. Linn. Lyon*, **19**: 156 (1950).

—*Lecanora pharcidia* Ach., *Synop. Lich*: 147 (1814)

—*Lecidea parasema* v. *athroa* Ach., *Method. Lich*: 36 (1803)

—*Diplotomma athroum* (Ach.) Kernst., *Verh. Zool-bot. Gesellsch. Wiess*, **41** : 734 (1891).

This species has been reported from India by Schubert & Klement (1966) as *Diplotomma athroum* but we have not examined any specimen of this species.

10. *Diplotomma proximatium* (Magnusson) Szat. ex-Awasthi & Singh comb. nov. (Text-fig. 1: 1-4; Pl. 1, fig. 6)

—*Buellia proximata* Magnusson, in Magnusson & Zahlbr., *Ark. Bot.* **32A** (2) : 52 (1945); Imsh., *Farlowia* **4** : 501 (1955).

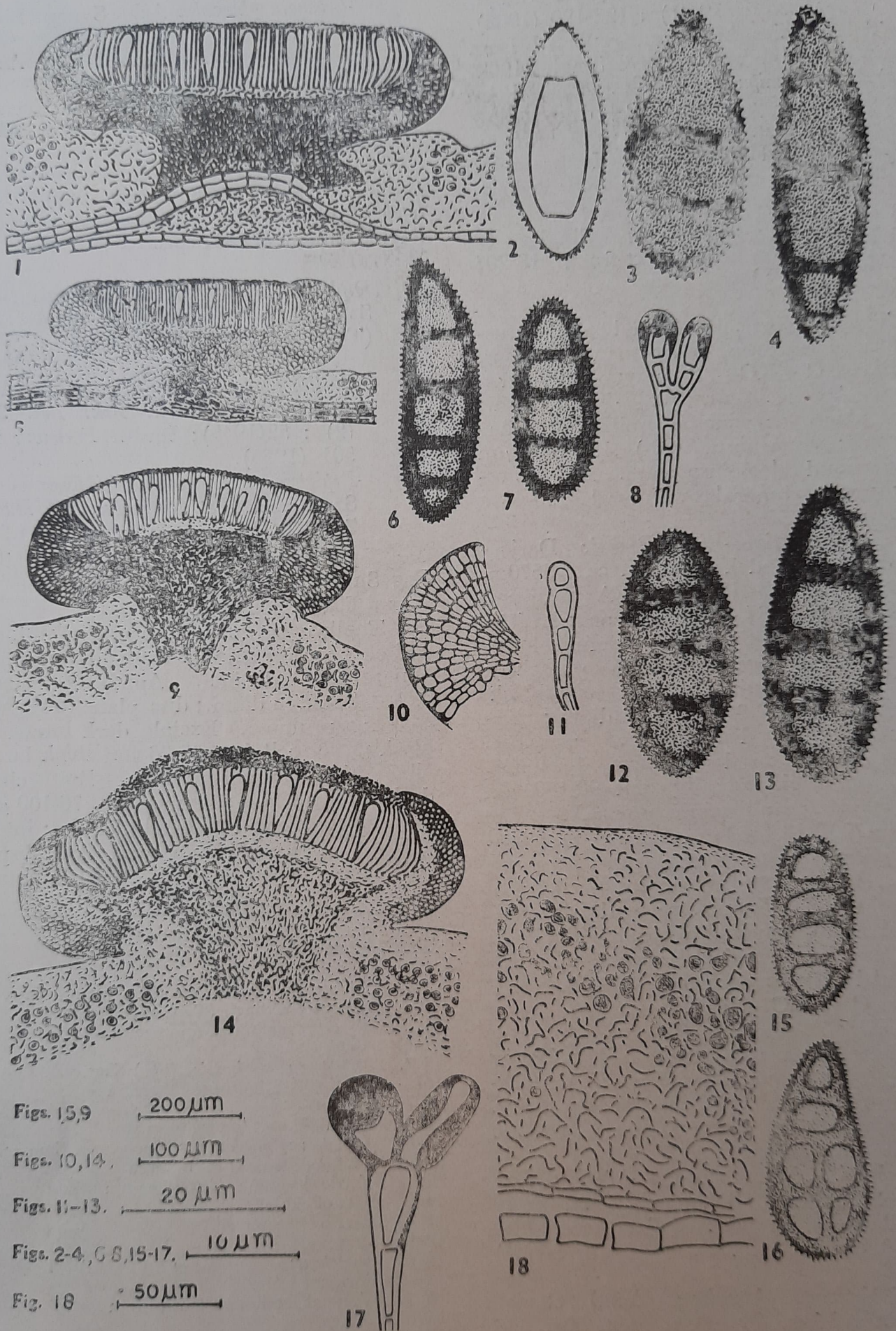
—*Diplotomma proximatium* (Magnusson) Szat., *Ann. Hist. Nat. Mus. Nat. Hung.*, **7** : 278 (1956) nom. inval. (Art. 33).

Type collection: Hawaiian Islands; Hawaiian Bog Survey, 1938, Kokee ca. 1100 m, on Kauai 6023 (Holotype : S!).

Thallus corticolous, crustose, effuse, white to whitish grey, smooth to verrucose; hypothallus indistinct. Apothecia black, 0.5—1.2 mm in diam.; disc plane to slightly convex, epruinose. Exciple dark brown to blackish, ± cellular, 55-76 μm thick laterally and 76-95 μm at base. Epithecium dark brown, K—; hymenium 76-100 μm high, not interspersed with oil globules; internal stipe dark reddish brown. Asci 8-spored; spores mostly 3-septate, but 1-2-septate

Text-figure 1

- 1-4. *Diplotomma proximatium* (Magnusson) Szat. ex Awasthi & Singh (Type specimen)
 1. Vertical section of apothecium
 - 2-4. spores
- 5-8. *Diplotomma lauricassiae* (Fée) Szat.
 5. Vertical section of apothecium
 - 6-7. spores
 8. Terminal part of paraphysis
- 9-13. *Diplotomma geophilum* (Floerke ex Sommerf.) Szat. ex Awasthi & S. Singh
 9. Vertical section of apothecium
 10. part of exciple
 11. part of paraphysis
 - 12-13. spores
- 14-18. *Diplotomma sorediatum* (Tuck.) Singh & Awasthi
 14. Vertical section of apothecium
 - 15-16. spores
 17. part of paraphysis
 18. Vertical section of thallus



Figs. 1, 5, 9 200 μ m
 Figs. 10, 14 100 μ m
 Figs. 11-13 20 μ m
 Figs. 2-4, 6, 8, 15-17 10 μ m
 Fig. 18 50 μ m

Text-figure 1

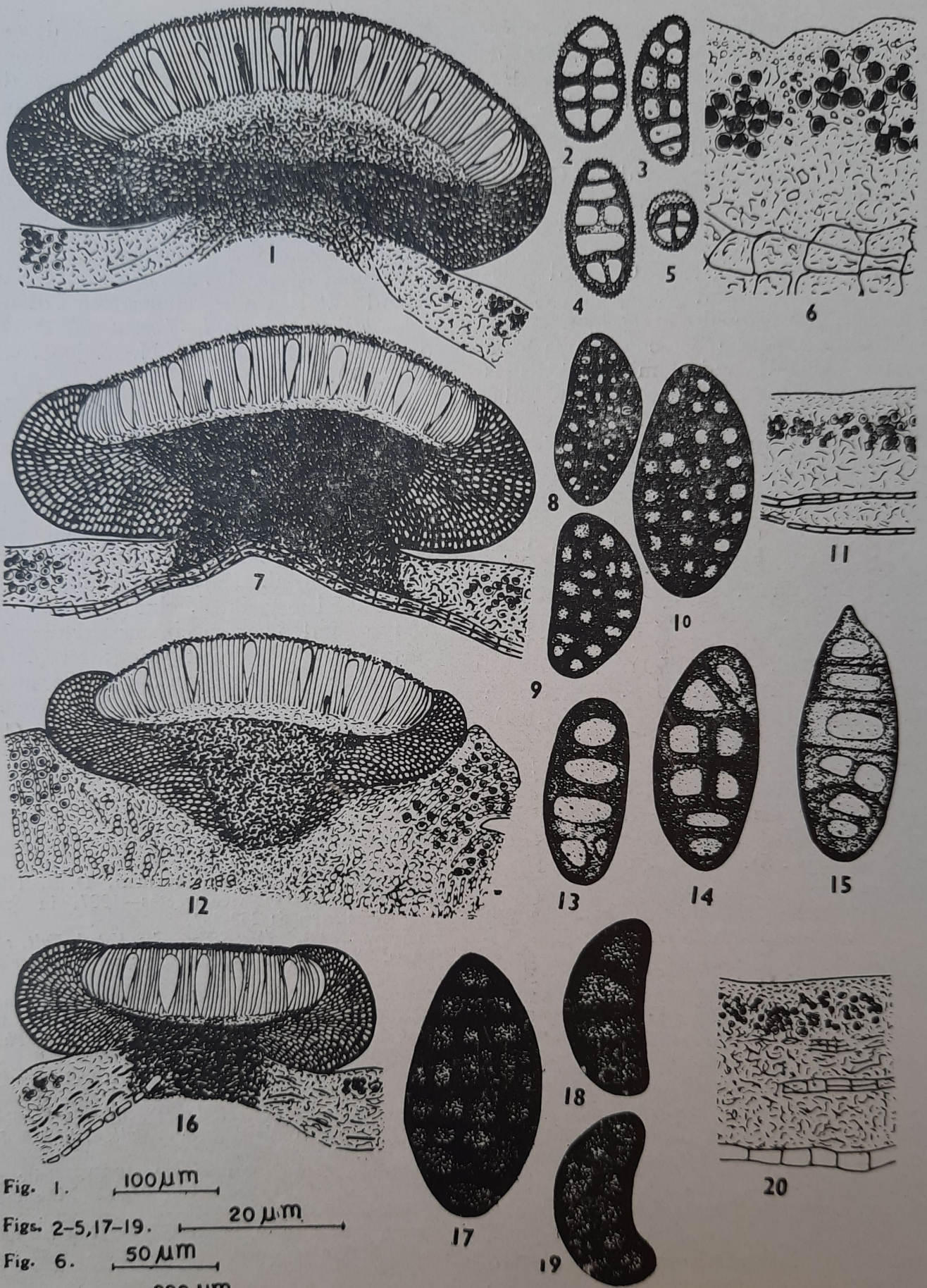


Fig. 1. 100 μm
 Figs. 2-5, 17-19. 20 μm
 Fig. 6. 50 μm
 Figs. 7, 12, 16. 200 μm
 Figs. 8-10. 20 μm

Figs. 11, 20. 100 μm
 Figs. 13-15. 10 μm

or 4-5-septate conditions also present, elongate-ellipsoid, brown, surface ornamented, (15)-19-32 (-36) × 7-12(-14) μm in size. Thallus K+ yellow, C—, KC—, P—.

TLC : Atranorin and an unidentified spot at Rf. class 6. Indian specimens are ± identical in morphology and TLC with type specimen.

D. proximatum is closely related to *D. triphragmioides* and *D. triphragmium*. *D. triphragmioides* is distinguished by C+ red reaction in the thallus and *D. triphragmium* by the presence of oil globules in the hymenium.

This taxon has so far been known from Hawaiian Islands and Jamaica. This is being reported for the first time from India from almost the same latitude.

Specimens examined—Kerala. Idukki, Thenmally Tea Estate area, near Munnar, Awasthi *et al.* 85.244 (LWU). *Madhya Pradesh*. Pachmarhi, Downfall, S. R. Singh 73.107 (LWU); on way to Dhoopgarh road, S. R. Singh 73.161 (LWU); Shahdol, Jwaleshwar, 12 km from Amarkantak, Upreti & Misra 80.546 (LWU). *Tamil Nadu*. Palni hills, Kodaikanal, near pillar rocks, Awasthi & Singh 70.237, 70.248B (LWU); Nilgiri hills, on way from Kodanad to Kilkotagiri, in Shola, Awasthi & Singh 71.70 (LWU); Pykara forest near Pykara, in Shola, Awasthi & Singh 71.231 (LWU); on way from Naduvattam to Gudlur, K. P. Singh 73.634 (LWU). *Hawaiian Islands*. Hawaiian Bog survey, 1938, Kokee, ca. 1100 m, on Kauai, 6023 (Holotype. S).

11. *Diplotomma sorediatum* (Tuck.) Singh & Awasthi comb. nov. (Text-fig. 1: 14-18).

—*Buellia parasema* v. *triphragmia* f. *sorediata* Tuck., *Gener. Lich.*: 187 (1872) (Type not seen).

—*Buellia sorediata* (Tuck.) Magnusson, *Ark. Bot.* 3 (10): 374 (1855).

—*Buellia parasema* f. *sorediata* Zahlbr., *Cat. lich. univ.* 7: 475 (1931).

Thallus corticolous, crustose, dusty grey, sorediate; soralia crumpled to crateriform; hypothallus absent. Apothecia black, immersed to adnate, 0.3–0.8 mm in diam.; disc plane to strongly convex, epruinose. Exciple dark brown on outer side and pallid on inner side, 18-27 μm thick laterally, and 27-36 μm at base. Epithecium brown; hymenium 72-99 μm high, not interspersed with oil globules; internal stipe reddish

brown to dark brown. Asci 8-spored; spores either transversely 3-septate or sub-muriform with 3 transverse and 1 longitudinal septa, 11-18 × 5-9 μm in size; surface ornamented. Thallus K—, C—, KC—, P—.

TLC: no lichen product.

D. sorediatum is easily distinguished from its related taxa *D. alboatrio* and *D. alboatrum* by sorediate thallus.

This taxon has so far been known from Nicaragua (type locality) and Hawaiian Island. It is a new report from India.

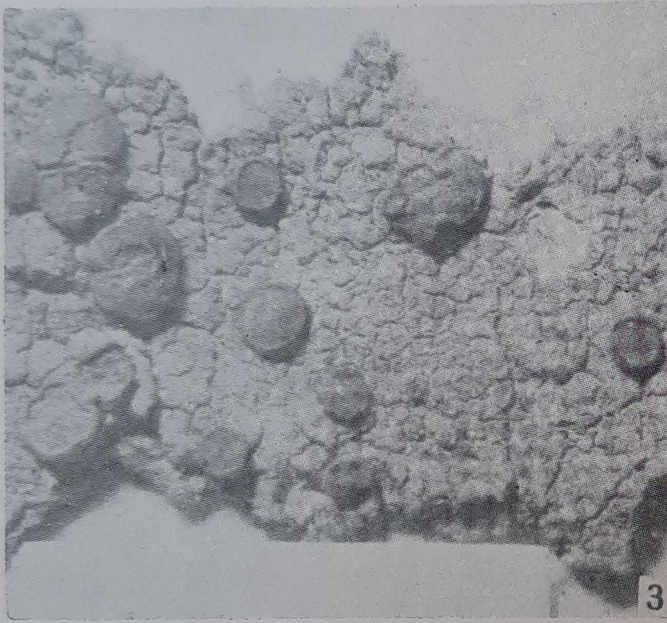
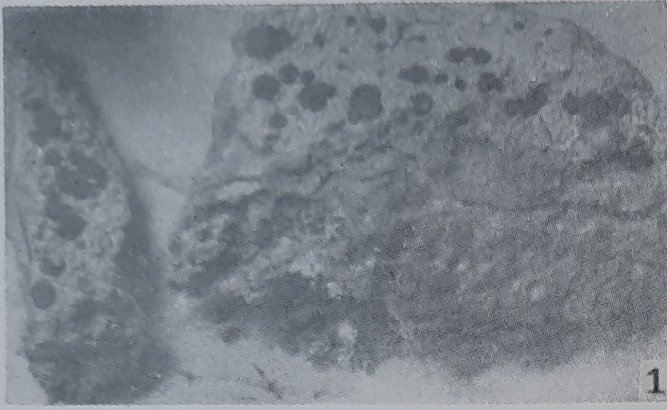
Specimen examined—Jammu & Kashmir. on way to Gulmarg, P. N. Mujoo 70.111 (AWAS.).

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Text-figure 2

- 1-6. *Diplotomma alboatrior* ((Nyl) Szat. ex Awasthi & Singh
 1. Vertical Section of apothecium
 2-5. spores
 6. Vertical Section of thallus
 7-11. *Diplotomma himalayense* Singh & Awasthi
 (Type specimen)
 7. Vertical Section of apothecium
 8-10. spores
 11. Vertical Section of thallus
 12-15. *Diplotomma alboatrum* (Hoffm.) Flotow.
 12. Vertical Section of apothecium
 13-15. spores
 16-20. *Diplotomma megasporum* Singh & Awasthi
 (Type specimen)
 16. Vertical Section of apothecium
 17-19. spores
 20. Vertical Section of thallus

Plate 1

1. *Diplotomma alboatrior* (Nyl.) Szat. ex Awasthi & Singh, S. Kurz 167 (Lectotype: H-Nyl. 9514).
 ×4.5
 2. *Diplotomma geophilum* (Floerke ex Sommerf.) Szat. ex Awasthi & Singh, Awasthi 2359 (AWAS). ×4.5
 3. *Diplotomma himalayense* Singh & Awasthi, Awasthi & Agarwal 67.414 (Holotype: LWU) ×5.5
 4. *Diplotomma lauricassiae* (Fée) Szat. Roychowdhary 1429 (GAL) ×5.4
 5. *Diplotomma megasporum* Singh & Awasthi, Awasthi & Agarwal 67.400 (Holotype: LWU) ×6
 6. *Diplotomma proximatum* (Magnusson) Szat. ex Awasthi & Singh, O. Selling 6023 (Holotype: S).
 ×4