

Some species of lichen genera *Dyplolabia* and *Graphis* from Maharashtra, India

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Species diversity of *Dyplolabia* and *Graphis* from Maharashtra is presented. *Graphis nerurensis* and *G. polystriata* are described as new species, while *G. librata*, *G. pyrrocheliodes* and *G. persulcata* are recorded for the first time from Maharashtra, India. *G. librata* is the first report from India. Six species of *Graphis* recorded earlier from Maharashtra have briefly been discussed.

Key-Words—Ascomycetes, Taxonomy, Graphidaceae, Trans-septate ascospores.

INTRODUCTION

SEVENTEEN species of *Dyplolabia* A. Massal. and *Graphis* Adans of the family Graphidaceae are described from Maharashtra. According to Staiger (2002), the genus *Graphis* is characterized by lirellate ascomata, usually elongate, simple or variously branched, rarely short oryzaeform, immersed in thallus or emergent, sessile; exciple totally or partially but distinctly carbonized, labia well developed, convergent, entire or crenate-sulcate; paraphyses simple, not thickened at apices; asci unitunicate; ascospores colourless, 3-many trans-septate, or muriform, locules lentiform, 1+blue violet, while *Dyplolabia* is characterized by completely carbonized exciple, labia with distinct powdery cover containing lecanoric acid (C+ red) and ascospores colourless, trans-septate, or muriform, I- or I+ blue violet.

MATERIAL AND METHOD

Sections of thalli and ascomata were mounted in water, 10% KOH (K), Lugol's solution (I), and lactophenol cotton-blue (LPCB). All measurements were made in water. The iodine reaction of the asci was studied in Lugol's solution after pretreatment with K. The secondary products of the specimens were identified by thin-layer chromatography using methods standardized for lichen products (Culberson & Kristinsson 1970; Culberson 1972; White & James 1985) using the solvent systems benzene-dioxane-acetic acid (180:45:5) and toluene-ethylacetate-formic

acid (139:83:8). All specimens were examined under UV light (365 nm).

TAXONOMIC DESCRIPTION

Dyplolabia afzelii (Ach.) A. Massalango
Pl. 1, Fig. 1.

Neogenea lichenum, 6. 1854. = *Graphis afzelii*
Ach. *Synops. Lich.* p. 85, 1814.

Thallus yellow to pale olivaceous buff to dark brownish tan to gray, smooth, thick. Ascomata white, lirelline, 1-6 mm long and 0.2-0.7 mm broad, mostly simple to occasionally branched or forked, distinctly emergent, straight, curved, flexuose, scattered all over, usually completely covered by a powdery white thalline layer, appearing black only where this layer is rubbed, terminally obtuse. Disc narrow, slit like, not visible in surface view. Exciple entire, present at the base, laterally carbonized, converging at the apical portion, covered by a thick thalline exciple till the top. Epithecium greenish brown to dark brown, 14-28 μ m thick. Paraphyses simple, long, thin, filiform, septate, thickened at the apices. Asci cylindrical, 8 sporate. Ascospores ellipsoidal, always with 3-trans-septate, 14-20 \times 6-8 μ m, I-.

Chemistry : Lecanoric acid present.

Distribution : India (Andaman Islands, Karnataka, Maharashtra, Meghalaya and Nagaland), South America, Australia, Brazil, Cuba, Dominica, Java, Mexico, Peru, Singapore and Sri Lanka.

Remarks: Dyplolabia afzelii, a common pantropical species was earlier reported as *Graphis afzelii* Ach., is unlikely to be confused with any other species, in this family in India by virtue of the presence of lecanoric acid and can be distinguished by its ascomata, with thick, covered by a powdery white thalline layer and laterally, carbonized exciple. *Dyplolabia afzelii*, apparently with broad ecological amplitude, apart from Maharashtra has also been collected from rain forests of Andaman and Nicobar Island, as well as at higher elevations in Meghalaya and Nagaland and also at lower elevation in Karnataka.

Specimens Examined: Maharashtra, Ratnagiri District, Nerur, 16.3.3.1975, A.V. Prabhu, 75.478, 75.479; Nivali Village, 5.12.1974, C.R. Kulkarni, 74.2108 (AMH).

***Dyplolabia* sp.**

Pl. 1, Fig. 2.

The specimen at hand differs from *Dyplolabia afzelii* (Ach). Massal., in having an unknown substance, in addition to lecanoric acid, indicated by distinct yellow spot at Rf 3 (at stitic acid level) on the TLC plate in TEF. The other characters are exactly identical to the species *D. afzelii*.

Although this is a distinct species, we do not wish to describe this as a new species based on a single small specimen and we prefer to keep it as a *Dyplolabia* species in the present treatment.

Specimen Examined: Maharashtra, Ratnagiri District, Nivali Village, Chiplun to Hatkhamba road, 5.12.1974, C.R. Kulkarni, 74.2062 (AHM).

***Graphis ajarekari* Patw. & Kulk.**

Pl. 1, Fig. 3.

Norweg. J. Bot. 26: 45, 1979.

Type: India, Karnataka, Coorg, Khushalnagar, leg. C.R. Kulkarni & M.B. Nagarkar, 74.3281-Holotype-AMH (!).

Thallus glaucous green to olivaceous buff, smooth to warty, thick. Ascomata lirellie,, black, semi-emergent to immersed, simple, rarely dendroidly branched, straight, curved, 0.5-4.0 mm long, with obtuse ends. Disc narrow, slit like. Exciple complete, present below, entire, laterally carbonized, partially covered by thalline exciple. Epithecium indistinct.

Hymenium hyaline, clear, 100-120 μ m high and 150-200 μ m across, I-, KI-. Hypothecium pale yellowish to hyaline, thin. Asci 8 sporate. Ascospores 8-12-trans-septate, (20) 30-40 \times 6-8 μ m, I+ blue.

Chemistry: Constrictic, norstictic, and stictic acids present.

Distribution: India (Karnataka, Kerala, Maharashtra and Tamil Nadu).

Remarks: Graphis ajarekari Patw. & Kulk., was reported to be very close to *G. nigroglauca* Leight., a species from Ceylon, in ascospore size and chemistry but differs in exciple characters and morphology. *G. nigroglauca* has distinctly emergent, black, simple lirellae with indistinct thalline margin and completely carbonized exciple.

The species was collected in moist forest in open places on the road sides.

Specimens Examined: Maharashtra, Ratnagiri District, Nerur, 16.3.1975, P.G. Patwardhan, 75.458; Nivali, 5.12.1974, P.G. Patwardhan, 74.2144. Sindhudurg District, Ajra to Amboli, 7.12.1974, P.G. Patwardha, 74.2256 (AMH).

***Graphis guimarana* Vain.**

Pl. 1, Fig. 4.

Ann. Acad. Sci. Fenn. Ser. A. 15(6): 248, 1921.

Thallus buff, smooth, cracked, moderately thick, surrounded by thin black hypothallus. Ascomata lirelline, 0.5-8 mm long and 0.1-0.2 mm broad, simple to profusely branched, flexuose, immersed to semi emergent, uniformly spread all over the thallus, terminally acute. Disc moderately broad, distinctly black, epruinose. Exciple orange brown, smooth, present at the base, converging at the apical portion, laterally carbonized, covered by a thick thalline exciple till the top. Epithecium greenish black, 14-18 m thick. Hymenium hyaline, clear, 53-67 μ m high and 140-210 μ m broad, I-, K/I-. Hypothecium hyaline, 14-25 μ m thick. Paraphyses simple, septate, thickened and branched at the apices. Asci cylindrical, 8 sporate., Ascospores fusiform to oblong, 8-11-trans-septate, I+ blue, 25-50 \times 7-10 μ m.

Chemistry: Constrictic (trace) and norstictic acids present.

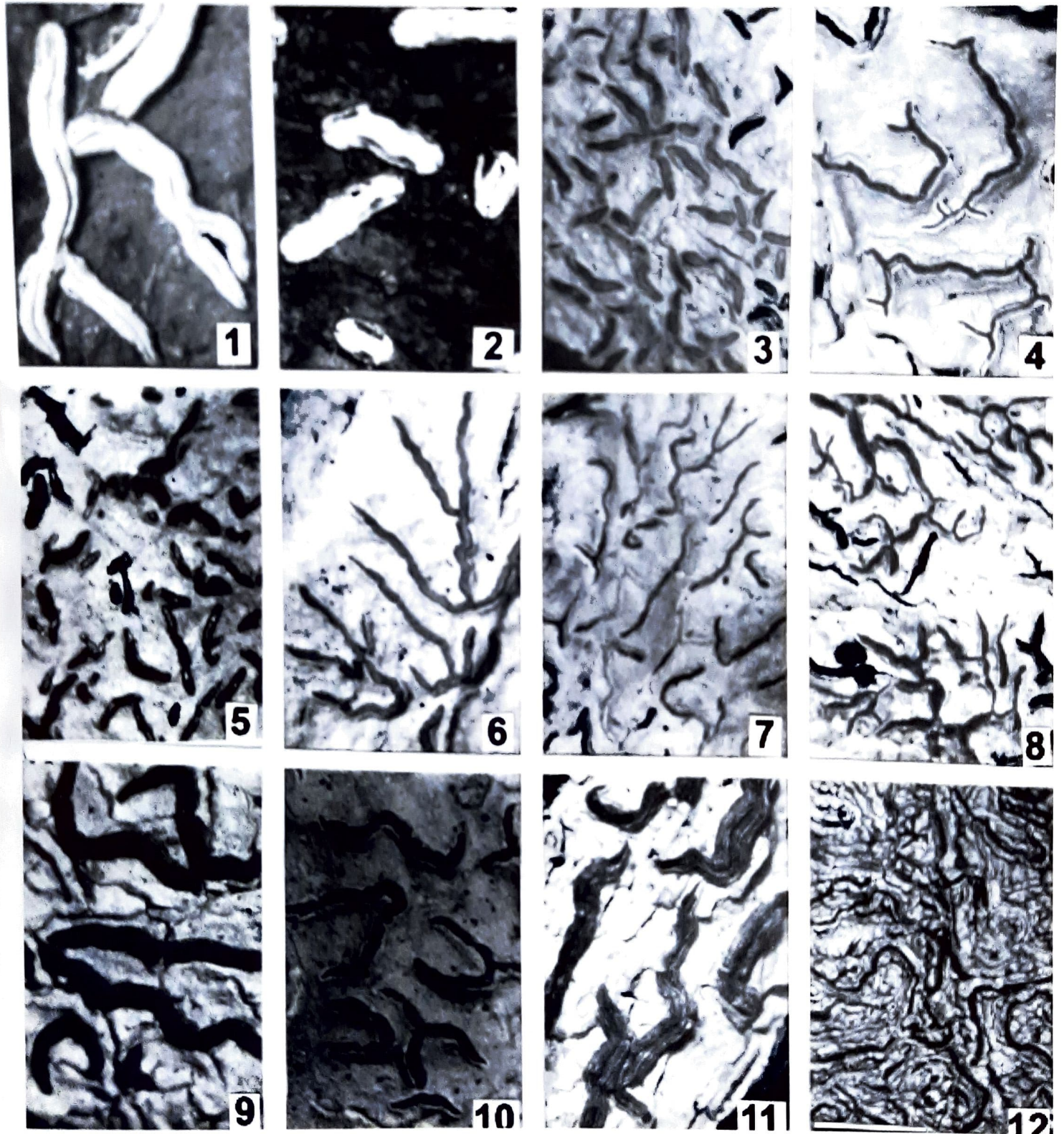


PLATE-1

Figures: 1-12, Habit

1. *Dyptolabia afzeli*, 75.478 - AMH 2. *Dyptolabia* sp., 74.2062 - AMH 3. *Graphis ajarekarii*, 74.2256 - AMH 4. *Graphis guimaraana*, 74.1993 - AMH 5. *Graphis librata*, 74.2042 - AMH 6. *Graphis modesta*, 75.494 - AMH 7. *Graphis nerurensis*, 75.489 - AMH 8. *Graphis persulcata*, 74.1387 - Holotype-AMH 9. *Graphis polystriata*, 00.278-Holotype - AMH 10. *Graphis pyrrocheiloides*, 74.1992 - AMH 11. *Graphis schizograpta*, 74.2116 - AMH 12. *Graphis vittata*, 00.476 - AMH

Scale: bar = 2 mm

Distribution: India (Karnataka, Maharashtra, Tamil Nadu) and Philippines.

Remarks: *Graphis guimarara* Vain. resembles *G. exalbata* Nyl. in ascospore size, exciple nature and chemistry. But *G. exalbata* has immersed and almost concolorous lirellae and is a saxicolous species. Externally similar *G. persicina* Meyen & Flot., a species from Philippines, however, has no lichen substances in its thallus.

The species was collected in semi-evergreen forest in open places on the road sides.

Specimens Examined: Maharashtra, Raigad District, Hirdoshi, 4.12.1979, C.R. Kulkarni, 74.1979; Karnala forest, 28.8.1974, M.B. Nagarkar & A.V. Prabhu, 74.610; Warandha ghat, 4.12.1974, C.R. Kulkarni, 74.1952, 74.1969. Ratnagiri District, Dabhole ghat, 5.12.1974, M.B. Nagarkar & A.V. Prabhu 74.1993 (AMH).

***Graphis librata* Knight**

Pl. 1, Fig. 5.

Trans. & Proc. New Zealand Instit., 16: 404, 1884.

Thallus continuous, rough, smooth to plicate or wrinkled, buff to greenish brown, thick, delimited by black hypothallus. Ascomata round to lirelline, short, 0.1-2.5 mm long and 0.1-0.2 mm broad, simple, semi-emergent, straight to curved, crowded, black, terminally obtuse. Disc narrow to broad, brown to blackish brown, epruinose. Exciple entire, black, present at the base, and converging at the apical portion, laterally carbonized, covered by a thin thalline exciple till the top. Epithecium blackish-brown, 11-21 m thick. Hymenium hyaline, interspersed with oil globules, 49-70 m high and 95-193 µm broad, I-, K/I-. Hypothecium hyaline, 11-14 µm thick. Paraphyses simple, long thin, filiform, septate, thickened at the tips and surrounded by oil globules. Asci cylindrico-clavate to cylindrical, 4-8 sporate. Ascospores fusiform to oblong, 3-10-trans-septate, 17-42 × 5-9 µm, I+ blue.

Chemistry: Constrictic and norstictic acids present.

Distribution: India (Maharashtra), Dominica,

Guadeloupe and New Zealand.

Remarks: *Graphis librata* is very closely related to *G. leptocarpa* Fee in all morphological and anatomical characters, but *G. leptocarpa* has stictic acid in its thallus. The species has been collected in coastal areas and in the semi-evergreen forests in open places of Maharashtra and is being reported for the first time from India.

Specimens Examined: Maharashtra, Bombay, Tulsi lake, 5.6.1974, J.G. Vaidya, 74.106. Raigad District, Warandha, Bhore to Mahad Road, 4.12.1970, A.V. Prabhu, 74.1970. Ratnagiri District, Dabhole Ghat, 5.12.1974, A. V. Prabhu & M.B. Nagarkar, 74.2042. Nerur, 16.3.1975. A.V. Prabhu, 75.449, 75.450; Nivali village, Chiplun to Hatkhamba Road, 5.12.1974, C. R. Kulkarni, 74.2129, 74.2130, 74.2132, 74.2136, 74.2142, 74.2147 (AMH).

***Graphis modesta* Zahlbr. apud Rechinger**

Pl. 1, Fig. 6.

In Denkschrift. Math.-naturw. KI. Akad. Viss. Wien. 88: 19, 1911.

Thallus glaucous gray to olivaceous, smooth, thick. Ascomata lirelline, black, semiemergent to emergent, simple, curved, flexuose, 1-8 mm long, obtuse ends. Thalline margin distinct, concolorous. Disc narrow, slit like to slightly broad, black pruinose. Exciple entire, present at the base, laterally carbonized, convergent, covered by thalline exciple till top. Epithecium indistinct, hyaline. Hymenium hyaline, clear, 80-90 m high and 100-130 m broad, I-, K/I-. Hypothecium thin, hyaline to pale yellowish. Asci cylindrical, 8 sporate, 70-80 × 8-10 µm. Ascospores 5-8 transeptate, 20-38 × 5-8 µm, I+ blue.

Chemistry: Constrictic and stictic acids present.

Distribution: India (Andaman & Nicobar Islands and Maharashtra) and Bougainville Island.

Remarks: *Graphis modesta* seems to be rare in Maharashtra.

Specimens Examined: Maharashtra, near Sawantwadi, 16.3.1975, A.V. Prabhu, 75.494 (AMH).

***Graphis nerurensis* sp. nov.**

Pl. 1, Fig. 7.

Thallus saxocolus, pallide cinereus, Ascomatia lirellata, disco pruinoso, excipulum carbonisatum, Genatis. Ascosporae 7-10 septis Transversalibus, 30-45 × 7-8 µm.

Type: India, Maharashtra, Nerur, 16.3.1975, A.V. Prabhu, 75.489-Holotype (AMH). Similis *Graphis exalbata* Nyl., sed habito corticolo differt

Thallus whitish gray, finely cracked, smooth to uneven, moderately thick, surrounded by thin, black hypothallus. Ascomata lirelline, 0.5-6 mm long and 0.1-0.2 mm broad, simple to dendroidly branched, immersed to semi-emergent, all over the thallus, concolorous, terminally acute. Disc narrow, slit like, blackish, covered with white pruina, not visible with naked eye. Exciple smooth, present at the base, and converging at the apical portion, entire, crenate to 2-4 striate, carbonized at the tips, covered by a thick thalline exciple till the top. Epithecium brown, 10-18 µm thick. Hymenium hyaline, clear, 70-98 µm high and 105-122 µm broad, I-, K/I-. Hypothecium hyaline to yellowish 14-21 µm thick. Paraphyses simple, septate, unbranched. Asci cylindrical, 4-8 sporate. Ascospores fusiform-oblong, hyaline, with 7-11-trans-septate, 21-49 × 5-10 µm, I+ blue.

Chemistry: Consalazinic, constictic, con-norstictic and norstictic acids present.

Distribution: India (Maharashtra).

Remarks: *Graphis nerurensis* is identical in all morphological and anatomical characters with *G. exalbata* Nyl. which, however, is saxicolous. The species was previously recorded as *G. exalbata* (Patw. & Kulk., 1976). The species has been collected in the semi-evergreen forests in open places.

Specimens Examined: Maharashtra, Ratnagiri District, Nerur, 16.3.1975, A.V. Prabhu, 75.451, 75.452, 75.463, 75.488, 75.489, 75.504 (AMH).

***Graphis persulcata* Strirton**

Pl. 1, Fig. 8.

Proc. Roy. Philos. Soc. Glassgow **11**: 315, 1879.

Type: India, Nilgiris, leg. A. Watt-Lectotype (BM)!

Thallus olivaceous buff to citrine green, thick. Ascomata lirelline, black, semi-emergent to distinctly emergent, 0.5-3 mm long, mostly simple, occasionally branched, terminally acute to subacute. Disc narrow, black, epruinose, Exciple striate, complete, present below, 3-4 striae on each side of the exciple, completely carbonized covered by a thin thalline exciple till the top. Epithecium indistinct. Hymenium hyaline, clear, 90-100 µm high and 100-130 µm broad. Hypothecium thin, hyaline to yellowish, I-, K/I-. Asci 8 sporate. Ascospores 7-10 trans-septate, 30-45 × 7-8 µm, I+ blue.

Chemistry: No lichen substances present.

Distribution: India (Karnataka, Kerala, Maharashtra and Tamil Nadu) and Australia.

Remarks: *Graphis persulcata* is one of the few examples of Australia-Asia disjunct distribution. The species is rare in Maharashtra and collected only once at Amboli, a place which gets heavy rains in monsoon.

Specimen Examined: Maharashtra, Sindhudurg District, Amboli, 18.10.1974, A.V. Prabhu & C.R. Kulkarni, 74.1387 (AMH).

***Graphis polystriata* sp. nov.**

Pl. 1, Fig. 9.

Thallus corticolous, albide cinereus. Ascomatia lirellata, disco epruinoso, excipulum carbonisatum, 2-13 crenatis, Ascosporae 3-24 septis transversalibus, 25-109 × 4-8 µm, I-.

Similis *G. patwardhanii* Kulk., sed thallo non isidiato differt.

Type: India, Maharashtra State, on the way to Phonda from Radhanagari, 12.10.2000, U.V. Makhija & V.A. Mantri, 00.278-Holotype (AMH).

Thallus corticolous, crustose, whitish-grey to greenish-grey, smooth, cracked with age, delimited by a black hypothalloidal region at the periphery; epiphloeodal part of the thallus 0.1-0.5 mm thick. Ascomata lirelline, semi-emergent, black, straight to curved, with ends acute, mostly simple, rarely branched, 0.1-7 mm long and 0.1-0.5 mm broad, terminally acute. Disc black, narrow slit-like, epruinose. Exciple distinctly striate, with 2-13 striae on each side, partially to

completely carbonized. Hymenium hyaline, 70-122 μm tall, m broad. Hypothecium hyaline, 1-30 μm thick. Paraphyses simple long, slender, branched at apices, with colourless or brown apical cell. Periphyses absent. Asci cylindrical, unitunicate. Ascospores 4-8/ ascus, hyaline, oblong, 3-24-septate, with one end acute, 25-109 \times 4-8 μm , I-.

Chemistry: No lichen substance present.

Distribution: India (Maharashtra).

Remarks: *Graphis polystriata* is distinguished by its black, mostly simple, raised ascomata; almost always completely carbonized exciple with 2-13 striae on each side, and many trans-septate, large, ascospores of 25-109 \times 4-8 μm .

The new species *Graphis polystriata* is closely related to the *Graphis patwardhanii* Kulk. (Holotype-AMH is seen), a species from India in respect of the overall morphology of the ascomata and the ascospores, which, however, differs from the new species in having isidiate thallus.

Graphis polystriata is restricted in Maharashtra and frequently collected on the road sides.

Specimens examined: Maharashtra Kolhapur District, Panhala, near Guest House, U.V. Makhija & B.C. Behera 00.479, 00.480. Pune district, Bhimashankar, 10.10.1974, P.G. Patwardhan & P.D. Badhe, 74.28, 74.57; Dongarwadi, K.R. Randive & V. A. Mantri 00.130, 00.133, 00.135; Sinhagad, 19.10.2000, U.V. Makhija & B. A. Adawadkar, 00.51. Sarata District, Ajinkyatara, 5.10.2001, U.V. Makhija & G. S. Chitale, 01.88; Kas Lake, 5.10.2001, B.A. Adawadkar & G.S. Chitale, 01.78, 01.79, 01.80, 01.81; 5.10.2001, B.C. Behera & B.A. Adawadkar, 01.82, 01.83, 01.84; Mahabaleshwar, 10.10.1970, P. G. Patwardhan & P. D. Badhe, 70.82; 13.2.1972, A. V. Sathe 72.5; Arther Seat, 27.11.1974, A. V. Prabhu & M. B. Nagarkar, 74.1742, 74.1753, 74.1777; Lodwick Point Road, 28.12.1974, M.B. Nagarkar & A.V. Prabhu 74.1863, 74.1870, 74.1870, 74.1874, 74.1885, 74.1899, 74.1920; Tiger Path, 8.3.1974, M. B. Nagarkar 74.25, 74.51, 74.53; Panchgani, 25.9.2001, G. S. Chitale, 01.38. Sindhudurg District, Amboli, 18.10.1974, A.V. Prabhu & C. R. Kulkarni, 74.1396, 74.1403, 74.1404, 74.1406, 74.1436, 74.1439, Harinyakeshi, A.V. Prabhu & C. R.

Kulkarni, 74.2387; On the way to Ajra from Amboli, 10.10.2000, U.V. Makhija & B.A. Adawadkar, 00.170, 00.185, 00.186, 00.208; On the way to Phonda from radhanagari, 12.10.2000, U.V. Makhija & V.A. Mantri, 00.267, 00.268, 00.274, 00.271, 00.276; On the way to Kasal from sawantwadi, 11.10.2000, U.V. Makhija & B.C. Behera, 00.257; On the way to Vaibhavwadi from Phonda, 12.10.2000, B.A. Adawadkar & K.R. Randive, 00.329; Matheran, 13.9.1970; P.G. Patwardhan 70.44 (AMH).

Graphis pyrrocheiloides (Vain.) Zahlbr.

Cat. Lich. Univ. 2: 321, 1924. = *Graphis pyrrochelia* Vain. *Hedwigia* 66: 179, 1907.

Pl. 1, Fig. 10.

Thallus brownish gray to greenish gray, thick, smooth to distinctly and finely cracked, surrounded by thin, black hypothallus. Ascomata lirelline to round, concolorous, 0.5-6 mm long and 0.4 mm broad, simple to rarely branched, immersed, flush with the thallus, flexuous, scattered, terminally obtuse. Disc broad, blackish to chestnut red, 0.25-0.6 mm broad, epruinose. Exciple entire, present at the base or sometimes absent, converging to moderately divergent at the apical portion, laterally carbonized, covered by a crystal studded, thick thalline exciple till the top. Epithecium brown to blackish-brown, 17-28 m thick. Hymenium hyaline, clear 87-116 m high and 175-350 m broad, I-, K/I-. Hypothecium yellowish to colourless, 17-70 μm thick. Paraphyses simple, long, thin, filiform, septate, thickened at the apices. Asci cylindrical, 2-8 sporate. Ascospores fusiform-oblong, 8-16-trans-septate, 18-67 \times 5-11 μm , I+ blue.

Chemistry: Norstictic acid present.

Distribution: India (Eastern Himalaya and Maharashtra) and Siam.

Remarks: *Graphis pyrrocheiloides* is close to *Graphis inamoena* Zahlbr., in respect of anatomy, ascospore size and chemistry. However, it has laterally carbonized exciple. *Graphis inamoena* has carbonization only at the tip.

The species is associated with *Pertusaria*, collected in the semi-evergreen forests in open places.

Specimens Examined: Maharashtra, Pune District, Bhimashankar, 17.9.1997, B.A. Adawadkar, 97.14,

97.17. Ratnagiri District, Dabhole ghat, 5.12.1974, A.V. Prabhu & M.B. Nagarkar, 74.1992; Ganpati Pule, 5.2.1974, P. G. Patwardhan, 74.2045. Kolhapur District, Vishalgad, 6.12.1974, C.R. Kulkarni, 74.2207 (AMH).

***Graphis schizograpta* Müll. Arg.**

Flora 65: 335, 1882.

Pl. 1, Fig. 11.

Thallus off white, smooth to rough, continuous, cracked, flaking away, surrounded by thin, black hypothallus. Ascomata lirelline, 0.5-5 mm long and 0.1-0.2 mm broad, simple to rarely branched, immersed to semi-emergent, irregularly curved, flexuose, scattered all over, black, acute ends. Disc fissurine to moderately narrow, blackish brown when visible, pruinose. Exciple black, indistinctly present at the base, 2-4 (6) striate, covered by a thick thalline exciple till the top, striae separated by thalline exciple, completely carbonized, and converging at the apical portion. Epithecium not clearly seen. Hymenium hyaline, clear 53-70 μm high and 80-88 μm broad, I-, K/I-. Hypothecium thin, hyaline, 11-18 μm thick. Paraphyses simple, long, thin, septate, brown, capitate at the tips. Asci cylindrical to cylindrico-clavate, 8 sporate. Ascospores fusiform, 6-9(-12)-trans-septate, 21-35 (-46) \times 5-7 μm , I+ blue.

Chemistry: No lichen substances present.

Distribution: India (Karnataka, Kerala, Maharashtra and Nagaland) and Java.

Remarks: *Graphis schizograpta* was previously reported from Khandala (Maharashtra) by Müll. Arg. 1882). The exciple of this species was reported to be absent at the base in the protologue.

Number of specimens of this species have been examined by us which have been collected from Maharashtra and other places in India (not listed here) and found to have completely carbonized exciple. We have not seen the type of this species but we have the photograph of the type of *G. schizograpta* together with Dr. Hale's observations which, however, shows the multistriate, completely carbonized exciple. Therefore we are keeping our specimen in this species.

The specimen was annotated by Patwardhan & Kulkarni (1976) as *G. persicina* May & Flot.

The species was collected in the semi-evergreen forests in open places.

Specimens Examined: Maharashtra Ratnagiri District, Nivali village, Chiplun to Hatkhamba Road, 5.12.1975, A.V. Prabhu & M.B. Nagarkar, 74.2116 (AMH).

***Graphis vittata* Vainio**

Ann. Acad. Sci. Fenn., Ser. A. 15(6): 243, 1921

Pl. 1, Fig. 12.

Thallus continuous, cracked, grayish-green, smooth to uneven, moderately thick, pruinose, surrounded by thin, black hypothallus. Ascomata lirelline, 0.5-4 mm long and 0.1-0.2 mm broad, simple to branched, semi-emergent, uniformly spread all over the thallus, straight to curved, black, terminally acute. Disc narrow, fissurine, black, pruinose. Exciple entire or 2-4 striate, laterally carbonized, absent at the base, converging at the apical portion, covered by a thin, concolourous, overarching thalline exciple, studded with crystals. Epithecium blackish brown to brown 7-16 μm thick. Hymenium hyaline, clear, 74-77 μm high and 92-120 μm broad, I-, K/I-. Hypothecium hyaline, 14-32 μm thick. Paraphyses simple, septate, unbranched, thickened at the apices. Asci cylindrical, 8 sporate. Ascospores fusiform-oblong, hyaline, with 7-9-trans-septate, 21-39 \times 4-7 μm , I+ blue.

Chemistry: Stictic, constictic (trace) acids present.

Distribution: India (Maharashtra) and Java.

Remarks: *Graphis stenotera* Vainio is similar to *Graphis vittata* in all respects except that it contains thallus containing stictic and norstictic acids. *G. persulcata* Stirton is also comparable with *G. vittata* which does not have any lichen substance. The species was collected on the bark of *Mangifera indica* in moist area.

Specimens Examined: Maharashtra, Kolhapur District, Panhala, near Guest House, 13.10.2000, U.V. Makhija & B.A. Adawadkar, 00.476 (AMH).

***Graphis aphanes* Mont. et V.D. Bosch**

Jungh. Plant. Junghuhn. 4: 474, 1855.

Distribution: India (Maharashtra), Java, Japan, Bonin Island and Thailand.

Remarks: *Graphis aphanes* was recorded by Patwardhan and Kulkarni (1976) from Maharashtra. But *Graphis aphanes* has now been placed in *Hemithecium aphanes* (Mont. et V.D. Bosch.) M. Nakan. & Kashiw. (Nakanishi et al., 2003). We have followed the same view.

***Graphis duplicata* Ach.**

Synops. Mehod., Lich. p. 81, 1814.

This species was reported by Müller Arg. (1895) from Nanipur and by Patwardhan & Badhe (1973) from Bhimashankar located in Western Ghats in Maharashtra state. However, neither we have seen the material from Manipur nor we have material in our collection matching to this species and hence not included in the present account.

***G. exalbata* Nyl.**

Lich. Insul. Guinness, p. 28, 1889.

This species was recorded by Patwardhan & Kulkarni (1976) based on corticolous specimens from Maharashtra. However, *Graphis exalbata* is a saxicolous species and hence our specimens can not be placed in this species.

The specimens have now been described under the new species namely *Graphis nerurensis* in the present treatment.

***Graphis nakanishiana* Patw. & Kulk.**

Norweg. J. Bot. 26: 46-47, 1979.

On account of the non carbonized exciple *Graphis nakanishiana* can not be placed in the genus *Graphis*. While describing this species a large number of specimens were kept under this name by Patwardhan & Kulkarni (1979). Careful examination of these specimens has resulted into the segregation of four species which includes *Hemithecium nakanishianum* (Makhija et al.) Patw. & Kulk. and three new species namely *Hemithecium amboliensis*, *H. indicum* and *H. norsticticum*, which have been

described separately by us and excluded from *Graphis* in the present work.

***Graphis persicina* May & Flot.**

Nova Acta Acad. Leopoldin. Carolin. 19: 229, 1843.

The specimen of *Graphis persicina* from Maharashtra (Nivali village, Chiplun to Hatkhamba Road, 74.2116-AMH) has been found to be *Graphis schizograpta* and was wrongly reported previously under this species by Patwardhan & Kulkarni (1976).

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