



GENUS *HYPOXYLON* BULLIARD EX FR. FROM KOLHAPUR DISTRICT

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ABSTRACT:

The genus *Hypoxylon* was proposed by Bulliard in 1791. It belongs to the family Xylariaceae and is stromatic, horizontally spreading, lignicolous and tropical in distribution, recognised by more than 200 species. However, it is a dynamic genus monographed by Miller (1961). He recognised 120 species and varieties. Ju and Rogers (1996) in "A revision of the genus *Hypoxylon*" features 127 species, out of which 112 belong to section *Hypoxylon*. Thind, K. S. and Dargan, J. S. (1980) and Alka Pande (2008) have made a good contribution in India. In the present work 19 species of *Hypoxylon* have been collected, studied and described.

Keywords : *Hypoxylon*, Ascomycota, Taxonomy, Fungi.

INTRODUCTION:

Genus *Hypoxylon* was proposed by Bulliard in 1791. However, the name *Hypoxylon* as commonly understood, is at present untenable and about two dozen genera from 1791 to 1944 have been known in literature as synonyms (Eriksson and D. L. Hawksworth, 1987) with *Sphaeria coccinea* (Bull.) Persoon as a lectotype (Dennis, R. W. G., 1963). It is tropical in distribution and recognised by more than 200 species with horizontally spreading lignicolous stromata. In his monograph, Miller (1961) recognizes 120 species and varieties. Ju and Rogers (1996), in their work 'A revision of the genus *Hypoxylon*', described 127 species, of which 112 belong to section *Hypoxylon*. Genus *Hypoxylon* stands second, next to *Xylaria* by number of known species and is studied well by many mycotaxonomists all over the world. Basic morphological features, supplemented by molecular and chemical studies are nowadays used in systematics as serviceable characters to clear the confusion in understanding. Cultural studies have also been carried out. It is a composite and complex genus and is under segregation. Certain taxa were separated into new

genera viz. *Annulohypoxylon*, *Rostrhypoxylon* etc. to make it more homogeneous.

MATERIAL & METHODS:

Fresh material was collected during rainy season and preserved by drying in oven. Detail structures and microphotography was done using research microscope and routine laboratory techniques. Perispore dehiscence was tested with 10% KOH. Stromatal extractable pigments were studied using 10% KOH. Photography was done using Nikon digital camera. Specimens were deposited in Herbarium Cryptogamae Indiae Orientalis (HCIO) New Delhi, India and accession numbers obtained.

RESULTS & DISCUSSION:

Key to the taxa of genus *Hypoxylon* studied;

1. Ascospores with perispores dehiscent and pigment released in 10% KOH solution2
- 1'. Ascospores with perispores indehiscent and pigment not released in 10 % KOH solution7
- 1". Ascospores with perispores indehiscent but pigments released in 10 % KOH solution14.

2. Pigment released from the strata is orange and ascospores measure 15 x 7.5 μm
.....*H. diatrypoides*
- 2'. Pigment released from the stromata other than orange colour and ascospores smaller
.....3.
3. Pigment released from the stroma yellowish-green and ascospores measure 10 x 5μm.....
.....*H. elevatidiscus*.
- 3'. Pigment released from the stroma purple, violet or purple -brown in shade.....4.
4. Stromata reddish-brown, large; pigment released from the stromata purple – violet, and ascospores measure 15 x 7.5 μm
.....*H. vandervekenii*
- 4'. Stromata small, ascospores large and pigments not as above.....5.
5. Pigment from the stromata purple -brown; ascospores 15 x7.5 μm and stromata smaller 4 - 5 mm in diameter*H. serpens* (Pers.ex Fr.) Kickx var. *microstromati* var. nov.
- 5'. Pigment from the stromata intense purple – violet.....6.
6. Ascospores measure 12.5 (-15) x7.5 μm and not guttulate
.....*H. serpens* (Pers. ex. Fr.) Kickx.
- 6'. Ascospores 10 - 12.5 x 5 - 7.5 μm biguttulate - guttule at each polar end
.....*H. ravidoroseum* Ju *et.al*.
7. Ascospores comparatively larger, more than 25 μm, or up to 37μm.....8.
- 7'. Ascospores comparatively smaller, less than 15μm long11.
8. Stromata comparatively large, separate and zonate ascospores 30 -35.5 x (5-)7.5
.....*H. umbilicatum*
- 8'. Stromata comparatively smaller..... 9.
9. Ascospores rather smaller, 25 – 30 X 7.5 – 10 μm but with a large central guttule.....
.....*H. regale* Morgan var. *macrospora* Miller
- 9'. There exist two forms: sterile and fertile in nature10.
10. Fertile form in which ascospores measured 30-35.5 x 12.5-10 μm to 40 μm long
.....*H. pynaertii*
- 10'. Ascospores which are variable in shape elliptic-ellipsoid-fusoid, gattulate or eguttulate and slightly smaller, 25-37.5x10-12.5 μm
.....*H. congoense* Sacc. var. *macrospora* var. nov.
11. Stromata smaller, 1-2 mm long and punctuate; ascospores fusiform and uniguttulate, ascospores, 10 -12.5 X 5μm.....
.....*H. submonticulosa* Ju and Rogers var. *minutae* var. nov.
- 11'. Not as above.....12.
12. Stromata elongated erumpent up to 2.5 cm long; ascospores biguttulate, 10-12.5 x 5-7. μm
..... *H. anthocronum* Berk. and Br.
- 12'. Not as above.....13.
13. Stromata lignicolous, crustose, postulate, aggregate, arranged in a linear series, rectangular, elliptic upto 20 mm; ascospores 7.5 -10 (12.5) x 4-5 μm.....
..... *H. submonticulosum*.
- 13'. Stromata corticolous; minute, scattered, crustose, black, linear or orbicular, hard, 3x6mm ; ascospores 10 x5 -6 μm

.....
H. deckmannii.

14. Asci with less than 8 spored i.e. 2, 4, 6, 8 spored; ascospores morphologically two types i.e. dimorphic guttulate and measure 25x15 µm and 35x10 µm

.....*H. deusta* (Hoffm. ex. St. Amon) Grev. var. *dimorphospora* var. nov.

14'. Asci as above spored, but ascospores not dimorphic15.

15. Asci 1, 2, 4, 6 and 8 spored; ascospores 25-37.5 x 10-12.5 µm

.....
H. pynaertii Bres. var. *sterilae* var. nov.

15'. Asci regularly 8-spored16.

16. The pigment released from the stroma is yellowish and ascospores 10x 5 µm

..... *H. hypomiltum*.

16'. Pigment released from the stromata in 10 % KOH solution purple -violet.....17.

17. Ascospores smaller, ellipsoid, uniguttulate and measure 5-10x 2.5 µm

.....
*H. monticulosum*.

17'. Ascospores larger, elliptic-fusiform, 30-35.5 x 7.5 µm

.....*H. vogesianum* Pers. ex. Sacc. var. *macrosporum* Miller.

***H. anthochroum* Berk. and Br., J. Linn. Soc. Bot. 14:122, 1873. Plate I (a), Text Plate I (a, b).**

= *H. albstigmatum* Speg., *An. Soc. Cient. Argent.* **181** (6):271, 1884.

= *H. guarapiense* Speg. *ibid.* **18** (6):272, 1884.

Stromata lignicolous, associated with resupinate polypores, in the cracks of wood;

long, gregarious, parallel, separate, short or long, pubstulate, black lines on the wood, erumpent, wavy, upto 2.5 cm long and 2–5mm broad, crustose, tuberculate, black, shining, smooth; perithecia immersed, globose to oblong, ostiolate, papillae indistinct, 400-500µm in diameter, flesh inferior brown, texture hard; asci cylindrical, long-stipitate, unitunicate, 8-spored, with well developed apical apparatus, stained blue by Melzer's reagent (J + ve), 75 – 100 x 5 – 7.5 µm; ascospores obliquely uniseriate, one - celled, ellipsoid – inaequilateral, biguttulate, smooth, 10 – 12.5 x 5 – 7.5 µm, germ slit not observed. Stromatal granules in 10 % KOH solution produce yellowish pigment; perispores not dehiscent.

Habitat: on dead branches, collected at Kandgaon, Tal – Gagdhinglaj, Dist. Kolhapur, M.S.,India, collected by Dr. Anjali R. Patil and Ketaki P. Patil, 06/09/2014, deposited in Mycological Herbarium, Department of Botany, Rajaram College, Kolhapur, M.S., India RCK-MH/H- H0006, HClO No. – 52127.

Remarks: Miller (1961) in his first monograph on the genus *Hypoxylon* considered *H. anthochroum*, *H. albstigmatum* and *H. guarapiense* as synonyms of *H. rubiginosum* (Pers.) Fries. Hladki and Romero (2009) revised these collections and *H. albstigmatosum* and *H. gurapiense* were considered as synonyms of *H. anthochroum* and not of *H. rubiginosum* (Pers.) Fr., a view shared by Rogers and Ju (1996) based on the nature of stroma (internal) and pigment in KOH solution. Present collection shows

similarity in almost all characters to *H. Anthochroum* viz. indehiscent perispores in KOH solution, yellowish pigment (not yellowish - green) extractable from stromatal granules and ascospore measurements. This species shows similarities with *H. Perforatum* also, except the perithecial ostioles which are not plugged with a white substance. This species has been reported from Argentina and Paraguay on decaying wood and on *Citrus aurantica*. There is no previous record of this species from India and thus a new report to the fungi of India.

***H. congoense* Sacc. var. *macrospora* var. nov. Plate I (b), Text Plate II (a - d).**

Variti congoense simile sedi, ascospori longi, 25 – 37.5 x 7.5 – 12.5 µm; guttulati eguttulati fusiformi et ellipsoidei.

Stromata corticolous and lignicolous, crustose, separate, folded, tuberculate, pitted, zonate, globose, orbicular, lobed, surface folded, wrinkled or umbonate, variable, bluish gray to shades of brown, 2.5 x 3 cm and 7 -3 mm thick, surface smooth, ostioles of perithecia distinct, conical, black with circular rim but lie in depressions; perithecia immersed, oblong – cylindrical, below the thick black crust, 600 x 1100 µm, flesh brown and solid; asci cylindrical, unitunicate, 8 – spored, J + ve, with well developed apical apparatus; ascospores one celled, elliptic – ellipsoid – fusoid, smooth, brown, guttulate to eguttulate, acute apex, obliquely uniseriate, 25 – 37.5 x 7.5 – 12.5 µm. Germ slit not seen.

Habitat: on bark and wood of *Bombax malabaricum* DC. (Bombacaceae) and

Memecylon umbellatum Brum. (Melastomataceae), collected at Kadgaon, Tal. Gagdhinglaj and Patgaon, Tal. Bhudargad, Dist. Kolhapur, M.S., 06/09/2014, collected by Dr. Anjali R. Patil and Ketaki P. Patil, deposited in RCK-MH/H-H0007 and HCIO – 52128.

Remarks: This species was named by P. A. Saccardo who studied the material from Congo and named it after the locality. It is studied by Dennis R. W. G. (1963) who revised the material in 'Flora of Congo' especially sub-family of Xylariaceae viz. Hyphoxylloideae. He suggested that this species is probably same as *H. rubrostromaticum* Miller (1961) reported from Brazil and other countries and not different from *H. vogesiacum*, *H. congoanum* and *H. vanderyst*. It is also one of the same or *H. diatrypeoides* Rehm.

In the present work, four collections were made from different localities in the Western Ghats. They are all identical with some minor differences. Stromata are large, variable and have largest ascospores upto 37.5 µm long. No pigment is produced from the stromata in 10 % KOH solution and perispores indehiscent. *H. vogesianum* Pers. ex Sacc. var. *macrosporum* J. H. Miller, *H. deusta* (Hoffm. ex St. Amans) Grev. var. *dimorphospora* var. nov. and *H. Pynaertii* Bers. var. *sterilae* var. nov. are recorded from the same localities and also have such long ascospores. But all these species produce distinct pigments either purple, violet or yellow in 10 % KOH solution from stromal granules. Thus, a new variety has been raised

based on the longer and broader ascospores produced without any sign of degeneration in the asci viz. *H. congoense* Sacc. var. *macrospora* var. nov. to accommodate the material collected on bark of *Bombax* while other are additional (Isotypes) material.

***H. deusta* (Hoffm. ex St. Amans) Grev. var. *dimorphospora* var. nov. Plate I (c), Text Plate III (a - d).**

Variti *deusta* simile sedi ascospori dimorphi; asci minus squam 8 – spori et ascospori degeneratibus.

Stromata lignicolous, scattered, separate, crustose, irregularly orbicular, tuberculate, folded, striated, punctuate, smooth, greyish – brown, loosely adhered to the substrate, 2 x 3 cm, and 2 mm thick, brittle hard, smooth; perithecia immersed, monostichous, minutely ostiolate, globose to oblong, 400 – 800 µm diameter, interior flesh brown and thick; KOH treatment to the stromal granules- faint yellow pigment liberated; asci cylindrical, stipitate, unitunicate, J + ve with reduced ascal apparatus, 150 – 200 x 7.5 – 10 µm, less than 8 ascospores per ascus i.e. 2, 4, 6, and 8 spored; ascospores one – celled, but of two types- fusiform, non- guttulate which measure 10 – 15 x 5 – 7.5 µm and ellipsoid – equilateral, with rounded ends, 2 – 4 guttulate, 15 -25 x 7.5 - 10 µm; germ slit not observed.

Habitat: on dead wood, Patgaon, Tal. Bhudargad, Dist. Kolhapur, M.S., 06/09/2014, collected by Dr.Anjali R. Patil

and Ketaki P. Patil, deposited in RCK-MH/H- H0008, HClO -52129.

Remarks: This species shows a wide geographical distribution such as Africa, Mauritius, North and South America, Scandinavia, China to Australia, New Zealand and Pacific Island (Dennis, 1963). Dennis (1963) has also provided a long list of synonyms. Tropical collections have often been distinguished as *Ustuta zonata* (Lev.). Saccardo has collected on palms from Java. This species is reported to be wound parasite of *Hevea* in Congo (Staner, 1932).

Present collection agrees in almost all morphological aspects to *H. deusta*, except faulty asci and two types of ascospores. Asci are less than 8-spored, the range observed from 2, 4, 6 and 8 spores per ascus. Ascospores are of two types viz. fusiform, non-guttulate and ellipsoid, guttulate. The stromata are also larger. Fusiform ascospore development found in the present collections and noted elsewhere is due to geographical distribution of the taxa – tropical or temperate. It is said that ascospores formed by taxa in Africa have comparatively smaller spores. On the basis of degenerating nature of ascospores and two forms of ascospores, a new variety viz. *H. deusta* (Hoffm. ex St. Amans) Grev. var. *dimorphospora* var. nov. has been proposed. This feature of asci and progressive sterility having less or fewer ascospores per ascus has been discussed elsewhere - see *H. pynaertii* Bres. var. *sterilae* var. nova. The abortive taxon e.g. *H. marginatum* (Schw.) Berk., which does not

show any trace of perithecia, which is more higher character than the abortive asci – became an evidence of segregation towards sterility (Diehl, W. W., 1937).

***H. diatrypeoides* Rehm, *Ann. Mycol.* 5: 525 – 526, 1917. Plate I (d), Text Plate I (a - d).**

Stromata lignicolous, erumpent – superficial, spreading irregularly, orbicular, solitary, gregarious, crustose with orange – tone, large and ca. 1 - 2 mm thick, smooth, pitted or punctuate due to conical papillate ostioles; perithecia immersed, ostioles umbilicate, globose to sub – globose, 400 – 500 µm in diameter; asci long, stipitate, unitunicate, 8-spored, with prominent cylindrical ascus apparatus, J + ve, 120 – 150 x 7.5 – 10 µm; ascospores one celled, elliptic – fusiform inequilateral, uniseriate – obliquely arranged, ends overlapping, brown, 15 x 7.5 µm; germ slit not seen. Extract of stromatal granules gives orange pigment in 10 % KOH solution and perispores dehiscent in 10 % KOH solution.

Habitat: on bark;

1. Kas, Dist. Satara, M.S., 19/09/2014, 18/01/2016, RCK-MH/H 0009, H0054;
2. Ajara, Tal. Ajara, Dist. Kolhapur, M.S., 05/11/2011, RCK – MH/ H0049, H0047;
3. Amba, Tal. Shahuwadi, Dist. Kolhapur, M.S., 03/08/2014, RCK – MH/ H 0049;
4. Kadgaon, Tal. Gadhinglaj, Dist. Kolhapur, M.S., 06/09/2014, RCK – MH/ H0050;

5. Radhanagari, Tal. Radhanagari, Dist. Kolhapur, M.S., 15/09/2013, RCK–MH/H0051;

6. Kolhapur, Tal. Karvir, Dist. Kolhapur, M.S., 20/09/2014, RCK – MH/ H 0009;

7. Shenawade, Tal. Gaganbawada, Dist. Kolhapur, M.S., 06/09/2015, RCK – MH/ H0034;

8. Patgaon, Tal. Bhudhargad, Dist. Kolhapur, M.S., 10/08/2014, RCK – MH/ H 0038; and HCIO – 52130.

Remarks: This taxon is widespread in its distribution. Stromata show orange tone, producing orange pigment in 10 % KOH solution. Perispores dehiscent in the same. Smooth perispore wall – as per the key by Rogers, J.D. *et.al*, 2012, but the dimensions of ascospores in the present collection are smaller, showing affinity to *H. haematospora*, but stromata not hemispherical and more thicker. It also shows affinities to *H. petriniae* with respect to KOH extractable pigment but ascospores are larger in the present collection. The range of ascospores in the present collection might be as a result of environmental factors or host substrate. For time being, it is referred to *H. diatrypeoides* Rehm. Alaka Pande (2008) has reported this species along with a variety *H. diatrypeoides* Rehm var. *poononsis* Alaka Pande (1974 and 1979) from Kunkeshwar, Dist. Ratnagiri and Pune from Maharashtra state on dead twigs of *Flacourtia* sp. based on smaller ascospores with size 12 – 15 x 6 – 8 µm.

***H. dieckmannii* Theiss. *Ann. Mycol.* 6: 346, 1908. Plate I (e), Text Plate I (a - c).**

Stromata corticolous i.e. on bark, scattered, minute to somewhat moderate in size, crustose, black, linear or orbicular, thin, 3 x 6 mm, rough, distinct, hard and brittle; perithecia immersed below the crust, no pigment granules, thus no extractable pigment in 10 % KOH solution, globose or oblong, 300 – 400 µm diameter, ostioles indistinct; asci cylindrical, unitunicate, 8 – spored, J +ve and 120 – 150 x 5 – 7.5 µm; ascospores obliquely uniseriate, one – celled, smooth, brown, ellipsoid – inequilateral, 10 x 5 – 6 µm, germ slit not observed and indehiscent in 10 % KOH solution.

Habitat: on bark collected at

1. Kas, Dist. Satara, M.S., 19/09/2014, RCK – MH/ H0010;
2. Dasewadi, Tal. Bhudhargad, Dist. Kolhapur, M.S., 10/08/2014, RCK – MH/ H0027;
3. Amba, Tal. Shahuwadi, Dist. Kolhapur, M.S. 03/08/2014, RCK – MH/ H0026;
4. Shenawade, Tal. Gaganbawada, Dist. Kolhapur, M.S., India 06/09/2015, RCK – MH/ H 0025 and HCIO – 52131 collected by Dr. Anjali R. Patil.

Remarks: This species shows wide geographical distribution and is considered as a distinct species (Martin P., 1968) and not related to *H. rubiginosum* complex, as per Miller (1961) who considered it as a small spored variety, due to distinct nature of the ascospores and violet-brown pigmentation. There is a report of a study by Gucht and Veken (1992) from Papua New Guinea and India. Dargan, J. S. (1973) studied the material of this species collected on dead

angiospermic twigs from Asazori (U. P.), however, it is not listed in the 'Fungi of India'. Later Alaka Pande (2008) has described it in the book 'Ascomycetes of Peninsular India'. Present collection matches well in all respects to *H. dieckmannii* Theiss. as per the key provided by Ju and Rogers (2012) for the Xylariaceae taxa from Hawaii Islands. It is a new record to the fungi of the Maharashtra state.

***H. elevatidiscus* Y. M. Ju, J. D. Rogers and Hsieh, *Mycologia* 96 (1): 154 -155, 1996.**

Plate I (f), Text Plate I (a - e).

Stromata effused-pulvinate, spreading irregularly up to 2cm long and 2-5 mm broad and one mm thick, with perithecial mounds, brick-reddish-brown to blackish and 1mm thick with granules extractable pigment in 10% KOH solution greenish – yellow, interior texture dark brown and woody; perithecia immersed, globose, 400-500 µm diameter, ostiolate, higher than the stromatal surface layer, papillate, encircling a truncate disc, disc not clearly observed; asci cylindrical, short-stalked, 8-spored, J +ve, 80-100 x 5 µm; ascospores unicellular, light- brown, smooth, ellipsoid-inequilateral, with narrowly rounded ends, dehiscent in 10% KOH solution, 10 x 5 µm, germ slit not seen.

Habitat: On dead twigs of dicotyledonous plant, collected at

1. Kas, Dist. Satara, M.S., 19/09/2014, RCK – MH/ H0011;
2. Shenawade, Tal. Gaganbawada, Dist. Kolhapur, M.S. RCK – MH/ H0011;

and HCIO – 52132, collected by Dr. Anjali R. Patil.

Remarks: Ju *et.al.* (1996) have collected a material from Taiwan which they found promising when compared to the existing valid species of the genus *Hypoxylon*. They found it quite interesting and raised a new taxon viz. *H. elevatidiscus* sp. nov., which refers to the ostiolar dark surface higher than the disk rims and collected on decorticated wood. Present collection shows some affinity to *H. intermedium* with respect to colour of the surface of stroma - dark brick like and KOH - extractable pigment greenish yellow, but the ascospores in *H. intermedium* are very large 17-22 x 9-11 µm. It also resembles *H. howeianum* w.r.t. ascospores similar to present collection in measurements.

But the present collection agrees in most of the respects to *H. elevatidiscus* Y. M. Ju, J. D. Rogers and Hsieh, except some differences noted, such as stromata and asci smaller in size. This species has not been reported from India and thus, new to the fungi of India.

***H. hypomiltum* Mont., Ann. Sci. Nat. Bot. Ser. 2, 13 : 356, 1840. Plate I (g), Text Plate I (a - b).**

= *H. subgilvum* Berk. and Br., *J. Linn. Soc. Bot.* **14**:120, 1873.

= *H. flendleri* Berk. and Cooke, *Grevillea* **11**:132, 1883.

Stromata spreading, lignicolous, small, linear, effused or irregular in outline, vinaceous brownish-black, smooth or rough, crustose, thin, 5-10mm long; perithecia

innate, sub-globose, 300-400µm in diameter, flesh brownish and solid, rusty-brown granules below and in between the perithecia, KOH extractable pigment yellowish or luteus; asci cylindrical, short, stipitate, unitunicate, 8-spored, with small apical ascus apparatus; blue in iodine solution i.e. J +ve, 60-75 x 7.5 µm; ascospores unitunicate, 1-celled, light to dark brown, smooth, ellipsoid- inequilateral, uni or biguttulate, if one then central and if two then polar, 10 x 5 µm; germ slit not seen.

Habitat: on wood, collected at Kas, Dist. Satara, M.S. 19/09/2014, RCK – MH/H0012, collected by Dr. Anjali R. Patil.

Remarks: This species has been reported from North America on the wood of deciduous trees (Ju and Rogers, 1996). This species is characterised by innate perithecia in effused stroma, with vinaceous shades and KOH extractable pigment yellowish. Present collection agrees in all respects to it, but perispores indehiscent in 10% KOH solution. This North American material shows affinity to *X. hypomilton* Mont. and it is ally of *H. rubiginosum* and fully described by Miller (1961). Cultural studies have been worked out by Rogers, J. D. *et.al* (1987) on the material collected from rain forest of Indonesia.

Sydow, H. and E. J. Butler (1911) have reported this species from Pusa (Bihar) on dead stems of *Zizyphus jujuba* and *Celastrus* sp., Mukerji & Kapoor (1969) reported it on bark of *Mangifera indica* L. from Dehli, Alaka Pande (1975) has reported it from Karnala, Dist. Raigad, Maharashtra and Dargan, J.S. and K.S. Thind (1982) from Dulhousie,

Himachal Pradesh. Dennis, R. W. G. (1963) has also studied this species from Congo and collected it from various localities such as Sierra Leone, Uganda, Kenya, Natal, North Carolina, Brazil, Philippines, Tasmania, Pacific Island – in which ascospores are slightly longer 9-12 (-13) x 4-6 μm .

***H. monticulosum* Mont., Syll. gen. spec. Pl. Crypt., 214, 1856. Plate I (h), Text Plate I (a - d).**

= *H. anthracoderma* Speg., *Ann. Soc. Cient. Argentina* **26** (1): 30, 1888.

Stromata lignicolous, spreading as a definite crust, aplanate, pulvinate, brownish-black, almost a thin crust of spreading, irregular patches, 1.5 x 6cm; perithecia almost superficial on the basal stromatic crust, separate or in groups, black, globose, papillate, indistinct ostioles, thin walled; 200-300 μm in diameter; asci cylindrical, stipitate, 8-spored, unitunicate, J+ve, 75-80 x 5 μm ; ascospores 1-celled, uniseriate, cylindrical-rectangular, 1-guttulate, smooth, brown, 5-6 x 2-2.5 μm , germ slit not observed; extract of the stromal granules in 10% KOH solution producing intense purple pigment before maturation of ascospores and perispores indehiscent in 10% KOH solutions. This is a misleading. This species is classified by Rogers and Ju (2012) under the section: species lacking pigment in 10 % KOH solutions.

Habitat: on decorticated wood, collected at 1. Amba, Tal. Shahuwadi, Dist. Kolhapur, M.S. 27/07/2014, RCK- MH/ H0013;

2. Kas. Dist. Satara, M.S., 19/09/2014, RCK- MH/ H0013, collected by Dr. Anjali R. Patil and Ketaki P. Patil.

Remarks: This taxon is widely distributed in the temperate and tropical parts of the world growing on wide range of substrates. Original species has longer ascospores, 7-11 x 3.5-4.5 μm , while in present collection ascospores are short, otherwise it matches in all other respects quite well and thus, referred to *H. monticulosum* Montagne. This species lacks a carbonaceous stromatal layer enclosing individual perithecia and a thickening on the ascospores perispores (SEM). Due to its smaller ascospores, guttulate nature and shape, it appears a new taxon. It also shows affinity to *H. rectangulospora* Ju. and J. D. Rogers, however it is collected on fallen seeds. There is no record of this species from India and thus, a new record to the fungi of India (N.I.).

***H. pynaertii* Bres., Ann. Mycol. 9: 275, 1911. Plate I (i), Text Plate I (a - d).**

Stromata lignicolous, scattered, orbicular to circular, plane, erumpent, appeared to substrate, thin, black, brittle, roughened by pitted natured of minute ostioles of underlined perithecia showing the definite contour, 1.2cm in diameter., 1-1.2 mm thick; texture hard and crumpling; perithecia immersed, globose, smaller, ostiolate, monostichous, 300 – 500 μm in diameter; flesh brown and hard; asci cylindrical, unitunicate, 8-spored, J + ve, 150-200 x 10-15.05 μm ; ascospores one celled dark brown,

elliptic-inequilateral, smooth, 30-37.5 x 10-12.5 μm ; germ slit not seen. No anamorph known. Stromal tissue treated with 10% KOH solution no pigment produced and perispores indehiscent.

Habitat: on wood, collected at Patgaon, Tal. Bhudhargad, Dist. Kolhapur, M.S., 06/09/2014, collected by Dr. Anjali R. Patil, RCK – MH/ H0014 and HCIO – 52134.

Remarks: This species has been reported from Congo (Africa) on dead bark and characterised by its large ascospores upto 40 μm ; stromata effused, orbicular, applanate, minute and only known from its type locality. Petch reported a species *H. angustatum* considered by Miller (1961) as synonym (Dennis, R. W. G., 1963). Present collection agrees in all respects to this species except stromata which are large. The same type of collection was collected on bark from Bhatachiwadi-Patgaon road (Kolhapur). It is morphologically similar except the asci which show fewer ascospores than 8 per ascus and therefore, a new variety has been proposed viz. *H. pynaertii* Bres. var. *sterilae* var. nov. It appears that there is a tendency in this species to show both- full fertile and sterile forms. This is a rare feature and is known only in a few taxa of the members of the family Xylariaceae viz. *Xylaria*, *Nemania* and *Hypoxylon*, it has been noted and studied in some collections in the present work. This species not reported from India and thus, new to the fungi of India.

***H. pynaertii* Bres. var. *sterilae* var. nov.**
Plate I (j), Text Plate I (a - c).

Variti Pynaertii simile sedi asci minus squam 8 spori et ascospori degenrati.

Stromata corticolous, separate, scattered, circular/round, orbicular, curstose - pulvinatus, hard, punctate, about 1cm in diameter, 1-2 mm thick, surface faint yellowish-brown, and smooth, flesh brown and hard; perithecia immersed, monostichous, minutely ostiolate and papillate, distinct contour of perithecia on surface with conical papillae at the centre; 600-800 μm in diameter; asci cylindrical, stipitate, unitunicate, less than 8 spores; ascospore numbers variable 1, 2, 4, 6 and rarely 8-spored, remaining degenerate and asci filled with gelatinous mass with fatty oil globules, 4-6 spored asci commonly developed, 200-220 x 25-30 μm ; mature ascospores 1-celled, yellowish-brown, elliptical-inequilateral, smooth, 25-37.5 x 10-12.5 μm , germ slit not seen. KOH treatment of stromatal granules produced faint yellow pigment and perispors indehiscent.

Habitat: on the bark, collected by Dr. Anjali R. Patil, collectd at;

1. Bhatachiwadi, Tal. Bhudhargad, Dist – Kolhapur, M.S. 06/09/2014, 10/08/2014, RCK – MH/ H- H0015, H0053;
2. Patgaon Tal. Bhudhargad, Dist – Kolhapur, M.S., RCK – MH/ H- H 0029; and HCIO - 52133

Remarks: This species has been reported from Congo (Africa) which is the type locality. *H. angustatum* Petch reported from Shri Lanka (Ceylon) is a synonym according to Miller, 1961 (Dennis, R. W. G., 1963) Present

collection is quite interesting and matches well morphologically to *H. pynaertii* Bres. This is one of the species amongst the gaint spored species of the genus *Hypoxylon* so far reported. A peculiarity of the present material is, the asci show various number of ascospores from 2-8; the frequency of 4 and 8 spored asci being more. During ascosporeogenesis, there are some genetic changes, as a result, a few spores only reach maturity while others show degeneration and convert into a gelatinous mass with large number of oil globules. Such a tendency is very rare in the Xylariaceae taxa so far known. There is a tendency leading to sterility making a taxon abortive progressively. The following examples are known in literature - the species of *Nemania abortive* J. D. Rogers *et.al.* (2006), *Xylaria mutipartita* Miller, *et. al.*, *X. hypoxylon* (L.) Lev. and *Hypoxylon subannulatum* P. Henn. and Nym. (Gucht *et. al.*, 1992) in which asci having consistently fewer than 8 ascospores per ascus. During the present work, authors have collected about ten such materials belonging to *Nemania* (01), *Xylaria* (05-06) and *Hypoxylon* (03). Present collection differs from *H. pynaertii* in this respect and also larger stromata. This unique feature has been recognised and a new variety has been proposed viz. *H. pynaertii* Bres. var. *sterilae* var. nov. to accommodate the material.

***H. ravidoroseum* Y. M. Ju, Van der Gucht and J. D. Rogers, *Mycotaxon* 55: 547, 1995.**

Plate I (k), Text Plate I (a - c).

Stromata on the bark, single, separate, erumpent, irregularly rectangular, crustose, smooth, rosy-pinkish tone to the stroma and surface roughened due to protruding part of the embedded perithecia in groups with conical -ostiolate papilla and measure 8 x 10 mm, brittle hard texture and inner stroma brown; perithecia almost immersed except the upper part, globose- subglobose, papillate-ostiolate, 300-500µm in diameter; asci long stipitate, unitunicate, 8-spored, with minute globoid apical apparatus, blue by iodine solution (Melzers reagent) J+ve, 150-200 x 7-10 µm; ascospores 1-celled, obliquely uniseriate, biguttulate, elliptic-inequilateral, smooth, brown, 10-12.5 x 5-7.5µm, germ slit not observed. Stromal granular extract in 10% KOH solution produces an intense purple colour and perispores dehiscent in same solution with smooth perispore walls.

Habitat: on Bark, collected at Kas, Dist. Satara, M.S., 21/09/2014, collected by Dr. Anjali R. Patil, RCK- MH/H0016 and HCIO – 52135.

Remarks: Rogers and Van der Gucht (1996) have collected, studied and described this species in their monograph on the material from Hawaii Island and characterised by stromata of various colours -greyish rose to vinaceous; perispores dehiscent and produce intensive purple pigment in 10% KOH solution prior to maturation of ascospores; ascospores measure 5-7 x 2.5 -3.5 µm. Present material matches in all respects except the ascospores are larger and biguttulate and thus, referred to it. There is no report of this species from India (Bilgrami,

K.S., 1991; Jamaluddin *et.al*, 2004 and Alaka Pande, 2008). This makes a new record to the fungi of India (NI).

***H. regale* Morgan var. *macrospora* J. H. Miller, *Mycologia* 25 (4): 321 – 329, 1933.**

Plate I (1), Text Plate I (a - c).

Stromata corticolous, crustose, separate, distinct or spreading, sometimes nodular, smooth, black, 5-25 mm long and thin; perithecia immersed, globose to oblong, ostiolate, ostiole inconspicuous, flesh brown and solid, texture hard; asci cylindrical unitunicate, 8-spored, J +ve, 160-175 x 7.5-10µm; ascospores 1-celled, dark-brown, smooth, uniseriate, slightly oblique, ellipsoid to fusiform, inequilateral, uniguttulate, 25-(-30) x 7.5-10 µm, germ slit not observed. KOH extractable pigment absent and perispore indehiscent.

Habitat: on the bark of unknown dicotyledon, collected Kas, Dist. Satara, M.S., 19/09/2014, , collected by Dr. Anjali R. Patil , RCK- MH/ H0017 and HCIO – 52136.

Remarks: This variety has been reported by Miller from America based on its larger ascospores, 25-40 x 14-20 µm, while *H. regale* Morgan has smaller ascospores upto 20-27 x 10-14 µm, usually 25 x 12 µm. In this regard the present species matches with *H. regale* Morgan but shows larger ascospores that become fusoid as those found in *H. semiimmersum*. However, this species and allied *H. udum* apparently occur only in Europe, while *H. regale* Morgan and *H. regale* Morgan var. *macrosporum* J. H. Miller are American. While the present

collection shared the features of the both taxa, preference is given to American variety of Miller, with some variations e.g. nature of the stromata and perithecia. There is no report of this variety from India and thus, new to the fungi of India (NI).

***H. serpens* (Pers. ex Fr.) Kickx., *Flore Crypt. Louvain* p.115, 1835. Plate I (m), Text Plate I (a - d).**

= *Sphaeria serpens* Pers. ex Fr., *Syst. Mycol.* II, p. 341, 1823.

Stromata corticolous, separate, sometime coalesced, globose, elongated, often small, irregular outlined, crustose, effused, pulvinate-slightly tuberculate, hemispherical, at first whitish, brick-red, bronze and then finally black, surface smooth, about 5-25 mm long and 10-15 mm broad, 1-5 mm thick; perithecia sub-globose, immersed, ovate, ostiolate-minutely papillate, ca. 400-800µm diameter, flesh solid, firm and blackish-brown; asci long stalked, cylindrical, unitunicate, 8-spored, J +ve, 100-125 x 7.5µm, apical apparatus prominent; ascospores mostly obliquely uniseriate, ellipsoid-inequilateral, smooth, with obtuse ends, 12.5 (-15) x 7.5 µm, germ slit not seen. Stromal extract in 10% KOH solution produced purple pigment and perispores dehisce.

Habitat: on bark, collected at Kas, Dist. Satara, M.S., 19/09/2014, collected by Dr. Anjali R. Patil, RCK – MH / H0018.

Remarks: Dennis (1963) while studying the Hypoxyloideae of Congo (Africa) has recorded this species on dead bark and wood. In

addition to Congo, the species is also reported from Sierra Leone, South Africa, Mauritius, Tristan da Cunha, Canada, Chile, Scandinavia, Philippines Island, Australia, Pacific Islands (Dennis, R.W.G., 1963). Alka Pande recorded it on dead twigs of *Carissa carandas* L. from Amba, Tal. Shauwadi, Dist. Kolhapur (M.S.). Present collection matched well morphologically to this taxon, and thus referred to it. Agnihothrudu (1964) reported it from N.E. India-especially Assam, and said to cause tea-plant rot (*Thea* sp.). It is also reported by Thind and Waraichi (1976) from Himachal Pradesh.

H. serpens (Pers. ex Fr.) Kickx var. *effusum* (Nitsch.) Miller has been reported from Tea estates of Tamilnadu, Karnataka and Kerala (Agnihothrudu, 1967). Dennis (1963) synonymised about 13 taxa belonging to *Sphaeria*, *Anthostroma*, *Hypoxylon* and *Ustula* species. There is still doubt as to the position of our Indian variety *effusum* with ascospores upto 12 µm.

***H. serpens* (Pers. Ex Fr.) Kickx. var. *microstromae* var. nov. Plate I (n), Text Plate I (a - e).**

Variti *serpens* simile sedi stromata minuti et circularis – nigri.

Stromata corticolous, gregarious, separate, sometime coalesced, globose to sub-globose, minute, discoid, brownish, 2-5 mm in diameter and 1 mm thick, surface folded and smooth; perithecia totally immersed, monostichous below to crust, globose to oblong, ostiolate, minutely papillate, 400-500 µm diameter, flesh solid, firm and brown.

Asci long, cylindrical, stipitate, unitunicate, 8-spored and J+ve, 175 x 7.5 µm; ascospores 1-celled, obliquely uniseriate, ellipsoid-inequilateral, smooth, with obtuse ends, 15 x 7.5 µm; germ silt not seen. Stromatal granules in 10 % KOH solution produce purple pigment and perispores dehiscent in the same.

Habitat: on bark, collected by Dr. Anjali R. Patil and Ketaki P. Patil, collected at

1. Kas, Dist. Satara, M.S., 19/09/2014, RCK – MH/ H0019;

2. Ispurli, Tal. Karvir, Dist. Kolhapur, M.S., 22/09/2013, RCK – MH / H0046;

3. Shenwade, Tal. Gaganbawada, Dist. Kolhapur, M.S., 06/09/2015, RCK-MH/H0020, and HClO – 52137.

Remarks: Present collection and previous collection of *H. serpens* were collected from same locality, at same date and also substrate bark almost found identical in all respects except the gregarious, smaller, circular, globose stromata and longer asci and therefore a new variety has been proposed on the basis of its stromatic nature, viz. *H. serpens* (Pers. Ex. Fr.) Kickx var. *microstromae* var. nov. to accommodate this collection.

***H. submonticulosum* Ju & Rogers var. *minutae* var. nov. Plate I (o), Text Plate I (a - d).**

Variti *submonticulosa* simile sedi stromata minutis et ascospori uniguttulatae.

Habitat: on dead stem of giant liana, collected at Shenawade, Tal. Gaganbawada,

Dist. Kolhapur, M.S., 06/09/2015, collected by Dr. Anjali R. Patil and Ketaki P. Patil, RCK – MH /H 0020 and HClO -52138.

Remarks: Three specimens have been collected belonging to the genus *Hypoxylon* Bull. ex Fr. on barks and dead stems of dicot plants from three different localities viz. Kas and Mahabaleshwar (Dist. Satara) and Shenawade which lies South West to these two localities. All the three were collected in the months of September-October in 2012, 2014 and 2015 and show similarities in many respects e.g. KOH extract of stromatal-pigments absent (present in young), non-dehiscent perispores, asci and dimensions of the ascospores, germ slit were not observed. Except the stromata their size is also a fixed entity and were compared to the known species of *Hypoxylon* Bull. ex Fr. where more than 1100 epithets are associated (Jacques, F. *et.al*, 2004). Muller (1961) and Ju and Rogers (1996) tried to stabilize the status of taxa of *Xylaria* and *Hypoxylon*, two big genera in the family, with the help of their polymorphic nature, chemotaxonomy, molecular studies, host- specificity and many other criteria. Still variations do exist. Therefore, on comparative study, one of the present material differs from two others in the size of the stroma and ascospores which are fusiform and centrally uniguttulate. Thus a new variety viz. *H. submonticulosa* Ju and Rogers var. *minutae* var. nov. has been proposed. The stroma of *H. submonticulosa* Ju and Rogers is upto 7 cm reported from France, America & Papua New Guinea.

***H. submonticulosum* Y. M. Ju and J. D. Rogers, Mycologia memoir no. 20 APS Press. St. Paul, MN, 365pp, 1996. Plate I (p), Text Plate I (a - b).**

Stromata lignicolous, postulate-crustose, erumpent, separate, gregarious, individuals separate, arranged in a linear series, rectangular, elliptic, cylindrical, small, upto 20 mm long, 2 mm broad and 1mm high, smooth, texture hard, interior black, soild; perithecia immersed, monostichous, ostiolate, minute-punctuate, 300-500 μ m diameter; asci cylindrical, stipitate, unitunicate, J +ve , 8-spored, with prominent apical apparatus, 100-150 x 5 μ m; ascospores 1-celled, smooth, ellipsoid-inequilateral, uniseriate, 10(-12.5) x 5-7.5 μ m; germ slit not observed, KOH extractable pigments absent and perispores indehiscent. However, it is said that in immatured stromata orange with dark purple to dark vinaceous pigment present (Fournier, J. *et al.*, 2010).

Habitat: on dead twigs, collected at Mahabaleshwar, Dist. Satara, Maharashtra State, India, 14/10/2012, collected by Dr. M. S. Patil and on bark of *Eugenia / Syzygium* sp. (Myrtaceae), RCK – MH/H0021 and HClO – 52139.

Remarks: It is a new species proposed by Ju and Rogers (1996) based on negative features: KOH extractable pigment from stroma absent, perispores non-dehiscent and ascospores small. However, Fournier J. *et. al.* (2010) claimed that in immature stroma KOH-extractable pigments such as orange, purple and vinaceous are present. This

species has been reported from France, America and Ethiopia (Fournier, J. *et. al.*, 2010). Present collection agrees well to this species and thus referred to it. There is one more collection of the some species collected on bark of *Eugenia / Syzygium* sp. (Myrtaceae) from Kas Plateau, Satara on 19. 09. 2014 and studied. It is in all respect matched to this except stromata are more larger and irregular in shape. There is so far no report of this species in India and thus it makes a new record to the fungi of India (N.I.).

***H. umbilicatum* Speg., Bol. Acad. Nac. Cienc. Cordoba 11 (4): 507, 1889. Plate I (q), Text Plate I (a - d).**

Stromata corticolous, globose to irregular, orbicular, tuberculate, coalesced, umbonate, greyish-brown, zonate, punctate, flat, attached to the substratum at a point and easily separated, 1.5-3.5 cm diameter, or 2.5 x 3 cm ; perithecia immersed, oblong, ostiolate, 800-1000 x 400-600µm, flesh brown and thick, texture soft, semi-hard; asci cylindrical, stipitate, unitunicate, J +ve , 8-spored, 100-150 x 7.5-10 µm; ascospores 1-celled, obliquely uniseriate, smooth, brown, 30-37.5 x 7.5-10 µm, germ slit not observed, without KOH extractable pigment and perispores indehiscent.

Habitat: on bark and trunk of tree – *Memecylon umbellatum* Burm. (Melastomataceae), collected by Dr. Anjali R. Patil and Ketaki P. Patil,

1. Amba, Tal. Shahuwadi, Dist. Kolhapur, M.S., 03/08/2014, RCK – MH/H0022;

2. Patgaon, Tal. Bhudhargad, Dist. Kolhapur, M.S., RCK – MH/ H0043; and HCIO – 52140.

Remarks: This species has been reported from Sao Paulo, Brazil by Spegazzini (1889) and the South American collections were revised by Hladki and Romero (2009). Miller (1961) did not consider this species, however Ju and Rogers (1996) accepted this species in their monograph under the section *Hypoxylon*. The species is characterised by large ascospores 38-40 x 20-22 µm, and brown to blackish or black, with a straight, central, short germ slit and pigments in KOH olivaceous brown (here it is yellowish).

Present material agrees to this South American species in respect of ascospore dimensions but are less broader. Stromata are larger and varied in morphological features and therefore, referred to it.

***H. vandervekenii* Van der Gucht, Y. M. Ju and J. D. Rogers, Mycologia 89 (3): 506, 1997. Plate I (r), Text Plate I (a - d).**

Stromata lignicolous, pulvinate, gregarious, grouped, superficial or erumpent, no conspicuous perithecial mounds, thick, irregular in outline, reddish-brown, smooth, 20 x 5 mm, surface olivaceous dull brown, interior flesh black; perithecia immersed, tubular, 400-500 µm in diameter, and 500-900 µm high, ostiole opening below the level of stromata surface (umbilicate); asci cylindrical, clavate, 150-200 x 7.5-9 µm,

apical ring bluing in Melzer's reagent i.e. J +ve; ascospores 1-celled, dark-brown, ellipsoid-inequilateral, with narrower rounded ends, smooth, 15 x 7.5 µm, germ slit not observed, nor the anamorphic state. Black granules of stromal tissue below the crust gives purple colour in 10 % KOH solution, perispore dehiscent in the same.

Habitat: on decorticated wood, collected by Dr. Anjali R. Patil,

1. Kas, Dist. Satara, M.S., 19/09/2014, RCK – MH/ H0023, H0024;

2. Patgaon, Tal. Bhudhargad, Dist. Kolhapur, M.S., 06/09/2014, RCK – MH/ H0024;

and HCIO – 52141.

Remarks: Interesting name of this taxon is the name of an eminent Belgian Botanist Paul Van Der Veken given by the author to honour his Botanical contribution and collector of the material, on which the species is based. Authors of this species considered the only species with an olivaceous stromatal surface to have purplish stromatal pigment in KOH solutions.

Present material almost in all respects agreed well, except the asci are longer and stroma are smaller, and thus referred to it. There is no report of this species from India. And thus, it is a new report to the fungi of India (Bilgrami, K.S. *et. al*, 1991, Jamaluddin *et al.*, 2004, Alka Pande, 2008).

***H. vogesianum* Pers. ex Sacc. var. *macrosporum* J. H. Miller, *Mycologia* 25 : 321-329, 1933. Plate I (s), Text Plate I (a - b).**

Stromata lignicolous, separate, or gregarious, globose to sub-globose to irregular in outline, crustose, firmly attached and spreads on the substrate, black shining tarred or dark bluish, 2-20 mm in diameter. Surface roughened by the conical elevations; perithecia immersed below the black crust and embedded into light coloured stromatic tissue, appeared to loculate; ostiolate, indistinct, 300-500 µm globose to oblong; asci cylindrical, long-stalked, unitunicate, with conspicuous apical apparatus, blued in iodine solution i.e. Melzers reagent, J +ve; less than 8-spored, 150-200 x 10-12.5 µm; ascospores 1-celled, obliquely uniseriate, fusiform-elliptic, equilateral, smooth, 30-37.5 x 7.5 µm, germ slit not observed. KOH 10 % extractable pigment of stromal granules purple- violet and perispores indehiscent.

Habitat: on dead twigs of dicot plant, collected by Dr. A.R.Patil and Ketaki P.Patil, Patgaon road, Tal. Bhudhargad, Dist. Kolhapur, M.S., 06/09/2014, RCK – MH/ H0029; and HCIO – 52142.

Remarks: This is a third case showing the sign of abortiveness in asci and ascospores in the perithecia. Fewer asci in the perithecium and fewer ascospores in the ascus. Normal development has been arrested, the reason exactly not known. However, such cases are known not only in the species of the genus *Hypoxylon* but also in *Nemania* and *Xylaria* (Ju and Rogers, 2012; Miller, 1957; Gucht and Veken, 1992; Diehl, W.W, 1937). Miller and Nielsen (1957) and Ju and Rogers (2012) have used this feature and raised new taxa

viz. *Xylaria multipartite* Miller and Nielsen characterised by 4-8 spored asci and *Nemania abortive* Ju and Rogers in which asci invariably fewer than 8 spores per ascus. However, this temptation to raise a new taxon is being kept in control for a time being. This variety is characterised by having larger ascospores 26-37.8 x 7-12 μm . Miller, J.H. discussed much about *H. vagesiacum* about the red series of *Hypoxylon*, which posed a difficult problem. Problems about variations – transitional forms, temperate and tropical distribution, smaller to larger ascospores formation have been solved with different names. As Theissen (?) suggested, such series constitutes a single species and requires sound justification, cultural and molecular studies to stabilize their nomenclature.

Present collection agrees well in respect of morphology except the number of ascospores per ascus and thus, referred to it. This material also shows affinity to *H. macrosporum* and *H. vagesiacum* but in one, pigment is olivaceous and smaller ascospores and in later pigments are violet- purple matching to the material, but ascospores 18-23 x 8- 10 μm i.e smaller. For larger ascospore collection Miller, J.H. has raised a taxon viz. *H. vagesiacum* Pers. ex Sacc. var. *macrosporum*, to which this collection matched well and thus, referred to it. Thind and Waraichi, K.S. (1976) and Dargan and Thind (1982) have reported this species on variety of hosts from North India. Alka Pande (1974) has reported a variety of the same species viz. *H. vagesiacum* Pers. ex Sacc var. *microsporum* Miller collected on dead stems of

Eugenia sp. from Mahableshwar, Dist. Satara (M.S.) and characterised by ascospores 5-6 x 11-14 μm . So, it is interesting to note the variations in dimensions of ascospores of these three taxa:

- I. *H. vagesiacum* Pers. ex. Sacc..... 18.5 - 25 x 8-10 μm (U.S.A.)
- II. *H. vagesiacum* Pers. ex. Sacc var. *macrosporum* Miller..... 26.2-37.8 x 7-12 μm (U.S.A. and India)
- III. *H. vagesiacum* Pers. ex. Sacc var. *microsporum* Miller..... 11-14 x 5-6 μm (U.S.A. and India)

This clearly gives an idea of variability that exists in *H. vagesiacum* Pers. ex. Sacc. and expressed in terms of the size of ascospores, that we observed progressively and retrogressively – increased the dimension and also reduction in dimension. It maybe correlated to the geographical distribution, genetic factors, or host-substrate reactions or all together and is a subject to work out in future.

COCLUSION :

In the present work 19 species of *Hypoxylon* have been collected, studied and described. Of these, 08 species are new to India viz. 1. *Hypoxylon anthochronum* Berk. and Br. , 2. *H. elevatidiscus* Y. M. Ju, J. D. Rogers and Hsiech, 3. *H. monticulosum* Mont., 4. *H. pynaertii* Bres., 5. *H. ravidoroseum* Ju, Van der Gucht and Rogers, Ju and Rogers, J. D., 6. *H. regale* Morgan var. *macrospora* Miller, 7. *H. submonticulosum* Y. M. Ju and J. D. Rogers, 8. *H. vandervekenii* Van der Gucht, Y. M. Ju and J. D. Rogers. One

species is new to fungi of Maharashtra viz.;1. *H. dieckmannii* Theiss. Five new varieties have been proposed viz. 1. *H. congoense* Sacc. var. *macrospora* var. nov., 2. *H. deusta* (Hoffm. ex St. Amans) Grev. var. *dimorphospora* var. nov., 3. *H. pynaertii* Bres. var. *sterilae* var. nov., 4. *H. serpens* (Pers. ex Fr.) Kickx. var. *microstromae* var. nov., 5. *H. submonticulosa* Ju and Rogers var. *minutae* var. nov. And five commonly occurring species have been also collected and studied viz. 1. *H. diatrypeoides* Rehm, 2. *H. hypomiltum* Mont., 3. *H. serpens* (Pers. ex Fr.) Kickx, 4. *H. umbilicatum* Speng., 5. *H. vogesiacum* Pers. ex Sacc. var. *macrospora* J.H.Miller.

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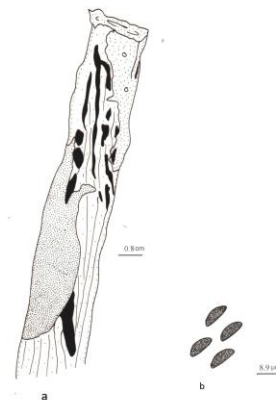
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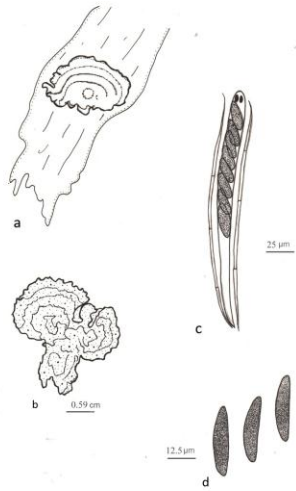


TEXT PLATE NO I



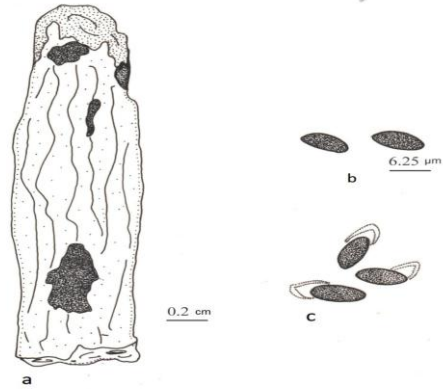
• *Hypoxylon anthochrotrium* Beek. and Br. a. Natural habit; b. Ascospores; Scale bar = 1cm

TEXT PLATE NO II



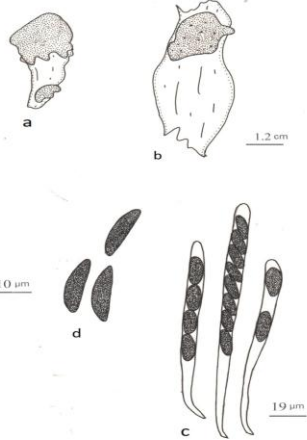
• *Hypoxylon congoense* Sacc. var. *macrospora* var. nov. a. Natural habit; b. Stroma; c. Asc; d. Ascospores; Sacle bar = 1cm

TEXT PLATE NO V



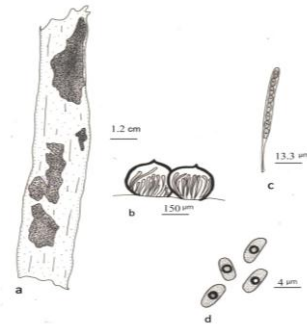
• *Hypoxylon dieckmannii* Theiss. a. Natural habit; b. Ascospores; c. Dehiscent ascospores; Sacle bar = 1cm

TEXT PLATE NO III



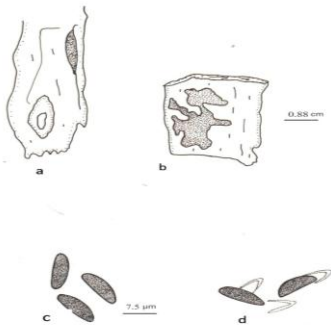
• *Hypoxylon deusta* (Hoffm. ex St. Amans) Grev. var. *dimorphospora* var. nov. a and b. Natural habit; c. Asc; d. Ascospores; Sacle bar = 1cm

TEXT PLATE NO VIII



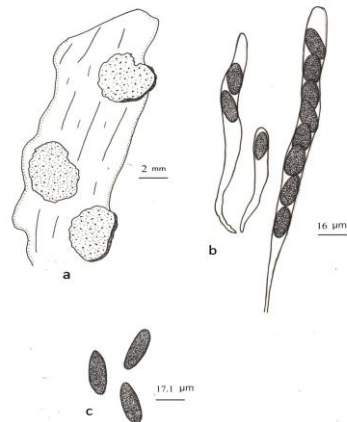
• *Hypoxylon monticulosum* Mont. a. Natural habit; b. Perithecia; c. Asc; d. Ascospores; Sacle bar = 1cm

TEXT PLATE NO IV



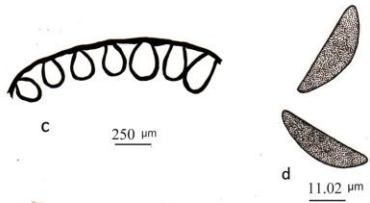
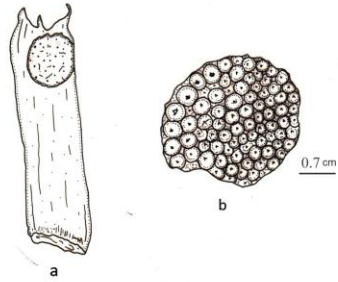
• *Hypoxylon distrypoides* Rehm. a and b. Natural habit; c. Ascospores; d. Dehiscent ascospores; Sacle bar = 1cm

TEXT PLATE NO IX



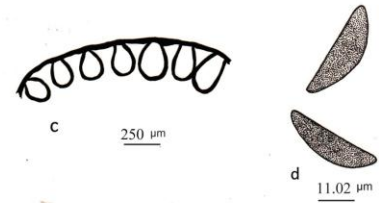
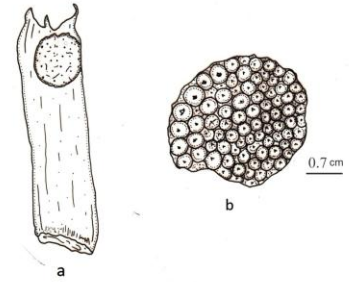
• *Hypoxylon pynaertii* Bres. var. *steriliae* var. nov. a. Natural habit; b. Asc; c. Ascospores; Sacle bar = 1cm

TEXT PLATE NO X



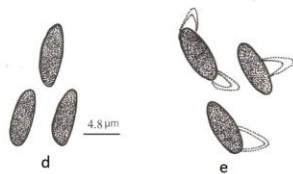
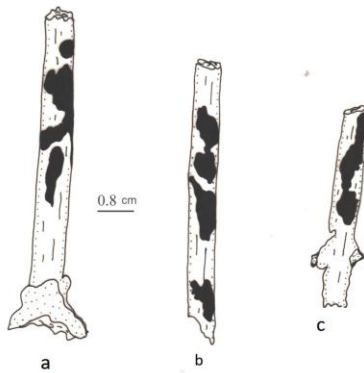
• *Hypoxylon pynaertii* Bres. a. Natural Habit; b. Stroma; c. Perithecia; d. Ascospores; Sacle bar = 1cm

TEXT PLATE NO X



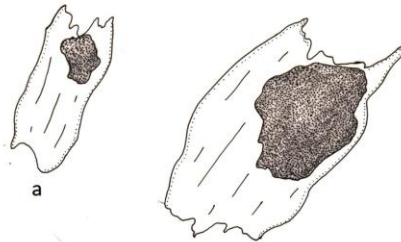
• *Hypoxylon pynaertii* Bres. a. Natural Habit; b. Stroma; c. Perithecia; d. Ascospores; Sacle bar = 1cm

TEXT PLATE NO VI



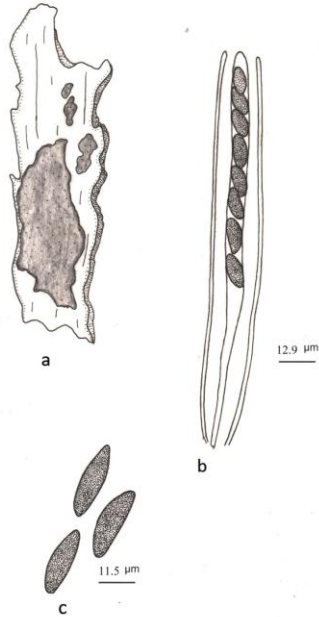
• *Hypoxylon elevatidiscus* Y. M. Ju, J. D. Rogers and Hsieh a,b and c. Natural habit; d. Ascospores; e. Dehiscent ascospores; Sacle bar = 1cm

TEXT PLATE NO XI



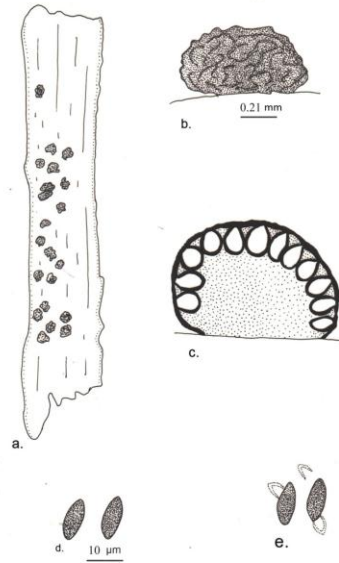
• *Hypoxylon ravidoroseum* Y. M. Ju, Van der Gucht and J. D. Rogers a. Natural habit; b. Ascospores; c. Dehiscent ascospores; Sacle bar = 1cm

TEXT PLATE NO XII



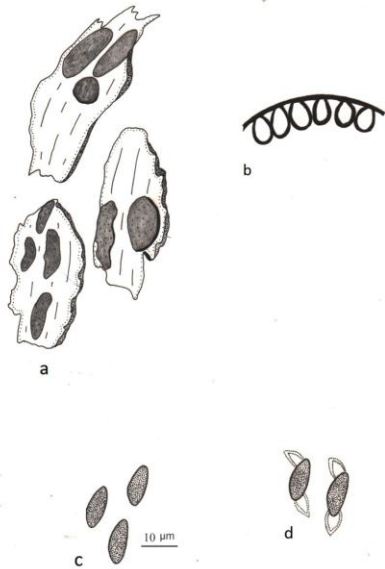
• *Hypoxylon regale* Morgan var. *macrospora* J. H. Miller a. Natural habit; b. Ascus; c. Ascospores; Scale bar = 1cm

TEXT PLATE NO XIV



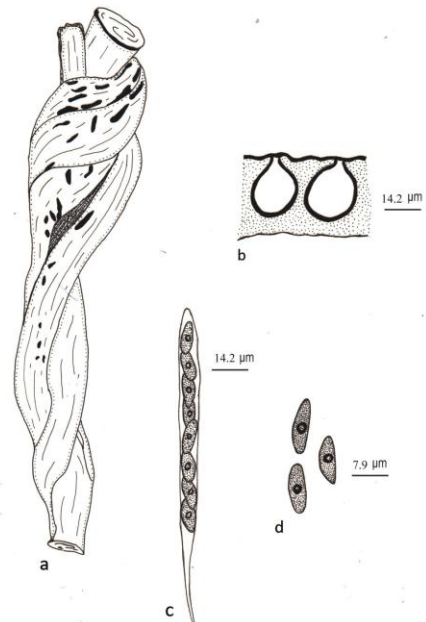
• *Hypoxylon serpens* (Pers. Ex Fr.) Kickx. var. *microstromae* var. nov. a. Natural habit; b. Stroma; c. Perithecia; d. Ascospores; e. Dehiscent ascospores; Scale bar = 1cm

TEXT PLATE NO XIII



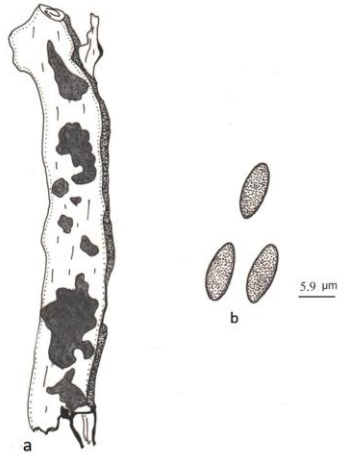
• *Hypoxylon serpens* (Pers. ex Fr.) Kickx. a. Natural habit; b. Perithecia; c. Ascospores; d. Dehiscent ascospores; Scale bar = 1cm

TEXT PLATE NO XV



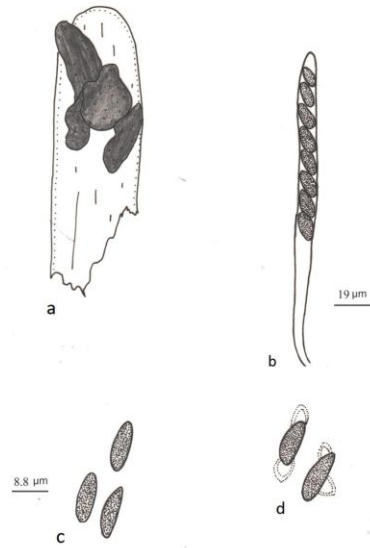
• *Hypoxylon submonticulosum* Ju & Rogers var. *minutae* var. nov. a. Natural habit; b. Perithecia c. Ascus d. Ascospores; Scale bar = 1cm

TEXT PLATE NO XVI



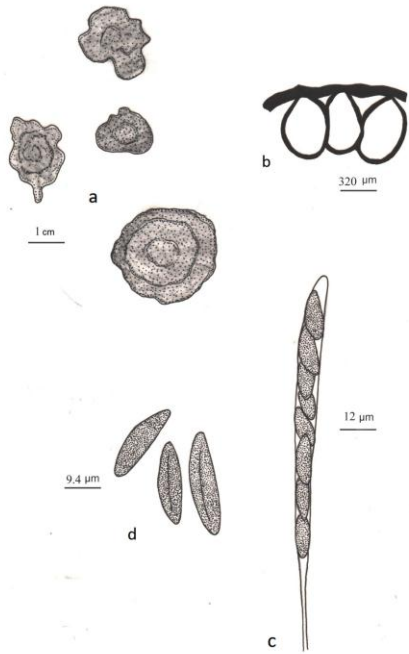
• *Hypoxylon submonticulosum* Y. M. Ju and J. D. Rogers a. Natural habit; b. Ascospores; Sacle bar = 1cm

TEXT PLATE NO XVIII



• *Hypoxylon vandervekenii* Van der Gucht, Y. M. Ju and J. D. Rogers a. Natural habit; b. Asc; c. Ascospores; d. Dehiscent ascospores; Sacle bar=1cm

TEXT PLATE NO XVII



• *Hypoxylon umbilicatum* Speg. a. Natural habit; b. Perithecia c. Asc; d. Ascospores; Sacle bar = 1cm

TEXT PLATE NO XIX



• *Hypoxylon vogesianum* Pers. ex Sacc. var. *macrosporium* J. H. Miller a. Natural habit; b. Ascospores; Sacle bar = 1cm