

Notes on some Indian Cercosporae V. *)

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With plates XVII.—XVIII.

In continuation of the previous studies on Indian Cercosporae, further collections made in different parts of India have been critically examined and data on some of the species which are either new records for India or new to Science, are presented in this paper. The types of the new species have been deposited in the Herb. Crypt. Ind. Orient. New Delhi, Herb. C.M.I., Kew, England, Mycological Division, U. S. D. A., Beltsville, Maryland, U.S.A., and in the Mycological Herb. Cornell University, Ithaca, N. Y.

1. *Cercospora biharica* sp. nov.

Leaf spots angular to irregular, 0.5 to 1.5 cms. in diameter, dingy grey to brown, sometimes with dark margin. Fruiting amphigenous, stromata composed of compact brown cells, $20 \approx 35 \mu$ in diameter. Conidiophores fasciculate, subhyaline to olivaceous brown, hyaline and attenuated at the tip, unbranched, 1—3-septate, $22-57 \approx 2.8-4.2 \mu$. Conidia hyaline, obclavate to acicular, acute at tip, 1—16-septate, $28.5-100 \approx 2.8-5.7 \mu$.

On leaves of *Ampelocissus latifolia* Planch., Sabour Agricultural College, Bihar, 19-12-1952, leg. M. J. Thirumalachar (Type), Patna City, 20-12-1952, leg. H. C. Govindu. (Figs. 1 and 2).

Maculae angulares vel irregulares, 0.5—1.5 cm diam., sordide griseae vel griseo-brunneae, margine brunneo. Caespituli amphigeni. Hypostromata $20-35 \mu$ diam., atro-fusca; conidiophora fasciculata, subhyalina vel olivaceo-brunnea, sursum hyalina et attenuata, simplicia, 1—3-septata, $22-57 \approx 2.8-4.2 \mu$. Conidia hyalina, obclavata vel acicularia, 1—16-septata, postice subtruncata, antice acuta, $28.5-100 \approx 2.8-5.7 \mu$.

The fungus resembles to some extent *C. arboriae* Tharp. in the measurements of conidia and conidiophores, but differs in having hyaline conidia and lack of stroma as against the pale olivaceous conidia and absence of stroma in *C. arboriae*. *C. cissi-japonicae* Hori on *Cissus japonica* from Japan and *C. truncata* Ell. & Evr. on *Vitis*

*) Part III in Sydowia 7: 309—312, 1953, and part IV in Sydowia 8: 1954.

have both hyaline conidia but differ in having longer conidiophores (40—120 μ in *C. cissi-japonicae* and 30—120 μ in *C. truncata*) than in the present species.

2. *Cercospora maculicola* sp. nov.

Leaf spots circular to irregular, 3—5 mm. in diameter, greyish-white in centre and dark-brown along the margin. Fruiting amphigenous; stromata absent or of few cells. Conidiophores subhyaline to light olivaceous brown, unbranched and unseptate, subgeniculate at tip, tubular, 16—40 \Rightarrow 3—4 μ . Conidia hyaline, narrowly obclavate to cylindric, 1—14-septate, obruncate at base, acute at tip, 66—117 \Rightarrow 3—4 μ .

On leaves of *Bidens pilosa*, Hebbal, Bangalore, 10-1-1953, leg. H. C. Govindu. (Figs. 3 and 4).

Maculae circulares vel irregulares, 3—5 mm. diam., griseo-albae, zonula atro-fusca cinctae. Caespituli amphigeni. Hypostromata non evoluta. Conidiophora subhyalina vel olivaceo-brunnea, simplicia, continua, apicem versus subgeniculata, 16—40 \Rightarrow 3—4 μ . Conidia hyalina, angustissime obclavata vel cylindracea, 1—14-septata, postice obruncata, antice acuta, 66—117 \Rightarrow 3—4 μ .

Nearly 5 species of *Cercospora* are known parasitising species of *Bidens*. Among the ones having hyaline conidia, comparisons may be made with *C. bidentis* Tharp., *C. bidenticola* Chupp. and the imperfectly known *C. bidentis-pilosae* Sawada. In both *C. bidentis* and *C. bidentis-pilosae* the conidiophores are septate and very long (50—120 μ) as compared with *C. maculicola* which has unseptate conidiophores measuring 16—40 μ . *C. bidenticola* has non-fasciculate conidiophores which are tortuous and branched in contrast to the fasciculate and unbranched ones in *C. maculicola*.

3. *Cercospora eugeniae* (Rangel) Chupp. in Monogr. Cercosporae pp. 406—407, 1953.

Leaf spots circular to irregular, 3—5 mm. in diameter, greyish-white to greyish-brown, surrounded by pinkish border, often coalescing to form large patches. Fruiting amphigenous. Stromata compact, dark brown, 30—60 μ in diameter conidiophores brown to diffuse brown, 1—2-septate, unbranched, 20—30 \Rightarrow 2.5—4 μ . Conidia light brown, obclavate to cylindric, 1—6-septate, base obconically truncate and tip acute, 20—50 \Rightarrow 2—4 μ .

On leaves of *Eugenia* sp., Parasnath, Bihar, 15-12-1942, leg. H. C. Govindu. (Figs. 5 and 6).

The fungus under study has been placed under *C. eugeniae* on account of very close resemblance in the morphology of the sori and

spore measurements. Previously *C. eugeniae* has been reported only from Japan and South America.

4. *Mycosphaerella asplenii* (Jaap) comb. nov.

Syn. *Cercospora asplenii* Jaap. (conidial stage). Ann. mycol. **14**: 43, 1916.

Perithecia epiphyllous, produced in the centre of infection spot in association with the conidial fruiting bodies of *Cercospora asplenii*, dark brown, 50—100 μ in diameter, ostiole conical and erumpent. Asci fasciculate, clavate-cylindric, 8-spored, 17—36 μ \approx 6—7 μ , paraphysate. Ascospores 1—2-seriate, hyaline, 1-septate, oblong-elliptic, without constriction, 7—10 μ \approx 3 μ .

On the leaves of *Asplenium nidus* L., Central College Botanical gardens, Bangalore, 15-8-1945, leg. M. J. Thirumalachar. (Figs. 8, 9 and 10).

Perithecia in centro macularum, epiphylia, in consortio *Cercosporae asplenii*, atra, 50—100 μ diam., ostiolo conico erumpentia. Asci fasciculati, clavato-cylindraceuti, 8-sporei, 17—36 μ \approx 3—7 μ , paraphysati. Ascosporeae 1—2-stichae, hyalinae, 1-septatae, oblongo-ellipticae, haud constrictae, 7—10 μ \approx 3 μ .

Cercospora asplenii Jaap was recorded for India by Thirumalachar and Chupp (Mycologia 40: 353, 1948) on the 'bird's nest fern' *Asplenium nidus*. The fungus causes formation of large brown patches on leaves which dry up and bear numerous conidial fruiting bodies. The perithecial stage was observed on some of the old infection patches. The perithecia are formed by the mycelium bearing the conidial fructifications.

5. *Mycosphaerella elatostemmae* sp. nov.

Leaf spots circular to polygonal, brown, with greyish-white centre and yellowish margin. Perithecia epiphyllous, grouped in the centre of infection spot, dark brown, globose, 33—100 μ in diameter, ostiolate; ostiole erumpent. Asci clavate, 8-spored, paraphysate, 28—42 μ \approx 7—11 μ . Ascospores 1—2-seriate, fusoid-cylindric, asymmetric, 1-septate, without constrictions, 11—21 μ \approx 3 μ .

On leaves of *Elatostemma* sp., Balehonnur, Mysore, 14-8-1942, leg. M. J. Thirumalachar. (Figs. 7, 11 and 12).

Maculae circulares vel angulosae, brunneae, in centro cinerascetes, margine flavae. Perithecia in centro macularum epiphylia, 33—100 μ diam.; ostiola erumpentia. Asci clavati, 8-sporei, paraphysati, 28—42 μ \approx 7—11 μ . Ascosporeae mono- vel distichae, cylindraeco-fusoideae, inaequilatae vel subarcuatae, 1-septatae, haud constrictae, 11—21 μ \approx 3 μ .

No conidial stage of this fungus has so far been observed on the host, and only the *Mycosphaerella* stage is being reported.

6. *Cercospora trapae* sp. nov.

Leaf spots circular, 2—3 mm. in diameter, brown, slightly raised, Fruiting chiefly epiphyllous. Stroma of few brown cells. Conidiophores fasciculate, dark-brown to olivaceous, 60—160 \cong 2.5—4 μ . Conidia faintly subhyaline, obclavate to narrowly clavate, obconical at base, and blunt at apex, 1—10-septate, 34—66 \cong 2.5—3.5 μ .

On leaves of *Trapa bispinosa* Roxb., Gulzaribagh, Patna City, Bihar, 20-12-1952, leg. M. J. Thirumalachar & H. C. Govindu. (Figs. 13 and 14).

Maculae circulares, 2—3 mm. diam., brunneae, leniter tumescentes. Caespituli plerumque epiphylli. Hypostromate inconspicuo vel nullo, e cellulis paucis composito. Conidiophora fasciculata, atrobrunnea vel olivacea, recta vel curvata, 1—10-septata, raro ramosa, subgeniculata, 60—160 \cong 2.5—4 μ . Conidia pallide subhyalina, obclavata vel angustissime cylindrica, postice obconica, antice rotundata, 1—10-septata, 34—66 \cong 2.5—3.5 μ .

Trapa bispinosa is a partially submerged, free-floating plant in fresh water ponds in India. The fruits yield a rich starchy kernel, and on that account the plants are carefully kept free of other weed plants. In Uttar Pradesh even spraying with fungicide is done to control leaf spot disease of *Trapa*. *C. trapae* has been found to incite severe leaf spotting and in later stages leaves shot hole effect and even partial decaying of the lamina.

7. *Cercospora lippiae* Ellis & Evr. Jour. Mycol. **3**: 20, 1887.

Leaf spots circular to irregular, 2—5 mm. in diameter, greyish-white at the centre and surrounded by pale brown coloured zone. Fruiting body amphigenous. Stroma composed of few brown cells. Conidiophores densely fasciculate, light to medium olive-brown, unbranched, indistinctly unseptate, subgeniculate at tip, 21—54 \cong 2.8—4.2 μ . Conidia hyaline, obclavate to acicular, straight to curved, 1—15-septate, broad at base, narrowing and pointed at the apex, 50—166 \cong 2—3 μ .

On leaves of *Lippia nodiflora* (L.) Michx., Nakhas Pind, Patna City, Bihar, 20-12-1952, leg. M. J. Thirumalachar and H. C. Govindu. (Figs. 15 and 16).

The fungus collected at Patna City, Bihar, is identical with the authentic material of *C. lippiae* with which it has been compared. Previously *C. lippiae* had been reported only from North America and Bermudas.

8. *Cercospora piaropii* Tharp. Mycologia **9**: 113, 1917.

Infection spots on leaves, circular to irregular, dark brown to almost black, 2—5 mm. in diameter, sometimes slightly raised. Fruiting amphigenous. Stroma of few brown cells. Conidiophores

in fascicles, straight or bent, medium olivaceous-brown, pointed and hyaline at the apex, unbranched, 1—10-septate, subgeniculate, 50—200 \Rightarrow 2.8—4.2 μ . Conidia hyaline, straight or curved, obclavate to acicular, broad and truncate at base, tip acute, 1—20-septate, 66—120 \Rightarrow 2—4.2 μ .

On leaves of *Eichornia crassipes* Solms., Gulzaribagh, Patna City, Bihar, leg. M. J. Thirumalachar & H. C. Govindu, 20-12-1952. (Figs. 17 and 18).

Cercospora piaropii was described by Tharp on *Eichornia crassipes* (*Piaropia speciosa*) from Texas, U.S.A., and has so far not been recorded outside the type, locality. *E. crassipes* is an ubiquitous weed in ponds and streams in the tropics, and a careful search would indicate that the fungus too has an equally wide distribution.

9. *Cercospora corchorifoliae* sp. nov.

Leaf spots circular to irregular, 3—5 mm. in diameter, yellowish-brown to dark brown, surrounded by a light pinkish zone. Fruiting amphigenous. Stroma well developed, brown, 20—40 μ in diameter. Conidiophores subhyaline to pale brown, densely fasciculate, cylindrical unbranched, unseptate, 14—28.5 \Rightarrow 2—3 μ . Conidia subhyaline to pale olivaceous, obclavate to cylindrical, obconical at base and acute at apex, 1—12-septate, 64—78.5 \Rightarrow 2.8—4.2 μ .

On leaves of *Melochia corchorifolia* L., Bannerghatta, Bangalore, 29-7-1951, leg. H. C. Govindu. (Figs. 19 and 20).

Maculae circulares vel irregulares, 3—5 mm diam., flavo-brunneae vel atro-brunneae, zonula rubra cinctae. Caespituli amphigeni. Hypostromata bene evoluta, atro-brunnea, 20—40 μ diam. Conidiophora subhyalina vel pallide brunnea, densissime fasciculata, cylindracea, simplicia, continua, 14—28.5 \Rightarrow 2—3 μ . Conidia subhyalina vel pallide olivacea, obclavata vel cylindrica, postice obconica, antice acuta, 1—12-septata, 64—78.5 \Rightarrow 2.8—4.2 μ .

Cercospora melanotes Syd., *C. melochiae* P. Henn. and *melochicola* Syd. differ from the species under study by the lack of stroma and presence of non-fasciculate conidiophores in contrast to the well developed stroma and densely fasciculate conidiophores of *C. corchorifoliae*. Further, the unseptate nature of conidiophores and lack of effuse type of growth in *C. corchorifoliae* also distinguishes it from other species of *Cercospora* on *Melochia* already referred to.

10. *Cercospora merremiae* Mendoza Philippine Jour. Sci. **75**: 172, 1941.

Infection spots circular to irregular, brown to almost black, often surrounded by a light coloured margin. Fruiting amphigenous stroma of few brown cells. Conidiophores dark brown, unbranched, geniculate, tip hyaline and pointed, 1—2-septate, 15—40 \Rightarrow 2.8—4 μ . Conidia

hyaline, 1—7-septate, obclavate to cylindrical, obconically truncate at base, tip slightly pointed, $50-75 \Rightarrow 2.8-4.2 \mu$.

On leaves of *Meremia emarginata* Hall., Phulwarisheriff, Patna, Bihar, 24-11-1952, leg. M. J. Thirumalachar & H. C. Govindu. (Figs. 21 and 22).

11. *Cercospora catappae* P. Henn. in Engl. Bot. Jahrb. **34**: 56, 1905.

In a previous paper a *Cercospora* species was reported on *Terminalia* sp. (*Sydowia* 7: 311, 1953) from Bangalore, India. Further comparative studies have indicated that it should be assigned to *C. catappae* on account of the similar spore measurements. The unbranched and unseptate conidiophores developed from strongly developed stromata and bearing pale olivaceous conidia are characteristic. The host is not *T. catappa*, but appears to be *T. crenulata* Roxb.

12. *Cercospora artocarpus* H. & P. Syd. Ann. Mycol. **12**: 202, 1914.

On the leaves of *Artocarpus incisa* (*A. communis*), Malleswaram, Bangalore, 15-2-1949, leg. M. J. Thirumalachar.

The fungus incites the formation of large brown patches on leaves which in later stages become excised leaving a shot hole effect.

13. *Cercospora tabernaemontanae* H. & P. Sydow. Philipp. Jour. Sci. (Bot.) **8**: 507, 1913.

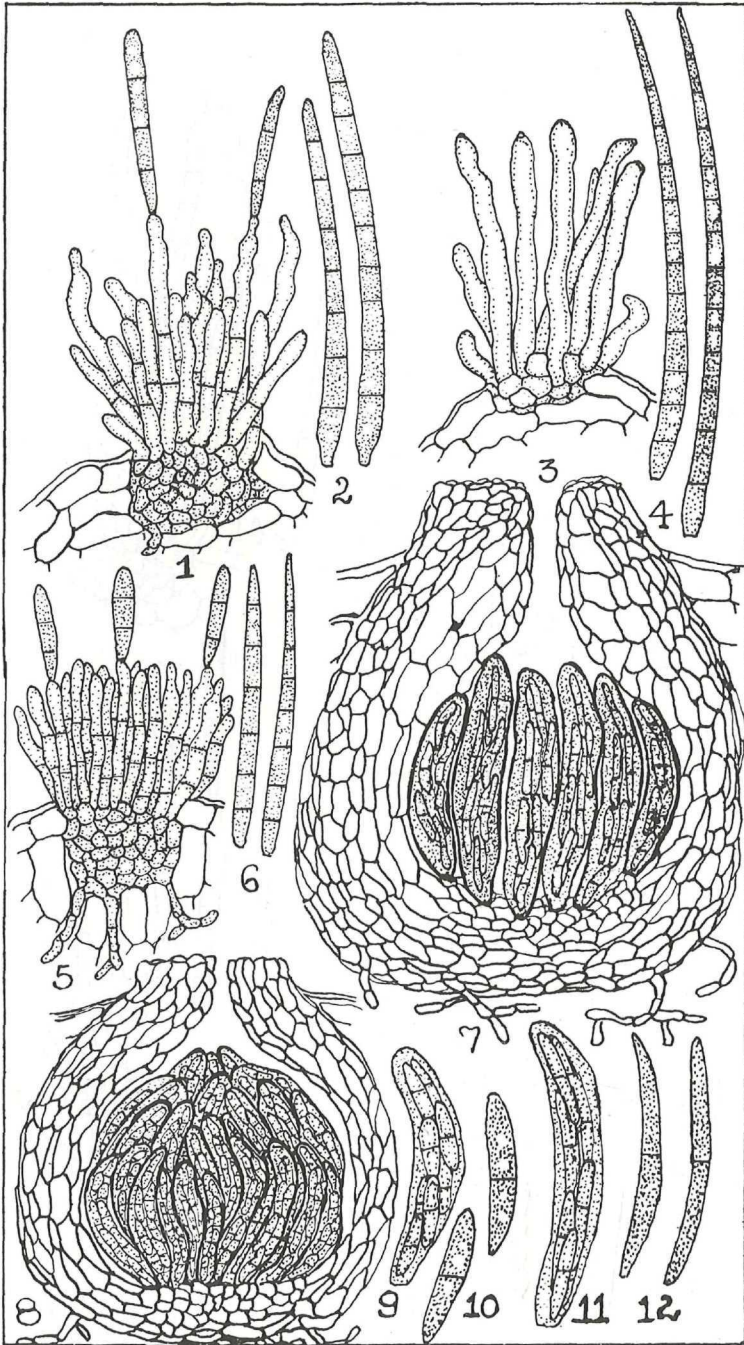
Syn. *C. tabernaemontanae* Thirumalachar & Govindu. in *Sydowia* **7**: 45—49, 1953.

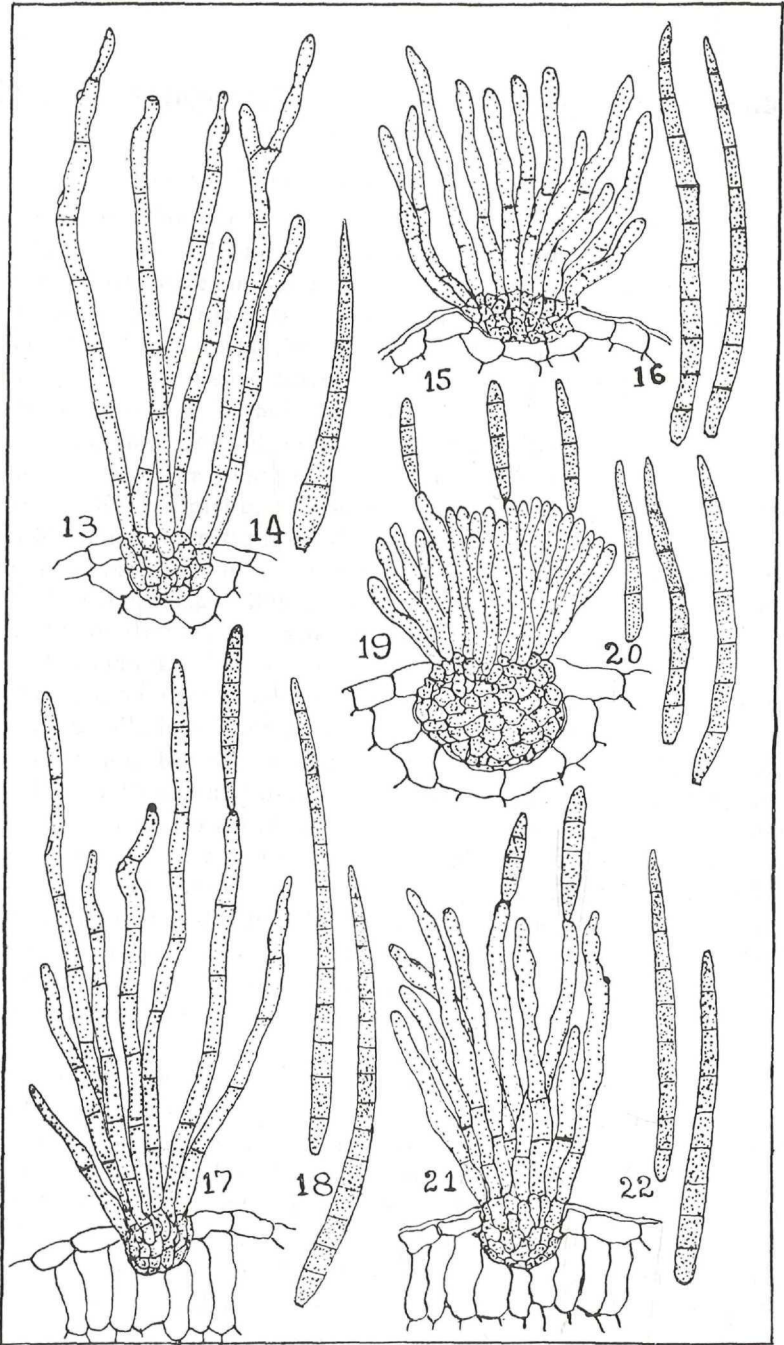
The fungus collected in Patna, Bihar, India, and that studied by Sydow on *Tabernaemontana pandacaqui* are identical in all respects.

In conclusion the authors wish to express their deep gratitude to Dr. Franz Petrak, Vienna, for kindly helping in translating the diagnoses of new species into latin.

Explanation of Plates XVII—XVIII.

(All figs, drawn for the magnification of $\times 750$ except 9 to 12 $\times 1250$.)
Figs. 1 and 2. *Cercospora biharica*. — Figs. 3 and 4. *C. maculicola*. — Figs. 5 and 6. *C. eugeniae*. — Figs. 7. *Mycosphaerella elatostemmae*. — Figs. 8. *M. asplenii*. — Figs. 9 and 10. Asci and ascospores of *M. asplenii*. — Figs. 11 and 12. Asci and ascospores of *M. elatostemmae*. — Figs. 13 and 14. *Cercospora trapae*. — Figs. 15 and 16. *C. lippiae*. — Figs. 17 and 18. *C. piaropii*. — Figs. 19 and 20. *C. corchorifoliae*. — Figs. 21 and 22. *C. meremiae*.





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