Four New Foliicolous Hyphomycetes from Vindhya Hills, India

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Abstract

This paper deals with four novel species of *Stenella* Sydow, viz., *S. cassiae–toriae*, *S. flacourtiae*, *S. ichnocarpicola* and *S. mirzapurensis*, collected on *Cassia tora* (F. Caesalpiniaceae), *Flacourtia indica* (F. Flacourtiaceae), *Ichnocarpus frutescens* (F. Apocynaceae) and *Passiflora foetida* (F. Passifloraceae) respectively, from Vindhya Hills, India. Keys are provided to distinguish the species of *Stenella* described on the host genus *Cassia* and host family Apocynaceae.

Key words: Biodiversity, Fungi, foliicolous hyphomycetes, *Stenella*, taxonomy, India

Geographically, the Vindhya region constitutes hilly tracts separating the North–Central Indian States, Uttar Pradesh and Madhya Pradesh. This region experiences sub–tropical climatic conditions and has lush–green deciduous vegetation which provided suitable habitat and substrate for growth of different foliar fungi. The Vindhya hills so far remained unexplored for systematics of saprophytic and parasitic fungi occurring on various substrates, including the foliar ones. The senior author made an extensive sampling of foliicolous fungi from this region during 1996–1998. Taxonomic characterization of the foliar fungi showed that cercosporoid forms were abundant. This paper deals with four hitherto undescribed species of the anamorphic genus *Stenella* Sydow (1930) from this collection.

The Genus *Stenella* Sydow. *Stenella* is a well–established genus in the *Cercospora*–complex. The genus now accommodates 113 species described from all over the world, notably from Africa, America and the Indian sub–continent. Generic features of *Stenella* have been discussed by Deighton (1971, 1979), Mulder (1975, 1982), de Hoog *et al.* (1983) and Shaw & Alcorn (1993) who also contributed for delimitation of the genus from *Cercospora* Fres., *Cladosporium* Link, *Mycovellosiella* Rangel, *Sirosporium* Bubak & Serebrian, *Veronaea* Cif. & Mantemart. and *Verrucisporota* Shaw & Alcorn.

The species in the genus *Stenella* have shown diverse mode of nutrition (biotrophic/saprotrophic). Most of the species are foliicolous plant pathogens occurring on a wide range of hosts including horticultural, medicinal and forest plants. Some of the species are confined to dead plant parts (de Hoog *et al.* 1993), rotten bark, rotten wood, fallen seed (Matsushima, 1983) and dead leaves (Yip, 1989) in the tropical, sub–tropical and temperate regions.

Of the 113 so far described species of *Stenella*, 52 have been recorded from the Indian sub–continent (Ponnappa, 1968; Pavgi & Singh, 1970; Singh & Kamal, 1978; Deighton, 1979; Kamal *et al.* 1980a; Kamal *et al.* 1980b; Kumar *et al.* 1980; Kamal *et al.*1981; Rajak, 1981; Meckenzie, 1982; Mulder, 1982; Yen *et al.* 1982; Kamal & Narayan, 1986; Singh & Kamal, 1986; Verma & Kamal, 1987; Verma *et al.* 1989; Das, 1990; Rai & Kamal, 1989,1990; Sarbjana, 1990; Sarbjana & Chattopadhyay, 1991; Chaudhary *et al.* 1991; Patil & Sawant, 1991; Shaw & Alcorn, 1993; Khan *et al.* 1994; Khan *et al.* 1995; Srivastava *et al.* 1994, 1995; Hosagoudar & Braun, 1995; Chaudhary *et al.* 1996; Misra *et al.* 1997; Singh *et al.* 1997; Braun & Bagyanarayana, 1999 (in Bagyanarayana & Braun, 1999) and Misra *et al.* 1999). The present paper is an extension of the above mentioned contribution to the taxonomy and systematics of the genus *Stenella*.

Materials and Methods

Leaf samples were brought to the laboratory in separate polythene bags. The specimens with distinct symptoms were dried and preserved following standard mycological herbarium techniques (Hawksworth, 1974). Using sharp razor blade, free–hand sections of the host leaf through infected region were made to study the morphology and taxonomic features of the fungi. The holotypes of new taxa were deposited at the Herbarium Cryptogamae Indiae Orientalis, New Delhi, and part of the holotypes (Isotype) were maintained at the Mycological Herbarium, DDU Gorakhpur University.

Results and Discussion

Stenella cassiae–torae Singh, Bhalla et Bhat **sp. nov.** [Fig. 1] *Maculae* amphigenae, plerumque circulares, superne griseobrunneae, inferne pallide brunneae, parvae vel magnae. *Caespituli* hypophylli, discreti, griseobrunnei. *Mycelium* internum vel plerumque externum; hyphae externae septatae, ramosae, verruculosae,

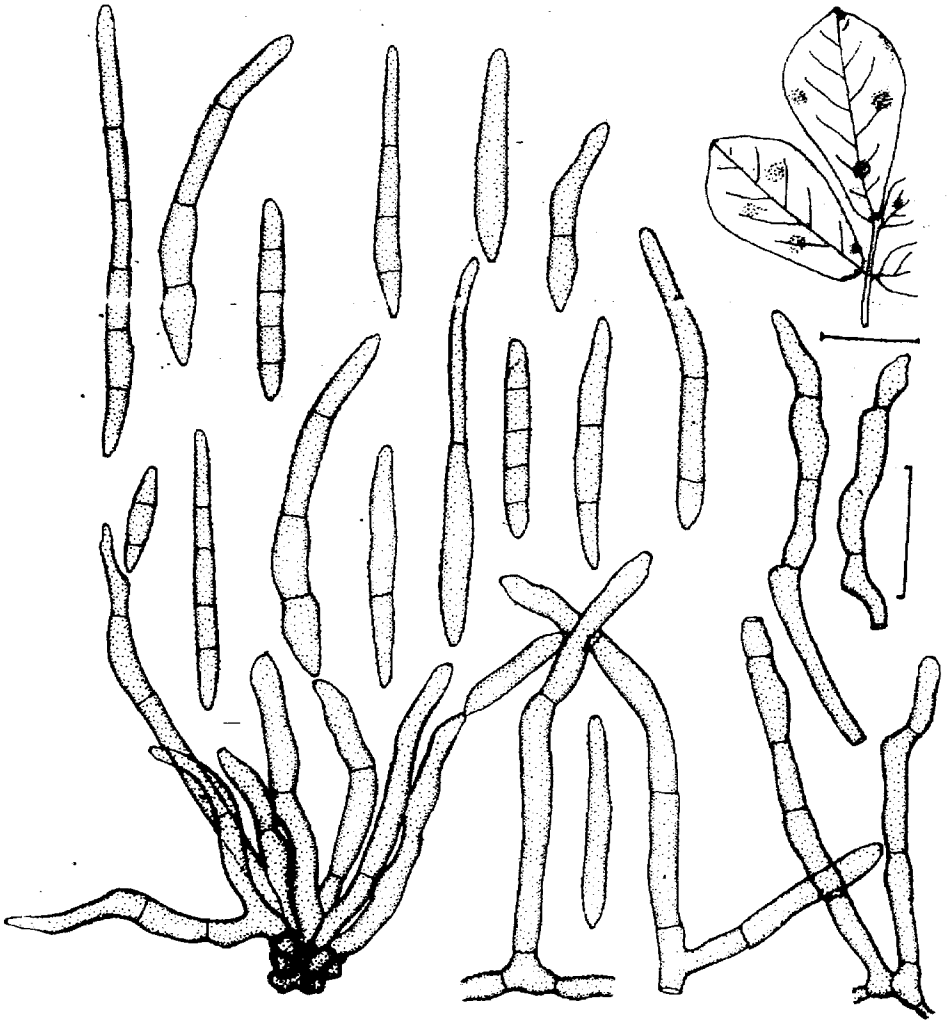

Fig 1. *Stenella cassiae–torae* sp. nov. a. conidiophores arising from subepidermal stromata; b. conidiophores arising from external mycelium; c. conidia; d. leaf spots. (Bars: a–c = 20 m; d = 20 mm)

subhyalinae, 2.5–3.5 µm latae. *Stromata* parva, subepidermalia, prosenchymatosa, brunnea, 7 x 10 µm. *Conidiophora* superficialia, singularia, ex hyphis superficialibus terminaliter et lateriter vel in fasciculo ex stromatibus oriunda, macronematosa, mononematosa, recta vel flexuosa, raro ramosa, 1–5 transverse septata, laevia vel verruculosa, pallideolivacea, 35–78 x 3.5–5 µm. *Cellulae conidiogenae* in conidiophoris incorporatae, plerumque terminales, sympodials, polyblasticae, cylindricae, geniculatae, cicatricatae, cicatricibus incrassatae, 10–30 x 3–5 µm. *Conidia* holoblastiea, acrogena vel acroplurogena, solitaria vel catenata, in catenis simplicibus formata, sicca, cylindrica, verruculosa, recta vel curvata, 1–5 transverse septata, subhylina vel pallide olivacea, apice subacuta vel rotundata, basi obconico attenuata, hilo incrassato, 17–76 x 3.5–5 µm.

In foliis vivis *Cassiae torae* (Caesalpiniaceae). India, Auhraura forest, Mirzapur, U.P., S. K. Singh, Nov. 1997, HCIO 42652 Holotypus, GPU 016/97 Isotypus.

Leaf spots amphigenous, almost circular, greyish brown on upper surface, pale brown on lower surface, small to large. *Colonies* hypophyllous, discrete, greyish–white. *Mycelium* internal to mostly external; external hyphae septate, branched, verruculose, subhyaline, 2.5–3.5 µm wide. *Stromata* feebly developed, subepidermal, prosenchymatous, brown, 7x10 µm. *Conidiophores* arising singly as terminal or lateral branches from superficial hyphae or in fascicles from superficial stromata, semimacronematous to macronematous, mononematous, straight to flexuous, unbranched, 1–5 transversely septate, smooth–walled to verruculose, pale olivaceous, 3.5–54 x 3–5 µm. *Conidiogenous cells* integrated, terminal, sympodial, polyblastic, cyindrical, geniculate, cicatrized, scars thickened, 10–30 x 3–5 µm. *Conidia* holoblastic, acrogenous to acropleurogenous, solitary to catenate in unbranched chains, dry, cylindrical, verruculose, straight to curved, 1–5 transversely septate, subhyaline to pale olivaceous, apex subacute to rounded, base obconically attenuate, hilum thickened, 17–76 x 3.5–5 µm.

Three species of *Stenella*, *S. chandleri* Singh & Kamal (1978), *S. cassiae* Kamal *et al.* (1980 b) and *S. cassiicola* Misra *et al.* (1999) were so far described on the host genus *Cassia*. *Stenella chandleri* differs from *S. cassi–torae* in producing smooth–walled external hyphae. This feature, having smooth–walled external hyphae, however does not fit well within the generic circumscription of *Stenella* and *S. chandleri* should have been accommodated in *Mycovellosiella*. *Stenella cassi–torae* is different from *S. cassiae* and *S. cassiicola* with the former having verruculose conidiophores arising from well–developed intra–epidermal stromata and the latter with smooth–walled conidiophores arising only from external mycelium (Table 1).

Table 1. Comparative analyses of *Stenella* spp reported on host genus *Cassia*

Stenella spp	External mycelium	Stromata	Conidiophores	Conidia
S. chandleri Singh & Kamal (1978) On *Cassia fistula*	Subhyaline, smooth–walled, up to 4.5µm wide	Absent	Arising from external mycelium, unbranched, smooth–walled, 28–120 x 3–6µm	Fusiform, constricted, apex obtuse, base truncate, echinulate, 20–55.5 x 2.5–4.5µm
S. cassiae Kamal, Singh & Kumar (1980b) On *Cassia fistula*	Light olivaceous brown, verruculose, up to 2µm wide	Rarely present, sub–stomatal	Arising from external mycelium, unbranched, smooth–walled, 85.5–150 (usually 55–90) x 4.5–7µm	Cylindrical to occasionally obclavate, not constricted, apex rounded, base truncate to conicotruncate, 12–153 x 3.5–8µm
S. cassiicola Misra, Srivastava & Kamal (1999) On *Cassia fistula*	Subhyaline to brown, up to 2.5µm wide	Absent	Arising from external mycelium, unbranched, smooth–walled, 33–90 x 1.5–4µm	Cylindrical to obclavatocylindrical, not constricted, apex rounded to slightly attenuated, base rounded to obconicotruncate, 19–51 x 1.5–4.5µm
S. cassiae–torae sp. nov. On *Cassia tora*	Subhyaline, verruculose, up to 3.5µm wide	Present, sub–epidermal	Arising from external mycelium and from stromata, unbranched, smooth–walled to verruculose, 3.5–54 x 3–5µm	Cylindrical, not constricted, apex subacute to rounded, base obclavate, 17–76 x 3.5–5µm

Stenella flacourtiae Singh, Bhalla & Bhalla sp. nov. [Fig. 2] *Maculae* primo indistinctae, subcirculares vel rectangulares, griseoalbidae. *Caespituli* hypophylli, effusi, griseobrunnei. *Mycelium* internum vel externum; hyphae externae septatae, ramosae, verruculosae, pallide olivaceaem 1.5–3.5 µm. *Stromata* subepidermalia, pseudoparenchymatosa, olivaceobrunnea, 8–25 µm. *Conidiophora* ex hyphis superficialibus terminaliter et

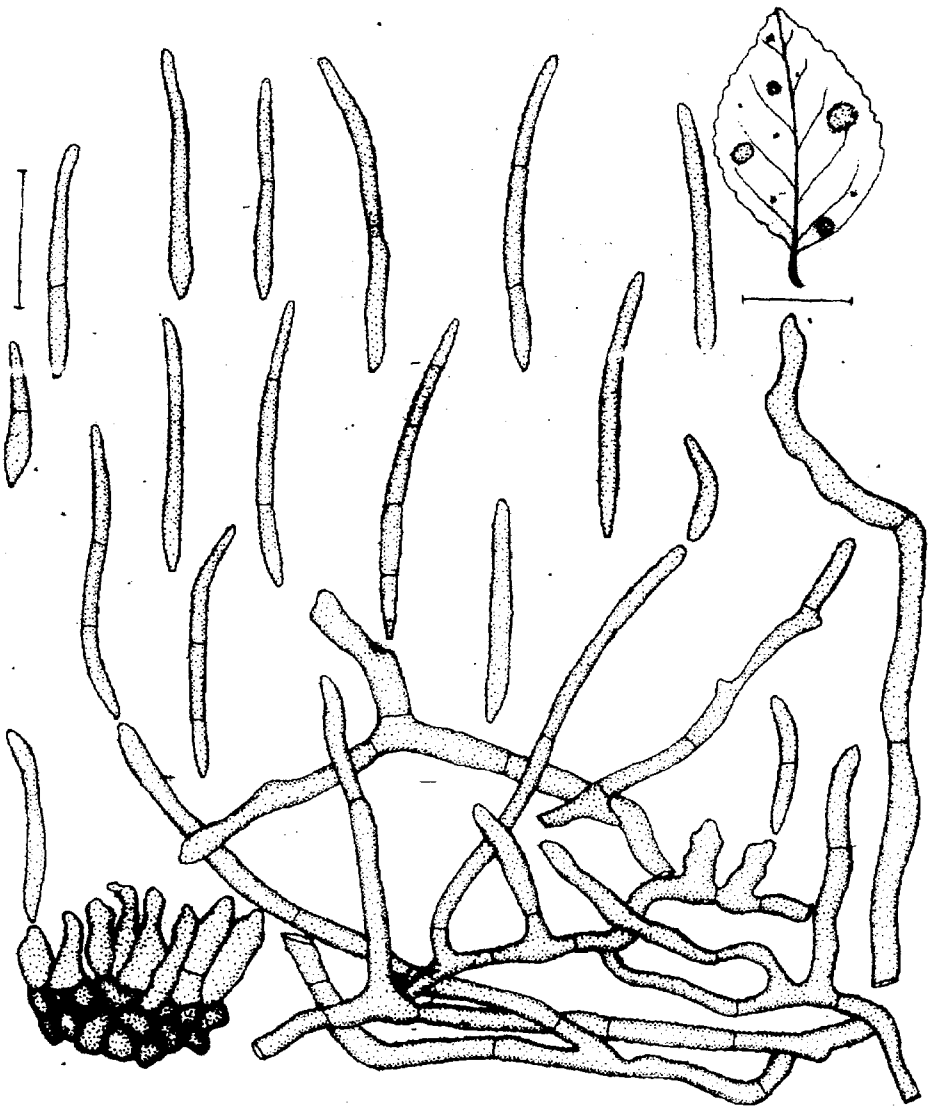

Fig. 2. *Stenella flacourtiae* sp. nov. a. conidiophores arising from subepidermal stromata; b. conidiophores arising from external mycelium; c. conidia; d. leaf spots. (Bars: a–c = 20 µm; d = 20 mm)

lateriter vel in fasciculo ex stromate oriunda, semimacronematosa, mononematosa, recta vel flexuosa, non ramosa, 0–2 transverse septata, laevia, pallide olivacea, 4–80 x 1.5–4.5 µm. *Cellulae conidiogenae* in conidiophoris incorporatae, terminales, sympodiales, polyblasticae, cylindricae, geniculatae, verruculosae, cicatricatae, cicatricibus incrassatae, 12–38 x 2–4 µm. *Conidia* holoblastica, acrogena vel acropleurogena, solitaria vel catenata, in catenis simplicibus formata, sicca, cylindrica, verruculosa, recta vel curvata, 0–4 transverse septata, pallide olivacea, apice sub acuta vel sub obtusa, basi leniter obconico attenuata, hilo incrassato, 15–47 x 2–2.5 µm.

In foliis vivis *Flacourtiae* sp. (Flacourtiaceae), India, Auhraura forest, Mirzapur, U.P., S. K. Singh, Nov. 1997, HCIO 42653 Holotypus, GPU 017/97, Isotypus.

Leaf spots primarily indistinct, later appearing as subcircular or somewhat oval to rectangular tiny patches on upper surface, with thin and somewhat darker border surrounding the greyish–white centre. *Colonies* hypophyllous, effuse, greyish brown. *Mycelium* internal to external, external hyphae septate, branched, verruculose, pale olivaceous, 1.5–3.5 µm wide. *Stromata* subepidermal, pseudoparenchymatous, olivaceous brown, 8 x 25 µm. *Conidiophores* arising singly as terminal or lateral branches from superficial hyphae or in fascicles from stromata, semimacronematous to macronematous, mononematous, straight to flexuous, unbranched, 0–2 septate, smooth–walled, pale olivaceous, 4–80 x 1.5–4.5 µm. *Conidiogenous cells* integrated, terminal, sympodial, polyblastic, cylindrical, geniculate, verruculose, cicatrized, bearing thickened conidial scars. *Conidia* holoblastic, acrogenous to acropleurogenous, solitary to catenate in simple chains, dry, cylindrical, verruculose, straight to curved, 0–4 transversely septate, pale olivaceous, apex subacute to subobtuse, base somewhat obconically attenuated, hilium thickened, 15–47 x 2–2.5 µm.

Although, the proposed species shows resemblance with *Stenella alyxiae* Yip (1989), *S. smilacis* Kumar *et al.* (1980), *S. sardoa* (Sacc.) Braun (1993) and *S. shoreae* Khan *et al.* (1995) in conidium dimensions, it differs in producing thin–walled, single conidiophores from verruculose external mycelium as well as in fascicles from intraepidermal stromata. The most distinguishing feature of this taxon, however, is the upper rough–walled conidiogenous portion with the lower portion of the conidiophores remaining almost smooth–walled. *Stenella flacourtiae* is the first species of the genus to be recorded on a host of the family Flacourtiaceae.

Stenella ichnocarpicola Singh, Bhalla & Bhat **sp. nov.** [Fig. 3] *Maculae* amphigenae, plerumque circulares vel irregulares, interdum coalescentes, olivaceo brunneae. *Caespituli* hypophylli, effusi, griseobrunnei vel luteobrunnei. *Mycelium* internum vel externum; hyphae externae septatae, ramosae, verruculosae, subhyalinae vel pallide olivaceae, 2.5–4 µm latae. *Stromata* intraepidermalia, pseudoparenchymatosa, atrobrunnea, 18.5–22.5 µm lata, 15–17.5 µm alta. *Conidiophora* singularia, ex hyphis superficialibus terminaliter et lateriter vel in fasciculo ex stromatibus oriunda, macronematosa, mononematosa, recta vel flexuosa, non–ramosa, 0–5 transverse septata, verruculosa, pallide olivacea, 7–61 x 2.5–3.5 µm. *Cellulae conidiogenae* in conidiophoris incorporatae terminales, sympodiales, polyblasticae, cylindricae, raro geniculatae, cicatricatae, cicatricibus incrassatae, 7–22 x 2–4 µm. *Conidia* holoblastica, acrogena vel acropleurogena, solitaria vel catenata, in catenis simplicibus formata, sicca, cylindrica, verruculosa, recta vel curvata, 1–4 transverse septata, pallide olivacea, apice subacuta vel subobtusa, basi obconico–truncata, hilo conspicuo et leniter incrassato, 15–87.5 x 3–5.5 µm.

In foliis vivis *Ichnocarpi frutescentis* (Apocynaceae) India, Kolana, Mirzapur, U. P., S. K. Singh, Feb. 1997, HCIO 42544 Holotypus, GPU 02/97 Isotypus.

Leaf spots amphigenous, almost forming concentric rings or sometimes irregular on upper surface, sometimes due to sporulation appearing dispersed and, covering large areas of the lower leaf surface, olive brown. *Colonies* hypophyllous, effuse, light brown to greyish brown. *Mycelium* internal and external, external hyphae septate, branched, finely verruculose, subhyaline to olivaceous, 2.5–4 µm wide. *Stromata* intraepidermal, pseudoparenchymatous, dark brown, 18.5 – 22.5 µm wide, 15–17.5 µm high. *Conidiophores* arising singly as terminal or lateral branches from superficial hyphae or in fascicles from stromata, macronematous, mononematous, straight to flexuous, unbranched, 0–5 transversely septate, finely verruculose, light olivaceous, 7–61 x 2.5–3.5 µm. *Conidiogenous cells* integrated, terminal, sympodial, polyblastic, cylindrical, rarely geniculate, bearing broad, thickened scars. *Conidia* holoblastic, acrogenous to acropleurogenous, solitary to catenate in simple chains, dry, cylindrical, verruculose, straight to curved, 1–7 transversely septate, light olivaceous, apex subacute to subobtuse, base obconico–truncate, hilum distinct and slightly thickened, 15–87.5 x 3–5.5µm.

Of the hitherto two species of *Stenella* described on host family Apocynaceae, *S. plumeriae* Sarbjana &

Chattopadhya (1991) and *S. alyxiae* Yip (1989), *S. plumeriae* is different from *S. ichnocarpicola* in the former having micronematous conidiophores as opposed to macronematous in the latter. *Stenella plumeriae* also demands redescription and disposition because of micronematous conidiophores which do not conform with the generic concept of *Stenella*. *Stenella alyxiae* differs from *S. ichnocarpicola* in having solitary

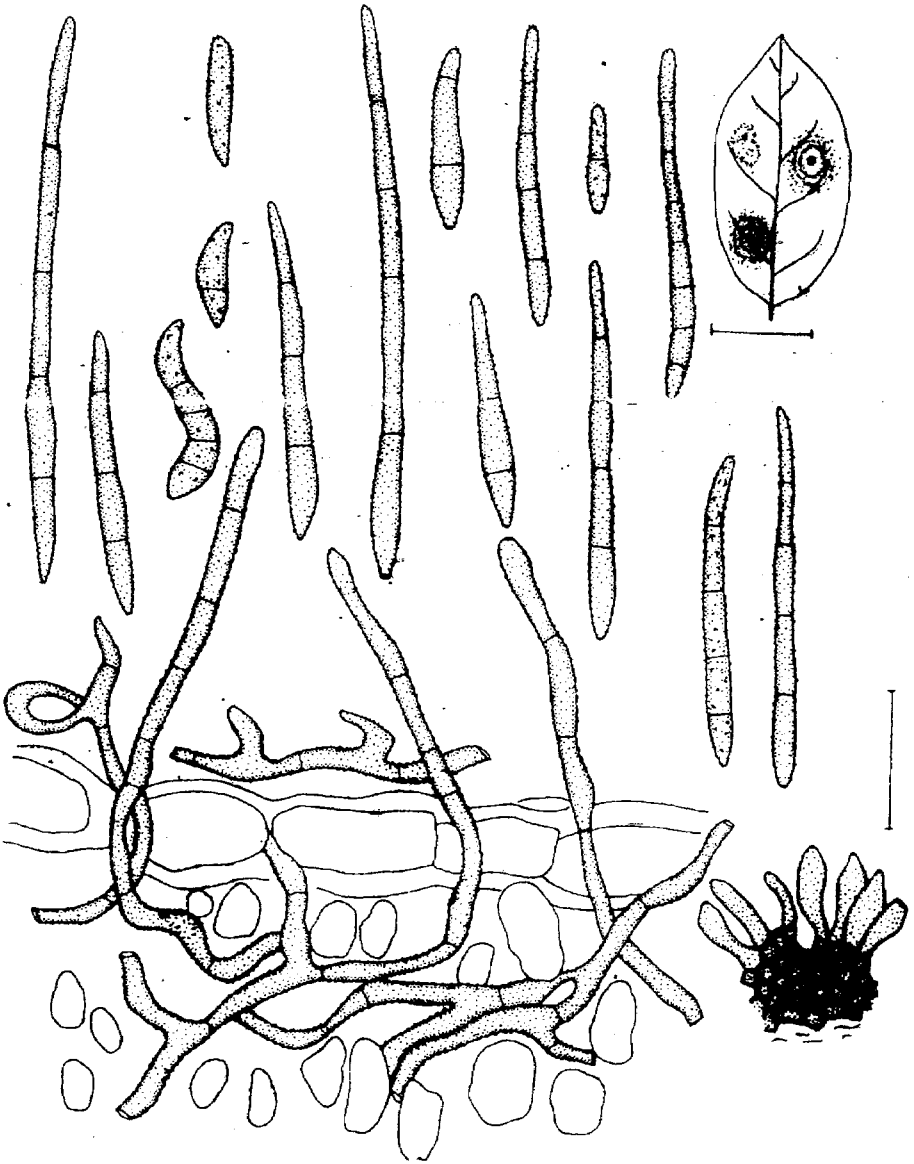

Fig 3. ***Stenella ichnocarpicola*** **sp. nov. a. conidiophores arising from intraepidermal stromata; b. section through leaf tissue, showing conidiophores arising from, external and internal mycelium; c. conidia; d. leaf spots (Bars: a–c = 20 µm ; d=20 mm)**

Table 2. Comparative analyses of *Stenella* spp reported on Apocynaceae

Stenella spp	Hyphae	Stromata	Conidiophores	Conidia
S. alyxiae Yip (1989) On *Alyxia buxifolia*	2.2–4.5µm wide, verruculose to verrucose	Absent	Arising from aerial hyphae, macronematous, verruculose, very seldom verrucose, up to 25 x 3.5–4.5µm, conidiogenous loci many	Solitary, cylindrical, apices obtuse, bases truncate with dark scars, verrucose, very seldom smooth, 20–52 x 2–3µm
S. plumeriae Sarbanja & Chattopadhyay (1991) On *Plumeria* sp.	3.5–5µm wide, finely verruculose	Present, substomatal	Arising from external secondary mycelium, and in 3–20 divergent fascicles through stomata, micronematous, smooth, thick–walled, 33–82.5 x 3–4.5µm, conidiogenous loci many	Solitary, obclavatocylindrical, apices sub–obtuse, bases attenuated with slightly dark scars, verruculose, 16.5–99 x 3.5–5µm
S. ichnocarpila sp. nov. On *Ichnocarpus frutescens*	2.5–4µm wide, finely verruculose	Present, intraepidermal	Arising from external mycelium, and in fascicles from stomata, macronematous, finely verrucufose, thin–walled, 7–64 x 2.5–3.5µm	Catenate, cylindrical, apices sub–acute to sub–obtuse, bases obclavate to obconicotruncate with slightly dark scars, verruculose, 1.5–87.5 x 3.5–5µm

conidia as against catenate ones in the proposed new species. The conidia are verrucose and broadly thickened in *S. alyxiae* whereas these are verruculose and narrowly thickened in S. *ichnocarpicola* (Table 2).

Stenella mirzapurensis Singh, Bhalla & Bhat sp. **nov.** [Fig.4] Maculae amphigenae, rectangulares, interdum venis limitatae, saepe fuscobrunneae, inferne brunneae. *Caespituli* amphiphylli, effusi, grisi. *Mycelium* internum vel externum; hyphae externae, septatae, ramosae, verruculosae, subhyalinae, 3–5 µm latae. *Stromata* substomatalia, atrobunnea, 20 µm lata, 17 µm alta. *Conidiophora* singularia, ex hyphis superficialibus terminaliter et latiriter vel in fasciculo ex stromatibus oriunda, semimacronematosa vel macronematosa, mononematosa, recta vel flexuosa, non–ramosa, 0–3 transverse septata, verruculosa, pallide olivacea vel brunnea, 3.5–54 x 3–5 µm. *Cellulae conidiogenae* in conidiophores incorporatae, terminales vel intercalares, sympodiales, polyblasticae, cylindricae, geniculatae, cicatricatae, cicatricibus incrassatae, 8–23 x 2–5 µm. *Conidia* holoblastica, acrogenosa vel acropleurogenosa, solitaria vel catenata, in catenis raro ramosis formata, sicca, cylindrica vel obclavata, verruculosa, recta vel curvata, 0–8 transverse septata, pallide olivacea, apice sub–acuta vel rotundata, basi obconico attenuata vel rotundata, hilo conspicuo, leniter incrassata, 16–100 x 3–7 µm.

In foliis vivis *Passiflorae foetidae* (Passifloraceae), India, Kolana, Mirzapur, U.P., S.K.Singh, Feb.1997, HCIO 42545 holotypus, GPU 1/97 isotypus.

Leaf spots amphigenous, rectangular sometimes vein–limited, blackish brown on upper surface, light brown on lower surface, later becoming necrotic with a greyish white centre surrounded by a thin and darker margin. *Colonies* amphiphyllous, effuse, with greyish sporulation in centre of the necrotic lesion. *Mycelium* internal and external; external hyphae septate, branched, finely verruculose, subhyaline, 3–5 µm wide. *Stromata* substomatal, pseudo–parenchymatous, dark brown, up to 20 µm wide, 17 µm high. *Conidiophores* arising singly as terminal or lateral branches from superficial hyphae or in fascicles from stromata, semi–macronematous to macronematous, mononematous, straight to flexuous, unbranched, with 0–3 transverse septa, finely verruculose, light olivaceous to brown, 3.5–54 x 3–5 µm. *Conidiogenous cells* integrated, terminal to intercalary, sympodial, polyblastic, cylindrical, geniculate bearing slightly thickened scars, 3.5–23 x 3–5 µm. *Conidia* holoblastic, acrogenous to acropleurogenous, solitary to catenate, rarely in branched chains, dry, cylindrical to obclavate, verruculose, straight to curved, with 0–8 transverse septa, light olivaceous, apex subacute to rounded, base obconically attenuated to rounded, hilum distinct and slightly thickened, 16–100 x 3–7 µm.

Stenella has so far not been reported from the host species, genus or family and therefore, the new fungus is comparable with other known species of *Stenella* showing similar morphological features. Majority of the *Stenella* species produce single conidiophores from superficial hyphae. *Stenella mirzapurensis* produces fasciculate conidiophores from substomatal stromata, in addition to superficial single ones. The new species is

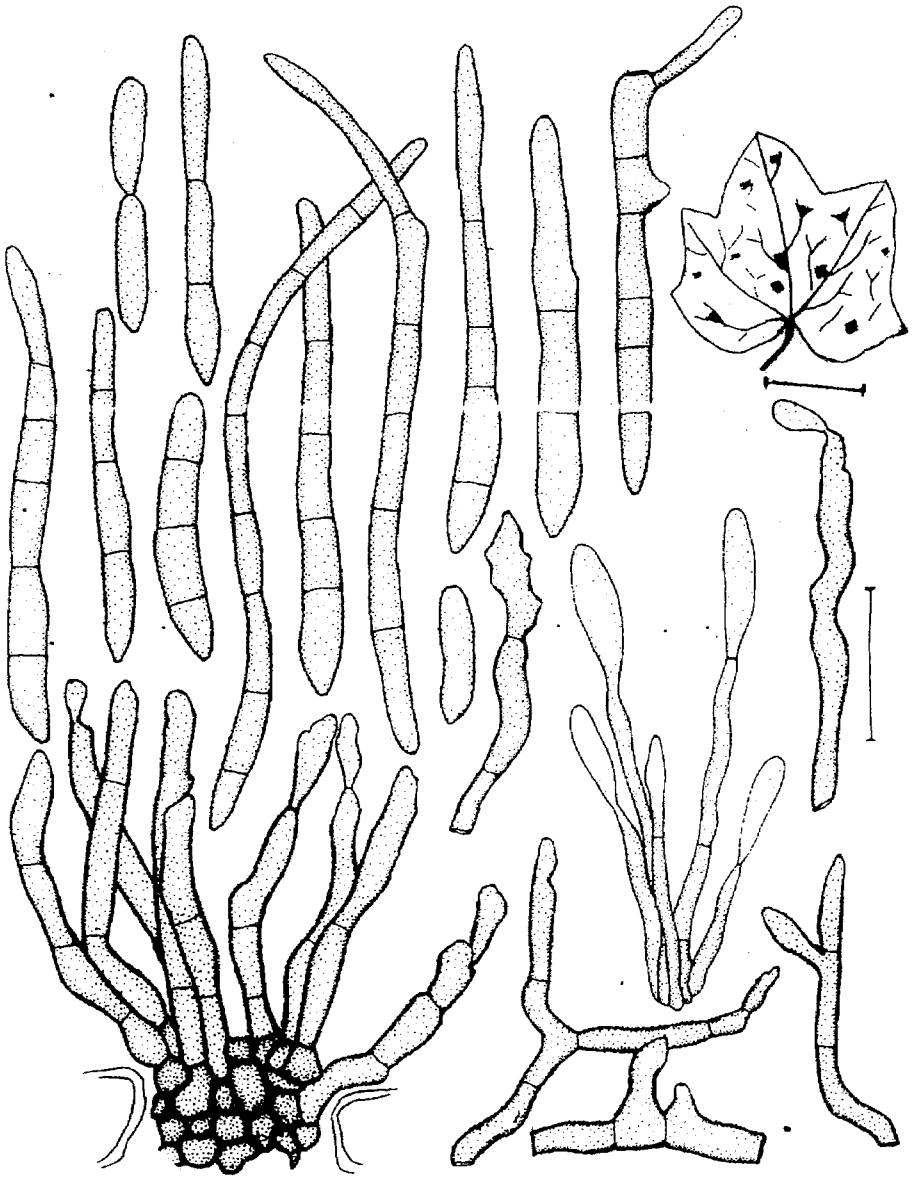

Fig 4. *Stenella mirzapurensis* sp. nov. a. conidiophore arising from substomatal stromata; b. conidiophores arising from superficial hyphae; c. conidia; d. leaf spots (Bars: a–c = 20 µm ; d = 20 mm).

comparable with *S. xeromphigena* Yen *et al.* (1982), *S. schizandrae* Pavgi & Singh (1970), *S.dianthi* Shin & Braun (1993), *S. embeliae* Rajak (1981), *S. tiliacori* Sarbajna (1990), *S. alocasiae* Sarbajna & Chattopadhyay, *S. plumeriae* Sarbajna & Chattopadhyay (1991) and *S. cassiae–torae* sp. nov. However *S. xeromphigena* is different in having subcuticular stromata, *S. schizandrae* with serrate and larger conidiophores, *S. dianthi*, *S. plumeriae*, *S. embeliae* and *S. tiliacori* in having smooth–walled conidiophores and *S. alocasiae* producing larger and more septate conidiophores as well as smaller and echinulate conidia. *Stenella cassiae–torae* sp. nov. and *S. ichnocarpicola* are distinct from *S. mirzapurensis* in having subepidermal stromata which are substomatal in the latter.

Key to known species of *Stenella* from Apocynaceae

1. Conidiophores macronematous and thin–walled 2
1. Conidiophores micronematous and thick–walled .....*plumeri*
2. Cylindrical conidia solitary and verrucose .....*alyxiae*
2. Cylindrical conidia catenate and verrucose .....*ichnocarpicola*

Key to the known species of *Stenella* from *Cassia*

1. External mycelium verruculose 2

External mycelium smooth–walled.....*chandleri*

2. Stromata present.....3

Stromata absent.....*cassiicola*

3. Conidiophores verruculose.....*cassiae–torae*

Conidiophores smooth–walled.....cassiae

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References

Bagyanarayana, G. and U. Braun. 1999. Phytopathogenic micromycetes from India (II). *Sydowia* 51: 1–19.

Braun, U. 1993. Taxonomic Note on some species of the *Cercospora*–complex (III). *Mycotaxon* 48: 275–298.

Casteneda Ruiz, R.F. and W.B. Kendrick. 1991. Univ. Waterloo Biol. Ser. 35: 1–132.

Chaudhary, R., C. Gupta and Kamal. 1991. New species of *Heterocamium*, *Pseudocercospora* and *Stenella* from India. *Mycol. Res.* 95: 1070–1073.

Chaudhary, R.K., S.K. Singh and G. Morgan–Jones. 1996. Notes on Hyphomycetes. LXXI. New Species of *Stenella*, *Stenellopsis* and *Tretospora* from Nepal. *Mycotaxon* 57: 201–209.

Das, A.K. 1990. A new species of *Stenella* Sydow from West Bengal. *Journal of Mycopathological Research* 28: 147–151.

De Hoog, G.S., M.A. Rahman and T. Boukhout. 1993. *Ramichloridium*, *Veronaea* and *Stenella*: generic delimitation, new combination and two new species. *Trans. Br. mycol. Soc.* 81: 485–490.

Deighton, F.C. 1971. Brown leaf mould of *Canavalia* caused by *Stenella canavaliae* (H. & P. Syd.) comb. nov. *Trans. Br. mycol. Soc.* 56: 411–418.

Deighton, F.C. 1979. Studies on *Cercospora* and allied genera. VII. New species and redispositions. *Mycol. Pap.* 144: 1–56.

Hosagoudar, V.B. and U. Braun. 1995. Two new Indian Hyphomycetes. *Indian Phytopath.* 48: 260–262.

Kamal, Kumar, P. and B. Rai. 1981. A new interesting hyphomycete from India. *Indian J. Mycol. Pl. Pathol.* 11: 144–145.

Kamal and P. Narayan. 1986. Fungi from hilly tracts of Uttar Pradesh–I. *Indian Phytopath.* 39: 198–203.

Kamal, B. Rai and P. Kumar. 1980a. A new species of *Stenella* from India. *Curr. Sci.* 49: 234–235.

Kamal, R.P. Singh and P. Kumar. 1980b. Fungi of Gorakhpur XVII. *Stenella*. *Sydowia* 33: 62–166.

Khan, M.K., Kamal and G. Morgan–Jones. 1995. Notes on Hyphomycetes. LXIV. New species of *Mycovellosiela*, *Phaeoisariopsis*, *Sirosporium* and *Stenella* from India. *Mycotaxon* 54: 27–36.

Khan, M.K., Khan, M.S. and Kamal. 1994. New species of *Pseudocercospora* and *Stenella* from India. *Mycol. Res.* 98: 1277–1283.

Kumar, P., D.N. Shukla and Kamal. 1980. A new species of *Stenella* from India. *Curr. Sci.* 49: 234.

Matshushima, T. 1983. Matshushima Mycol. Memoirs 3: 17–18.

Mckenzie, E.H.C., 1982. New hyphomycetes on monocotyledons. *NZ J. Bot.* 20: 245–252.

Misra, S., N. Srivastava and A.K. Srivastava. 1997. New species of *Stenella* from India. *Mycol. Res.* 101: 278–280.

Misra, S., A.K. Srivastava and Kamal. 1998. Further additions to *Stenella* from India and Nepal. *Mycol. Res.* 103: 268–270.

Mulder, J.L. 1975. Notes on *Stenella*. *Trans. Br. mycol. Soc.* 65: 514–517.

Mulder, J.L. 1982. New species and combinations in *Stenella*. *Trans. Br. Mycol. Soc.* 79: 469–478.

Patil, M.S. and R.S. Sawant. 1991. Studies on Hyphomycetes I. *Indian Phytopath.* 44: 145–20.

Pavgi, M. S. and U.P. Singh. 1970. Parasitic fungi from North–India. *Sydowia* 24: 113–119.

Ponnappa, K.M. 1968. Some interesting fungi–II. *Cercospora hydrophilae* sp. nov. and *Stenella plectroniae* sp. nov. *Proc. Indian Acad. Sci.* 67:31–34.

Rai, A.N. and Kamal 1989. A new *Stenella* species form India. *Mycol. Res.* 93: 398–399.

Rai, A.N. and Kamal 1990. A new *Stenella* from India. *Indian Phytopath.* 43: 214–216.

Rajak, R.C. 1981. A new species of *Stenella* from India. *Acta Bot. Indica* 9: 132–133.

Sarbajna, K.K. 1990. New foliicolous hyphomycetes from India. *J. Eco. Tax. Bot.* 14: 487–452.

Sarbajna, K.K. and B.K. Chattopadhyay. 1991. New *Stenella* species from India. *J. Mycopathol. Res.* 29: 31–38.

Shaw, D.E. and J.L. Alcorn. 1993. New names for *Ver*[illegible]*cispora* and its species. *Aust. Syst. Bot.* 6: 273–276.

Shin, H.D. and U. Braun. 1993. Notes on Korean Cercosporae and allied genera. *Mycotaxon* 49: 351–362.

Singh, S. and Kamal. 1978. Fungi of Gorakhpur VI. *Indian Phytopath.* 31: 315–317.

Singh, A.K. and Kamal. 1986. Fungi from hilly tracts of Uttar Pradesh. *Indian Phytopath.* 39: 274.

Singh, S.K., A. Singh and Kamal. 1997. Additons to *Phaeoramularia* and *Stenella* from Indian Sub–Continent. *Mycol. Res.* 101: 530–534.

Srivastava, K., A.K. Srivastava and Kamal. 1994. New species of *Stenella* from India. *Mycol. Res.* 98: 516–520.

Srivastava, K., Srivastava, A.K. and Kamal. 1995. New species of *Stenella* from India. *Mycol. Res.* 99: 233–236.

Sydow, H. 1930. Fungi Venezuelani. *Ann. Mycol.* 28: 29–244.

Verma, R.K., U. Budathoki and Kamal. 1989. New species of *Phaeoramularia, Pseudocercospora* and *Stenella* from Nepal. *Indian Phytopath.* 42: 53–60.

Verma, R.K. and Kamal. 1987. New species of *Pseudocercospora, Phaeoisariopsis, Sarcinella* and *Stenella* from Uttar Pradesh, India. *Trans. Br. mycol. Soc.* 89: 67–72.

Yen, J.M., Kar, A.K. and Das, B.K. 1982. Studies on Hyp[illegible] from West Bengal, India. I–III. *Mycotaxon* 16: 35–95.

Yip, H.Y. 1989. *Stenella alyxiae* sp. nov.: the anamorph of *Mycosphaerella alyxiae*. *Mycol. Res.* 92: 373–375.