APPENDIX 2

a) Paper published:

i) Studies in fungal biodiversity from Western Ghats, India- Genus *Myriangiella* Zimm.
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b) Paper accepted for publication in Press:

i) Studies of some Noteworthy fungi from Maharashtra.
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STUDIES IN FUNGAL BIODIVERSITY FROM WESTERN GHATS, INDIA- GENUS *MYRIANGIELLA* ZIMM.

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ABSTRACT

The present paper deals with the study of 10 taxa of the genus *Myriangiella* Zimm. Out of these, eight new combinations, one new species and a new variety have been proposed. These are: *Myriangiella cabraliae* (Bat. and Lima) comb. nov., *M. cordiae* (Bat. and Lima) comb. nov., *M. duckei* (Bat. and Lima) comb. nov.; *M. lecithicola* (Bat. and Lima) comb. nov., *M. longispora* sp. nov., *M. paullinae* (Bat. and Lima) comb. nov., *M. protiana* (Bat. and Lima) comb. nov., *M. rionegrensis* (Bat., Holand and Peres) comb. nov., *M. roupalae* Syd.var. *batistae* var. nov., and *M. swartiziae* (Bat. and Lima) comb. nov. The genus has been recorded for the first time in India.

INTRODUCTION

The genus *Myriangiella* Zimm. (Schizothyriaceae-Dothideineae-Dothideales) is an ectoparasitic, foliicolous fungus. It is collected from cool, moist, localities of Western Ghats in India, represented by a dozen species in subtropical region of the world. The genus is characterized by having superficial, appressed, dimidate-scutate, isolated ascomata, asci bitunicate, cylindro-ellipsoidal with hyaline, multiseptate ascospores. The collections of the genus *Sydowiellina* were made synanomous with the genus *Myriangiella* Zimm. by von Arx & Muller (1975) and Eriksson (1987). Therefore, this scheme is also followed in this paper and new combinations are proposed.

MATERIALS AND METHODS

The infected leaves were collected from different localities in Western Ghats in winter and summer seasons. Cool and moist atmosphere was found to favour their growth on dry and semi-dry leaves. The ascomata, asci and ascospores were studied by preparing semipermanent micro preparations in cotton blue and mounted in lactophenol. The bitunicate nature of asci was studied by staining with 1% Congo red. Upto-date literature was consulted for their identification and characterization (von Arx & Muller 1975; Eriksson 1987; Patil et al. 2006). Dry herbarium of the materials were prepared and deposited at HCIO, New Delhi with Nos.- 40693 to 40702. The slides were deposited in the museum of the institute. The Camera Lucida drawings were taken and figures prepared at various magnifications.

DESCRIPTIONS

1. *Myriangiella cabraliae* (Bat. & Lima) comb. nov.

= *Sydowiellina cabraliae* Bat. and Lima, Publ. Inst. Mic. Uni. Recife 56: 398-399, 1959.

Remarks: Batista and Lima (1959) recorded *Sydowiellina cabraliae* Bat. & Lima

on *Cabralea canangera* Saldanha from Africa. The present collection was identical with this species in overall morphological features. In the present collection 11-13 septate ascospores were observed in contrast to 11-17 septate in the earlier species. This may be due to environmental factors, like humidity and temperature. Since *Myriangiella* Zimm. is a valid genus, present collection is being transferred to it as new combination, *M. carbralie* (Bat. & Lima) comb. nov.. This makes a new record to the fungi of India and *Psidium guyava* L. is the new host record.

Habitat; Collected on living leaves of *Psidium guyava* L. (Myrtaceace), Shelap (Dist. Kolhapur), 19thMarch 1985, Leg. A. B. Pawar, HCIO 40693.

2. *M. cordiae* (Bat. and Lima) comb. nov.

= *Sydowiellina cordiae* Bat. and Lima, Publ. Inst. Mic. Uni. Recife 56: 399-400, 1959.

Remarks: Batista and Lima (1959) recorded *S. cordiae* Bat. & Lima on *Cordia sellowiana* Cham. from Africa. The present collection was found to be matching well in all respects with *S. cordiae*, except having larger ascomata. Thus the present collection has been transferred to it and proposed a new combination as *M. cordiae* (Bat. & Lima) comb. nov. It makes a new record to the fungi of India and *Ixora coccinea* L. is the additional host record.

Habitat: Collected on living leaves of *Ixora coccinea* L. (Rubiaceae), Amboli (Dist. Sindhudurg), 1stMay 1984, Leg. A. B. Pawar, HCIO 40694.

3. *M. duckei* (Bat. and Peres) comb. nov.

= *Sydowiellina duckei* Bat. and Peres, Publ. Inst. Mic. Uni. Recife 393: 14-16, 1963.

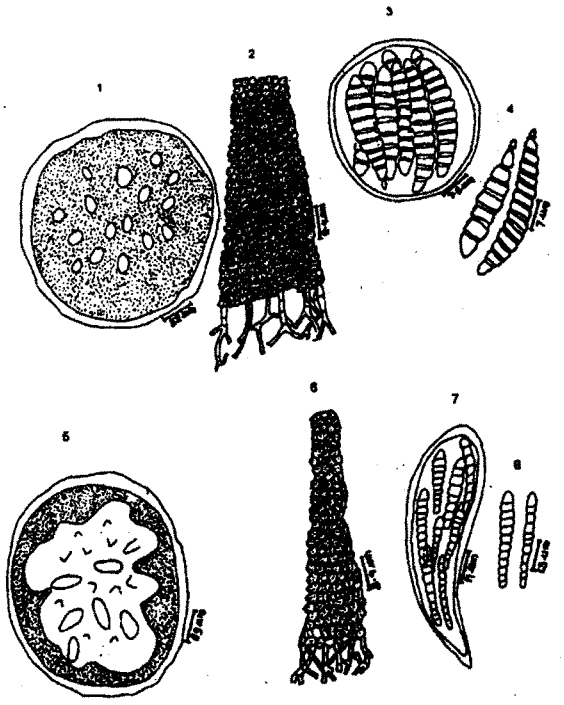
Remarks: Batista & Peres (1963) recorded this as *Sydowiellina duckei* Bat. & Peres. on

Table 1. Comparative account of morphotaxonomic features of 4 spp. of *Myriangiella* Zimm.

Species	Ascomata (diam.in µm)	Asci (µm)	Ascospores (µm)	Septation	Host	Locality
M. orbicularis Zimm.(Type)	-	45-50 x 32	50 x 15	10-12	*Coffea liberica*	Java
M. arcuata Toro	425-550	40-55	45-54 x 8-9	9-11	*Caesaria aculeata*	Brazil
M. roupalae (Syd.) v. Arx & Muller	300-600	40-70 x 17-27	30-35 x 5-8	7-9	*Roupalia veranguiensis*	Costa-Ricca
M. longispora sp. nov.	425-500	104-124x31-47	78-93x13	17-20	*Maba nigrescence* Dalz.	Amboli (Dist.-Shindh-udurg)

Table 2. Comparative account of morphotaxonomic features of *M. arcuata, S. paullinae* and the present collections.

Species	Ascomata (diam. in µm)	Asci (µm)	Ascospore (µm)	Host	Locality
Myriangiella arcuata Toro	425-550	40-55	45-54 x 8-9 (9-11 septate)	*Casearia aculeate*	Brazil
Sydowiellina paullinae	350-400	27-62x27-36	28-41 x 8-11 (4-9 septate)	*Paullinia pinnata*	Africa
M. paullinae (Bat. & Lima) comb.nov.	375-572	30-66 x 35	32-44 x 6 (7-11 septate)	*Glochidion tomentosum* Dalz.	Vishalgad (Dist.-Kolhapur)



Figs. 1-8. *Myriangiella longispora* sp. *nov.* (1-4), ascocarp: (1), part of the ascocarp enlarged (2), asci with ascospores (3), and ascospores (4). *Myriangiella roupalae* Syd. var. *batistae* var. *nov.* (5-8), ascocarp: (5), part of the ascocarp enlarged (6), asci with ascospores (7), and ascospores (8).

an unidentified plant from Africa. The present collection was found to be identical with this species, except having 10-12 septate ascospores in contrast to 4-6 septate in earlier species. Therefore, a new combination has been proposed as *Myriangiella duckei* (Bat. & Peres) comb. nov. This makes a new record to the fungi of India and *Derris scandense* Benth. as an additional host record.

Habitat: Collected on living leaves of *Derris scandense* Benth. (Fabaceae), Amboli (Dist. Sindhudurg), 26thFeb. 1984, Leg. A. B. Pawar, HCIO 40695.

4. *M. lecithicola* (Bat. and Lima) comb. nov.

= *Sydowiellina lecithicola* Bat. and Lima. Publ. Inst. Mic. Uni. Recife 56: 400-401,1959.

Remarks: Batista and Lima (1959) recorded this species as *Sydowiellina lecithicola* Bat. & Lima on *Lecithis* sp. from Africa. The present collection was found to match morphologically in all respects with *S. lecithicola* Bat. & Lima, except ascospore septation. In the present collection, ascospore are 10-13 septate, while it is 7-17 septate in earlier described species. Thus, the present collection is also transferred to *Myriangiella* and a new combination is proposed, *M. lecithicola* (Bat. & Lima) comb. nov. It makes a new record to the fungi of India and *Anodendron paniculatum* DC. is the new host record.

Habitat: Collected on living leaves of *Anodendron paniculatum* DC. (Apocynaceae), Gaganbawada (Dist. Kolhapur), 1stFeb.1984, Leg. A. B. Pawar, HCIO 40,696.

5. *M. longispora* sp. nov.(Figs. 1-4).

Mycelio libero absentae; ascomata epiphyllous, superficialibus, sparsis, orbicularae, dimidata-scutata; non-ostiolata, brunneus, 425-500 µm in diam., hymenium simplicibus, hyalinae, ascomata marginalibus pelliculosum et hyphis hyalinae, ramosis, 1-3µm in diam.; asci clavatus vel cylindro-ellipsoidus, subsessilis, bitunicatae, 8-spori, apseudoparaphysatibus, 104-124 x 31-47 µm; ascospori fusoides, parallellae, 17-20 septatae, constrictae, cellulae, unequalie, apicem rotundatae, hyalinae, levibus, 78-93 x 13µm. Status conidialies non visa.

Habitato: *Typus lectus* in foliis *Maba nigrescence* Dalz. (Ebenacae), Amboli (Dist. Sindhudurg), 26th Feb.1984, Leg. A. B. Pawar, HCIO 40,697 holotypus.

Free mycelium absent; ascomata superficial, orbicular, dimidate-scutate,

astomatous, dehiscent, irregular, 425-500 µm in diam., superior wall brown, pesudo-parenchymatous, cell polygonal to rectangular, 3-6 x 3 µm; hymenium hyaline, ascomata marginally pelliculose; hyphae hyaline, reticulate, shortly stipitate, bitunicate, 8-spored, apseudoparaphysate, 104-124 x 31-47 µm; ascospore fusoid, parallel, 17-20 septate, constricted at the septa, middle cell rectangular, basal and terminal cells rounded at both the ends, separated at maturity, hyaline, smooth-walled, 78-93 x 13 µm. Conidial state not observed.

Habitat: Collected on living leaves of *Maba nigrescence* Dalz. (Ebenacae), Amboli (Dist. Sindhudurg), 26th Feb.1984, Leg. A.B. Pawar, HCIO 40, 697 holotype.

Remarks: The present collection is compared with the three recorded species of the genus *Myriangiella* Zimm. in respect of morphology and dimensions of ascomata, asci and ascospores (Table 1). The present collection is identical with the type species and recorded species in respect of dimension of ascomata, but the asci and ascospores are considerably larger, therefore, a new species has been proposed to accommodate the present collection as *M. longispora* sp. nov.

Etymology: The specific epithet refer to long ascospores.

6. *M. paullinae* (Bat. & Lima) comb. nov.

= *Sydowiellina paullinae* Bat. & Lima Publ. Inst. Mic. Uni. Recife 56: 402, 1959.

Remarks: Batista and Lima (1959) recorded this species as *Sydowiellina paullinae* Bat. & Lima on *Paullinia pinnata* L. from Africa. The present collection was found to match well with the *S. paullinae* in many respects, except ascomata, which are slightly larger, and therefore, referred to it. von Arx & Muller (1975) considered this genus as invalid and transferred to *Myriangiella* Zimm. and also considered this species as synonymous to *M. arcuata* Toro, but it is observed that the ascomata and ascospores of *S. paullinae* are smaller, while asci are slightly larger than *M. arcuata* (Table 2). They do not match at all, therefore, *S. paullinae* Bat. & Lima should not be considered as synonymous to *M. arcuata.* Here the present species has been transferred and a new combination is proposed as *M. paullinae* (Bat. & Lima) comb. nov. This makes a new record to the fungi of India and *Glochidion tomentosum* Dalz. is the additional host record.

Habitat: Collected on living leaves of *Glochidion tomentosum* Dalz. (Euphorbiaceae), Vishalgad (Dist. Kolhapur), 16th April 1984, Leg. A. B. Pawar, HCIO 40,698.

7. *M. protiana* (Bat. & Lima) comb. nov.

= *Sydowiellina protiana* Bat. & Lima, Publ. Inst. Mic. Uni. Recife 56: 404-405, 1959.

Remarks: Batista and Lima (1959) recorded this species as *Sydowiellina protiana* Bat. & Lima on *Protium hepatophyllum* March. from Brazil. The present collection was found to match well with the *S. protiana* Bat. & Lima in all respects, expect having slightly larger ascomata and the ascospores, which are 6-12 septate rather than 7-17 septate and therefore, referred to it. von Arx & Muller (1975) treated this genus as invalid and transferred to *Myriangiella* Zimm.. Thus *S. protiana* Bat. & Lima is transferred and a new combination has been proposed as *M. protiana* (Bat. & Lima) comb. nov. This makes a new record to the fungi of India and *Olea dioica* Roxb. is the additional host record.

Habitat: Collected on living leaves of *Olea dioica* Roxb. (Oleaceae), Vishalgad (Dist. Kolhapur), 24th April 1984, Leg. A. B. Pawar and deposited in HCIO 40,699.

8. *M. rionegrensis* (Bat., Holand & Peres) comb. nov.

= *Sydowiellina rionegrensis* Bat., Holand & Peres, Publ. Inst. Mic. Uni. Recife 393: 20-22, 1963.

Remarks: Batista et al.(1963) recorded this species as *Sydowiellina rionegrensis* Bat., Holand & Peres on an unidentified plant from Brazil. The present collection has been compared and found to match well with *S. rionegrensis* Bat., Holand & Peres in all respects, except having smaller ascomata and therefore referred to it. von Arx & Muller (1975) considered this genus valid and treated as a synonymous with *Myriengiella* Zimm.. Thus *S. rionegrensis* Bat., Holand & Peres is transferred to it and a new combination, & proposed as *M. rionegrensis* (Bat., Holand & Peres) comb. nov. It makes a new record to the fungi of India and *Mitragyana parviflora* is the additional host record.

Habitat: Collected on living leaves of *Mitragyana parviflora* Koarth. (Rubiaceae), Shelap (Dist. Kolhapur), 19th March 1985, Leg. A. B. Pawar, HCIO 40,700.

9. *M. roupalae* Syd. var. *batistae* var. nov. (Figs. 5-8).

Mycelium libero absentae; ascomata epiphyllous, superficialibus, orbicularae, dimidata-scutata, hyalinae vel sub brunnescentia, non-ostiolata, 440-500 µm in diam., marginalibus pelliculosum add hyphis ramosis, hyalinae, 2-3 µm in diam., paries superior pseudoparenchymatibus add cellalae polgonalibus vel rectangulariae, 3-6 µm in diam., hymenium hyalinae; asci ellipsoides–productum, sessilis, bitunicatae, 2-8 spori, apseudoparaphysatibus, 75-81 x 16-26 µm; ascosporic cylindraciae vel clavates, parallelae, 8-10 septatae, constrictae, cellae moniliformis, unequalis, hyalinae, levibus, 32-46 x 3-7 µm. Status conidalies absentae.

Habitato: *Typus lectus* in foliis *Dioscorea bulbifera* L. (Dioscoreaceae), Thoseghar (Dist-Satara), 4th December 1983, Leg. A.B. Pawar, HCIO 40, 701 holotypus.

Free mycelium absent ascomata epiphyllous, superficial, orbicular, dimidate-scutate, 440-500 µm in diam., hyaline to pale brown, astomatous, dehiscence irregular, superior wall pseudoparenchymatous, cells polygonal to rectangular, 3-6 µm in diam., hymenium hyaline, ascomata marginally pelliculose; hypae reticulate, branched, 2-3 µm in diam., asci ellipsoidal elongated, sessile, bitunicate, 2-8 spored, apseudoparaphysate 75-81 x 16-26 µm, ascospores cylindrical to clavate, parallel, 8-10 septate, constricted at the septum, cells, moniliform, unequal, separated at maturity, hyaline, smooth-walled, 32-46 x 3-7 µm. Conidial state not obsereved.

Habitat: Collected on living leaves of *Dioscorea bulbifera* L. (Dioscoreaceae), Thoseghar Dist- Satara, 4th December 1983, Leg. A.B. Pawar, HCIO 40, 701 holotype.

Remarks: The present collection has been compared (Table 1) with known species of the genus *Myriangiella* Zimm. in respects of morphology and dimensions of ascomata, asci and ascospore matched with *M. roupalae* Syd., except having larger asci, therefore, a new variety is proposed here to accommodate the present collection. This species has also been recorded on *Plectronia wightiana* Cooke. (Rubiacae) from Vishalgad, Dist. Kolhapur, 16thApril 1984, deposited in HCIO 40,701 holotype.

Etymology: Varietal epithet refers to a well known Brazilian Mycologist Batista A.C. for his outstanding contributions to this group of fungi.

10. *M. swartiziae* (Bat. & Lima) comb. nov.

= *Sydowiellina swartiziae* (Bat. & Lima) comb. nov. Publ. Inst. Mic. Uni. Recife 36: 405-406, 1959.

Remarks: Batista & Lima (1959) recorded this species as *Sydowiellina swartiziae* Bat. & Lima on *Swartizi pickelline* Killip from Africa. The present collection has been compared in all respects of ascomata, asci and ascospores with this species and was found to matched well, except having slightly smaller asci and therefore, referred to it. von Arx & Muller (1975) treated this genus as invalid and transferred it to *Myriangiella* Zimm.. Following this, *S. swartiziae* Bat. & Lima is being transferred and a new combination has been proposed as *M. swartiziae* (Bat. & Lima) comb. nov. This makes a new record to the fungi of India and *Ochrocarpus longifolius* Bentham and Hooker is an additional host record.

Habitat: Collected on living leaves of *Ochrocarpus longifolius* Bentham and Hooker (Guttiferae), Shelap (Dist. Kolhapur), 19thMarch 1985, Leg. A. B. Pawar, HCIO 40,702.

RESULTS

Thus, this genus *Myriangiella* has been studied with majority of its species along with the proposal of a new species and a new variety. It has been observed in sub-tropical countries. In India, it is recorded for the first time. The forms are very peculiar in their evergreen and semi-evergreen, cool and moist forest localities, in winter and summer seasons.

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