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SEIMATOSPORIELLA GEN. NOV., AN ADDITION TO COELOMYCETES FROM PAKISTAN

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Abstract

Seimatosporiella salvadore gen. et sp. nov., is proposed for a species found on *Salvadora oleoides*. It has pycnidial to eustromatic conidiomata. Conidia brown, cylindrical to fusiform to clavate, minutely verruculose, straight or curved with 3 transversely eusepta, apical cell conic, brown, rarely hyaline; basal cell hyaline tapered towards the truncate base. The genus is compared with *Exosporiella, Bactrodesmium, Endocoryneum, Seimatosporium, Pestalotiopsis* and *Neohendersonia*. Nature of appendage in *Exosporiella* is illustrated and discussed and compared with appendaged bearing related genera.

A temporary slide made by scrapping the stem surface of twigs of *Salvadora oleoides* collected by the senior author from Karachi, Pakistan showed a fungus looking like a dematiaceous hyphomycete *Exosporiella*. Microtome sections, however, showed that it was in fact a Coelomycete with eustromatic conidiomata. A comparision of the fungus with conidial fungi of similar characteristics revealed that it does not match with any of the known taxa and warrants a description as a new taxon.

Seimatosporiella gen. nov.
Fig. I (A,B,C,D,E)
Etym.: Seimatosporium et riella = like (faceis)

Conidiomata pycnidialia vel eustromatica, globosa vel applanate-globosa vel oblonga vel pyriformia, nigra, immersa, separata vel aggregata, unilocularia vel multilocularia, *ostiolum* singulum, circulare, centrale, parietes ex textura angulari vel textura prismatica compositi, pallide brunnei vel virides, 2-plures cellulis crassi. *Conidiophora* absentia, raro presentia tum hyalina, laevia, septata vel ad basim ramosa. *Cellulae conidiogenae* cylindricae vel lageniformes, hyalinae, laeves, 2-plures proliferantionibus percurrentibus enteroblasticis. *Conidia* holoblastica, brunnea, cylindrica vel fusiformia, vel clavata, recta vel leviter curvata, minutim verruculosa, plerumque 3 euseptata transversalia sed raro 4-5 euseptata, cellula apicalis conica, generatim brunnea raro hyalina, cellula basalis hyalina, basim versus contracta truncata.
Sp. typ.: *Seimatosporiella salvadorae* **sp. nov.**

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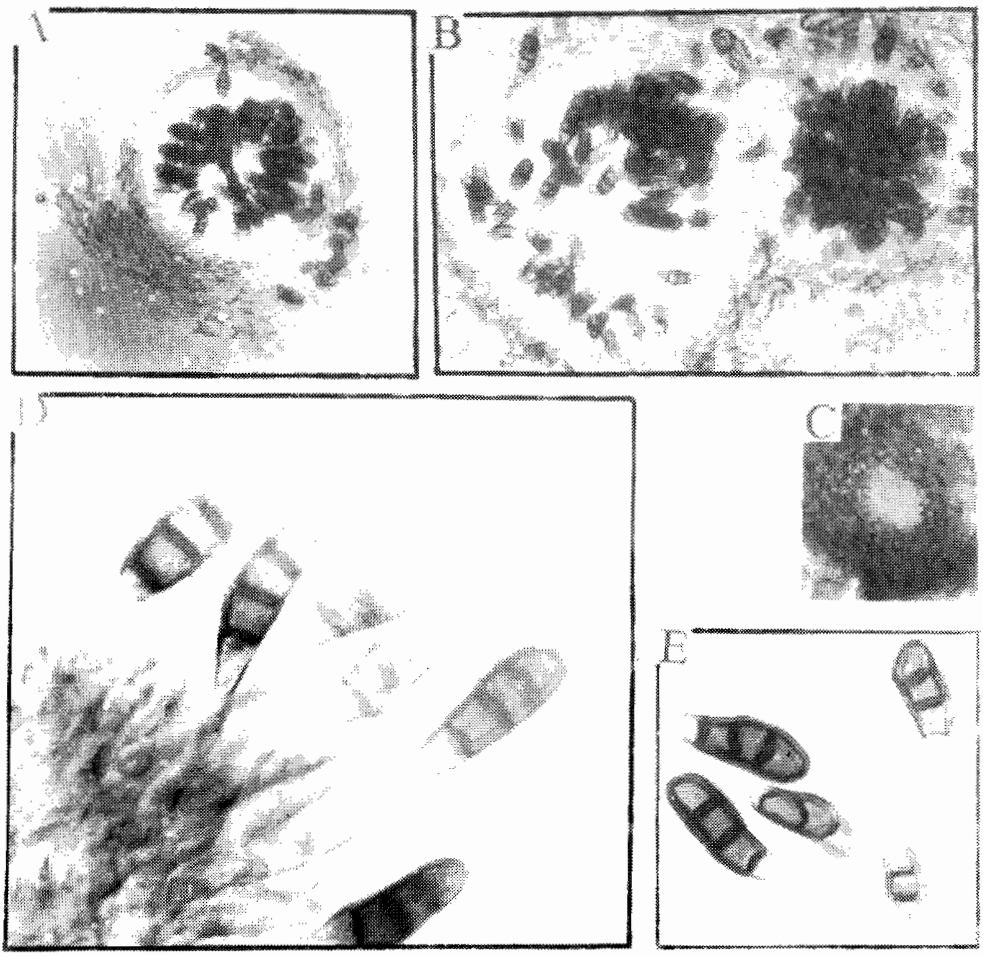

Fig.1. *Seimatosporiella salvadorae* (A) V.S. of conidioma, 40X; (B) V.S. of aggregated condiomata, 250X; (C) ostiole, 250X; (D) conidogenous cells and conidia, 1800X; (E) conidia, 1000X.

Seimatosporiella gen. nov.
Fig. 1 (A,B,C,D,E)

Conidiomata pycnidial to eustromatic, globose to applanate globose to oblong or pyriform, black, immersed, solitary or aggregated, unilocular or multilocular, *ostiole* single, circular, central, wall of textura angularis or prismatica, pale brown to yellowish, 2-several cells thick. *Conidiophores* mostly absent but when present then hyaline, smooth, septate and branched at the base. *Conidiogenous cells* cylindrical or lageniform, hyaline, smooth, 2-several enteroblastic percurrent proliferations, with a succession of sequential conidia formed at higher levels. *Conidia* holoblastic, brown, cylindrical to fusiform to clavate, straight or slightly curved, minutely verruculose, usually 3-transversely euseptate, but a small proportion are 4 or 5 septate. Apical cell

conic, generally brown rarely hyaline, basal cell hyaline tapered towards the truncate base.

Seimatosporiella resembles *Exosporiella* (Fig.2 B,C) in having conidiophores, similar conidiogenous cells and conidial morphology (Ellis, 1971). Conidiophores in both genera are cylindrical or lageniform, septate and branched at the base, conidiogenous cells in both genera proliferate enteroblastically, with percurrent proliferations and with a succession of sequential conidia formed at higher levels. Conidia are brown, euseptate, straight or curved, cylindrical or fusiform. However the two genera differ in conidiomata and to some extent in conidial morphology. In *Exosporiella* conidiomata are hyphal and conidia septate, smooth with a hyaline swollen hemispherical apical cell and hyaline basal cell with a single hyaline basal appendage. In *Seimatosporiella* conidiomata are eustromatic and conidia have no hyaline, hemispherical, swollen apical cell, but the basal cell is hyaline and has no basal appendage. Furthermore *Exosporiella* is an ectoparasite on *Corticium* and its telomorphic stage was described as *Anomalemma* (Sivanesan, 1983), whereas *Seimatosporiella* is not an ectoparasite on any fungus and telomorph is also not known.

Ellis (1971) redescribed and illustrated *Exosporiella* and referred to the base as caudate. However, a critical examination of various collections revealed that it is a conidiogenous cell which remains attached, differentiated by a septum and with various percurrent proliferations. Sometimes conidia become detached at this point. Rupture of the outer wall of the conidiogenous cell occurs while the inner wall, which is common to conidium and conidiogenous cell collapses and thus gives the impression of a centric endogenous appendage. However, this type of appendage can be analogous to the appendage seen in *Kellermania* Ell. & Everh., and *Harknessia* Cke. In *Kellermania* the basal appendage is short, and termed as a frill by Sutton (1980) while in *Harknessia* it can be very long. The basal appendage of *Exosporiella* may also be compared to the basal appendage in *Pestalotiopsis* Steyaert, *Seiridium* Nees., *Seimatosporium* Cda., and *Monochaetia* (Sacc.) Allesch., and *Monochaetinula* Muthumary, Abbas & Sutton. Sutton (1961) described appendage formation in *Pestalotiopsis sydowiana*, but the details of appendage formation are not available in other genera. Apical appendages and endogenous basal appendages are developed by simple elongation into tube-like structures. The wall building material is localized in a small area equivalent to the diameter of the appendage and from that area active formation of wall material begins which results in elongation of very thin tube-like structure, while in *Exosporiella*, the situation is quite different.

Pestalotiopsis steyaertii (Mordue, 1985), an unusual species, has close affinity to *Exosporiella*. Conidiophores in both genera are hyaline, cylindrical, smooth, septate and branched at the base. Similarly in both the genera conidiogenous cells, proliferate enteroblastically and percurrently with a succession of sequential conidia formed at higher levels and conidia are cylindrical, brown, 4-septate with a hyaline, swollen apical cell and a basal hyaline cell with an appendage. It differs from *Exoporiella* in having acervular conidiomata. The conidiomatal character is not very stable since in culture it is very difficult to draw a line between hyphal and acervular conidiomata (Sutton, 1973). Furthermore Mordue (1985) described conidia in this species as very variable with regard to appendage formation. In culture two isolates only produced (1-

10%) apical appendages, which is characteristic of *Pestalotiopsis*. It would appear that *P. steyaertii* may form a link between *Exosporiella fungorum*, a hyphomycete fungus and *Pestalotiopsis*, a coelomycete.

Bactrodesmium Cooke (Ellis, 1971) has some similarities with *Seimatosporiella* (Fig.2A). Both the genera have similar conidiophores and conidiogenous cells, but they differ in conidiomatal structure. *Bactrodesmium* has sporodochial conidiomata rather than the eustromatic conidiomata found in *Seimatosporiella*. Furthermore conidia in almost all species of *Bactrodesmium* are clavate, 3-7 septate, septa being black-banded, apical cell usually not hyaline, though the basal cell is slightly paler in colour and without a basal appendage. *B. traversianum* (Peyronel) M.B. Ellis, is the only species which has some resemblance with *Seimatosporiella*, where conidia are 3-4 septate, not black-banded and with basal hyaline cells. It differs in the sporodochial conidiomata, absence of an apical hyaline cell or a hyaline basal appendage.

Endocoryneum Petrak (Petrak, 1922; Sutton, 1980) shows some similarity with *Seimatosporiella* (Fig.2D). Both have eustromatic conidiomata and 3 septate brown conidia, but they can easily be differentiated since *Edocoryneum* has more complicated conidiomata, with 2-many locules, no conidiophores, ampulliform, enteroblastic proliferating conidiogenous cells with a succession of sequential conidia formed at the same level and light brown conidia without either a hyaline apical or basal cell. A hyaline basal appendage is also absent.

Neohendersonia Petrak (Sutton & Pollack, 1974; Sutton, 1980), can also be compared with *Seimatosporiella*. Of the two species *N. kickxii* (Westd) Sutton & Pollack (Fig.2 E) and *N. congoensis* (Torrend) Sutton (Fig.2 F). *N. kickxii* resembles *Seimatosporiella* only in the brown 2-3 septate conidia. It differs by having pycnidial conidiomata, no conidiophore, determinate conidiogenous cells, sometimes proliferating enteroblastically with a succession of sequential conidia formed at the same level, 2-3 distoseptate pyriform conidia without a basal hyaline cell. *N. congoensis* shows more resemblance to *Seimatosporiella* than *N. kickxii* since both taxa have eustromatic conidiomata and transversely septate, cylindrical conidia with a hyaline basal cell. However, *N. congoensis* differs in having more developed multilocular eustromatic conidiomata, no conidiophores, ampulliform determinate conidiogenous cells and longer clavate 3-7 transversely septate conidia with 1-2 hyaline cells towards apical and basal ends.

Seimatosporium Corda shows some similarity with *Seimatosporiella* since both have hyaline cylindrical smooth, septate branched conidiophores, enteroblastic percurrently proliferating conidiogenous cells with a succession of sequential conidia formed at higher levels and cylindrical, clavate to fusiform, brown, transversely septate conidia. However they differ in that *Seimatosporium* has acervular conidiomata, though there is great variability in conidiomatal structure in *Seimatosporium* spp. No species has been recorded which has eustromatic conidiomata as is found in *Seimatosporiella*. Conidia in *Seimatosporium* vary from cylindrical to fusiform to clavate and 2-5 septate. In species bearing 3 septate conidia, generally the periclinal walls are relatively thinner than the transverse septa and this gives conidia a collapsed effect. By this character *Seimatosporium* spp., can easily be distinguished from other genera having such types of conidia. Furthermore the conidia generally have one apical and

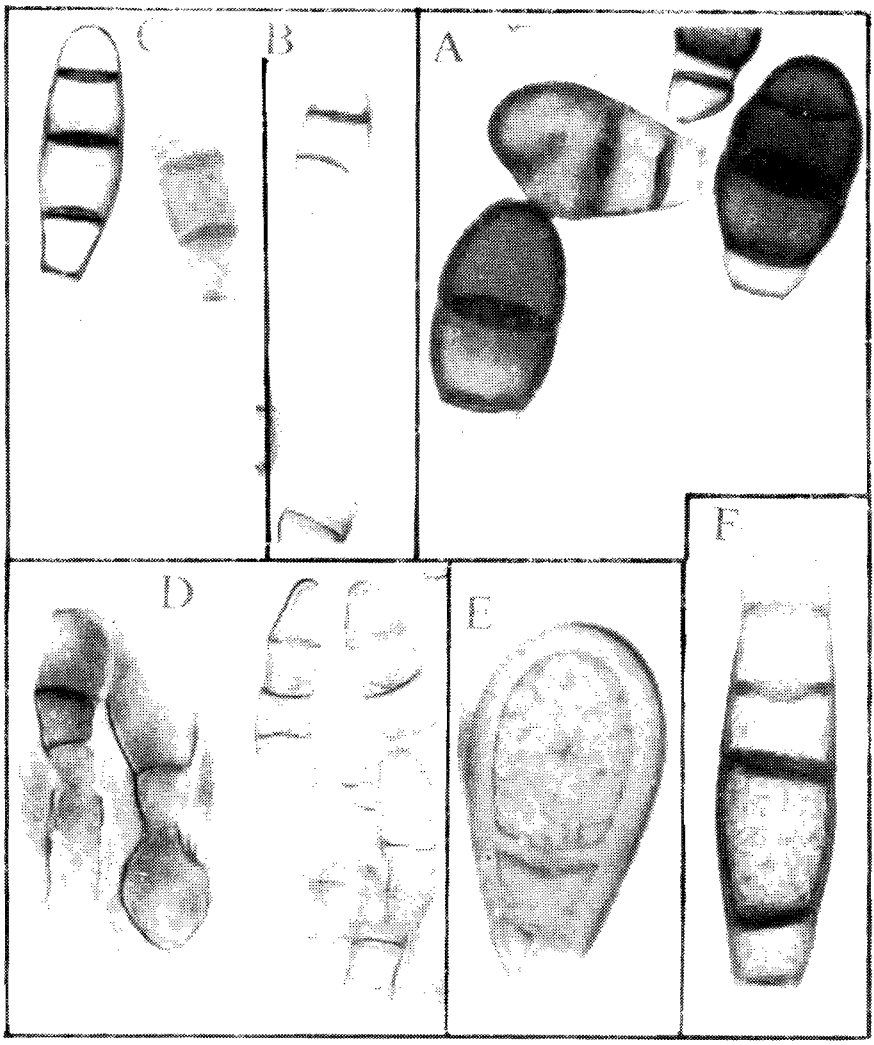

Fig.2. *Bacterodesmium traversianum*, IMI 138481 (A) Conidia, 1800X; *Exosporiella fungorum*, IMI 13848 (B) conidiogenous cells with conidia, 1800X; (C) conidia with long basal appendage, 1800X; *Endocoryneum loculosum*, IMI 179081 (D) conidia and conidiogenous cells, 1800X; *Neohendersonia kickxii*, IMI 168433 (E) conidium, 1800X; *N. congoensis*, IMI 180820 (F) conidium, 1800X.

one basal hyaline cell with or without one or more simple or branched apical appendage, and 1- or more basal appendages. Appendaged conidia can easily be distinguished from *Seimatosporiella*, but there are many species in *Seimatosporium* where apical and basal appendages are absent. Brockmann (1976) described *Discostroma* Clem., having two type of anamorph, *Seimatosporium* with appendaged conidia and *Sporocadus* Corda without appendaged conidia. She also pointed out that *Seimatosporium hysterioides* (Fuckel) Brockmann and *Discostroma rosae* Brockmann

both have appendaged and non-appendaged conidia in nature as well as in culture, whereas in *D. massarina* (Sacc.) Brockmann appendaged conidia are produced in nature and non appendaged conidia in culture. Sutton (1980) did not agree with the view of Brockmann (1976). There seems to be no justification for such variable characters to be used for the separation of genera. There are five species of *Discostroma* with 3-septate non-appendaged conidia and of these *D. canina* Brockmann, *D. corticola* (Fuckel) Brockmann, *D. polymorpha* Brockmann and *D. saccardoana* Jacz. have smaller, narrower conidia than *Seimatosporiella*, whereas *D. sanguineae* Brockmann has longer and wider conidia than *Seimatosporiella*. Similarly there are five *Seimatosporium* spp., (Sutton, 1975, 1980) with 3-septate, non-appendaged conidia, and of these *S. dacicum* (Sàvul. & Hulea) Sutton, *S. glandigenum* (Bub. & Frag.) Sutton, *S. pestalozzoides* (Sacc.) Sutton, *S. vaccinii* (Fuckel) Eriksson have smaller narrower conidia, whereas *S. rhododendri* (Schw.) Pirozynski & Shoemaker has smaller wider conidia. Thus all species with 3-septate, non- appendaged conidia clearly differ from *Seimatosporiella*.

Seimatosporiopsis Sutton, Ghaffar & Abbas also shows some similarity with *Seimatosporiella*. Both genera are comparable in having pycnidial to eustromatic conidiomata, enteroblastic percurrently proliferating conidiogenous cells, with a succession of sequential conidia formed at higher levels and cylindrical to straight, 3-septate brown conidia. However *Seimatosporiopsis* differs in absence of conidiophores and the 3-septate brown uniformly coloured conidia with one or more simple or branched apical appendage and one or more basal or slightly lateral appendages.

Seimatosporiella salvadorae sp. nov.
Fig. 1 (A,B,C,D,E.)

Conidiomata pycnidialia vel eustromatica, globosa, applanato - globosa vel oblonga vel pyriformia, nigra, immersa, separata vel aggregata, unilocularia vel bilocularia, 115-198 x 99-247 μm, parietes unistrati, 2-7 cellulis crassi ad 4-16 μm lati, ex textura angulari vel prismatica compositi, pallide-brunnei vel pallide-virides, *ostiolum* singulum, centrale, circulare, 10-12 μm diam. In conidiomata bilocularia, parietes secedentes loculos usque ad 18 cellulis crassi ad 28 μm lati consistanste. *Conidiophora* absentia, ad raro presentia tum hyalina, laevia, lageniformia vel cylindrica, septata ad raro ramosa ad basim, oriens a cellulae cuneiformes vel cylindrica, septata, ramosa modo infra septum 8-25.5x1.6-4 μm. *Cellulae conidiogenae* discretae, determinatae, lageniformes vel cylindricae, hyalinae, laeves 1-plures enteroblasticae percurrentes proliferationes 6.4-17.6 x 1.6-3.2 μm. *Conidia* holoblastica, brunnea, cylindrica vel fusiformia vel clavata, 3-transverse euseptata, raro 4-5 septata, 15-24.5x4-7.2 μm, cellula apicale conica vel obtusa, generatim brunnea raro hyalina. Cellula basalis hyalina, truncata, versus basim contracta, interdum parites cellulae medianae leviter crassiores.

In ramis emortuis *Salvadora oleoides*, Karachi, Pakistan 3 July 1975. S.Q. Abbas UCMH 756 (IMI 322508), holotypus.

Seimatosporiella salvadorae sp. nov.

Conidiomata pycnidial to eustromatic, globose to applanate globose to oblong to pyriform, black, immersed, solitary or aggregated, unilocular or bilocular, 115-198 x 99-247 μm, *ostiole*, single, central, circular 12-20 μm diam., wall of textura prismatica or angularis, pale yellow, comprised of only one layer 2-7 cells thick and 4-16 μm wide, but in bilocular conidiomata walls separating the locules are up to 18 cells thick and 28 μm wide. *Conidiophores* are usually absent but if present then hyaline, smooth, lageniform to cylindrical, septate, sometimes branched at the base, arising from wedge-shaped cells or branches arising from a cylindrical septate branch just below the septum. *Conidiogenous cells* discrete or integrated, cylindrical to lageniform, hyaline, smooth, with 1-many percurrent enteroblastic proliferations with a succession of sequential conidia formed at higher levels. *Conidia* brown, clavate or cylindrical to fusiform, transversely 3-euseptate, rarely 4-5 septa are also present, 15-24.5 x 4- 7.2 μm. Apical cell conical or obtuse, sometime slightly paler in colour. Basal cell hyaline, having cytoplasm, truncate. Sometimes middle cells are slightly thicker than the apical and basal cells.

Specimens examined:

Seimatosporiella salvadorae: On twigs of *Salvadora oleoides* Karachi, Pakistan, 3 July 1975, S.Q. Abbas, Urdu Science College, Karachi, Pakistan Mycological Herbarium (UCMH 756), (IMI 322508), holotype; Gatwala forest, Faisalabad, Pakistan, 3 Nov. 1968, M.A. Nasir (IMI 140920).

Anomalemma epochnii (Berk. & Br.) Sivanesan

On *Ulmus* bark, Dunwich Forest Suffolk, M.B. Ellis & J.P. Ellis, Apr. 1982 (IMI 266788), holotype (in folder of *Cylindrobasidium evolvens* (Fr. ex Fr.) Julich.

Endocoryneum loculosum (Sacc.) Petrak

On branches of *Fraxinus excelsior*, Weisskirchen, Moravia, Austria, 1913, Petrak, Slide ex PAD (IMI 179081), holotype (=holotype of *Coryneum loculosum* Sacc.)

Exosporiella fungorum (Fr.) Karst.

On *Corticium* on *Salix*, Epaigny, France, 1916 (IMI 179077). (= holotype of *Coryneum discolor*); on *Corticium* on *Tilia* sp., France, Mussat, (= holotype of *Coryneum mussationum*); on *Corticium* on Elm leaves, Mendlesham, 2 Nov. 1944, Mayfield ex herb. Mayfield (IMI 36550); on *Corticium* 22 June 1907 ex NYO (IMI 770), (in folder of *Clasterosporium fungorum* (Fr.) Sacc.); on *Coryneum*, 1931, ex herb. Wallworth, herb. Univ. Strasburrg, (IMI 68244) (in folder of *Sporidesmium atrum*); Warkigh, Apr. 1866. herb Berk. 1879 (IMI 769). (in folder of *Clasterosporium fungorum*).

Neohendersonia congoensis (Torrend) Sutton

On stem of Aloe or Agave, Chemin de Lazaret, Congo, Sept. 1908, H. Vanderyst, Slide ex BR. (IMI 80829), holotype (= holotype of *Coryneum congoensis* Torrend).

Neohendersonia kickxii (Westd.) Sutton & Pollack

On *Fagus sylvatica* Parc Saint George, Courtzai (Kortrijik), Belgium, Austria, Mar., G.D. Westendorp, herb. Crypt. fasc. 18, No.850 Ex BR (IMI 168433), holotype; on *Fagus sylvatica*, Dunwitch forest, Suffolk, U.K. M.B. Ellis & J.P. Ellis (IMI 1256988).

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