tion in this case is clearly indicated by the abundance of ooids and pisoliths in the rocks. Evidently, some of these waves would have to be very powerful in order to move even boulder size blocks indicating high winds or storms. However, the majority of oncolites indicate moderate agitation causing their displacement rather than their overturning. This was why the oncolites had a rather flat base and almost domal of acutely arched top with stacking of numerous laminae. Interruption in movement must have produced irregular oncolites.

Laterally linked hemispheroidal stromatolites (figure 3) occur in areas away from the lake beyond where oncolites are found. They are generally close-link type[6]. The height of such structures does not in any case exceed half a metre. The diameter of hemispheroidal laminae varies from 10-20 cm.

These stromatolites require a continuity in the algal mat growth and therefore form in the protected locations of the intertidal zone[6]. It has been observed in the Lake Cowan (Western Australia) that LLH-C type stromatolites[6] form at the margins of the lake[7]. The supralittoral zone can not support their growth, for the long periods of dessication would cause the destruction of the mats. Similarly, sublittoral or deeper parts are characterised by the growth of space-linked hemispheroids[7]. Thus, these stromatolites must have formed in the then littoral zone of the Lake Manyara. The availability of sufficient sediment particles was a cause for active binding by algal mats and hence perpetuation of these stromatolites within the littoral zone.

Stromatolite coatings can be identified on numerous cobbles, boulders and other rock surfaces (figure 4). The thickness of such coatings could vary from 3 cm to tens of centimetres. In the formation of these coatings, the algal mats seem to have covered and grown on whatever surfaces were available to them. This kind of coatings must have formed in any environment where growing algae could find a surface and sediments were available for trapping. Perhaps the littoral zone of the lake was a more favourable location where such layers might have developed unhindered. Some other stromatolite forms noted in the area include discrete, vertically stacked hemispheroidal stromatolites with variable basal radii (SH-V stromatolites[6]) and cryptalgalaminates of Aitken[8].

The stromatolite forms and their distribution in the Lake Manyara area appear to be controlled by sediment supply and the capacity of the algal mats to bind them and their interaction with the lacustrine environments. The distribution of different lacustrine stromatolite facies in the area is being worked out and might provide important clues to the subtle variations in the palaeoenvironments. Occurrence of stromatolites, oncolites, pisoliths and ooids, all of lacustrine origin, might not only determine lake level fluctuations but also the overall relationship between the sedimentation and tectonics of the Rift. As it is, the present spread of the lake is but a fraction, in size, of the original one and over the time, its level has fallen by tens of metres.

The author is thankful to Prof. U. Aswathanarayana and Prof. R. Vaidyanadhan of the Department of Geology of the University of Dar es Salaam for valuable discussions and for reading the manuscript.

24 November 1982

1. Awramik, S. M., Hofmann, H. J. and Raaben, M. E., *Bibliography in Stromatolites*, (ed) Walter, M. R., Elsevier, 1976, 705.
2. Pickering, R., *Quarter Degree Sheet 53*, Geological Survey Division, Dodoma, 1965.
3. Grove, A. T., and Goudie, A. S., *Nature (London)* 1971, **234**,403.
4. Johnson, G. D., *Nature (London)* 1974, **247**, 520.
5. Orridge, G. R., *Quarter Degree Sheet 69*, Mineral Resources Division, Dodoma, 1965.
6. Logan, B. W., Rezak, R., and Ginsburg, R. N., *J. Goel.* 1964, **72**, 68.
7. Clarke, E. de D., and Teichert, C., *Am. J. Sci.*, 1946, **224**, 271.
8. Aitken, J. D., *J. Sed. Petrology*, 1967, **37**, 1163.

THREE NEW SPHAEROPSIDALES FROM INDIA

K. K. SONI, V. S. DADWAL AND JAMALUDDIN
Regional Forest Research Centre, P.O. Bilhari, Jabalpur, 482 020, India.

SYSTEMATIC survey of diseases in local forest and plantation resulted in the collection of 3 new species of fungi belonging to Sphaeropsidales. The fungi reported in this paper are both new generic and species record on *Pongamia pinnata* and *Eucalyputs* sp. The species of *Dothiorella* and *Cytospora* described in this paper have been compared with the known species (table 1). They considerably differ from the known species.

Dothiorella indica sp. nov.

Fungus induxit in siliquarum facie maculas minutas nigras, coalescentes in areas maiores. Stroma

TABLE I

Comparative morphology of some closely related species of Dothiorella & Cytospora sp.

Name of species	Size of stromata/pycnidia	Size of spores	Morphology of spores
Dothiorella indica sp. nov	100–250 × 90–200 μ	2.5–35 × 6.25–10 μ	broadly ellipsoid.
D. gaurensis sp. nov.	84–400 μ in diameter	3.75–8.75 × –3.75–5 μ	globose to oval
D. pyrenophora	0.5–1 mm in diameter	5–6 × 2.5 μ	elliptic ovoid
D. fraxinea	upto 500 μ in diameter	8–10 × 2–2.5 μ	oblong ellipsoidal
Cytospora agarwalli sp. nov	100–450 × 100–350 μ	2.5–5 × 1–1.25 μ	cylindrical, slightly curved
C. lantanae	250–300 μ in diameter	5–7 × 1 μ	curved
C. lonicerae	200–300 μ in diameter	5–6 × 1 μ	sausage shaped
C. alstoniae	222.5–959.6 μ	3.48–6.96 × 0.87–1.74 μ	elongated curved

nigrum fungi crescit etiam in partibus infectis. Mycelium subhyalinum vel fuscum, septatum, ramosum; 2.5–5 μ latum; pycindia fusca, stromatosa, immersa in siliquis, ostiolata, 100–250 × 90–200 μ; conidiophora, hyalinae, simplicia, brevia; sporae hyalinae, unicellulares, cum pariete tenui, late ellipsiformes, 2.5–35 × 6.25–10 μ.

The fungus caused black minute spots on the surface of pods which coalesced to form larger areas. The black stroma of the fungus also developed on the affected areas. Mycelium subhyaline to dark, septate, branched, 2.5 to 5 μ broad; pycnidia dark stromatic, embedded in pods, ostiolate 100–250 × 90–200 μ (figure 1A); conidiophores, hyaline, simple, short; spores hyaline, unicellular, thinwalled, broadly ellipsoid, 2.5–35 × 6.25–10 μ (figure 1B).

On the living pods of *Pongamia pinnata*, Jabalpur (M.P.), India. The type specimen has been deposited in CMI. herbarium IMI No. 248190 and also in herbarium of R.F.R.C., Jabalpur.

A comparison of morphological characters of other closely related species of *Dothiorella* indicated that the species which has been described here is not correlated due to the presence of larger spores[3]. The organism is highly pathogenic on pods of *Pongamia pinnata*.

Dothiorella gaurensis sp. nov.

Colonia videtur alba, senescens fiebat fusce brunnea, compacta, submersa; pycnidia stromatosa, crescentia superficialiter in culturis adolescentibus; stroma nigrum, globosum, cum pariete crasso, ostiolatum, 84–400 μ diametro; conidiophora hyalinae, simplicia, brevia; sporae hyalinae, unicellulares, globosae vel ovatae, 3.75–8.75 × 3.75–5 μ.

Colony appeared white, on ageing turned dark brown, compact, submerged; pycnidia stromatic, developing superficially on the growing cultures; stroma black, globose, thick walled, ostiolate,

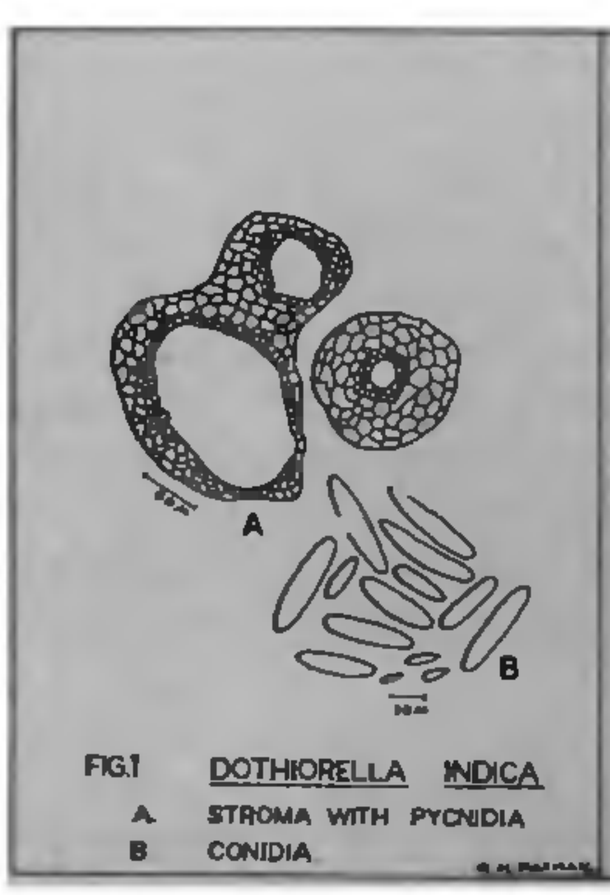

FIG.1 DOTHIORELLA INDICA
A STROMA WITH PYCNIDIA
B CONIDIA

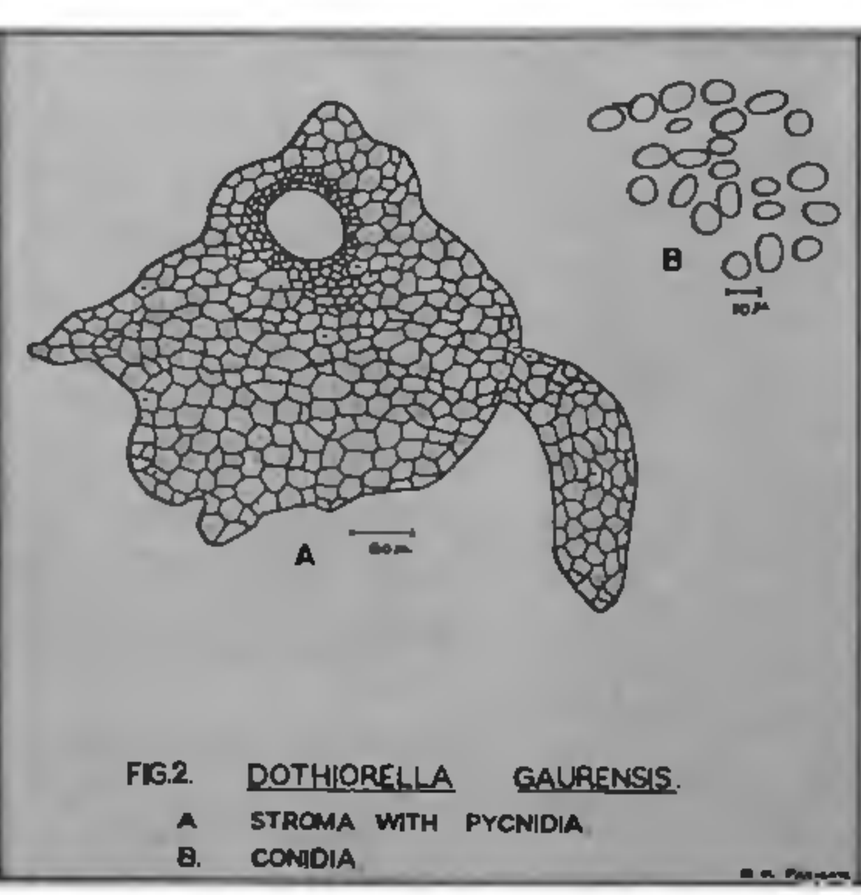

FIG.2. DOTHIORELLA GAURENSIS.
A STROMA WITH PYCNIDIA
B. CONIDIA

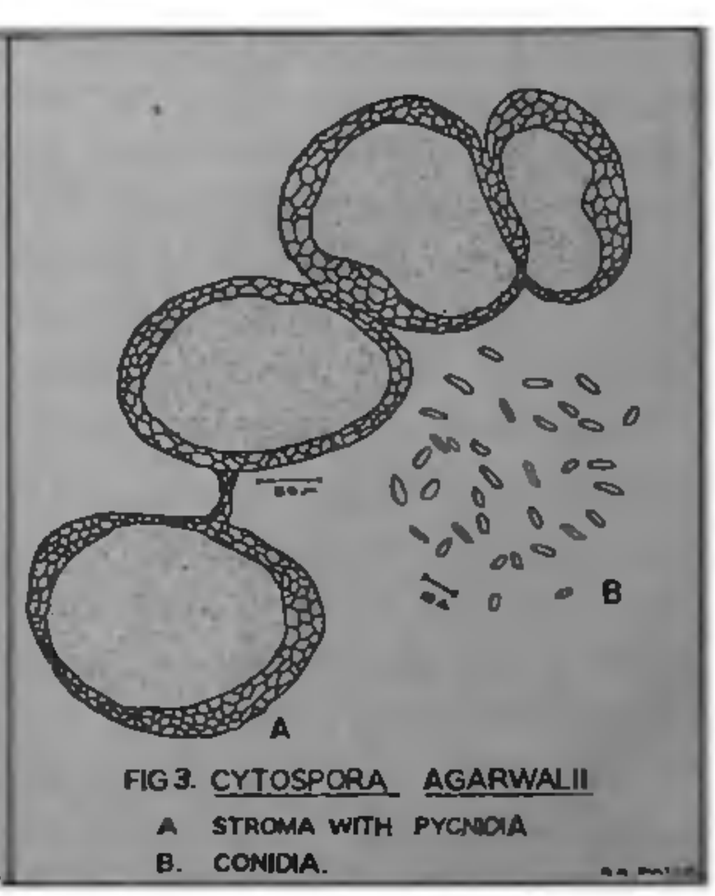

FIG 3. CYTOSPORA AGARWALII
A STROMA WITH PYCNIDIA
B. CONIDIA.

84–400 μ in diameter (figure 2A); conidiophores hyaline, simple, short; spores hyaline, unicellular, thin-walled, globose to oval, 3.75–8.75 × 3.75–5 μ (figure 2B)

On the living twigs of *Eucalyptus* sp. Jabalpur (M.P.) India. The culture of the organism has been deposited at CMI., Kew IMI No. 249233 and in R.F.R.C. Jabalpur.

The species produced slightly smaller conidia as compared to other species of *Dothiorella*[3]. The epithet of the species was given after the name of River Gaur near the campus of this research centre.

Cytospora agarwalii sp. nov.

Colonia clara pleraque brunnea, senescens exhibet stroma prolatum. Stroma prolatum, cylindratum, usque ad 0.5 cm altum, terminans in cacumine acuto. Basis stromatis aliquantulum erumpens, globosus, proferens partem fertilem frugis. Pars fertilis proferens pycnidia cum singulis vel pluribus loculis, ovalia vel irregularia, 100–450 × 100–350 μ; conidiophora unicellulares, hyalini, leviter prolati; proferentes conidia a terminis conidiophorum; conidia unicellularia, cylindrata, hyalina, cum pariete tenui, leviter curva 2.5–5 × 1.0–1.25 μ.

Colony light, mostly brown, on ageing there was development of elongated stroma. Stroma elongated, cylindrical, upto 0.5 cm in height, ending in a pointed tip, base of the stroma some what erumpent, globose, bearing fertile region of the fruit body. The fertile region consists of pycnidia with one to many chambers; oval to irregular, 100–450 × 100–350. (figure 3 A); conidiophores single celled, hyaline, slightly elongated, developing conidia from the ends of conidiophores; conidia single celled, cylindircal, hyaline, thin walled, slightly curved, 2.5–5 × 1–1.25 μ (figure 3 B).

On the living twigs of *Eucalyptus* sp., Jabalpur (M.P.) India. The culture of the fungus has been deposited in herbarium CMI., Kew, IMI No. 249224 and in R.F.R.C., Jabalpur.

The species of *Cytospora* described here was not correlated with the other species of *Cytospora* due to smaller spores[3]. The epithet of the species was given after the name of Prof. G.P. Agarwal to memorise his contribution to mycology.

The authors are thankful to Dr E. Punithalingam Mycologist, CMI., KEW, England for the help in identification of fungi, to Dr. Rev. Father V. Diercks, St. Xaviers College, Ranchi for rendering the latin translation and to Shri V.R. Neelay, IFS, Ex-Officer-incharge for providing necessary facilities.

20 July 1982; Revised 2 February 1983

1. Bilgrami, K. S., Jamaluddin and Rizwi, M.A., *Fungi of India.*, 1979. Part I Today and Tomorrow's Printers and Publishers, New Delhi.
2. Bilgrami, K. S., Jamaluddin and Rizwi, M. A., *Fungi of India.*, 1981, Today & Tomorrow's Printers and Publishers, New Delhi.
3. Grove, W. B. *British stem-and-leaf-fungi* (*Coelomycetes*) Volume I & II., 1967.

SYMPTOMATOLOGY AND TRANSMISSION OF WITCHES' BROOM DISEASE OF SOYBEAN IN INDIA

K. L. DHINGRA AND V. V. CHENULU
Division of Mycology and Plant Pathology, Indian Agricultural Research Institute, New Delhi 110 012, India.

A DISEASE resembling Machismo[1,2] of soybean in symptomatology has been observed in soybean crop at the farm of Indian Agricultural Research Institute, New Delhi every year since 1976. The disease incidence varied from 2–5% in some cultivars. In the epidemic year of 1978, the cultivars *viz.*, PK 73–148, 74–203 and 74–275 showed 30–50% infection causing considerable loss to the crop. The present paper describes the symptoms of 'Witches' broom' disorder and its transmission by the insect vector *Orosius* sp.

Symptoms were recorded from soybean plants infected naturally and artificially. The first symptoms of witches' broom were observed about the time of blooming or after initiation of pod formation. Symptoms comprised of curved, flat, thin pods usually in upright position with no beans formed or the pods were transformed into corrugated leaf like structures resembling phyllody. Later, excessive proliferation of buds from leaf axils occurs anywhere on the plant resulting in typical witches' broom appearance (figures 1–2). Sepals from flowers showing witches' broom are usually longer giving the appearance of small leaves as compared with healthy sepals. The size of flowers is reduced and they remain closed. Under field conditions it is common to find plants in which just one large branch or a maximum of two branches showing symptoms of the disease while the rest of the plant remains apparently healthy with normal development of flowers, pods and beans. In such plants the affected branch usually occurs close to the soil. In some cases the seeds germinate in the