

A DEIGHTONIELLA DISEASE OF SACCHARUM SPECIES.

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A LEAF disease called "Veneer Blotch" is reported on *Saccharum officinarum*, *S. robustum*, *S. spontaneum* and *Saccharum* sp. in Papua, New Guinea, New Britain and the British Solomon Islands Protectorate. The genus *Deightoniella* is emended to include species with amerspores, and the causal organism of the disease is described as *Deightoniella papuana* sp. nov.

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Species of *Saccharum* (*S. officinarum*, *S. robustum* and *S. spontaneum*) collected in Papua, New Guinea, New Britain and the British Solomon Islands Protectorate, have been found with striking leaf lesions caused by a species of *Deightoniella*.

The lesions on all hosts are similar, although a little narrower on the narrow-leaved species, *S. spontaneum*, than on *S. officinarum* and *S. robustum*. The lesion begins as a small, oval spot, light green to straw coloured, with a distinct thin red-brown border on any part of the lamina. It then becomes flanked by two longitudinally elongated similar lesions, resembling wings, one on each side (Plate 1). Two more wings then appear, flanking the first pair, and so on until sometimes twelve wings are formed on each side of the original spot, each successive wing usually being larger than the preceding one. One lesion examined measured 61 cm. long by 1.2 cm. wide. Occasionally the wings on each side are not symmetrical, and very occasionally secondary wings will form parallel to the main chain. The whole lesion has a beautiful pattern, particularly on the upper surface, and is not unlike a veneer of wood. Upon the death of the leaves the pattern is still discernible.

On the upper surface each wing is outlined with a thin dark-red border, 0.5-1 mm. wide. The interior of the lesion is at first light green, later greeny-grey or straw-coloured and finally light brown.

On the under surface of the lesion, the conidiophores form a dense black pile except in the newly-formed wings at the apex and base of the lesion. Occasionally conidiophores also form on the upper surface.

In the field, spores are often found with the conidiophores, although usually detached from them.

They are produced abundantly on the conidiophores, however, if the leaves are kept in a humid atmosphere overnight or longer.

If a common name is required for the disease, "Veneer Blotch" would seem appropriate.

A. Emendation of the genus and description of the species.

On the recommendation of Dr. M. B. Ellis, of the Commonwealth Mycological Institute, Kew, the genus *Deightoniella* is emended to include species with amerspores:—

Deightoniella Hughes emend. D. Shaw.—

Colonies on host: effused, black, velvety. Conidiophores arising close together, singly or in small fascicles, simple, straight or twisted, often elongating by successive subglobose apical proliferations. Conidia formed singly as blown-out ends at the apex of the conidiophore and each proliferation, o-multiseptate, subhyaline to olivaceous brown or brown, smooth verrucose or echinulate.

Description of the species:

Deightoniella papuana sp. nov.

Coloniae: effusae, atrae.

Conidiophores: densa, singulariter oriunda simplicia, tortuosa, continua, basi inflata (6-9 μ) brunnea supra pallidiora, 39-70 (90) x 6-8 μ .

Conidia: singula, globosis vel subovoideis, aseptata, minute echinulata, pallide oliveaceo-brunnea, 15-20 x 15-18 μ .

Habitat: in foliis vivis *Saccharum officinarum* L., *S. robustum* Brandes et Jesweit ex Grassl., *S. spontaneum* L. and *Saccharum* sp. (Gramineae), Papua, New Guinea, New Britain, British Solomon Islands Protectorate. Typus T.P.N.G. 1221, Laloki River, Papua, 10.1.57, D. Shaw, *Saccharum robustum*. Herb. I.M.I. No. 71316.

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The conidiophores of *Deightoniella papuana* form a dense black pile, usually on the under surface of the leaves, although occasionally they form on the upper surface also. They are simple, 39-70 (90) x 6-8 μ , dark brown, slightly paler above, cylindrical throughout most of their length but tapering slightly at the tip, with twisted growth, either clockwise or anti-clockwise, as described for *Deightoniella africana* (Hughes, 1952; Ellis, 1957). The number of twists per conidiophore ranges from 8-14. The base is swollen into a bulb, 6-9 μ wide and is partly immersed in the cell wall of the epidermal cell. The base of the conidiophore connects with the fungal tissue inside the epidermal cell by a



PLATE 1

Compound lesions on leaves of *Saccharum robustum*. Note the pattern caused by the development of successive wings beginning initially from the infection court; upper surface (x1).



PLATE 2

Conidiophores and conidia, and one conidium still attached to the conidiophore (x350).

narrow hypha about 2-3 μ long. The conidiophores are arranged in more or less straight rows in the cells between the ridges, although some conidiophores issue from the ridge cells themselves; up to four conidiophores were noted issuing from the one cell. The mycelium in the cells is pale olivaceous.

The conidia at maturity are globose to nearly ovoid, aseptate, minutely echinulate, very pale olivaceous brown, 15-20 x 15-18 μ . No basal scar could be detected. They retain their circular shape during germination.

Habitat: on living leaves of *Saccharum officinarum* L. (chewing cane), *S. robustum* Brandes and Jesweit ex Grassl, *S. spontaneum* L. (cane grass) and *Saccharum* sp. (Gramineae), Papua, New Guinea, New Britain, British Solomon Islands Protectorate. Type T.P.N.G. Accession No. 1221, Laloki River, Papua, 10.1.57, D. Shaw, *Saccharum robustum*. I.M.I. No. 71316. Another collection, T.P.N.G. Acc. 1967, has been given Herb. I.M.I. 71317.

Collections examined.

Locality.	T.P.N.G. Acc. No.	Collector.
<i>Saccharum officinarum</i> —		
Kanosia, Papua	1262	D.S.
<i>Saccharum robustum</i> and <i>robustum</i> types—		
Laloki River, Papua	674, 726, 1221, 1967	D.S. D.S. D.S.
Keravat River, New Britain	802	D.S.
Goroka, New Guinea	859	D.S.
Mount Hagen, New Guinea	964	D.S.
Brown River, Papua	1283, 1552, 1678 1329 1411	
Beipa, Papua		
Tenaru, Guadalcanal, British Solomon Islands Protectorate	1529	C. O. Grassl, J. Warner.
Arona, New Guinea	1845	D.S.
Aiyura, New Guinea	1850	D.S.
<i>Saccharum spontaneum</i> —		
Epo, Papua	432, 651 571	A.W. Charles F. Arndt.
Samarai, Papua	452	D.S.
Popondetta, Papua	617	D.S.
Erap, New Guinea	763	D.S.
Beipa, Papua	1410	D.S.
Port Moresby, Papua	1990	D.S.
<i>Saccharum</i> sp.—		
Mount Hagen, New Guinea	965	D.S.

B. Other aspects of the disease

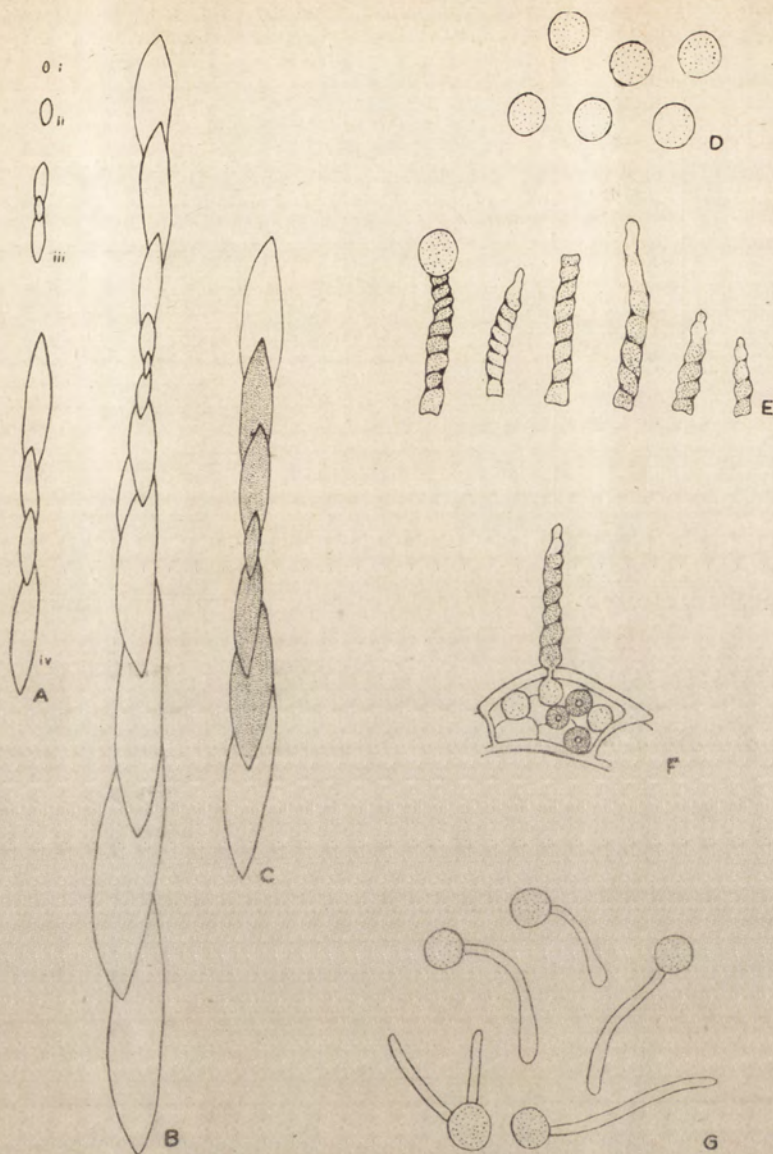
Germination of spores in water was difficult to obtain—very rarely, in fact, did any germinate at all. Germination occurred overnight, however, when a piece of the leaf was added to the spore suspension. Germination was also obtained overnight when the spores, either dry (having been scraped from the leaf surface with a scalpel) or in a water suspension, were streaked directly on to an agar surface. Germinating spores retained their circular shape, and produced one germ tube, or, more rarely, two, per spore. The germ tubes in water often showed the tendency to end in a small appressorium-like body. Germ tubes on agar surface were often aerial, and, although some reached over 80 μ in length and branched once, no growth past this has so far been obtained, despite the use of various media held under different conditions. Germination of the spores and growth of the germ tube was slow, whether on agar or in water suspension with leaf fragments.

When surface sterilized pieces of lesions were plated on to agar, either contaminant fungi which produced other spores were obtained, or no mycelium was obtained at all. Conidiophores were also streaked on numerous occasions on to agar, but no growth occurred. This was as expected, because, as Hughes (1952) pointed out, the conidiophores are aseptate. When removed from the leaf surface, the conidiophores usually break off at the surface, which means that the cytoplasmic connection with the portion in the leaf tissue is broken, so that each detached conidiophore is, in fact, a broken cell.

Of the five described species of *Deightoniella*, only one (*D. torulosa*) has been obtained in culture. Germination of *D. torulosa* spores has been obtained, and Ellis (1951) reported that, although the conidia of *D. arundinacea* (then *Napicladium arundinacium*) do not germinate readily in tap water, a few conidia did germinate at the apex in four days, each one forming a single germ tube. Neither germination of spores nor growth in culture has been reported for *D. africana* or the other species.

Ellis (1951, 1957) has reported that infection by *D. arundinacea* is systemic, but this would not seem to be the case with *D. papuana*, where the development of the lesion can be easily traced. Lack of facilities has so far prevented inoculation studies with *D. papuana*.

The hosts of *D. papuana* have a very varied habitat. They were located in dry Eucalyptus savannah (*S. spontaneum*, Papua); in grassland dominated by *Imperata cylindrica* and *Themeda australis* (*S. spontaneum*, New Guinea); in streams and on the banks of streams (*S. robustum*, Papua, New Britain, British Solomon Islands Protectorate); in native gardens in rain forest clearings (*S. officinarum*, Papua); on sandy beach soil on the coast (*S. spontaneum*, Papua); all the above being at or within a hundred feet of sea level. In New Guinea, however, the disease was found in great abundance, and with lesions over two feet long, on *S. robustum* in the valleys of the Highlands, at 5,000 to 6,000 feet.



- A. (i-iv) Series of lesions of *Saccharum robustum*, showing development of wings; upper surface (x1).
- B. A large compound lesion, with wings; upper surface (x1).
- C. A compound lesion, under surface, showing pile of conidiophores (x1).
- D. Conidia, globular, minutely echinulate (x350).
- E. Conidiophores in various stages of development, showing clockwise and anti-clockwise twists (x350).
- F. Edge cell of leaf of *S. spontaneum*, showing emergence of conidiophore, the protoplasmic connection, and conidiophore bases (x350).
- G. Germinating conidia in water containing leaf fragment with swelling at tips (x350).

The present known distribution of this disease is Papua, New Guinea, New Britain and the British Solomon Islands Protectorate. The disease is also probably in Netherlands New Guinea. Two of the hosts, *S. indicarum* and *S. spontaneum*, are widely distributed throughout the Indo-Malayan region, and it will be interesting to note if the disease is recorded in the future on any of the islands west of New Guinea.

No species of *Deightoniella* has previously been recorded on *Saccharum*. *D. africana* (Hughes, 1952; Ellis, 1957) occurs on *Imperata cylindrica* var. *africana* in Africa, and *D. arundinacea* (Hughes, 1952; Ellis, 1957, and, as *Napicladium arundinaceum*, Ellis et al. 1951; Sprague, 1950) occurs on *Phragmites communis*. The other three species described by Ellis (1957) are not recorded on Gramineae.

The condiophores of *D. papuana* and their emergence from the leaf are very similar to those described for *D. africana*. The spores of *D. africana*, however, and of all the other species of *Deightoniella*, are septate (from one to three septa), whereas those of *D. papuana* are aseptate. Care was taken that the bulbous bases of the condiophores were not mistaken for spores, and that immature spores, which possibly had not developed a stium, were not mistaken for mature ones.

So far *D. africana* has not been recorded on *Imperata cylindrica* in the Territory, although this grass is widespread and is one of the dominant species in many areas. *D. arundinacea* has not as yet been recorded on *Phragmites communis*, which is also common in certain areas.

ACKNOWLEDGMENTS.

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