REVISION OF A RUST ON *OLDENLANDIA* SPP.

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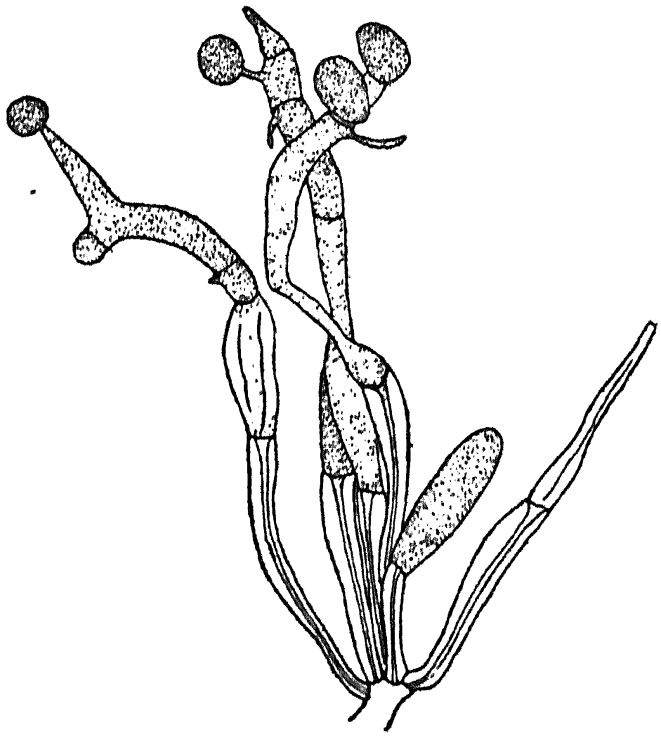
IN 1946 the writers collected rusts on *Oldenlandia stylosa* O. Kze. (*Hedyotis stylosa*, Br.) and *Oldenlandia articularis* Gamble (*Hedyotis articularis* Br.). The rusts on these two hosts agreed with the description of *Chrysocelis ascotela* (Syd.) Thirumalachar. An examination of the fresh material of these specimens indicated that the taxonomy of this rust was in need of revision.

Oldenlandia stylosa O. Kze. is affected by a rust on the Nilgiris and Pulneys. One or more orange yellow spots which on drying turn black on the upper surface are formed on the leaf. On the upper surface of the spot several reddish brown to red pycnia are present. These are sometimes hypophyllous though more often they are epiphyllous. The pycnia are sub-globose, subepidermal, deep-seated, and paraphysate with the paraphyses projecting out of the ostiole (Plate IX, Fig. B). On the lower surface of the spots numerous crowded telia are seen. When fresh a wax-yellow to golden yellow colour is presented after the germination of the teliospores. Each telium is sunk in the tissue of the leaf. A peridium is lacking. The teliospores develop in oval broad cavities of the mesophyll (Plate IX, Fig. C). They are one-celled clavate to cylindrical $54 \times 13 \cdot 6\,\mu$ ($37–70 \times 9–18\,\mu$), pedicellate, thin-walled and filled with yellowish contents. The spores originate from a mass of hymenial cells, in the topmost layer of which the cells are laterally free and from each of which two, or more teliospores are developed. The spores of a cluster are of varying ages and all stages from initial formation to spores that have collapsed after germination can be seen in each group originating from a basal cell. Each spore has a pedicel which lengthens as the spore matures and may attain a length of $40\,\mu$ or more. When scrapings of the spores are examined under the microscope it is often seen that the pedicels are not complete but get partially broken. The pedicel is hyaline and has a central protoplasmic strand with clear gelatinising portion all round. Such pedicels have been described by Cummins (1940) for *Scopella bauhinicola*. Thus the spores are pedicellate and are produced in groups from laterally free basal cells.

The teliospores germinate *in situ* as soon as they are fully developed and at this time the stalk elongates to its maximum so that the promycelium is pushed out of the leaf tissue. The promycelium is the direct prolongation of the apex of the spore and does not come out through a germ pore. It is yellowish in colour, 4-celled and from each cell a big oval or round, thin-walled, light yellow basidiospore is produced on a sterigma. The protruding promycelia get reflexed on the epidermis and masses of these give a waxy appearance to the telia. The teliospores do not come out of the leaf at all but only the promycelia project out in a mass through a wide opening. The spore collapses after germination.



TEXT-FIG. 1. A cluster of teliorpores of *Scopella ascotela* froma basal cell × 300.

This rust was first described by Sydow (1935) as *Blastospora ascotela.* Mains (1938) examined the specimen again and renamed it *Maravalia ascotela.* Thirumalachar (1942) studied it in greater detail and transferred it to the genus *Chrysocelis* as *C. ascotela.* Now our examination of fresh specimens collected at Ootacamund in October 1946 has shown the necessity for a further revision of the genus of the rust.

This rust is not *Blastospora* as is evident from the formation of the telia subepidermally. Thirumalachar includes the rust under *Chrysocelis* which has sessile teliospores, for he does not concede that the cell below the spore is a pedicel though he states that this elongates and reaches 40–70 μ in length and " simulates a pedicel ". In our opinion the cell below the spore is definitely a pedicel, reaching its maximum length when the spore germi-

nates. That it is a pedicel is shown by its structure. The central protoplasmic strand with hyaline gelatinising outer portion in this cell is indicative of its being a pedicel and not any other structure. Such pedicels have been noticed in *Scopella* by Cummins (1940). Further it is hyaline and the spore is coloured. With the collapse of the spore after germination the lower cell does not make any further growth but disintegrates in the same manner as remnants of pedicels often do. Thirumalachar has stated that the spore is hyaline and he has not observed the difference in colour between the spore and its pedicel. The colour of the spore is conspicuous in fresh specimens; but in old herbarium specimens, or two or three months after collection the colour is lost and this may be the reason why the colour has not been described by earlier authors. Mains (1938) has also described the spore as hyaline. Since the teliospores are prominently pedicellate the rust cannot be *Chrysocelis*. In *Maravalia* the teliospores are produced singly from the cells of a compact hymenium (Mains, 1939). In the rust under study examination of microtome sections and dissected telia showed that the teliospores are formed in groups of varying numbers, each group developing from a basal cell which is laterally free (Plate IX, Fig. A). That the cells are laterally free can be clearly seen in the photomicrograph of a cluster where a small spore is developing from a side of the basal cell which will be possible only if the basal cells are laterally free. Each cluster contains spores in different stages of development. For these reasons this rust cannot be included in the genus *Maravalia*. Judging from the characters of the telia and the teliospores it must be transferred to the genus *Scopella*. Mains (1939) who founded the genus has stated that in *Scopella* the pycnia are subcuticular and hemispherical while in this rust they are subepidermal and subglobose. This difference need not be a serious objection to include this rust under *Scopella*. Instances are known in other genera [*e.g.*, *Ravenelia* (Arthur, 1934)] where both kinds of pycnia have been observed in the same genus.

The distinction between *Scopella* and *Maravalia* rests mainly on, (1) the compactness or lateral freedom of the basal cells and (2) the formation of one or more teliospores from each basal cell. Cummins (1940) states that the basal cells are subject to variation and that there is no rule by which one can definitely decide when basal cells cease to be basal cells and become part of a compact hymenium. Considering the variation that may be expected in the hymenial layers and taking into account that we are dealing with living organisms in which machine-made uniformity cannot be expected, it is quite possible that *Maravalia* and *Scopella* are merged into one and the same genus, at a later time. For the present this merger is not attempted

and as the rust does not fit in with Mains' emended diagnosis of *Maravalia* but agrees more with *Scopella* it is thought fit to place this rust in the latter genus and revise the name as *Scopella ascotela.*

A similar rust was found infecting the leaves of *Oldenlandia articularis* in the neighbourhood of Ootacamund and the Agricultural Research Station, Nanjanad, Nilgiris. Only telia were present and these formed deep-pink, waxy, raised patches on the lower surface of the leaves. Corresponding brown areas became visible on the upper surface at a later stage. Telia are subepidermal and sunk in the tissue. Teliospores are one-celled, deep orange coloured with thin hyaline walls, 45·5× 12·8 μ, formed in clusters from free basal cells, pedicellate, pedicels hyaline, 36–65× 10–14 μ, with a central protoplasmic strand and hyaline gelatinising outer portions. Teliospores germinate *in situ*, producing apical promycelia which project beyond the surface of the leaf.

This rust closely resembles the one on *O. stylosa*, the difference being the absence of pycnia and the difference in the colour of the telia and the teliospores. These differences do not warrant the creation of a new species though the host is different. As the structure of the telia and the teliospores and the spore size do not exhibit any significant difference, this rust is also identified as *S. ascotela.*

The diagnosis of the genus *Scopella* is emended as follows:—*Pycnia* amphigenous, subcuticular and subepidermal, hemispherical or globose; *uredia* subepidermal, powdery; *urediospores* brown, pedicellate, several arising together from a cylindrical basal cell, basal cells free amongst themselves; *telia* subepidermal; *teliospores* unicellular, pedicellate many arising from a single basal cell, basal cells free amongst themselves, spore wall thin, hyaline, without germpore, teliospores often coloured, germinating *in situ*, at once by apical prolongation of the teliospore.

Scopella ascotela (Syd.) Comb. nov. Ramakrishnan and Ramakrishnan

Synonyms: *Blastospora ascotela* Syd.
Maravalia ascotela (Syd.) Mains.
Chrysocelis ascotela (Syd.) Thirumalachar.

Pycnia amphigenous mostly epiphyllous, grouped in the rust spot, subepidermal, subglobose, sunk in the tissue 155–207 × 110–125 μ; *uredia* and *æcia* not known; *telia* hypophyllous, subepidermal, clustered in the region of the spot which is thickened, waxy-yellow to golden yellow or pink; *teliospores* one celled with yellowish or orange coloured contents, clavate to cylindric, pedicellate pedicels hyaline up to 65 μ long, produced in groups

on laterally free basal cells, the spores in a group being in different stages of development, 54× 13·6 μ (37–70× 9 –18 μ) germinating *in situ* by the prolongation of the spore apex into ephemeral yellowish 4-celled promycelium, basidiospores round or oval, light yellow.

On living leaves of *Oldenlandia stylosa* O. Kze. and *Oldenlandia articularis* Gamble. Ootacamund, Nilgiris, 22–9–1946 (T. S. Ramakrishnan).

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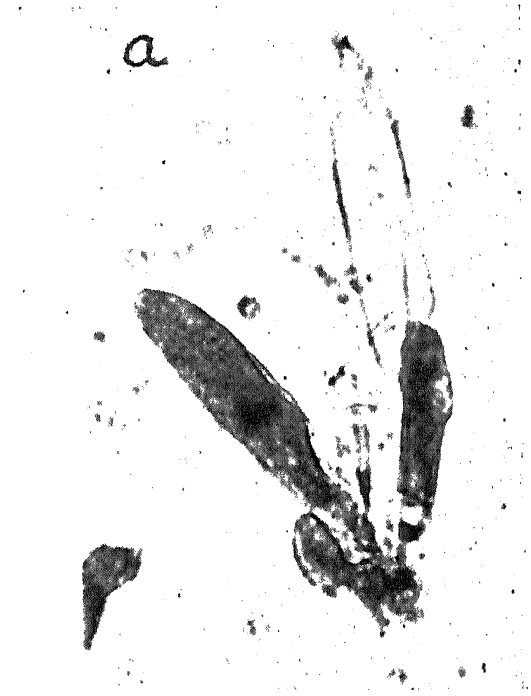
Explanation of Plate

A. One cluster of teliospores on a basal cell, (× 500).
B. Pycnium, (× 500).
C. Telia, (× 100).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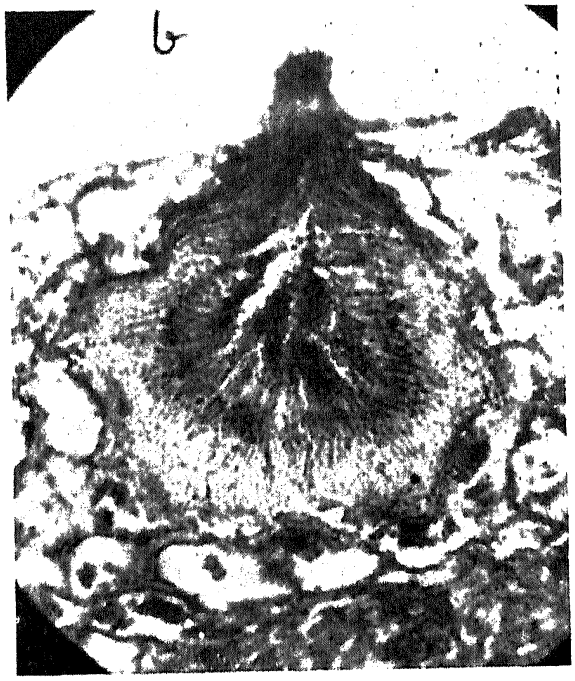
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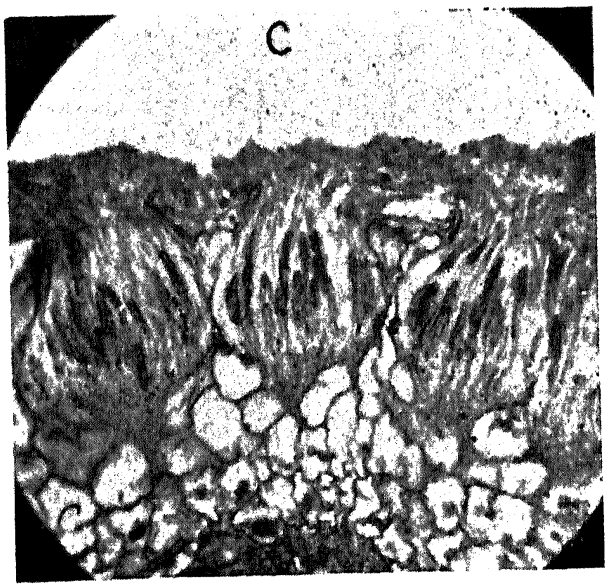
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