

## Studies in some Rust Fungi from India

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With 11 figs.

During the course of collections five rust fungi were collected from Satara, India. The observations about them are recorded below.

### 1. *Haploraavenelia hobsoni* (Cooke) Ito. (Plate I, Fig. 1, 2, 3.)

No previous studies have described all the four spore forms of this rust on *Pongamia pinnata* (Linn.) Pierre. These four spore forms were collected at Satara and are described below.

Pycnia — amphigenous, subcuticular, minute, domeshaped, broad, ostiolate,  $32.8-72.8 \times 55.0-91.7 \mu$ , pycniospores — small, oval, unicellular, thin walled, hyaline, about  $1.5 \mu$ .

Aecia — hypophyllous, subepidermal, uredinoid, in concentric groups, accompanied by pycnia, coalescing, without paraphyses,  $20.5-41.0 \times 41.0-82.0 \mu$ . Aeciospores borne singly on pedicels, sphaeroidal to ellipsoidal,  $(12.8-18.3) \times (9.2-18.3 \mu)$ , wall — finely echinulate, germ pores obscure.

Uredia — hypophyllous, subepidermal, erumpent, scattered, paraphysate,  $30.7 \times 13.7 \mu$ , urediospores sphaeroidal to ellipsoidal or oval, pale to brown,  $(19.9-21.9) \times (18.6-19.9) \mu$ , wall echinulate,  $1.3 \mu$  thick, germ pores orbicular,  $0.7-1.3 \mu$  diameter.

Telia — hypophyllous, scattered and almost covering the entire surface when intense, dark brown to black, 0.2 mm. Teliospores in almost sessile heads, total number of spores in a head 9 to 19, along circumference 7—12 spores, 4—5 spores across diameter, head — sphaeroidal, reddish brown to dark brown,  $53.3-77.9 \times 53.3-69.8 \mu$ , peripheral cells appendiculate, appendages spiny and unbranched, cysts about 6—12, minute to inconspicuous.

The presence of uredinoid aecia indicates the autoecious nature of this rust (Cummings, 1936). The uredinoid aeciospores and the urediospores differ in their dimensions.

Sathe (1969) remarks that "he ... collected the aecial and pycnial stages of this fungus. The aecia are uredinial and are subcuticular and are organically connected with the pycnia ...". The observations of this rust on the contrary show the subepidermal nature and not subcuticular nature for the aecia.

This rust has been named differently by various workers in India. Thus Butler & Bisby (1931) list it as *Ravenelia hobsoni* Cooke.

Thirumalachar & Mundkur (1950), Thirumalachar & Narasimhan (1951) followed the same name. Ramkrishnan and Sundaram (1952) enlisted it as *Haploravenelia hobsoni* (Cooke) Ito. Again Yadav (1968), Pavagi & Singh (1969), Sathe (1969), Rajendran (1970) & Nair (1971) call it *Ravenelia hobsoni*.

To point out the correct name of this rust one has to look back to the taxonomy of the genus *Ravenelia*. Long (1903) considered that this genus comprises three separate genera as a) True — *Ravenelia* with 2-celled teliospores b) *Neoravenelia* with one-celled teliospores and caeomoid aecia c) *Haploravenelia* with one-celled teliospores and aecidioid aecia. Now the rust on *Pongamia pinnata* under consideration has one-celled teliospores and uredinoid aecia. It cannot be, therefore, accommodated in any of these three genera.

Thirumalachar and Mundkur (1950) advocated that the genus *Ravenelia* be split into three sections as:

- a) *Pleoravenelia* with 2-celled teliospores
- b) *Neoravenelia* with one-celled teliospores & caeomoid aecia &
- c) *Haploravenelia* with one celled teliospores and aecidioid aecia.

In this scheme also the rust on *Pongamia pinnata* cannot be accommodated.

Sydow (1921) had divided this genus *Ravenelia* into 8 different genera on following scheme.

A: All the teliospores with one celled teliospores in the centre of the head.

0, I, II, III — found.

a) Aecia without peridia — *Neoravenelia*.

b) Aecia with peridia — **Longia**. nov. gen.

0, I, III — found. **Cystotelium**. nov. gen.

0, II, III — found. **Haploravenelia**. nov. gen.

0, III — found. *Dendroecia* Arthur.

B: Inner teliospores 2-celled in the centre of the head.

0, I, II, III found. **Cephalothelium**. nov. gen.

0, I, II found. **Cystingophora**. nov. gen.

0, II, III found. *Ravenelia* Berk.

The rust on *Pongamia pinnata* has one-celled teliospores in the centre of the telial head and must be accommodated in the part A of this scheme. One apparently feels that there is also no provision for uredinoid aecia.

But then uredinoid aecia were looked upon as primary uredia and were treated under stage II. Hence this rust under consideration will have to be accommodated in the genus *Haploravenelia*.

Hence the correct name for this rust will be as proposed by Ito &

Murayama (1943) and used by Ramkrishnan & Sundaram (1952) viz. *Haploraavelia hobsoni* (Cooke) Ito.

2. *Puccinia leonotidicola* (P. Henn.) Arthur (Plate 1 — Fig. 4, 5)

In February 1970, a rust was collected on the plants of *Leonotis nepetaefolia* at Satarra. There is one report of *Puccinia leonotidicola* on this host. But Arthur (1915) had made interesting remarks about it. Arthur had a part of the type material collected from South Africa by Hennings but that well rusted leaf revealed no teliospores though abundant urediospores were present. Also in other type materials as of *Uredo cancerina* and *Uredo leonotidicola*, Arthur did not find teliospores. Arthur therefore concluded that "the assignment of this rust to the genus *Puccinia* was based only upon the observations of Hennings".

The rust collected at Satarra on *Leonotis nepetaetifolia* did show teliospores and urediospores. The teliospores were of *Puccinia* type. The measurements and morphology of these two spore forms are similar to those described by Hennings for the rust *Puccinia leonotidicola* and hence this report confirms the *Puccinioid* nature attributed to this rust by Hennings.

3. *Uromyces mucunae* Rabenh. (Plate II — Fig. 1)

There is already one report of *Uromyces mucunae* Rabenh. on the plants of *Mucuna prutines* D. C. A rust was collected on the plants of *Mucuna hirsuta* W. & A. at Satarra. The uredial and telial sori & spores in them closely agree in their morphology and measurements with the uredial and telial stages & their spore contents collected on the *Mucuna prurienis* from Satarra and even with those already described for by Laundon and Rainbow (1971). *Mucuna hirsuta* is therefore considered as a new host report for this rust *Uromyces mucunae* Rabenh.

4. *Trochodium sampathense* Thirum. (Plate II — Fig. 2, 3)

A rust collected on *Argyreia involucrata* from Pratapgad-Mahad Road, Satarra, showed teliospores of *Trochodium* type. Alle the known species of *Trochodium* are autoecious. Here also telial stages were encountered in association with aecial stages. This indicated autoecious-opsis nature for this rust. There is only one opsis species in the genus *Trochodium* and it is *T. sampathense* Thirum. The comparison of the spore forms available on *Argyreia involucrata* revealed close agreement with those described for *Trochodium sampathense*.

The aecial stages of this rust were also in close agreement with those described for *Aecidium argyreiae-involucratae* by Chavan (1969) reported on the same host and from the same locality. Hence it is also considered as belonging to *Trochodium sampathense*. *Argyreia involucrata* is a new host report for this rust.

5. *Aecidium satarense* sp. nov. (Plate II — 4, 5, 6).

Aecial stages on the leaves of *Notonia grandiflora* were collected at Yewateshwar, S a t a r a. No aecial stages had been reported on this host from Maharashtra by Ch a v a n (1969). It was, therefore, studied in details and was considered as new to science. Latin diagnosis is given below:

*Aecidium satarense* Chavan et Patil.

Pycnidia amphigena, subepidermalia (90.0—) 105.0 (—165.5) × (89.0—) 105.0 (—143.1) μ, pycnidiosporae — 1.3 μ, aecidia amphigena, vulgo hypogena, concentrica, cupulata, subepidermalia, 0.2—0.5 × 0.2—0.6 mm, cellulae peridii, aecidiosporae catenulatae, sphaeroeae vel ellipsoideae, (15.0—) 20.0 (—20.3) × (15.0—) 18.6 (—21.3) μ, parietibus externis verrucosis, 1.8 μ crassis.

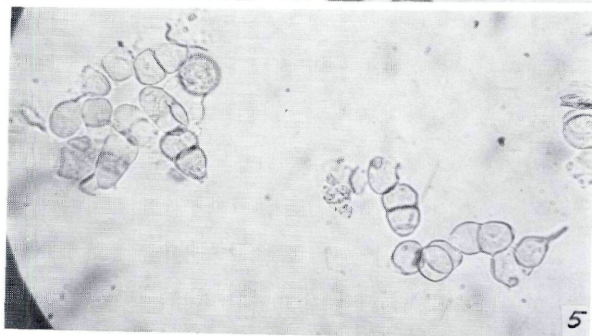
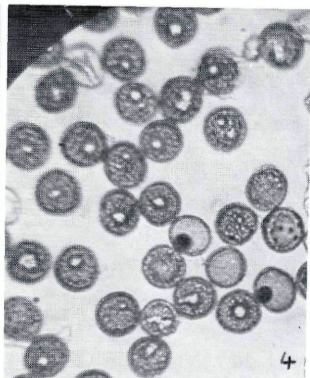
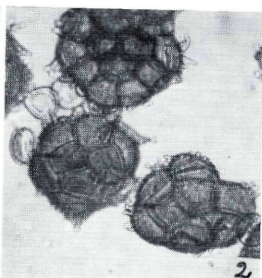
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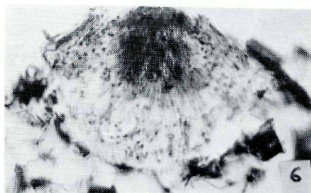
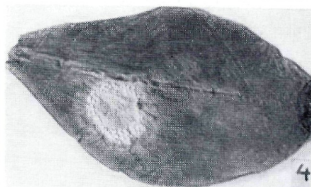
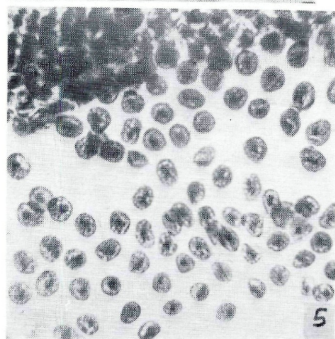
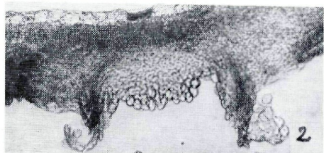
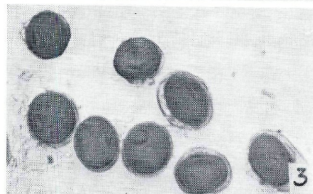
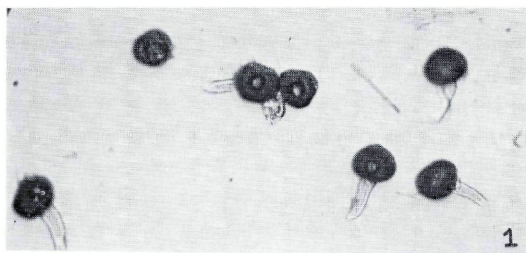
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#### Explanations of photomicrographic Plates

##### PLATE I

- Fig. 1 — T. S. showing subcuticular pycnium of the rust *Haploravenelia hobsoni*.  $\times 550$ .
- Fig. 2 — Few urediospores and telial heads showing appendages.  $\times 330$ .
- Fig. 3 — T. S. showing uredinoid aecium.  $\times 450$ .
- Fig. 4 — Urediospores, of the rust *Puccinia leontidicola*, showing echinulations, many scattered, basal germ pores, and nuclei;  $\times 420$ .
- Fig. 5 — Two-celled, thin walled teliospores and few urediospores.  $\times 270$ .

##### PLATE II

- Fig. 1 — One celled thick walled teliospores, of the rust *Uromyces mucunae* on *Mucuna hirsuta*, with persistent stalks.  $\times 440$ .
- Fig. 2 — T. S. of hypophyllous, subepidermal aecial sorus, of the rust *Trochodium sampathense*, showing aecial chains and recurved peridium  $\times 40$ .
- Fig. 3 — Unicellular teliospores showing apical rimmed, raised germ pore.  $\times 265$ .
- Fig. 4 — A leaf of *Notonia grandiflora*. Showing pycnial and aecial spots.  $\times$  N. S.
- Fig. 5 — T. S. of hypophyllous aecial cup showing aeciospores in chains.  $\times 225$ .
- Fig. 6 — T. S. showing epiphyllous subepidermal pycnium.  $\times 320$ .

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