

## ADDITIONS TO FUNGI OF MADRAS—I

BY T. S. RAMAKRISHNAN AND K. RAMAKRISHNAN  
(Mycology Section, Agricultural Research Institute, Coimbatore)

Received October 10, 1946

(Communicated by Dr. B. V. Nath, C.I.E., D.Sc., F.R.I.C., F.A.Sc.)

DURING a foray undertaken in March 1946, collections of fungi were made in the jungles round about Coonoor and Ootacamund in the Nilgiris district of Madras province. Among the collections were several new records for the locality and some which are new to science. Three of these fungi are described below:

(1) *Xenostele neolitsea* sp. nov.

*Neolitsea zeylanica* Merr. is a medium-sized tree common in the upper slopes of the Nilgiris in the neighbourhood of Ootacamund, Kotagiri and Naduvattam. At the time of the visit this plant was affected by a severe epiphytotic of rust in all these places. Numerous brown rounded woody galls were seen on the leaves and sometimes on the petioles and stem (Plate, Fig. 1). The galls on the leaves are more conspicuous on the lower surface, there being few or none on the upper. They are isolated or clustered together and their diameter varies from 2 to 5 mm. But on the branches the hypertrophied portions are 2.5 cm. or more in thickness as against the normal thickness of half a centimeter of the healthy part. Wherever a gall develops on the lower surface of the leaf a corresponding depression is visible on the upper surface.

On the surface of the galls a number of rounded warts or tubercles are seen. The wart is ruptured and a whitish conical structure projects from the interior. In others a depression or cup-like cavity is present from which reddish brown mass of teliospores is visible. Two to thirty-two cups or more can be seen on old galls depending on their size.

The gall is very hard and woody. In cross-section the tissue of the gall is found to be made up of a high proportion of thick-walled scalariform cells mixed with parenchymatous cells packed with starch grains. Sunk in the galls are the cups of the teliosori. In the early stages a conical whitish to cream-coloured solid structure projects out of each sorus, bursting through the outer surface. When the galls are young a number of these whitish structures are seen protruding out. These can be easily picked out by needles and they come off as "stoppers". The conical structure represents the

peridium. When a section is examined the peridium appears as a solid mass made up of several layers of hyaline, thick-walled, sterile cells, rectangular to polygonal in shape and  $40-80 \times 17-19 \mu$  in size, closely united together and with a finely warty surface. In nature the peridial caps fall off after a time and expose the telia (Plate, Fig. B).

Telia are cup-shaped,  $300-400 \mu$  deep and  $300-410 \mu$  wide. A pseudo-parenchymatous mass of fungal tissue develops from the bottom of the cup. The upper layers of this tissue are made up of elongated cells closely packed together (Plate, Fig. C). The teliospores originate from these cells. The teliospores are stalked with long hyaline pedicels up to  $200 \mu$  in length. The pedicels easily break off leaving short remnants still attached to the spore. Each telium produces several spores borne in succession, the older ones being pushed up as new ones are formed. Thus an apparent resemblance to several layers of spores is produced. The remnants of the basal parts of the pedicels of old spores can be seen between the younger spores. Each teliospore is two-celled, elliptical or spindle-shaped, with rounded ends, dark reddish-brown and smooth-walled. The shape of the teliospore resembles a structure made of two cones united by their bases and having blunt apices. The spores measure  $47 \times 26 \mu$  ( $40-56 \times 24-29 \mu$ ). The upper cell varies in length from  $20-24 \mu$  and the lower from  $20-32 \mu$ . The cavity of the cells is bell-shaped. One germ pore is present in each cell—at the apex of the top cell and near the point of attachment of the stalk in the bottom cell. There is a slight constriction at the junction of the two cells, which in some cases becomes very pronounced. The two cells may separate from each other or be united only in the centre.

The telial stage alone has been observed in this rust. From its morphology it is manifest that it belongs to the genus *Xenostele* Syd. Two species of this genus have been recorded—*X. echinacea* (Berk) Syd. on *Actinodaphne molochina* in Ceylon and *X. Litseæ* (Pat.) Syd. on *Litsea glauca*—in Japan. The galls formed by *X. echinacea* are developed only on leaves and the telial cups are  $200-250 \mu$  in diameter. Further the stalks of the spore are said to be golden-brown and twisted into bundles. The rust on *Neolitsea* produces galls on stems and leaves and the cups are bigger being  $300-410 \mu$  wide. The stalks are hyaline and not twisted into bundles. *X. Litseæ* has been reported only on the leaves of *Litsea glauca* and the spores have a rough surface as described by Sydow (1920). The spores of the rust on *Neolitsea* are quite smooth and no warts have been seen even when they are examined with an oil-immersion objective. Since the host is different and there are differences in the size of the sorus, the nature of the pedicel and the wall of

the spore this rust is considered to be different from the other two species and is named *X. neolitseæ*.

*Xenostele neolitseæ* sp. nov.—Aecia, pycnia, and uredia not known; telia sunk in woody galls formed on leaves and stem, 300–410 $\mu$ , with a whitish conical peridium of many layers of sterile, rectangular to polygonal, thick-walled, and warty cells; teliospores two-celled, dark reddish-brown spindle-shaped, sometimes separating into individual cells, 47.0  $\times$  26.0 $\mu$ ; pedicelled, pedicels long up to 200 $\mu$ , hyaline, fragile.

*Habitat*.—On living leaves of *Neolitsea zeylanica* Merr. on the Nilgiris, March 1946. Collected by C. L. Subramanian and K. Ramakrishnan (type) at Ootacamund, 15th March 1946. Type deposited in the herbarium of the Government Mycologist, Coimbatore and Herb. Crypt. Ind. Orient., New Delhi.

Aecia, pycnia et uredia non cognita; telia demersa ligneis excrescentiis formati in foliis et caulibus, 300–410 $\mu$ ; albo conico peridio multorum stratorum cellarum sterilium, rectangularum ad polygonarum crassomuratum, echinularum; telio-sporidia bicellata fuscis rubricosi brunnei coloris, fusiformia, interdum seperantia in duas cellas, 47  $\times$  26 $\mu$ ; Pedicellata, pedicelli longi, hyalini, fragiles, ad 200 $\mu$ .

Hab. in vivis folii et rames *Neolitsea zeylaniceæ* Merr. Ootacamund (Nilgiris) 15-III-1946 C. L. Subramanian et K. Ramakrishnan typus. Typi specimina deposita in Herbario Government Mycologist Coimbatore et Herb. Crypt. Ind. Orient, New Delhi.

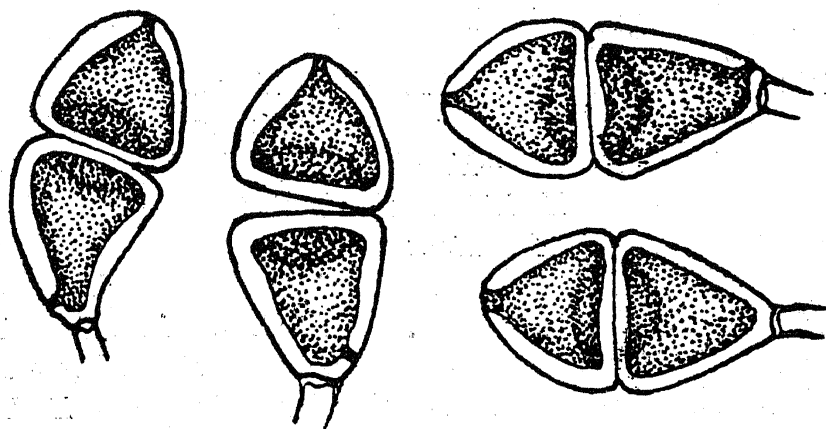


FIG. 1. Teliospores  $\times$  720.

(2) *Pseudopeziza rubiæ* sp. nov.

*Rubia cordifolia* L. a common climber was affected by a leaf spot in the neighbourhood of Lovedale and Coonoor (Nilgiris District of Madras

Province). On the under surface of the spotted region groups of apothecia had developed. Four to five apothecia were present in each group. These apothecia were saucer-shaped 0.5–0.8 mm. in diameter, roughly circular with incurved margins. When fresh the texture of the apothecium is waxy, but it becomes hard and brittle on drying. Young apothecia have a light buff colour but older ones turn dark on the upper surface. The apothecium opens out when mature.

A section of the leaf through the apothecium (Plate, Fig. D) reveals that the latter is sub-epidermal in origin though the whole apothecium is outside the leaf and is carried on a short stalk-like structure  $83\mu$  in length and  $125\mu$  in breadth. This portion broadens out into the hypothecium composed of fairly large, polygonal, thin-walled cells. Above the hypothecium and below the hymenium is the narrow subhymenial layer formed of small-celled tissue. The hymenium is made up of closely packed asci and paraphyses. The asci are hyaline more or less clavate and  $70 \times 5.2\mu$  ( $59-93 \times 4-7\mu$ ). The ascospores are eight in number, uniseriate and obliquely arranged. They are hyaline long-oval and  $7 \times 2.5\mu$  ( $5.5-9 \times 1.5-5\mu$ ). The paraphyses are as long as the asci, filiform, unbranched at the tip and hyaline.

*P. repanda* (Fr.) Karst. has been recorded on the leaves of *Galium* spp. (*G. mollugini*, *G. borealis*, *G. silvaticum*, and *G. asperula*) (Butler and Bisby, 1931, and Saccardo, 1889), and leaves and stem of *Rubia tinctorum* (Saccardo, 1889 and 1898) belonging to the Rubiaceæ and *Potentilla cerasti* belonging to the Rosaceæ. On the last host the apothecia are seen on the stems and rarely on the leaves. But the species now recorded is different from *P. repanda*. It has bigger apothecia and larger asci. Further the size, shape and arrangement of the ascospores are entirely different from those of *P. repanda*. Therefore it is named *Pseudopeziza rubiæ*.

*Pseudopeziza rubiæ* sp. nov. Apothecia hypophyllous, gregarious, light buff when young and dark when old, concave, roughly circular, 0.5–0.8 mm. in diameter; asci, hyaline, long-clavate  $70.0 \times 5.2$  ( $59-93 \times 4-7$ ) $\mu$ , ascospores uniseriate, hyaline, 8, oblong— $7 \times 2.5\mu$  ( $5-9 \times 1.5-5\mu$ ); Paraphyses filiform, unbranched hyaline.

*Habitat*.—On living leaves of *Rubia cordifolia* L. Lovedale and Coonoor, 19-3-46. Collected by C. L. Subramanian and K. Ramakrishnan. Type deposited in the herbarium of the Government Mycologist, Coimbatore and Herb. Crypt. Ind. Orient, New Delhi.

Apothecia hypophylla, gregaria, levi brunnei coloris in juvenu teet fuscis cooris in maturitate, concava, cerciter orbicularia 0.5–0.8 mm. nil

diametro; asci hyalini, elongato-clavata,  $70.0 \times 5.2$  ( $59-93 \times 4-7$ )  $\mu$ ; asco-sporidia uniseriata, hyalina, 8, oblonga  $7 \times 2.5$  ( $5-9 \times 1.5-5$ )  $\mu$ ; paraphyses filiformes, simplices, hyalini.

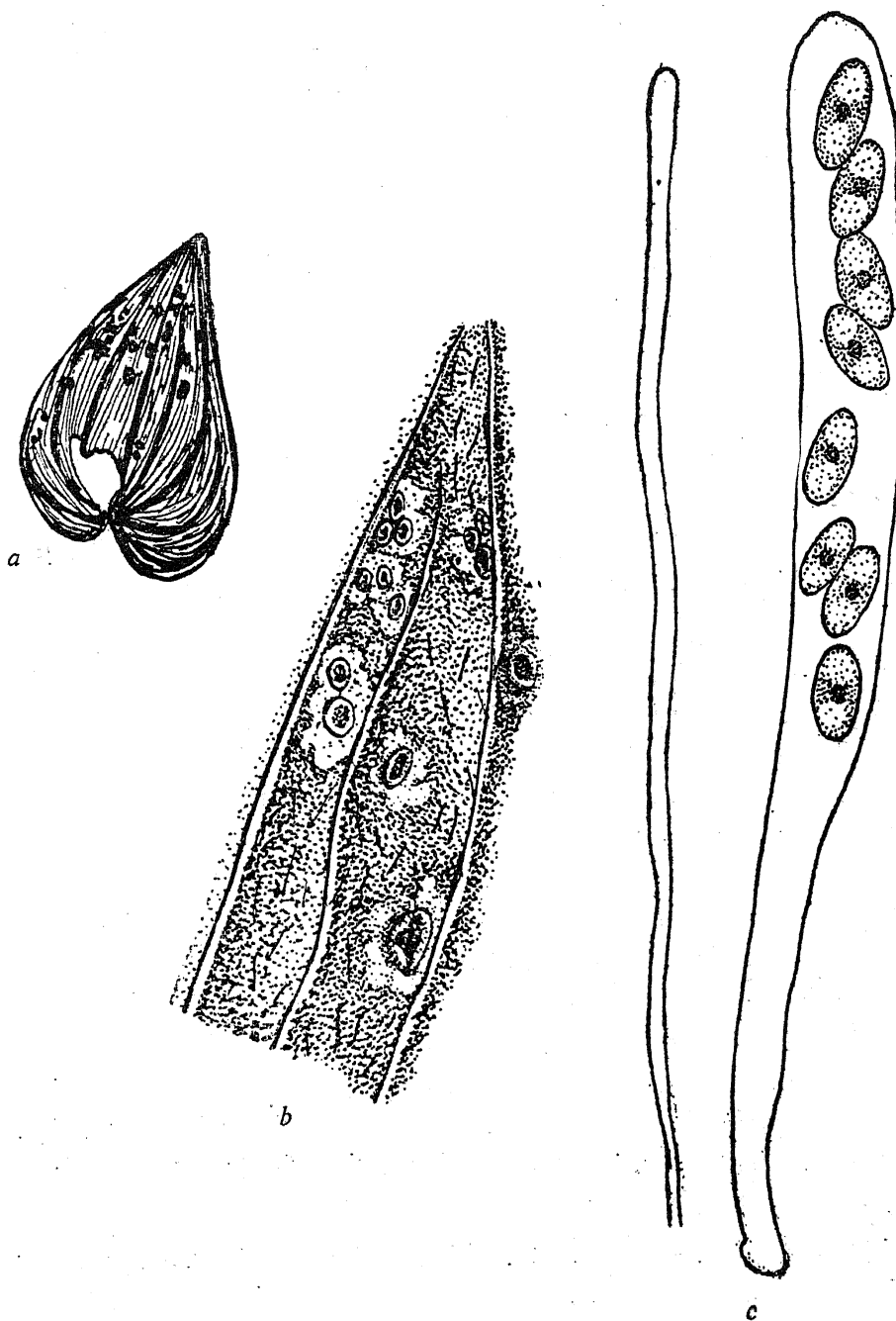


FIG. 2. *a.* leaf with apothecia. *b.* a portion enlarged. *c.* paraphysis and ascus  $\times 2000$ .

*Habitat* in vives foliis *Rubiae cordifoliae* L. Lovedale, Coonoor 19-3-46. Leg. K. Ramakrishnan et C. L. Subramanian. Typi specimina

deposita in Herbario Government Mycologist, Coimbatore et Herb. Crypt. Ind. Orient. New Delhi.

(3) *Puccinia Linkii* Koltzch.

This rust was recorded on the leaves of *Viburnum erubescens* Wall.

Telia are epiphyllous and brown spots are visible on the lower surface of the leaves. Very often telia are ring-shaped, erumpent and dark brown in colour. Teliospores are pedicellate, pedicels hyaline. They are two-celled chestnut brown, with hyaline, prominent, sparsely arranged *art.* on the wall. They measure  $42 \times 17.5$  ( $30.75-51 \times 10.2-26.7$ )  $\mu$ . They are elliptical with rounded ends, slightly constricted in the middle with one germ pore in each cell—at the apex of the top cell and at the junction of the stalk in the lower cell.

*Puccinia Linkii* Koltzch has been described (Sydow; 1904) on *Viburnum pauciflorum* in America. The rust on *V. erubescens* resembles that closely and is therefore identified as *P. Linkii*.

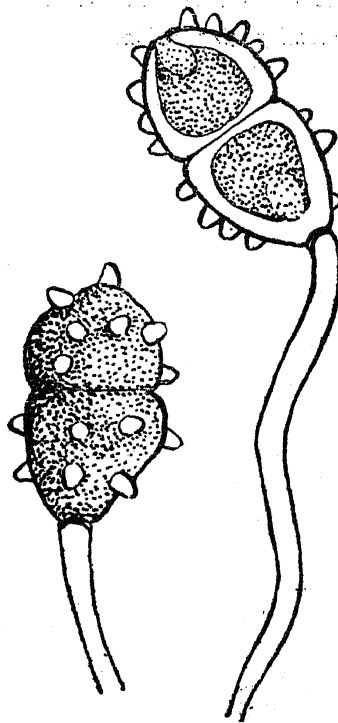


FIG. 3. Teliospores ( $\times 720$ ).

The authors acknowledge the help rendered by Mr. M. S. Balakrishnan, Research Fellow, Mycology Section, in making drawings and by Rev. Fr. Singarayar of St. Joseph's Seminary, Coimbatore, in rendering the diagnosis, into Latin. Dr. B. B. Mundkur of New Delhi and Mr. K. M. Thomas,

Government Mycologist, Coimbatore, were kind enough to go through the manuscript and we are grateful to them for their help.

## REFERENCES

- Butler, E. J., and Bisby, G. R. .. *Fungi of India*, 1931.  
 Clements, F. E., and Shear, S. L. .. *The Genera of Fungi*, 1931.  
 Engler, A., and Prantl, K. .. *Die natürliehen Pflanzenfamilien* Teil. I. Abt. I. 1900.  
 .. *Ibid.*, Second Edition, Part 6, 1928.  
 Mundkur, B. B. .. *The Fungi of India*, Supplement, I, 1938.  
 Saccardo, P. A. .. *Syll. Fung.*, 1889, 8.  
 .. *Ibid.*, 1898, 13.  
 Sydow, H. and P. .. *Monographia Uredinearum*, I, 1904.  
 .. *Ann. Mycol.*, 1920, 18, 178.

## EXPLANATION OF PLATE

- A. *Neolitsea zeylanica* leaf and stem showing the galls produced by the rust (Natural size).  
 B. Section through the gall showing the telial cup closed by the stopper-like peridium ( $\times 100$ ).  
 C. A similar section showing the telio-sorus and the teliospores ( $\times 100$ ).  
 D. Section of apothecium of *Pseudopeziza rubie*.