Development of pycnium and aecium of the rust *Ravenelia kirganelliae* Mund. & Thirum.

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IN an earlier communication, development of uredia and telia in *Ravenelia kirganelliae* Mund. & Thirum. on *Phyllanthus reticulatus* Poir. was described. This paper embodies our observations on the development of pycnia and aecia in this fungus.

Infected leaves of *Phyllanthus reticulatus* Poir. showing pycnial and aecial stages were collected from western ghats near Radhanagari (Kolhapur), India in the months of September-October and fixed in FAA solution on the spot. The fixed material was passed through different grades of alcohol, then to alcohol-xylene series and later embedded in paraffin wax. Microtome sections of 5-7μ thickness were processed and stained in Heidenhain's haematoxylin and counterstained in Orange G. For differentiation saturated solution of picric acid and iron alum were used.

Hiratsuka and Cummins (1963) have summarised the various structural and developmental patterns in the spermogonia of the rust. The pycnia of *Ravenelia kirganelliae* were observed to appear during August-September on *Phyllanthus reticulatus* leaves. The vegetative mycelium of the fungus is relatively localized. The hyphae run parallel to each other forming a compact mass in the palisade layer, sometimes extending to the mesophyll and continue to grow filling the intercellular spaces between the upper and lower epidermis (Pl. 1, fig. 1). The mycelium shows uninucleate haustoria. The hyphae also extend up to the epidermal layer and the cuticle, and piercing the epidermal cells to reach the subcuticular space where these develop into hyphal mass. The hyphae begin to form pycnial initials indeterminate site unlike in *Melampsora lini* where they are formed in substomatal chambers (Coffey *et al.*, 1970).

The hyphae entering the subcuticular space do not ramify to form an extensive mycelium, but produce oval or oblong cells each with a conspicuous nucleus. They develop into pycniophores simultaneously forming a flat hymenium. During this process, the lower half of the pycniophore becomes pigmented pale orange and slightly thick walled as compared to the tip which remains thin walled. The nuclei in the vegetative mycelium as well as in the developing pycniophores are in partially expanded state and as the pycniophores gradually elongate the nuclei become fully expanded to maximum diameter (Pl. 1, figs 2, 3). Similar observations were reported for *Ravenelia emblicae* by Hiremath & Pavgi (1975) and for *Puccinia helianthi* by Craigie (1927). The process of formation and liberation of pycniospores is similar to that of *R. breyniae* (Singh, 1967).

The initiation of the dikaryon begins at this stage (pl 1, figs 5, 6) between the adjacent cells by the process of nuclear migration. At that time the migrating nucleus becomes elongated and finds its passage into adjacent cells through a minute pore in the cell wall (Pl. 1,fig. 6.) After migration, the nucleus resumes its original shape and the two nuclei lie side by side. Such type of dikaryotization has been reported by Kulkarni (1965) in *Masselia narasimhani* and by Hardikar (1978) in *Ravenelia esculanta*. In some sections, it was observed that receptive hyphae get attached to pycnia leading to dikaryotization (Pl. 1, fig. 4).

After dikaryotization, the aecial initials are organised in the aecial primordium which consists of binucleate pseudoparenchymatous cells (Pl. 1, figs 6, 7). Later aecial primordial tissue gets differentiated into two zones (Pl. 1, figs 6, 7): an upper fertile consisting of compactly arranged cells with dense cytoplasm and nuclei and the

lower displacement zone with much narrow vacuoated cells. The binucleate cells of the fertile zone get elongated forming compact layer of basal cells— the aeciospore mother cells. Each sporogenous cell contains two nuclei which divide conjugately and give rise to a chain of binucleate aeciospores (Pl. 1, fig. 8). After the initial is delimited from the mother cell by a septum, the nuclei in the initial divide again and a transverse septum separates the initial into a binucleate aeciospore and a small wedge shaped intercalary of disjunctor cell. The entire process is repeated several times, eventually resulting in the formation of a chain of aeciospores and disjunctor cell with the older cells towards tip and young aeciospores at the base (Pl. 1, fig. 8). A peridium is formed which is tough and dome- shaped.

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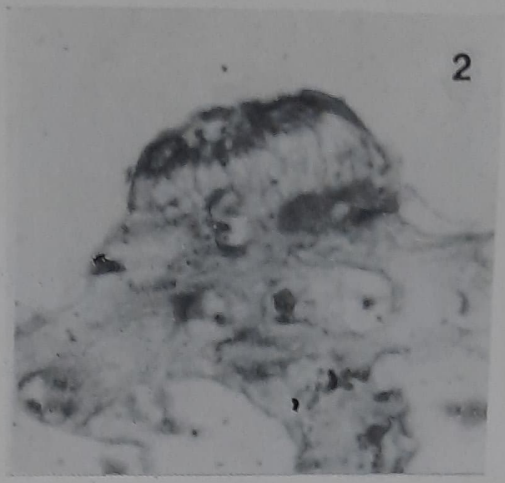
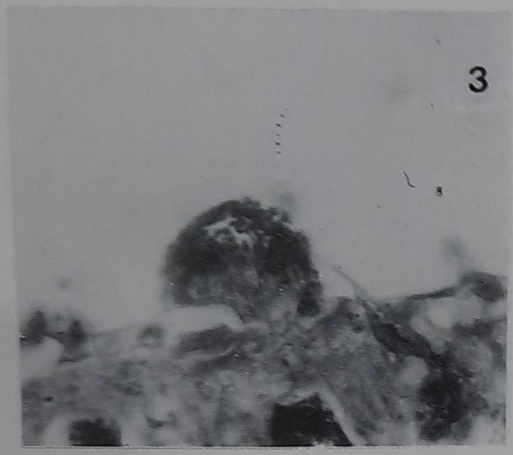
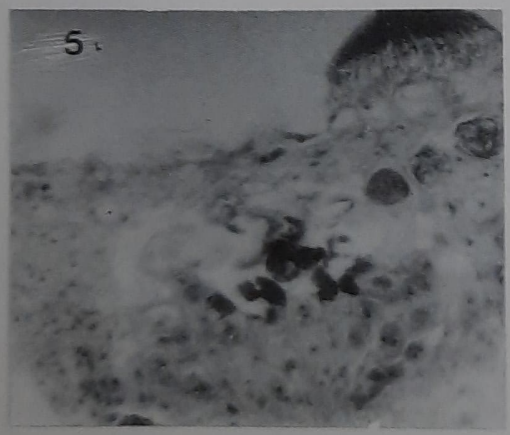
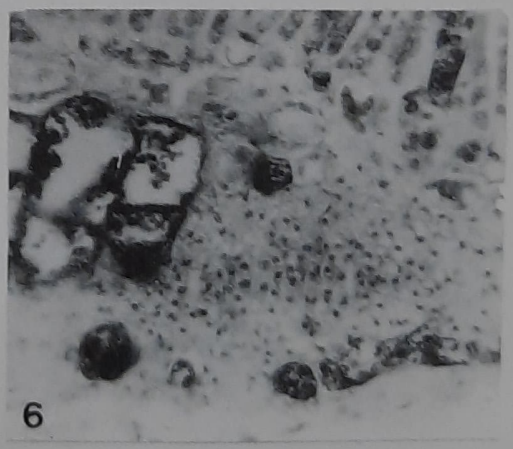
Plate 1

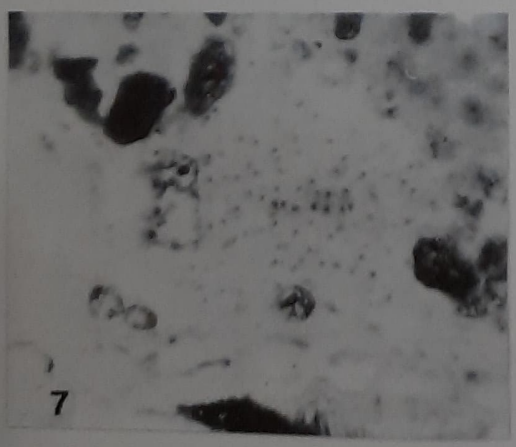
1. Development of vegetative mycelium in the intercellular spaces and around the palisade cells, X 675.
2. Section showing differentiation of basal stroma and pycniophores, X 675.
3. Mature pycnium with pycniospores collecting and extruding through rupture in cuticle, X 1600.
4. Section showing pycniospore gets attached with the receptive hyphae, X 1600.
5. Section showing mature pycnidium and aecial primordium, X 675.
6. Vegetative mycelium showing uninucleate condition and nuclear migration and dikaryotic cells, X 450.
7. Section showing aecial primordium with dikaryotic cells, X 675.
8. Mature aecial cup with aeciospores, X 315.











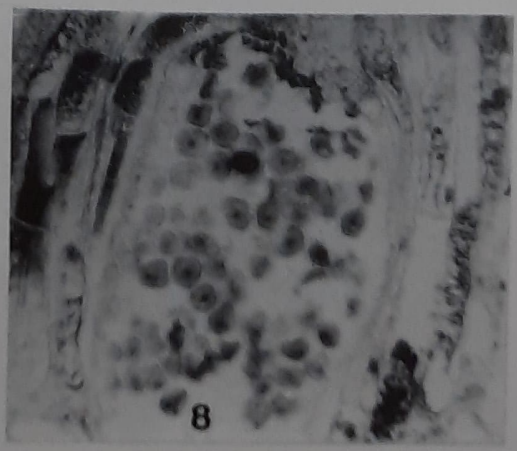


Plate 1