

released on an infested sleeved branch. Within three weeks mummified (parasitised) woolly aphids were observed in this sleeve. Emerging adults parasitised the remaining woolly aphids present on the sleeved branch. The duration of the immature stages of the parasite was about 30 days. In June 300 parasites were received from Coonoor; of these 100 were released on a sleeved branch, and the rest directly over other infested branches. Observations made in July indicated that the parasites released directly had also attacked the pest; however, their activity was found to be very limited. In July about 300 adults from the sleeves were released on other sleeved branches. Heavy parasitism was very soon noticed. The infestation of the pest in August, September and October was considerably less than in the corresponding months of the previous years. In October 3,000 parasites were received from Coonoor and Kulu; 1,000 were released on 8 sleeved branches, and the rest directly in the field. Mummified aphids were observed in large numbers until December, and effective control of the pest was obtained. However, in 1964 the woolly aphid reappeared. It was thought that the parasite had failed to build up its population following the severe cold in January 1964. Therefore, further releases of *A. mali*, received from Kulu, were made; 600 adults on sleeved branches in August, September and October 1964. Following these releases the parasite has become well established and has very effectively checked the pest. Parasitised woolly aphids are now quite common on the apple trees and it has not been necessary to make any further releases of *A. mali*, or to take any chemical control measures during the last two years.

Commonwealth Institute of Biological Control,  
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Bangalore-6, India, January 8, 1967.

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#### ON FERTILE PLANTS OF *LUNULARIA CRUCIATA* IN INDIA

So far, only the vegetative plants of *Lunularia cruciata* (L.) Dum. bearing characteristic semilunate gemma cups have been reported from India. The fertile specimens of this plant are usually extremely rare even in other continents as well.<sup>1</sup> In a plant collection trip to various localities in South India during

the last week of December 1965, a number of male plants of *L. cruciata* were collected by me and Dr. Ram Udar in the damp narrow gorge in Government Botanical Garden, Ootacamund.

The nature of the dorsal epidermal cells and pigmentation of the ventral surface of the thallus in *Lunularia* were regarded by Herzog<sup>2</sup> to be of specific significance. Accordingly plants showing greatly thickened dorsal epidermal cells and dark purple colour of the ventral surface of the thallus were raised to a new species *L. thaxteri*<sup>2</sup> while the rest remain under *L. cruciata*. Recently, observation of the plants under cultivation<sup>3</sup> have shown that these distinctive features are not stable and such plants have been regarded to represent 'forma *thaxteri* (Evans and Herzog) Hassel de Menendez.'

Recently Campbell<sup>1</sup> has shown that plants in New Zealand show three types of dorsal epidermal cells depending on conditions of growth: (1) cells with thin walls; (2) cells with prominent trigones and (3) cells with uniformly thickened walls. Thalli with uniformly thick-walled epidermal cells grow under high light intensity, low temperature and high humidity. New thalli arising from such plants under lesser light intensity show the characteristic trigones of the epidermal cells, but those arising on plants transferred to green-houses have cells with thin walls. It is therefore certain that these variations are merely ecological and not of any taxonomic significance.

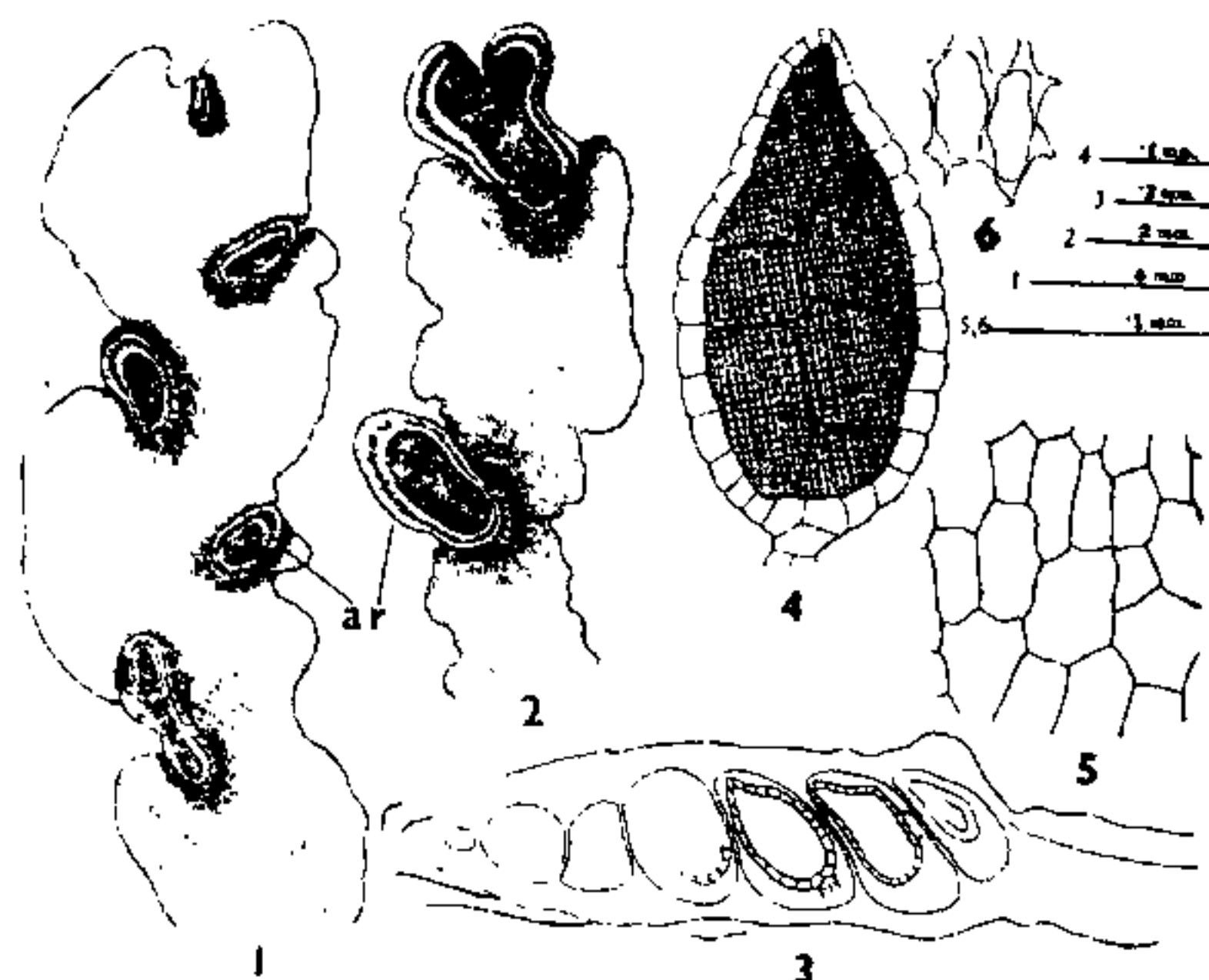
In South India plants with thin-walled epidermal cells (Fig. 5) are very common in shaded and highly humid conditions and those with trigones (Fig. 6) in humid but exposed habitats. Thalli showing uniformly thickened epidermal cells have not yet been discovered.

Only male plants are represented in the collection. It is quite possible that the female plants may also be occurring in the same locality but developing to their characteristic shape only later in the season.

The present report from South India is the first record of sexual plants of this taxon in the bryoflora of India.

The plants (Figs. 1, 2) are green in colour with purplish margins, delicate, dichotomously branched and approximately up to 3 or 4 cm. long and 0.8 cm. broad. Younger thalli innovate from the tips of the older ones. Epidermal cells are thick-walled (Fig. 6) with distinct trigones. The air chambers are filled with simple, branched filaments and open externally through simple, elevated pores. The

ventral scales are in a single row on each side of midrib. They are delicate, hyaline and have a broad rotundate appendage. The dorsal semilunate gemma cups are very common.



FIGS. 1-6. Fig. 1. Thallus showing alternate antheridial receptacles (ar). Fig. 2. Thallus showing bilobed antheridial receptacle. Fig. 3. Longitudinal section of the thallus through an antheridial receptacle. Fig. 4. Antheridium in L.S. (semi-diagrammatic). Fig. 5. Thin-walled epidermal cells. Fig. 6. Thick-walled epidermal cells with distinct trigones.

The male receptacles (Figs. 1, 2: ar) are sessile, slightly elevated, terminal at the point of dichotomy, disciform and occasionally bilobed (Fig. 2), up to 3 mm. long, surrounded by a membranous cup-like sheath with slightly dentate margin. In mature male thalli (Fig. 1) they appear lateral by suppression of growth in the branches bearing them and usually regularly alternate in position. The antheridia (Fig. 4) are pear-shaped with a sterile jacket one cell layer thick, and a stalk two cells wide. Each antheridium remains embedded in the receptacular tissue in an antheridial chamber (Fig. 3).

The present work has been completed during the tenure of a Junior Research Fellowship in the project "Studies on the Hepaticæ of South India" sponsored by the Council of Scientific and Industrial Research, Government of India, under Dr. Ram Udar to whom the author is grateful for the valuable guidance.

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### CULTURAL BEHAVIOUR OF *SCLEROTIUM ROLFSII* SACC. AT DIFFERENT pH LEVELS WITH AND WITHOUT THIAMINE SUPPLEMENTATION

WHILE making cultural studies of *Sclerotium rolfsii* on Asthana and Hawker's medium-A, it was observed that mycelial growth was optimum and sclerotial formation good at pH 5.5. At the other pH levels tried, viz., 2.7, 3.5, 4.4, 6.6, 7.3 and 8.0, mycelial growth was found to be retarded and no sclerotia were formed unless thiamine was supplemented. The intriguing behaviour of this fungus to form sclerotia at a particular pH, even in the absence of thiamine, led to further experimentation. The fungus was, therefore, grown on media in which the hydrogen-ion concentration has been adjusted to pH 4.5, 5.0, 5.3, 5.5, 5.7, 6.0 and 6.5. Two sets of four replicates were maintained at each of these pH levels. One of the sets was without thiamine while the other contained thiamine hydrochloride at the rate of 1 p.p.m.

Comparison of results between the two sets showed that exclusion of thiamine from the medium decreases the dry weight of the fungus, at corresponding pH levels (Fig. 1). On the

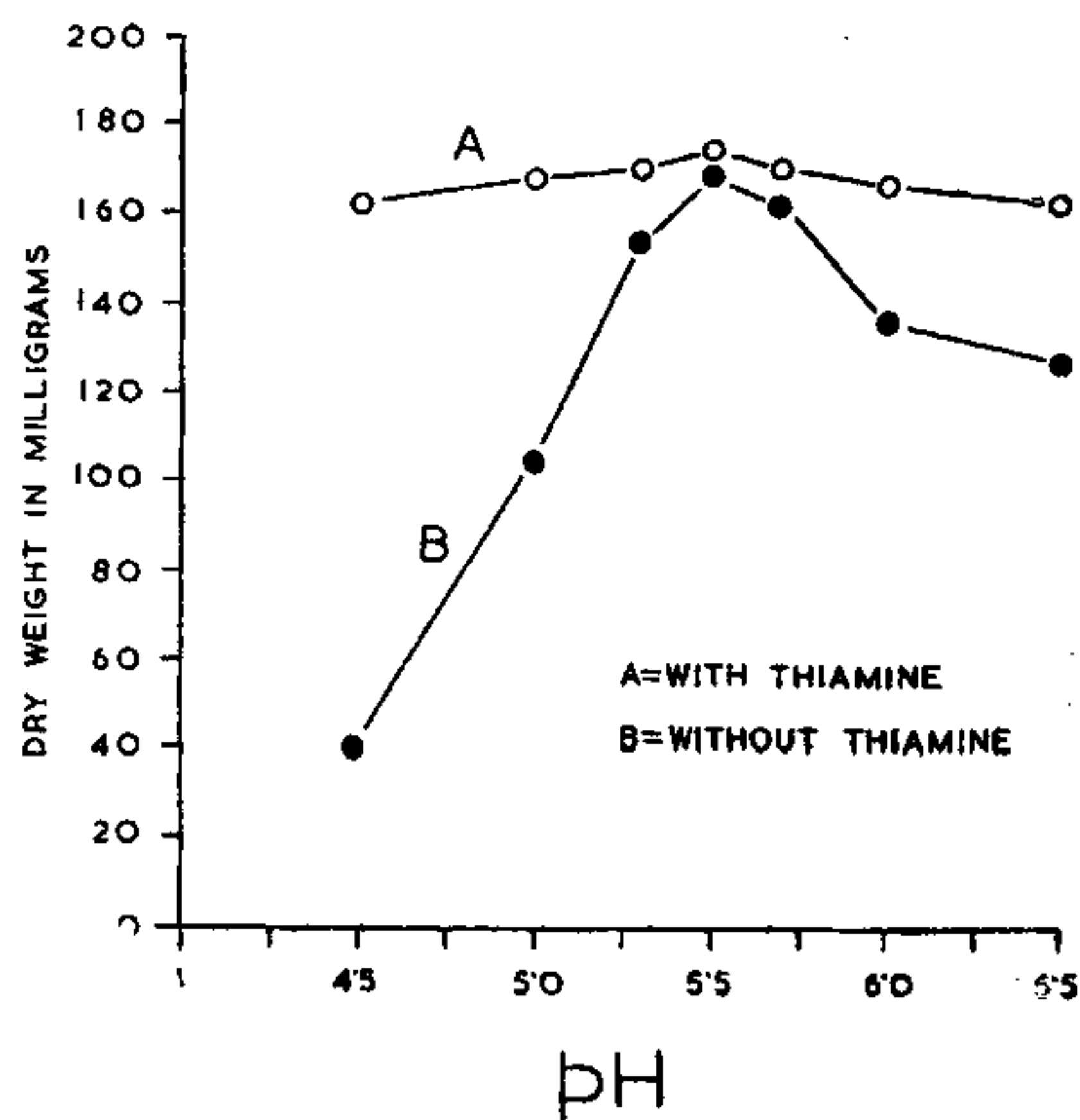


FIG. 1. Growth of *Sclerotium rolfsii* at different pH levels with and without thiamine supplementation.

thiamine-deficient medium, mature sclerotia were formed only at pH 5.5. A few immature sclerotial initials were observed at pH 5.3, but at the other pH levels tested, even sclerotial initiation did not take place. Sclerotial production on the thiamine-supplemented medium was, on the other hand, good at all the pH levels. In the thiamine-deficient medium, pyruvic acid