degradation of starch in YpSs broth. Based on other observations (Satyanarayana and Johri, *Curr. Sci.*, in press), the role of volatile substances can also not be ruled out. While inhibition by thermophilic mycoflora in arable soil would appear to be of little consequence, an interesting possibility does, however, exist; it is the stimulation of conidial germination of fusaria by the degradation products of thermophiles which in the absence of a suitable host will result in lysis and concomitant death of the pathogen. Such a possibility has recently been exploited in biological control of *Gauemannomyces*[10] and *Rhizoctonia*[11].

The author is thankful to the CSIR, New Delhi, for the award of a Post-Doctoral Fellowship and to Prof. S. B. Saksena, F.N.A., for helpful suggestions.

May 30, 1981.

1. Zakaria, M. A. and Lockwood, J. L., *Phytopath.*, 1980, 70, 240.
2. —, — and Filonow, A. B., *Ibid.*, 1980, 70, 495.
3. Papavizas, G. C. and Lumsden, R. W., *Ann. Rev. Phytopath.*, 1980, 18, 389.
4. Satyanarayana, T., *Ph.D. Thesis*, University of Saugar, 1979.
5. Booth, C., The Genus *Fusarium*, C.M.I. Publ., Kew, Surrey, 1971, pp. 237.
6. Johri, B. N. and Thakre, R. P., *Proc. Indian Nat. Sci. Acad.*, 1975, 41B, 564.
7. Johri, Kiran, Saksena, S. B. and Johri, B. N., *Curr. Sci.*, 1975, 44, 605.
8. —, —, — and —, *Proc. Indian Nat. Sci., Acad.*, 1975, 41B, 148.
9. —, —, — and —, *Plant and Soil.*, 1975, 43, 347.
10. Deacon, J. W., *Soil Biol. Biochem.*, 1976, 8, 275.
11. Halder, Y., Chet, I. and Henis, Y., *Phytopath.*, 1979, 69, 64.

FIRST RECORD OF LEAF GALLS ON *LITSEA STOCKSII* (MEISSN.) HOOK. F. (LAURACEAE) CAUSED BY A PSYLLID

C. KANDASAMY
Division of Entomology
UPASI Tea Research Institute
Cinchona 642 106, Coimbatore District, India
AND
B. HARI KRISHNAN
Division of Botany
UPASI Tea Research Institute
Cinchona 642 106, Coimbatore District, India

OUT of the 43 species of *Litsea* Lam. (Lauraceae) recorded from Indian subcontinent, occurrence of galls is reported only on 4 species, *viz.*, *L. glabrata* Hook. f., *L. ligustrina* Hook. f., *L. polyantha* Juss., and *L. wightiana* Hook. f.[1]. Gall formations in these species are restricted to leaves, induced mostly by mites and insects. *Eriophyes* spp. (Acarina) cause leaf galls on these plants except on *L. polyantha* in which the galls are induced by an insect *Pauropsylla beesoni* Laing (Homoptera : Psyllidae).

The leaf galls reported here were collected from the Annamallai Hills at an elevation of 1380 m. The host plant was identified as *Litsea stocksii* Hook. f., by the Botanical Survey of India, Coimbatore. The identity of the gall maker was confirmed as *Pauropsylla beesoni*[2], after comparing it with the paratype of the same deposited at the Forest Research Institute, Dehra Dun. The occurrence of these leaf galls on (Fig. 1) *L. stocksii* induced by *P. beesoni* is a new record to cecidology.

The hypophyllous, simple, pouch galls occur along the lateral veins of the laminar region of the leaf. Interestingly, the galls occurring on the mid veins agglomerate, resulting in the crinkling of the leaves. The galls were confined to the veins, unlike in most of the other pouch galls of psyllids, where the galls occur throughout the laminar surface. The number of

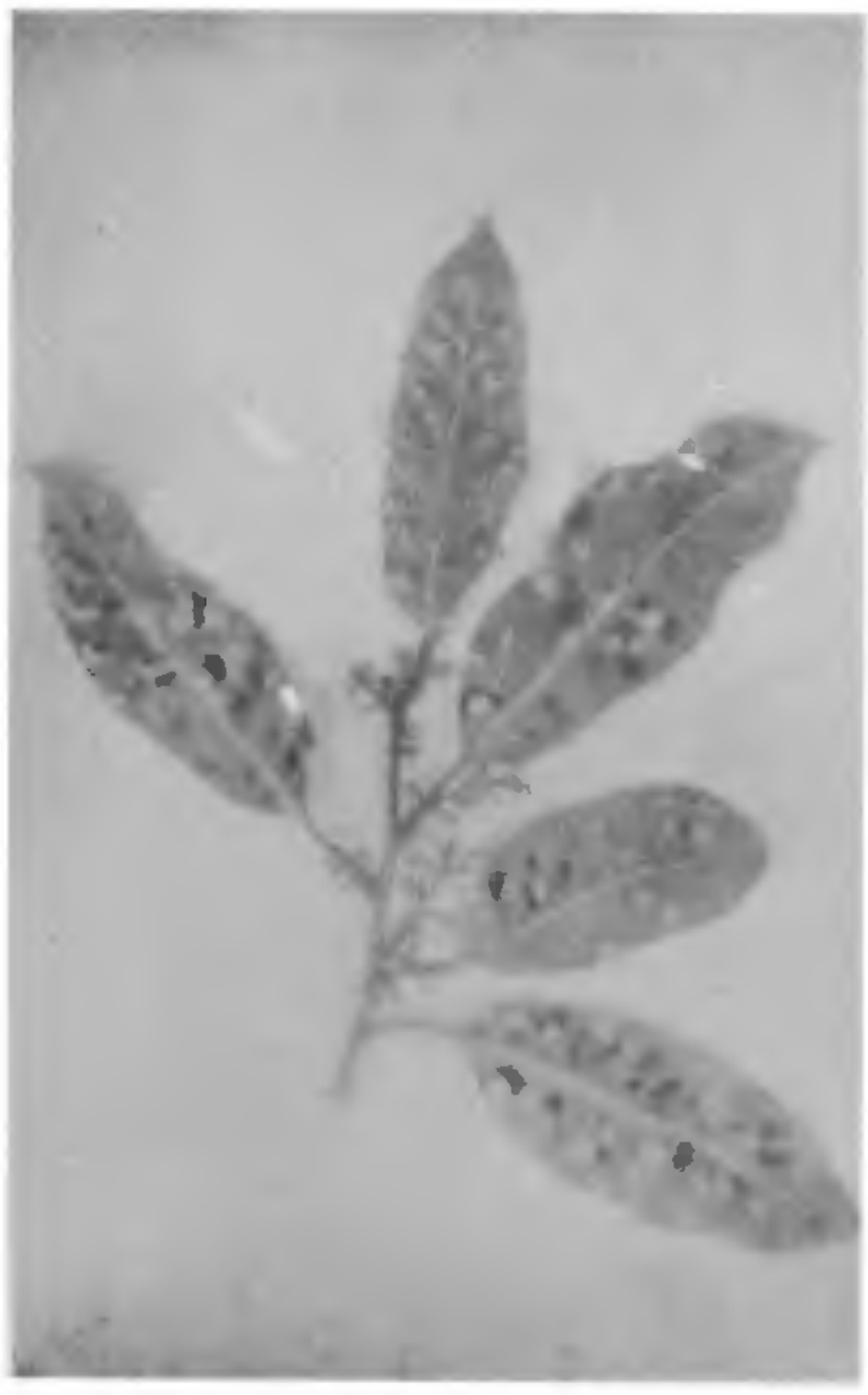

FIG. 1. Leaf galls of *Litsea stocksii* by *Pauropsylla beesoni*.

galls on a leaf varied from 5 to 40 and the young galls were green in colour while the older ones were brown. The mature gall chamber is 4 to 7 mm in diameter, unilocular, enclosing a single nymph inside, unlike the leaf galls of *Garuga pinnata*[3], where more than one nymphal instar occur. Though the galls occur in clusters, the zoocecidia are, however, *unilocular*. The gall cavity is spongy in nature at the nutritive zone of the gall maker and the outer zone is hard.

The size of the gall, which varies from 2 to 12 mm, depends on the developmental stage of the gall maker. When the young and mature galls were cut open, the first and fifth instar nymphs respectively were observed in the gall chambers. The fifth instar nymphs were always surrounded by their white waxy secretions. Exuviae of these nymphs were noticed in fully developed galls indicating their moulting into adults in the nymphal cavity itself. The moulted adults escape from the galls through the apex region on the ventral side of the leaf as in the case of leaf galls on *Ficus glomerata* induced by a *Pauropsylla* sp.[4].

Further studies on the developmental anatomy of this gall is in progress.

Our thanks are due to the Deputy Director, Botanical Survey of India, Coimbatore, for confirming the identity of the host plant. The first author gratefully acknowledges Dr. T. N. Ananthakrishnan, Director, Entomology Research Institute, Loyola College, Madras, for his constant encouragement and guidance.

October 13, 1980.

1. Mani, M. S., *Plant Galls of India*, Macmillan India, New Delhi, 1973, p. 184.
2. Mathur, R. N., *Psyllidae of the Indian Subcontinent*, ICAR Publications, 1975, p. 373.
3. Laing, F., "Some records of Indo-Malayan Psyllidae," *Indian Forest Rec.*, 1930, **14**, 166.
4. Ramakrishna Ayyar, T. V., "List of Psyllidae recorded from India and Ceylon," *Rec. Indian Mus.*, 1924, 26, 621.

TISSUE RESPIRATION IN *SAROTHERODON MOSSAMBICUS* (PETERS) EXPOSED TO SUB-LETHAL CONCENTRATION OF SUMITHION AND SEVIN

P. R. Koundinya and R. Ramamurthi
Department of Zoology, S.V. University College
Tirupati, India

Organophosphate (OP) and Carbamate Insecticides have been reported to reduce whole animal and tissue respiration in Fishes. Exposure of Fish[1] *Lebistes reticulatus* to OP insecticides like malathion, foschlor, dichlorovos inhibited oxygen uptake by 65%, 40% and 30% respectively, while[2] parathion and malathion inhibited *in vitro* O_2 uptake of Blue gill (*Lepomis microchirus*) liver mitochondria in the presence of succinate. The organochlorine and Cyclodiene insecticides namely Chlordane, heptachlor, Kepone, thimet and toxaphene severely inhibited oxygen uptake by Blue gill (*Lepomis microchirus*) liver mitochondria in the presence of succinate[2], but other insecticides like aldrin, dde, dasanit, endrin, lindane, methoxychlor (all organochlorides) parathion, malathion, diazinon (organophosphates), carbofuran and sevin (carbamates) inhibited oxygen uptake in fishes[2]. According to Hiltibran, the inhibition of oxygen uptake was less in the presence of L. Ketoglutarate than in the presence of succinate. Similarly D.D.T. was also found to inhibit oxygen uptake in Blue gill liver mitochondria in the presence of succinate[2]. Earlier experiments with *Tilapia* (Sarotherodon) have revealcd that lethal (Lc 50/48 hours) concentration of sumithion (6 mg/l) and sevin (10 mg/l) reduced 02 uptake of brain, gill, muscle, liver intestine and kidney[3]. The present paper describes tissue respiration of *Sarotherodon mossambicus* (Peters) exposed to sub-lethal concentration of sumithion and sevin.

Maintenance, size and weight range of fish used in the experiments were described earlier. Fish ringer solution with Phosphate buffer at pH 7·5 was used as the suspension medium for the tissues. Oxygen consumption of different tissues was measured in a warburg constant volume respirometer as per procedures given by Umbreit *et al*[5]. Commercial grade sumithion O, O-dimethyl O-(3-methyl-4-nitrophenyl) phosphorothioate from Tata Fison and Co., and sevin (1-naphthyl N-methyl carbamate) EC 50% W.P. from Union Carbide of India were used. The insecticides selected were extensively sprayed by local agricultural workers. Lethal (Lc 50/48 hours) concentration was calculated by Probit method[6] and approximately 1/3 of the Lc 50/48 hours concentration was selected for sub-lethal treatment. It was found that sub-lethal concentration of sumithion and sevin was 2 mg/l and 4 mg/l respectively. Tissue respiration was recorded in fishes exposed to a sub-lethal concentration of sumithion and sevin for 30 days. Similar experiments with normal fish served as controls.

The data on oxygen consumption of brain, gill, muscle, liver, intestine and kidney of normal, 30 day sumithion exposed, 30 day sevin treated fish has been given in Table I. With the exception of gill, metabolic tissues such as brain, liver and muscle exhibited greater reduction of oxygen uptake than osmoregulatory tissues. With sumithion the per cent reduction of O_2 consumption in different tissues was in the following order. Brain > gill > liver > muscle > intestine