

Photosynthetic activity of wheat leaf increased rapidly with increase in CO₂ concentration from 100 to 600 ppm (table 1). With further increase in the level of CO₂, the increase in the rate of photosynthesis was marginal till 3,400 ppm. At 10,000 ppm the rate of photosynthesis started declining. In other C₃ plants also it has been shown that net photosynthesis increases at higher CO₂ level under green house⁴. In wheat leaves photosynthetic rate was doubled when CO₂ concentration was increased from 100 ppm to ambient 340 ppm and from 340 ppm to 600 ppm. Although the decline in photosynthesis occurred at a much higher level, the rate was still higher than that at 340 ppm. This suggests that if the CO₂ level becomes higher than ambient level, the photosynthetic rate of wheat would increase up to 3,400 ppm.

Increasing the level of CO₂ also caused considerable changes in the products of photosynthesis and photorespiration (table 1). At 100 ppm no starch was labelled by the added ¹⁴CO₂. But as the level of CO₂ increased, the content of starch increased reaching a maximum at 10,000 ppm. On the other hand, glycine-serine content showed a gradual decline. At 10,000 ppm the production of glycine-serine was almost untraceable. It is interesting to note that while starch content increased due to increase in CO₂ level, the levels of both sucrose and sugar phosphates remained almost unchanged even after much higher level of CO₂. Thus it appears that additional reduced carbon provided by CO₂ enrichment was stored in the starch and not available for transport as sucrose. The triose-phosphate produced under high CO₂ was diverted towards starch production.

The present study also showed that as photosynthetic incorporation of CO₂ increased due to increase in CO₂ level, the production of glycine-serine

declined indicating reduction in photorespiration. However, it may be noted that some amount of photorespiration still occurred at 3,400 ppm. Thus it appears that photorespiration could not be eliminated completely even if the concentration of CO₂ increases beyond the ambient level.

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TWO INTERESTING LICHEN TAXA NEW TO INDIA

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DURING the course of investigations on Indian lichens the following two taxa of lichens have been found to be new reports from India, exhibiting interesting distribution.

1. *Pyrgillocarpon indicum* (Krempelh.) Nadv.

Stud. Bot. Cech. 5:125(1942).—*Tylophoron indicum* Krempelh., Nuov Giorn. Bot. Ital. 7:11(1875), tab. 1, fig. 28. Type collection: Borneo, Sarawak, 1866, O. Beccari 16 (holotype: M!)

The taxon had been known so far from the type collection from Borneo, though the specific epithet used by Krempelhuber was '*indicum*'. The taxon is characterized by a corticolous, cartilaginous, crustose, ± smooth to rimulose yellowish thallus with verrucial, subglobose to irregularly oblong apothecia to about 1(2) mm tall, and 1.5 mm in diameter, expanded and thicker at base and somewhat narrow-

Table 1 Photosynthetic rate and percentage distribution of labelled products in wheat leaves after feeding with ¹⁴CO₂ under different levels of CO₂

	CO ₂ level (ppm)					
	100	340	600	1,000	3,400	10,000
Photosynthetic rate (dpm 10 ⁴ /dm ² /min)	28	62	123	135	152	140
<i>Labelled products</i>						
Sucrose	59.2	54.9	51.2	53.3	53.3	55.3
Glycine-serine	5.90	6.74	6.06	5.00	2.08	-
Starch	-	1.59	1.89	1.92	2.10	4.83
Sugar phosphate	30.0	34.0	36.5	37.1	36.1	36.3

er (0.5–1 mm) at top. There is an outer thalline exciple covering a yellowish orange distinct proper exciple enclosing the spores in the form of mazaedium. The spores are 2-celled, brown, (8) 12–16 × 5–9 μm , constricted at septum. The thallus is K+ red with formation of red stellate crystals and by TLC is found to contain norstictic acid.

The taxon has now been found growing in India on the trunks of thick, tall trees as detailed below. The Indian specimens were compared with the type specimen and were found to tally well in all the morphological and chemical details except that the thallus is thinner and more rimulose (figure 1), which apparently is due to the nature of bark and the difference in the climatic conditions.

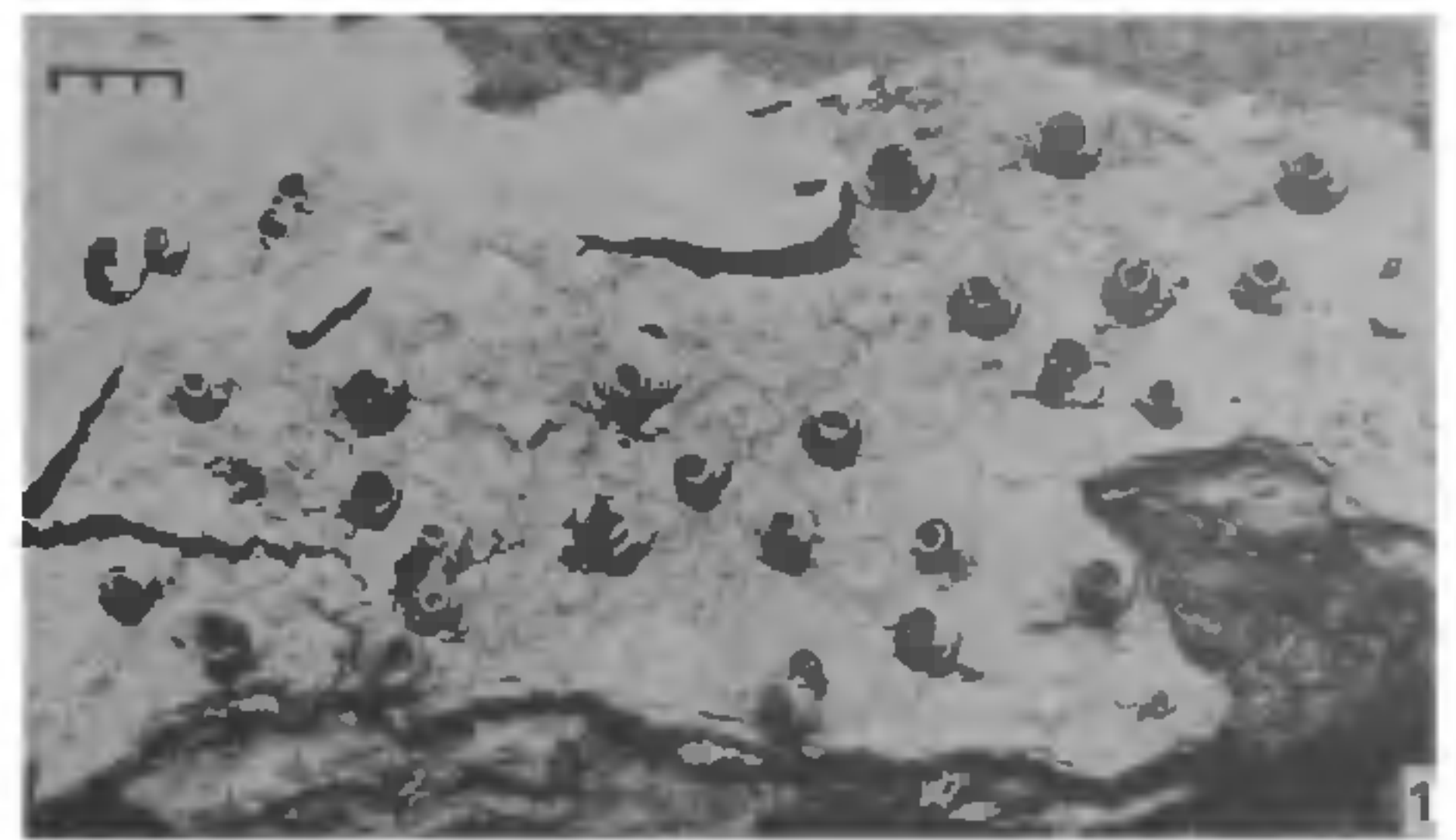
Specimens examined: Kerala, Idukki district, Myladumpara, Indian Cardamom Research Institute campus, alt. ca. 1200 m, 1.3.1984, D.D. Awasthi & G. Awasthi 84.46, 84.47 (LWU)—one duplicate sent each to BM, CAL, M; same locality and date, D. K. Upreti 87163, 87186 (LWG).

2. *Sphaerophorus diplotypus* Vain.

Hedwigia, 37:26(1898). Type collection: Madagascar, Ivohimanitra, 1896, C. Forsyth Major 97(TUR—not seen).

The taxon was described on the material from Madagascar and is characterized by a fruticulose, repeatedly dichotomously branched thallus; branches cylindrical, terete, compressed and smooth, glaucous grey above and whitish and slightly rugulose below (unexposed surface). The fronds are 0.5–1 mm thick, hollow in the central medullary region. The fertile branches are sympodial and have terminal apothecia.

A specimen (figure 2) collected as detailed below from India compares well with the description above as well as to the specimens of the taxon at BM, except that the Indian specimen is comparatively shorter (5–7 mm) in length and that the apothecia are lacking. It was found to possess sphaerophorin, stictic, cryptostictic and constictic acids in TLC by Dr P. W. James (to whom my thanks are due). The genus *Sphaerophorus* is hollow in the medullary region in only two species—*S. diplotypus* and *S. madagascareus* Nyl. ex Cromb. The two are differentiated by a \pm compressed thallus with terminal apothecia in the former and laminal apothecia on the lower surface in the latter. The Indian specimen examined is sterile but compares to *S. diplotypus* Vain. in the compressed thallus and the distribution



Figures 1 and 2. 1. *Pyrgillorarpon indicum* (Krempelh.) Nady., D. Awasthi & G. Awasthi No. 84.46 (LWU); 2. *Sphaerophorus diplotypus* Vain., D. Awasthi & G. Awasthi 84.109 (LWU), (scale = 1 mm).

from Madagascar eastwards to Borneo, Java and Japan. *S. madagascareus* is endemic in Madagascar.

Sphaerophorus is known from Sri Lanka by the two species, *S. australis* Laur. and *S. melanocarpus* (Sw.) DC., none of which is hollow in medulla, and they are not known to occur in India.

Specimen examined: Kerala, Idukki District, Myladumpara, Indian Cardamom Research Institute campus, alt. ca. 1200 m, 1.3.1984, D. D. Awasthi and G. Awasthi 84.109 (LWU).

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