

1. Stewart, W. D. P., *Plant and Soil*, 1970, 32, 555.
2. Allen, M. B. and Arnon, D. I., *Pl. Physiol.*, 1955, 30, 366.
3. Pandey, D. C., *Nova Hedwig.*, 1965, 9, 299.
4. Fogg, G. E., *Proc. Roy. Soc.*, 1952, 139 B, 372.
5. Singh, R. N., *The Role of Blue-Green Algae in Nitrogen Economy of Indian Agriculture*, I.C.A.R., New Delhi, 1961.
6. Stewart, W. D. P., *Nature*, 1963, 200, 1020.
7. Venkataraman, G. S. and Neelkantan, S., *J. Gen. Appl. Microbiol.*, 1967, 13, 53.

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**AN EDIBLE ALGA OF MANIPUR (*LEMANEA AUSTRALIS*): PRESENCE OF SILVER**

DEB<sup>1-5</sup> collected an interesting alga in Manipur State, locally called *Nungsam* which is sold as an article of food. It is a freshwater Rhodophyta representing the family Lemaneaceae and is determined as *Lemanea australis* Atkins<sup>6-8</sup>. It is found on the rocks in the swiftly flowing fresh water at the confluence of the Manipur and Chakpai rivers (24° 16' 35" : 93° 52' 30", Topo sheet 83 H/SE) at a distance of about 1.6 km south of Shugnu in Manipur State. The plant grows luxuriantly but for few months in the early winter, when it is collected and dried. In Manipur it is cooked with vegetable primarily for its characteristic fishy smell. No reference could be traced from literature<sup>9-15</sup> in this regard. This is, however, reminiscent of the uses of *Enteromorpha intestinalis* Link<sup>16-18</sup>. The sample on analysis (dry wt. basis) showed 20% protein, 32.5% carbohydrate and 10% lipid.

No toxic effect is reported as yet, although it is eaten by local people for generations. Biological evaluation of the material in animals should be carried out to specify nutritive value of protein, etc.

Spectrographical analysis of ash conducted in the Chemical Laboratory of Geological Survey of India, Calcutta, reveals the presence of trace elements as shown in Table I.

TABLE I

Element	Cu	Pb	Zn	Ni	Co	V	Mn	Ag	Ba	Sr	Cr	Zr
Quantity ppm	>200	100	1600	100	60	20	>3000	4	200	100	100	40

Of the trace elements the most interesting is the presence of silver which has not been reported from any Indian plant, nor is there any report on the occurrence of this mineral in the area in which this plant is found.

The use of plants as an indicator of economic deposits has been recently summarised by Cannon<sup>22</sup>. He did not mention silver which, however, has been detected in several plants<sup>23-27</sup>. Presence of silver as a trace element in the plant indicates its existence in the rock on which it grows. A thorough survey of the region is desirable to explore the potentiality of the rocks involved.

1. Deb, D. B., *Bull. Botan. Soc. Bengal*, 1957, 11, 15.
2. —, *J. Bombay nat. Hist. Soc.*, 1958, 55, 313.
3. —, *Ind. For.*, 1960, 86, 94.
4. —, *Bull. bot. Surv. India*, 1961, 3, 115.
5. —, *Ibid.*, 1961, 3, 253.
6. Atkinson, G. F., *Ann. Bot.*, 1890, 4, 218.
7. —, *Bot. Gaz.*, 1931, 92, 225.
8. Palmer, C. M., *Biol. Abstr.*, 1942, 16 (1), 5023.
9. Watt, G., *A Dictionary of the Economic Products of India*, 1889-1993, pp. 1-6.
10. Bruhl, P. and Biswas, K., *Mem. Asiat. Soc. Bengal*, 1929, 8 (5), 257.
11. Biswas, K., *J. Bombay nat. Hist. Soc.*, 1931, 34 (1), 189.
12. — and Calder, C. C., *Handbook of Common Fresh Water and Marsh Plants of India and Burma*, 1937.
13. —, *Rec. bot. Surv. India*, 1949, 15, 1.
14. Bharadwaja, Y., *Proc. Indian Acad. Sci.*, 1963, 57 B, 239.
15. Manjunath, B. L. and Sastri, B. N. et al., *The Wealth of India: A Dictionary of Indian Raw Materials and Industrial Products*, 1948-1972.
16. Seale, A., *Philipp. J. Sci.*, 1911, 6, 308.
17. Hooper, D., *Gard. Bull. S. S.*, 1927, 6, 37.
18. Burkill, I. H., *A Dictionary of the Economic Products of the Malay Peninsula*, 1936, 1, 928.
19. Mcready, R. M., Gagglioz, J., Silviera, V. and Owens, H. S., *Anal. Chem.*, 1950, 22, 1156.

20. Lowery, H. O., Rose Brough, N. J., Lewis, A. F. and Randell, R., *J. Biol. Chem.*, 1951, 193, 261.
21. Bloch, K., *Lipid Metabolism*, 1960.
22. Cannon, H. L., *Taxon*, 1971, 20, 227.
23. Harry, W. V. and Delavault, R. E., *Bull. Geol. Soc. Amer.*, 1950, 61, 123.
24. Nagata, M., *Sci. Repts. Osaka Univ.*, 1954, 3, 53.
25. Kawai, H. and Kawai, M., *Gifu. Yakka Daigaku Kiyo*, 1959, 9, 41.
26. Markrudov, I. P., Pogorelko, I. P. and Yuldarhev, P. Kh., *Usbeksk. Khim. Zh.*, 1962, 6, 84.
27. Vinogradova, Z. A. and Kovalskii, V. V., *Dokl. Akad. Nauk. SSSR*, 1962, 147, 1458.