(5 × 10^8 cells/ml) of Rizobium. The air inlet is connected to the compressor (in this instance, Khosla & Co., Model 1968 2 H.P.) and air allowed into the fermentor after successively passing through a dehumidifier and air filters (previously sterilized). The rate of aeration could be adjusted by manipulating the air inlet valve and air bleeder to give a constant pressure of 3 lb per square inch inside the fermentor which also serves as an efficient method of agitation. At the time of harvesting, the compressed air is shut down and the sampling outlet (O) opened. The entire bacterial culture can be recovered easily into a suitable container due to the release of pressure at outlet (O).

The time course growth curves of _R. trifolii_ obtained with this apparatus and with a commercially available fermentor indicate that the production rate in both the vessels are almost identical (Fig. 2).

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**ISOLATION OF A NEW CYANOPHAGE, TAUHN-1**

So far ten cyanophage types are known^1-11, of which five infect heterocystous nitrogen fixing blue-green algae^1,3,9,10_. Using the method of Saferman and Morris^5_, a new cyanophage, TAUHN-1, having a host spectrum of _Tolyphothrix tenuis_, and _Auxisira fertilissima_ (Scytonemataceae) as well as _Nostoc muscorum_ (Nostocaceae) and _Hapalosiphon intricatus_ (Stigonemataceae) was isolated from sewage water from Baroda.

The TAUHN-1 phage is relatively stable when stored in its own lysate and the plaques formed on _T. tenuis_ are clear with regular margins, varying in size from 1-5 mm in diameter. Like C^19_, AR-19_ and A-23 phages, this phage also does not lyse the heterocysts (Fig. 1, C, D, E, I).

In phage infected cultures of _Hapalosiphon intricatus_, lysis was first noted in cells that were randomly distributed along the length of the trichome (Fig. 1 G) and as lysis progressed, the trichomes fragmented into smaller units and eventually only scattered cells were found in the population. In _Nostoc muscorum_, the cells were completely lysed, leaving the empty mucilage with unlysed heterocysts (Fig. 1, I, h). In _Tolyphothrix tenuis_, lysis starts from the open end of the sheath, suggesting the phage entry through these regions (Fig. 1 A). Once lysis begins, it progresses rapidly down the length of the filament, resulting in empty sheaths (Fig. 1 B). When the infection proceeds along the non-pore side of a single-pored heterocyst, the lysis stops at the heterocyst, leaving the cells beyond the pore side unlysed (Fig. 1 C). However, if the lysis proceeds on the pore side also, then the heterocyst content is also lysed, leaving the empty heterocyst wall (Fig. 1 D), suggesting

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*Fig. 1. A-E, Lysis of *T. tenuis*: F, G, healthy (F) and lysed (G) filaments of *H. intricatus*; H, I, healthy (H) and lysed (I) cultures of *N. muscorum* (h, unlysed heterocysts).*
that the phage particles enter through the heterocyst pores. This is clear when the trichomes are interspersed with intercalary double-pored heterocysts. In these cases, the lysis of the cells proceeds upon the heterocysts and continues to progress through the heterocyst to the other side (Fig. 1 E). When this happens, empty sheaths are found to contain only empty heterocyst walls.

The isolation of TAuHN-1 cyanophage infecting T. tenuis and A. fertilissima, the two commonly used algae in algalization is likely to have greater implications.

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Division of Microbiology, B. D. Kaushik

2. — and —. Ibid., 1972, 47, 701.

DISTRIBUTIONAL RECORDS OF SOLIVA ANTHEMIFOLIA, CENTIPEDA MINIMA AND MERREMA EMARGINATA IN AND NEAR DELHI

During the course of intensive studies on the flora of Delhi and its environs, the authors noted the occurrence of the following plants which constitute new records for the region (see Maheshwari[1–2]). The South American species, Soliva anthemifolia R. Br. ex Less. (Asteraceae) was collected along the banks of Jamuna river, near Wazirabad. Centipeda minima A. Br. & Aschers. (Asteraceae), an inconspicuous herb, occurs commonly in moist and shady situations. Merrema emarginata Hallier f. (Convolvulaceae) is found in the vicinity of Suraj Kund, near Delhi. This note provides brief diagnostic features of the above taxa together with notes on their habitat.

1. Soliva anthemifolia (Juss.) R.Br. ex Less.

Creeping, often caespitose herbes with short stems. Leaves pinnatifid, thinly white-hairy; segments membranaceous, lanceolate-oblong. Capitula sessile, globose, generally basal and crowded on the short stem, small and greenish at first, accrescent and green to dull brown later. Marginal florets without corolla; disc florets with greenish-yellow, pubescent corolla. Cypselae cuneate, truncate, with wrinkled wings and persistent hardened style.

Specimens collected.—Prithipalsingh 3377, 3398, Wazirabad, Dec. 1971, Herb. Univ. Delhi; V. Singh 74760, Atru Village, Kota District, Rajasthan, LGW.

Common in sandy tracks bordering the cultivated fields along Jamuna river near Wazirabad, Delhi State. The large, globose heads crowded on short stems and finely dissected leaves distinguish this taxon from other Compositae of Delhi. This species is a native of Argentina, Paraguay and Brazil, and has been introduced into India, Australia, New Zealand, Belgium, Taiwan, etc. (see Maheshwari and Singh[2], Cabrera[4]).

2. Centipeda minima (L.) A.Br. & Aschers.

Small, prostrate, often many-stemmed herbes. Stems glabrescent or cottony-hairy on younger parts only. Leaves toothed or pinnatifid; segments linear, short. Capitula sessile, solitary. Florets white to pale yellow, minute. Cypselae oblong, 4-angular, the angles hairy. Pappus absent. Receptacle convex.

Common name: Spreading Sneeze-weed.


Common with grasses along streams and other moist habitats. The toothed or divided leaves; inconspicuous, sessile or subsessile heads and 4-angled cypselae with hairs on the angles distinguish this species from other Compositae in the area.

3. Merrema emarginata (Burm. f.) Hallier f.


Specimens collected.—Prithipalsingh 7063, 7064, Suraj Kund, Oct. 1972, Herb. Univ., Delhi; V. Singh