branched, septate, aggregate to form pycnostromata. Pycnostromata dark-coloured, leathery to carboneous, irregular, thick-walled, pseudoparenchymatous, aggregated, formed generally in 10-day old culture. Pycnidial cavity immersed, without an ostiole, 120-172 μm in diameter. Sporogenous cells hyaline, simple, rarely branched, phialidic, enteroblastic, arising directly from the innermost layer of cells lining the pycnidial cavity. Spores of 2 types: Phialospores, hyaline, unicellular, pointed at ends, fusiform, biguttulate. 7.5-10.5 x 3.4-5.2 μm. Stylospores hyaline, unicellular, long, slender, often bent at one side like a walking stick, 19-31 x 1.3-2 μm.

Pycnostromata fusca, Coriacea, carbonacea, irregularis. Crasse tunicata, pseudoparenchymatica, aggregata, plurumque die decema prima evoluta. Cavatitas pycnidii immerso, haud ostiolati, 120-170 μm in diametro. Cellulae sporogenae hyalinae, simplices, raro ramosae, phialidicae, enteroblasticae ex orientes stratis ex intimis cellularum cavatitas pycnidii. Sporae biformes: phialosporae hyalinae, continuis, utrinque acuta, fusiformes, biguttulatae, 7.5-10.5 x 3.4-5.2 μm; stylosporeae hyalinae, continuis, longae, graciles, arcuatae vel lateraliter instar baculi deflectae, 19-31 x 1.3-2 μm.

The type species has been deposited at CMI, Kew, England, with accession no. IMI 276385.

The authors are grateful to Prof. G. P. Agarwal, for facilities and to Dr E. Punithalingam of CMI, Kew, England for identification of the fungus. The authors are thankful to Dr S. K. Hasija and Dr R. C. Rajak for their help and to CSIR for the award of a fellowship to AC.

27 July 1983; Revised 20 October 1983

CYTOKININ-LIKE SUBSTANCES IN BLUE-GREEN ALGAE

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Growth regulators have been reported in both freshwater and marine algae. Very few of them, however, have been isolated and chemically examined. The information pertaining to their occurrence in algae has been reviewed by several workers1-3.

Bentley-Mowat and Reid4 were the first to study cytokinins in marine phytoplankton. Cytokinin-like substances were later reported5-8 in a number of marine algae. These, however, have not been studied in blue-green algae. Two blue-green algae Westiellopsis prolific a Janet and Plectonema boryanum Geit. have, therefore, been studied for the presence of cytokinins.

The algae were grown in modified Benecke's medium9 under 40 W fluorescent tube light at 30 ± 2°C. Three-week old cultures were harvested by centrifugation under aseptic conditions and used for the experiments. Solvent extraction10, purification on Dowex 50W-X8 H+ column, paper chromatography and radish cotyledon expansion bioassay11 were used. The strip chromatogram was divided into 10 Rf units (Rf 0.0-0.1 to 0.9-1.0) and these were tested for their biological activity. The hypocotyl sections were used to test any gibberellin activity.

The ultraviolet light absorption bands in chromatogram of W. prolific a at Rf 0.1 to 0.3 and 0.6 to 0.7 and in P. boryanum at Rf 0.7 to 0.8 and 0.9 to 1.0 and their activity in radish cotyledon bioassay indicated the presence of cytokinin-like substances of the nature of purine and its derivatives (figure 1). The biologically active factors observed near the starting line in a number of organisms10,12 were identified as zeatin ribonucleotide. The activity at Rf 0.1 to 0.3 in W. prolific a may, therefore, be ascribed to substances of this nature. Zeatin has been identified at Rf 0.65 to

![Figure 1. Percentage increase in fresh weight of radish cotyledons incubated in eluates from strip chromatogram. The shaded areas in horizontal bars indicate the location of UV light absorption bands of the chromatogram a. W. prolific a Janet b. P. boryanum Geit.](image-url)
The substances at Rf 0.6-0.7 in W. prolifica and at Rf 0.7 to 0.8 in P. boryanum are likely to be of the nature of zeatin. The gibberellin acid has a stimulating effect on cotyledon growth in the absence of cytokinin while in the presence of cytokinin it is markedly inhibitory. The absence of any increase in the length of radish hypocotyl sections in the experiments shows that the expansion of radish cotyledons in the bioassay is due to cytokinin-like substances only.

It may be concluded that W. prolifica and P. boryanum contain cytokinin-like substances. Their actual chemical nature, however, needs confirmation. The presence of gibberellins and cytokinins may partly account for the beneficial effect observed in some crops on blue-green algal seed treatment.

23 August 1983.


TEMPEH—A FERMENTED FOOD FROM SOYBEAN

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Several fermented food products are known from the South-East Asian countries. A few examples are sufu and tempeh from soybean, while ragi and bhakar are obtained by fermenting rice. Tempeh, particularly, has interested many investigators because of its good flavour, cheap base and nutritional value. Since tempeh has more protein as compared to other pulse products and is palatable, it can be a good substitute for raw soybeans which are considered unpalatable. However, most of the work on tempeh fermentation to date has been with American soybean cultivars viz Hawkeye, Hood, Harvey, Dorman, Lincoln, Chippawa, Dortchsoy, Jackson and Lee or with Japanese cultivars viz Hokkaido, Iwota and Kunamoto. It was, therefore, thought desirable to develop tempeh fermentation with popular Indian commercial cultivars of soybean, mainly, DS-74-24-2, Bragg, Clark-63 (yellow-seeded) and Jawa-16 (black-seeded).

Pioneering work on food fermentation in the Orient led to the knowledge that Rhizopus was associated with fermentation in tempeh. Later, other species like R. oligosporus, R. oryzae, R. arrhizus, R. formosensis and R. achlamydosporus were also utilized for fermentation technology.

Tempeh is traditionally prepared by soaking the beans overnight, dehulling by hand and boiling for 30 min at atmospheric pressure. These are later dried and packed into banana leaves or paper along with an old piece of tempeh as starter.

In the present investigation, the laboratory method devised by Hesseline et al. was employed. Rhizopus stolonifer, R. arrhizus, R. oryzae, R. microsporus, R. oligosporus and R. chinensis were utilized to ferment the four soybean varieties mentioned above. The beans (100 g) were soaked in 300 ml of water for 20 hr at 25°C. These were then dehulled by hand under tap water and boiled for 30 min at atmospheric pressure.