Tissue Culture Laboratory, M. SINHA.
National Botanical H. C. CHATURVEDI.
Research Institute,
Lucknow, *September* 11, 1978.

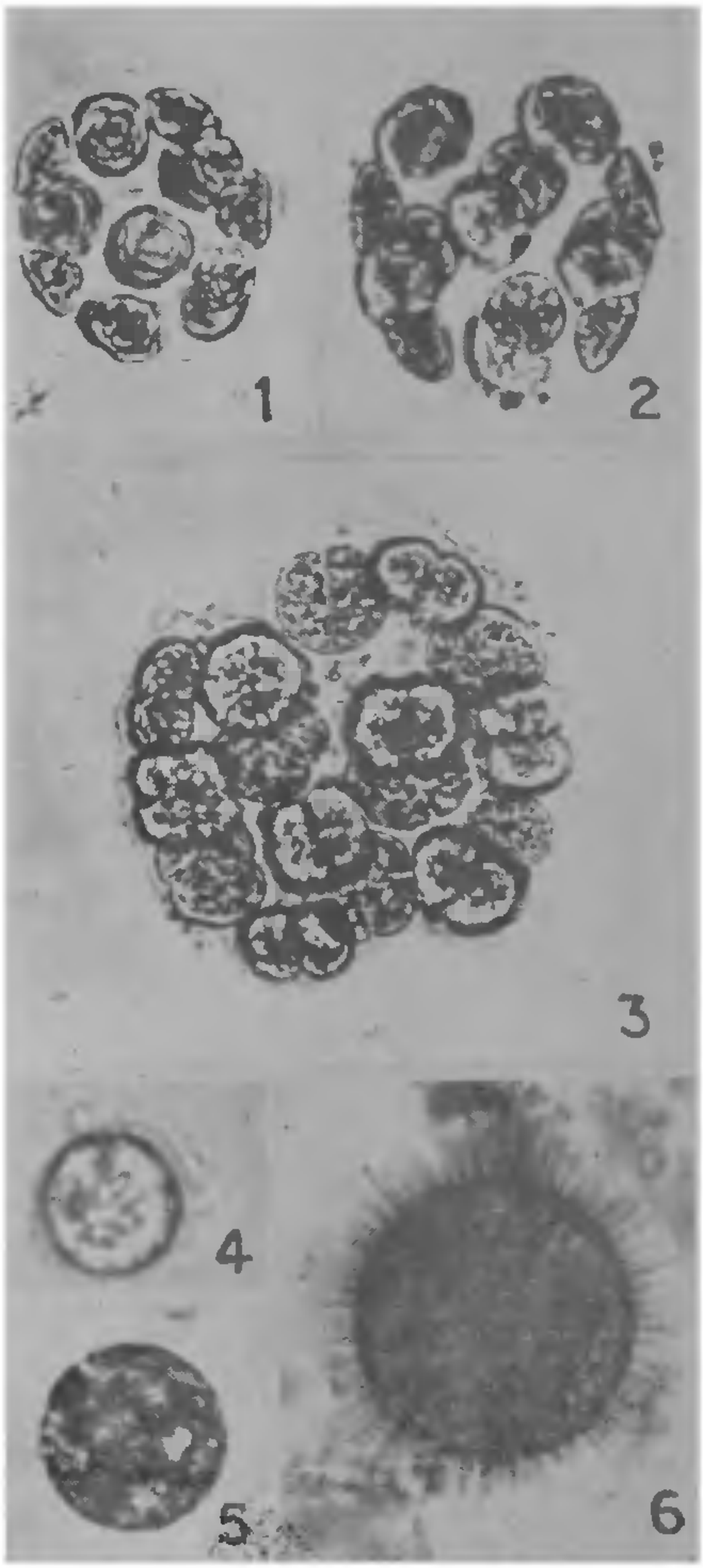
1. Chaturvedi, H. C., *Curr. Sci*, 1975, 44, 839.
2. Lakshmi Sita, G., Bammi, R. K. and Randhawa, G. S., *J. Hort. Sci.*, 1976, 51, 551.
3. Chaturvedi, H. C., Sinha, M. and Sharma, A. K., In *Cultivation and Utilization of Medicinal and Aromatic Plants*, (Eds.) C. K. Atal and B. M. Kapur, Leipzig Press, New Delhi, 1977, p. 500.
4. Skoog, F. and Miller, C. O., In *Biological Action of Grouth Substances, Symp. Soc. Exp. Biol.*, 1957, 11, 118.
5. Kunisaki, J. T., *Hort. Sci.*, 1977, 12, 141.
6. D'Amato, F., In *Applied and Fundamental Aspects of Plant Cell, Tissue and Organ Culture*, (Eds,) J. Reinert and Y. P. S. Bajaj, Springer Verlag, Berlin, 1977, p. 343.
7. Chacko, E. K. and Randhawa, G. S., *Indian J. Hort.*, 1977, 34, 72.

STUDIES ON NORTH INDIAN VOLVOCALES
V. *Volvulina steinii* Playfair from India

THE genus *Volvulina* comprising three species, *viz.* *V. steinii* Playfair, *V. pringsheimii* Starr and *V. playferiana* Skvortzow, is one of the ephemeral Volvocalean genus. *V. pringsheimii*[1] was obtained from soil cultures and in water samples collected from a temporary pond at Varanasi. There is no authentic record of *V. steinii* from any part of India. The present study records the observations on the morphology and the reproduction of *V. steinii* collected from various rain water puddles in two subsequent years from different localities in Varanasi. The alga was grown into Pringsheim soil-water tubes[2] containing steamed wheat or pea. Clonal cultures were raised from a single colony and maintained at $21 \pm 1°C$ in a thermostatically controlled culture chamber by providing an illumination of 3,000 Lux for 16 h daily.

The coenobia consisting of 16 (occasionally 8) cells were somewhat spherical and $20{\cdot}7 \times 18{\cdot}4\ \mu m$ to $51{\cdot}3 \times 46{\cdot}7\ \mu m$ in size (Figs. 1–2). The cells [$4{\cdot}6$–$13{\cdot}8\ \mu m \times 3{\cdot}3$–$11{\cdot}5\ (13{\cdot}8)\ \mu m$] were arranged in alternating tiers of 4 cells each and found embedded in a hollow hyaline matrix. The shape of the cells was angular to circular in surface view and lenticular to hemispherical in side view with their apical portion slightly flattened. The chloroplast was massive and apparently lack a pyrenoid. The uninucleate cells were biflagellate with two contractile vacuoles placed anteriorly near the flagellar base. The eyespots were prominent and dark red in the cells of anterior tier but diminished in size in the cells of posterior tier and even lacking in the cells of 4th tier.

Asexual reproduction in the present alga confirmed to that described earlier for *V. steinii*[3,4] and *V. pringsheimii*[1,5]. All the vegetative cells of coenobium functioned in the formation of daughter colonies (Fig. 3). Sequential cleavage in each cell resulted in plakea



FIGS. 1–6. Figs. 1 and 2. Morphology of the 16-celled coenobia showing lenticular to hemispherical cells, × 700. Fig. 3. Asexual reproduction, × 700. Fig. 4. A spherical gamete with prominent eye-spot; flagella are not clear at this focal level, × 1,000. Fig. 5. A spherical zygote with only primary membrane; inner secondary wall is yet to be developed, × 700. Fig. 6. A mature spiny-walled zygospore; primary smooth membrane is almost disintegrated, × 700.

formation which following inversion produced a daughter colony.

Sexual reproduction was accomplished by biflagellate gametes (transformed vegetative cells) lacking a cell wall and characteristic shape but having an anterior colourless papilla (Fig. 4). The alga was heterothallic and mating reaction started soon after mixing compatible clones from cultures. The first sign of mating reaction was marked by clumping of colonies followed by liberation of gametes. Gametes of opposite mating type paired with each other by agglutination of their flagellar tips and later by their papillae. The cytoplasmic bridge between the two gametes broadens gradually and resulted in cytoplasmic fusion. The spherical, quadriflagellate planozygote after a short period of motility came to rest, enlarged slightly and shedded its flagella (Fig. 5). The zygote later secreted a secondary wall internal to the smooth primary membrane. As the secondary wall thickened, spine-like processes develop all over its surface. At maturity the primary membrane was ultimately lost, the spiny zygospore increased considerably in size and changed its colour from green to orange-red (Fig. 6). The mature zygospores ranged between 30–37 μm in diameter with the length of spine 5 to 7 μm.

The Indian isolates of *Volvulina steinii* (present study) confirms the Carefoot's[6] observations of the two additional attributes, *i.e.*, presence of apical mating papillae in gametes and production of spiny-walled zygospores, which were not recorded by earlier workers for this species. Interestingly these two characters are also known for *V. pringsheimii*[1,2] which differs from *V. steinii* only by the presence of a pyrenoid in the cell and occurrence of a uniform mucilaginous sheath common to the entire coenobium. Stein[4] recorded smooth-walled zygospores in *V. steinii*. The production of only spiny-walled zygospores from the mating of all the clones isolated from two populations at Varanasi is noteworthy. Carefoot[6], however, recognised three sexually isolated groups of clones from different geographical area. Of these, the clones of two sexually isolated groups produced only smooth-walled zygospores whereas the third group produced always spiny-walled zygospores. Due to lack of production of smooth-walled zygospores *in vivo* as well as from the crosses of clones *in vitro*, it is presumed that the present isolates of *V. steinii* consist of sexually isolated group of clones characterised by the production of spiny-walled zygospores.

The author thanks Prof. Y. S. R. K. Sarma, Department of Botany, B.H.U. and Dr. T. N. Khoshoo, Director, National Botanical Research Institute, Lucknow, for facilities and encouragements.

Algae Laboratory, R. SHYAM.
National Botanical Research Institute,
Lucknow 226 001, *September* 26, 1978.

1. Shyam, R. and Sarma, Y. S. R. K., *Int. Symp. Taxonomy of Algae, Madras*, 1976, p. 36.
2. Pringsheim, E. G., *Pure Cultures of Algae*, Cambridge University Press, 1946, p. 119.
3. Pocock, M. A., *Trans. Roy. Soc., South Africa*, 1953, **34**, 103.
4. Stein, J. R., *Am. J. Bot.*, 1958, **45**, 388.
5 Starr, R. C. *Arch. Mikrobiol.*, 1962, **42**, 130.
6. Carefoot, J. R., *J. Phycol.*, 1966, **2**, 150.

A MEALYBUG ATTACKING *PARTHENIUM HYSTEROPHORUS* LINN.

THE pernicious weed *Parthenium hysterophorus* L. has spread like wild fire both in cities and in the rural parts of many States in India[1–3]. Since it competes with useful crop plants and causes a number of diseases[4–6], its eardication has become important. Some chemicals are known to control the growth of this weed. However, there cannot be a better method than biological control.

It has been shown that an aphid (*Aphis fabae*) feeding on *Ipomoea purga* can cause stunted growth of *Parthenium*[5]. There are also reports of phylloidy in *Parthenium* caused by mycoplasma-like bodies[7,8]. Moreover such plants are often heavily infested by aphids[9]. The presence of mealybugs, *Ferrisa virgata* Cockerell, on the roots of *Parthenium* has also been reported[10]. However, a type of mealybug that can cause complete destruction of the plant has not been reported.

In our garden a few *Parthenium* plants were found infested by mealybugs. Within a few days, the plants started wilting. When *Parthenium* plants were grown in pots a few mealybugs were transferred, the bugs multiplied within a few days and covered the leaves, inflorescence and axils of branches. Within a week the entire group of plants completely wilted without producing a single seed. Even after eradication of the mealybugs, regeneration of the plants was not possible.

The bug has been identified as *Planococcus* sp. closely resembling *Planococcus citri* Risso. It is also capable of growing on citrus.

We are thankful to Dr. D. R. Miller, U.S. Department of Agriculture, for identifying the bug. Our thanks are due to C.S.I.R. for financial help and to Prof. G. V. Joshi, Head, Botany Department, Shivaji University, for encouragement.

Department of Botany, B. A. HEGDE.
Shivaji University, T. M. PATIL.
Kolhapur 416 004, *November* 1, 1977.

1. Hakoo, M. L., *Curr. Sci.*, 1963, **32**, 273.
2. Ellis, J. L. and Swaminahtan, M. S., *J. Bomb. Nat. Hist. Soc.*, 1969, **66**, 234.