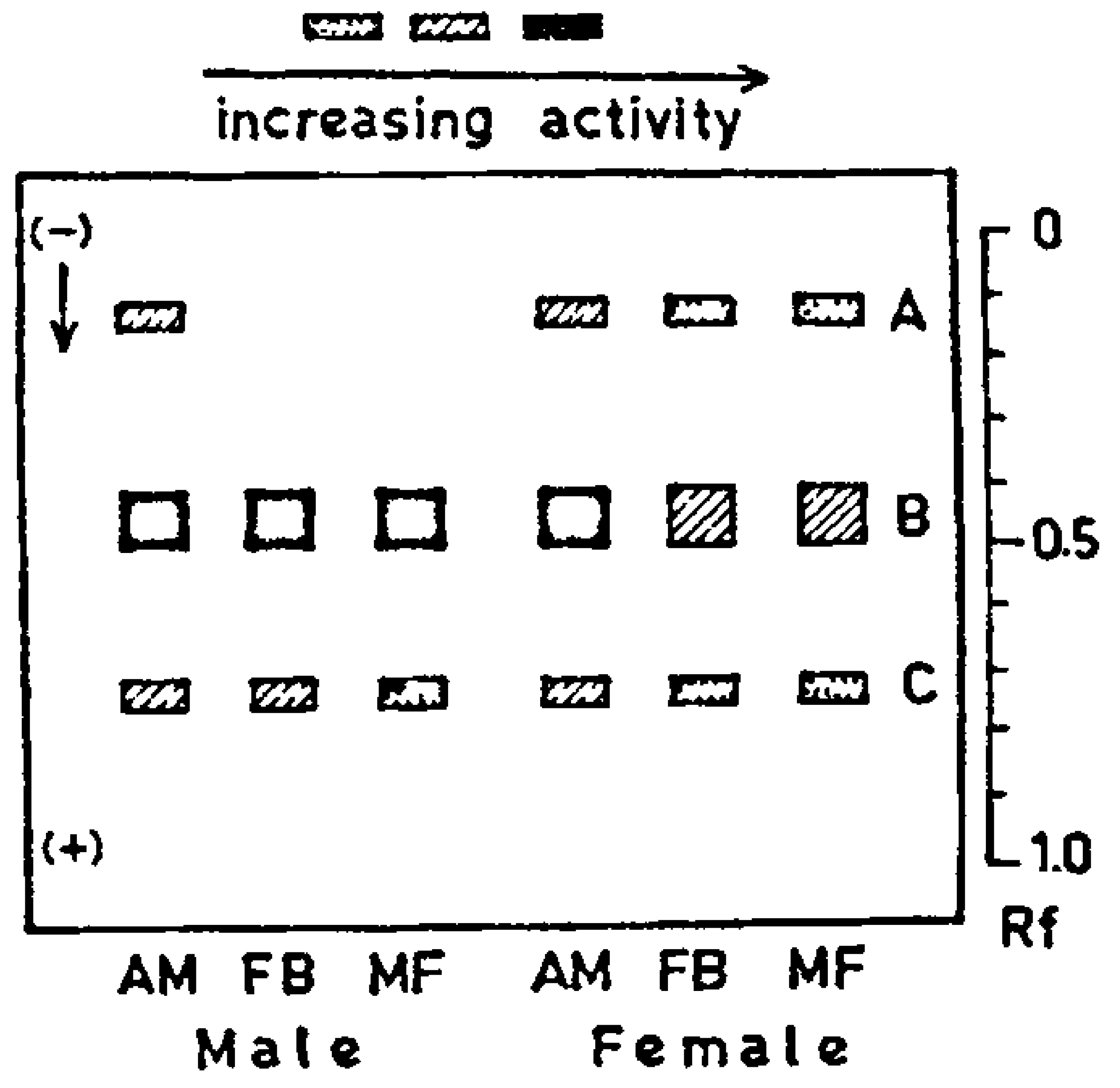

Figure 1. Zymograms showing the patterns of acid phosphatase (pH 4.8) isoenzyme distribution in vegetative and reproductive tissues of male and female plants of *Coccinia indica*. [AM, vegetative shoot tips; FB, flower buds; MF, mature flowers.]

both male and female plants, each with similar relative electrophoretic mobility and intensity in both sexes (figure 1). However, band A was absent in developing and mature male flowers, and the intensity of band C decreased during flower development. All three bands were present in female reproductive tissues but bands A and C were less intense in flowers than in vegetative tissues.

Gibberellins are known to favour male sex expression in many plants, including cucurbitaceous species. A correlation between higher gibberellin content and male sex expression has been established[4,12]. It has been demonstrated that gibberellin treatment enhances acid phosphatase activity and its secretion in plant tissues[5,13]. It appears that acid and alkaline phosphatase activities are enhanced in male reproductive tissues as a result of higher endogenous gibberellin content of these tissues, as suggested earlier[8].

Changes in isoenzyme patterns during organ differentiation and growth have been reported in several plants[14]. The present results suggest that acid phosphatase isoenzyme A, present in vegetative tissues, disappears in male reproductive organs during their formation but not in female reproductive organs. It is likely that repression of certain gene(s), specific to acid phosphatase isoenzyme A, is responsible for male sex expression, whereas female sex expression is favoured by the continued expression of such gene(s) in *C. indica*.

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INDUCTION OF MUTATION THROUGH INTERSPECIFIC GRAFTING

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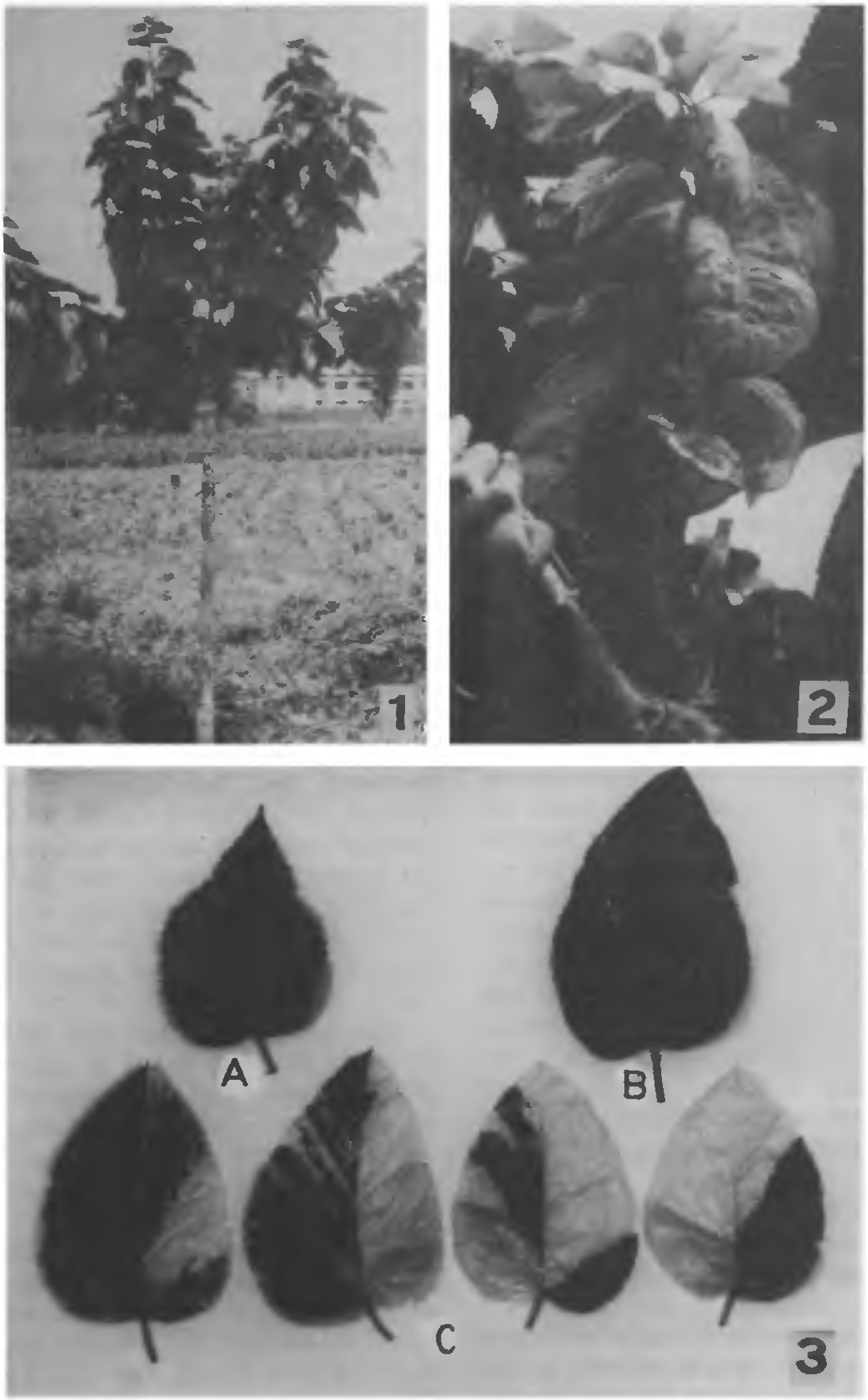
PHYSICAL and chemical mutagens are the major agents used to induce mutations. It has also been reported that sudden damage to apical portions of plants, severe attack of pests and interspecific/intra-specific grafting resulted in some heritable changes in the plants. Change of sex from male to female by decapitation in papaya has been noticed by earlier workers. Breaking of apical dominance by pinching



Figures 1–3. **1,** Branches from grafted buds. **2,** Variegated branch. **3,** Variegation pattern, A, leaf of the stock; B, leaf of the scion; C, leaves of the variegated scion.

has also affected sex expression in mulberry[1]. Similarly interspecific grafting has been employed to change the sex of dioecious plants. Often, to change the sex of a particular strain, it is grafted on a stock bearing the desired sex.

It is observed that when interspecific/intraspecific grafting is done with different scions and stocks, sometimes the scion gets some of the features of the stock. Change of sex in scion has been reported[2] in mulberry through grafting of strains of different sex.

This note reports occurrence of a variegated mutant in mulberry when axillary buds from exotic strains were grafted on to branches of a local strain. To establish a mulberry germplasm of temperate strains, which are difficult to root, bud grafting of exotic strains on the established local trees was undertaken. Nearly 60 varieties were grafted on local trees. Among them 18 buds of Kokuso-21, an improved Japanese mulberry variety of *M. multicaulis*, were grafted on a *M. indica* tree of 6–7 years (figure 1).

A week after grafting, the top portion above the grafted bud was pruned to facilitate quick sprouting of scion buds. When the buds sprouted, among 12 sprouts one was found producing variegated leaves. This branch was allowed to grow till December of the same year. It attained a growth of 127 cm with 55 leaves. All the leaves were variously variegated (figure 2). The variegation pattern was irregular (figure 3). The mutated scion bears features present in neither the stock nor the scion. The leaves are also thin and differ in size from those of both the parents. The length of the stock branch was 242 cm, with 22 leaves per metre and internodal distance of 4.5 cm; the girth of the branch was 1.5 cm; the area of the leaf was 638 cm^2. The length of nonmutated scion was 218 cm, with 30 leaves per metre and internodal distance of 3.3 cm; the girth of the branch was 2 cm; the area of the leaf was 231.25 cm^2. The length of the mutant branch was 127 cm, with 43 leaves per metre and internodal distance of 2.3 cm; the girth of the branch was 1 cm; the area of the leaf was 187 cm^2.

From the above, it is clear that the length of the mutant branch, internodal distance and leaf area are reduced when compared to those of the nonmutant scion and stock.

The mutant is being multiplied and observations being made to assess its value to sericulture. The variegated nature of the leaves can serve as a marker in genetic studies. In addition, the variegated leaves can be of horticultural importance.

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CADMIUM INDUCIBLE PROTEINS IN *SCENEDESMUS QUADRICAUDA*

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HEAVY metals like cadmium, lead, mercury, copper, etc. are increasing in the biosphere through pollution, agricultural runoff and mining activities. They have direct bearing on various physiological and biochemical functions of organisms. The pronounced effects of heavy metal toxicity are reduction in growth and photosynthesis, inhibition of enzyme activities, and degradation of chloroplasts and mitochondria. Heavy metal tolerance in plants has been explained by several views: exclusion from plant parts[1], accumulation of metals in vacuoles[2] and on cell walls[3], evolution of metal-tolerant enzymes[4], and induction of specific metal-binding proteins similar to metallothioneins[5]. Metals like cadmium, zinc, lead, silver, antimony, copper, mercury, gold, beryllium, tin and nickel induce these proteins[6], which are thought to be involved in metal ion homeostasis and many other functions, such as regulation of cellular metabolism, control of cellular growth, detoxification of free radicals and excess metal ions, and protection against ionizing radiation[7].

Algae and cyanobacteria were studied for metal toxicity[8]. The first report of cadmium-inducible binding proteins was in the freshwater blue-green alga *Anacystis nidulans*[9]. Metal-inducible proteins were also reported in some other algae, viz. *Chlorella ellipsoida*[10], *C. pyrinoidosa*[11], *Dunaliella bioculata*[12] and *Synechococcus* sp.[13]

The present report deals with cadmium-inducible proteins in the common freshwater alga *Scenedesmus quadricauda*. *S. quadricauda* cells were grown in modified Chu medium[14]. Cultures were maintained at 25±2°C in a 16 h light and 8 h dark cycle. Cultures were exposed to different concentrations of cadmium chloride (1, 10, 50, 100, 200 and 400 μM Cd) and growth was measured as increase in optical