Mercury is one of the most hazardous and potentially harmful polluting agents[1,2]. At 20 ppm, mercury promoted senescence of *P. stratiotes* by decreasing chlorophyll, protein, RNA, dry weight and activities of catalase and protease as well as increasing free amino acid content, peroxidase activity and the ratio of acid to alkaline pyrophosphatase activity[3]. These findings inspired the present author to look for the Hill reaction activity (i.e. photolysis of water, an important component of photosynthesis) of chloroplasts of *P. stratiotes* under the influence of different concentrations of the heavy metal mercury for a better understanding of the sensitivity of the plant to the metal.

Pistia stratiotes L. (25 to 35 days old) growing in ditches around Siliguri, West Bengal was used as the experimental material. Methods of isolations of chloroplasts from samples and the measurement of Hill reaction activity of isolated chloroplasts have been described in detail elsewhere[4]. Hill reaction activity (reduction of 2, 6-dichloroindophenol at 20°C and 1200 W/m^2) of isolated chloroplasts (isolation medium : 50 mM sodium phosphate buffer (pH 7.5), 50 mM NaCl, 3 mM $MgCl_2$, 0.5% (w/v) bovine serum albumin and 5 mM mercaptoethanol; determination medium (10 ml) : 45 mM sodium phosphate buffer (pH 7.5), 45 mM NaCl, 3 mM $MgCl_2$, 0.012 mM DCIP, 0.045% (w/v) BSA and about 20 μg chlorophyll) were measured using procedures described earlier[4]. Each experiment was replicated in six separate preparations of chloroplasts, and the mean values are given in table 1. Statistical evaluations of the results have been done at treatment and replication levels. CD (critical difference) values at 5% level are also presented in table 1.

The effects of different concentrations (0.05, 1, 2, 5, 10, 15, 20 ppm) of the mercury salt on Hill reaction activity of *P. stratiotes* after 1 and 2 days of contact (table 1) show that all the treatments, except 0.05 and 1 ppm, decreased Hill reaction activity over control data. But up to 1 ppm of the metal, there was no significant change in the variable over control. The inhibitory effects were markedly pronounced with the treatment of 20 ppm.

High mercury concentrations result in the inhibition of SH enzymes, of which there are many in photosynthetic metabolism[5]. The data indicated that up to 1 ppm, mercury could not interfere with chloroplast membrane and the electron transport of photosystem II, an important component of photosynthesis[1,4], due to the capacity of accumulation of mercury salt in plant body[5]. The decreased

Table 1 *Effect of mercury on changes in Hill reaction activity (μmol 2, 6-dichloroindophenol reduced/mg chlorophyll/hr) of chloroplasts in Pistia stratiotes at 1 and 2 days contact*

Treatment	Concentration (ppm)	Hill reaction activity: Contact time (days) 1	2
Control	0	223 ± 2	225 ± 1
Hg	0.05	220 ± 1	219 ± 2
	1	218 ± 3	216 ± 4
	2	195 ± 4	189 ± 5
	5	113 ± 2	102 ± 1
	10	45 ± 3	39 ± 3
	15	10 ± 2	8 ± 2
	20	2 ± 1	1 ± 1
CD at $P = 0.05$		7.13	9.87

Hill reaction activity with increased concentration of mercury has led the author to suggest that mercury at toxic level possibly interferes with the chloroplast membrane and electron transport of photosystem II, whereby $NADP^+$ gets reduced[6,7]. Mercury concentrations above 1 ppm were toxic to *P. stratiotes*.

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A PRELIMINARY REPORT OF CONE TOXINS TO FISHES AND CRABS

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CONUS is confined to the tropics, where its representatives are most abundant in shallow water. The

venom apparatus in *Conus amadis* (Gemelin) was earlier described[1]. The venomous nature of *Conus* and the human injuries inflicted by these were also reported earlier[2]. The venom is probably a 'neurotoxin'. The venom of several species of *Conus* is known to be highly toxic and human fatalities have resulted from Conus stings[2,3]. Although the species of *Conus* are available in a large number in both East and West coast of India, virtually no information is available on the toxic nature of venom to the aquatic organisms as well as to man. In the present study, an attempt was made to determine the toxicity of venom of *C. amadis* to aquatic organisms.

Fishes *Mugil cephalus* and crabs *Scylla serrata*, *Thalamitta cranata* were collected from the Vellar estuary (Lat. 11°29'N; Long 79°46'E) and were acclimated in laboratory condition for four days. Fishes *Oreochromis mossambicus* were also collected from freshwater ponds. The specimens of *C. amadis* collected from Porto Novo coast were dissected and the venom apparatus including venom bulb, duct and radula was homogenized with an equal volume of distilled water and then centrifuged. Supernatant solution (crude extract) was injected into the test organisms in different concentrations varying from 2 to 150 µl/g, using Hamilton micro-syringe and the organisms were kept in separate tanks. The behaviour of the organisms was observed at regular intervals and the dead organisms were removed at once. Controls were also maintained.

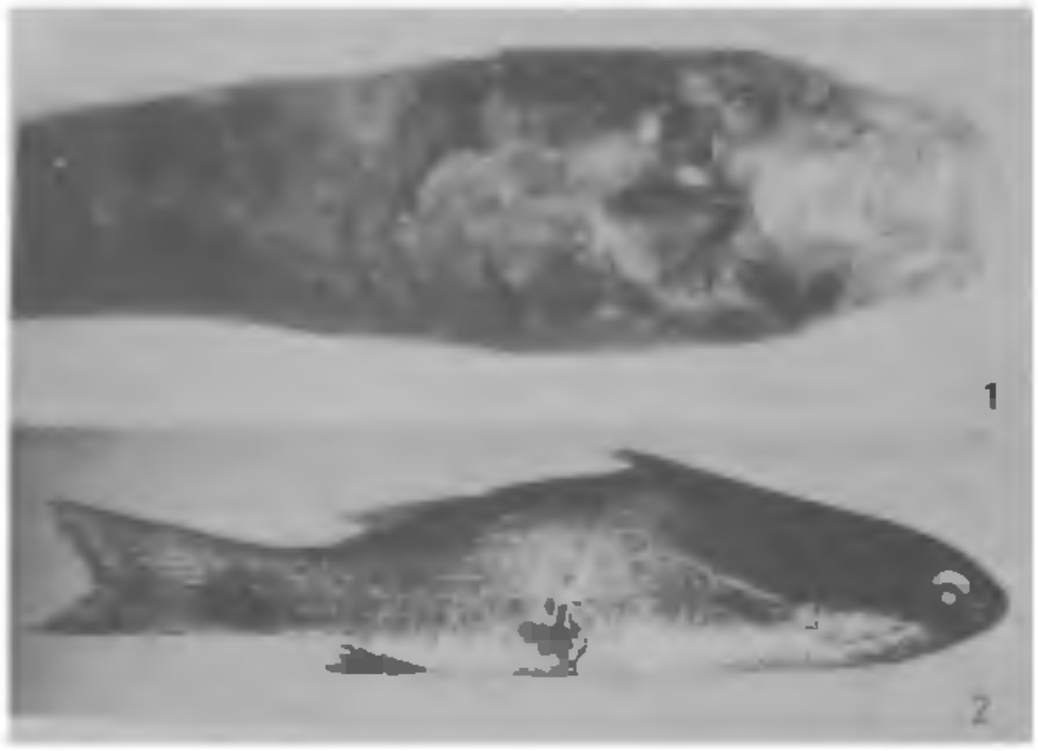
Extracts from the venom apparatus were injected into the organisms and the results are shown in table 1. It is evident that extracts of venom apparatus of *C. amadis* is toxic to the organisms tested. It may be significant that all the organisms tested were sensitive to the cone toxin. *M. cephalus* was dead in 21–38 hr, at the highest concentration tested (150 µl) whereas the same concentration was lethal in 18–21 hr, for the fish *O. mossambicus* (table 1). It is clear that freshwater fish is highly sensitive. However supernatant solutions of venom apparatus injected (50 µl) into haemocoel of *Scylla serrata* and *Thalamitta cronata* were lethal within 5 hr. The difference in toxicity in fish and crabs is a function of dosage as well as species (table 1). Since no published information is available on the toxic nature of cone toxin to the aquatic organisms, a comparison of the results of the present study is limited. However toxicity of extracts of dorid nudibranchs to shore crabs has been reported elsewhere[4].

Table 1 *Toxicity of venom apparatus extrats of Conus amadis to the aquatic organisms (total number of injected and dead organisms: 10 each)*

Test organisms	Dose (µl)	Time to death (hr)
M. cephalus	25	80–102
M. cephalus	50	62–78
M. cephalus	75	56–76
M. cephalus	100	44–68
M. cephalus	125	38–52
M. cephalus	150	21–38
O. mossambicus	25	90–118
O. mossambicus	50	88–96
O. mossambicus	75	66–80
O. mossambicus	100	36–42
O. mossambicus	125	26–38
O. mossambicus	150	18–21
S. serrata	5	16–48
S. serrata	10	12–18
S. serrata	10	5–8
S. serrata	50	5
T. crenata	5	21–72
T. crenata	10	10–18
T. crenata	20	5–10
T. crenata	20	5

The mechanism of feeding is by using the sting for paralysing the prey organisms prior to feeding. The operation is accomplished by injection of a detachable redula tooth, containing venom. Marine invertebrates contain a wide variety of toxic substances that affect heart and peripheral vasculature. The mode of action of cone toxin to the aquatic organisms is not clear.

The behaviour of fish and crabs was affected by the injection of extracts of venom. Fishes are restless and show heavy spasms followed by turning upon their back, want of breath, immobility and spasmatic quivering. Finally they die lying at the bottom. Shedding of scales by *M. cephalus* is also observed. Further the absence of slime secretion was also noticed in the fish. The slime on the skin protects the skin against bacterial infections. However, the secretion of slime cells increases when they are irritated. But in the present study, it is interesting to note the absence of any such secretion of slime. Because of the absence of slime secretion, the body was exposed to the bacterial invaders and this may be due to the change of the colour of the fish *M. cephalus* from grey to red. However, in *O. mossambicus* also, the thick red colour was noticed in fin regions. Bacterial diseases are generally characterized by red spots on the skin and in the



Figures 1 and 2. Lesion of *M. cephalus* injected conus toxin **1.** on the head; **2.** on the lateral sides.

muscles. The spots are called ecchymoses[5]. These colour changes were observed in fish exposed to higher concentrations of venom. Information on the colour changes in fish due to the influence of venomous substance is unknown. Further work in this line is being carried out. Lesions on the head and the sides of the fish were also seen (figures 1 and 2). In crabs, the movements of chelate and swimming legs were restricted and finally the activity stopped before death. No such colour changes were observed in crabs. Investigations are in progress to determine the pharmacological aspects of venom of Conus. Cone toxin may prove useful in both ecological studies and in pharmacology.

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EFFECT OF MAGNETIC FIELDS ON THE SEX EXPRESSION AND YIELD IN THE *CUCUMIS PUBESCENS* WILLD

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CUCURBITS show a wide range of sex forms and great sexual diversity in the ratio of male and female flowers. Sex expression and sex ratio in flowering plants may be affected by a number of agencies such as mineral nutrition, temperature, light, hormones, chemical vernalization and radiation. Quantitative difference in sex expression and sexual diversity was considered to be hereditary[1] or environmental[2] or both[3]. In the present study magnetic field treatment was found to cause a shift in the sex ratio leading to enhancement in yield.

Dry seeds of *Cucumis pubescens* Willd were put in small paper covers and placed between the pole pieces of an electromagnetic equipment at the Palaeomagnetic Lab., of NGRI, Hyderabad. The seeds were exposed to magnetic fields of 1000, 2000, 3000 and 5000 gauss respectively for 2 hr each. Care was taken to maintain the uniform magnetic fields between the two poles of electromagnet during each magnetization process.

As is clear from table 1, magnetically-treated seeds showed improvement in the vegetative growth, sex ratio and yield depending on the dose. The vine length and number of lateral branches increased up to 3000 gauss but at 5000 gauss it showed a decline. Flowering was delayed in the treated material. At 3000 gauss an increase in the number of male and female flowers was noticed. The number of fruits per plant in all the treatments was lower than that of control, but among the treatments 3000 gauss recorded the highest number of fruits per plant. The size of the fruit increased at 3000 gauss and as a result maximum yield was observed at this dose, over the control.

From the results it is clear that magnetically-treated plants grew faster than the control and they were robust[4]. This was attributed to the enhanced uptake of certain mineral nutrients and higher nitrogen uptake[4–6]. Probably the magnetic fields might have accelerated the pace of nitrogen metabolism. The present increase in vigour of the treated material seems to fall in line with the observations of the above workers. The change in the number of