

23-days of emergence, when the female population is at its peak, could be the reason for the mating of adult males with pupal females. The pupal mating behaviour of this species has an advantage in that the female pupae, developing from eggs laid in old inflorescences and occupying the place of the seed, are carried away by wind to other places where there would be no males. It is also advantageous to the alate adult females that develop from eggs deposited in the younger inflorescences, as there would be no males available when such females migrate to fresh inflorescence for feeding and subsequent reproduction. This type of mating with an immature stage is not abnormal in thrips as similar observations have been made in *Limothrips denticornis* by Lewis¹¹. In *C. mexicanus* the larvae feed on the ovarian tissue while the adults prefer the milk content in the ovaries of young inflorescence. The mortality of apterous males within a few days of emergence may be due to the lack of milky juice in the ovaries of the same inflorescence. *C. mexicanus* chooses a favourable habitat in the inflorescence of the grass host where the immature individuals are protected by glumes, assuring wind dispersal of the pupae. The life-cycle of *C. mexicanus* is adjusted in such a way that it is completed in the inflorescence of *C. barbata* before the host inflorescence dries up. The total duration of the life-cycle (egg to adult) is about 14-19 days while the total life span of the inflorescence (bud to seed dispersal) is about 28-32 days.

March 2, 1981.

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CADMIUM-INDUCED NEOPLASIA IN *CHANNA PUNCTATUS* (BLOCH)

O. P. SAXENA

Zoology Research Laboratories, M.M. College
Modinagar 201 204, India

CADMIUM salts are obtained as by-products of zinc or lead production, and are also found in effluents in alloy, pigment, glass and paint industries. Cadmium ions when absorbed cause considerable damage to the kidney tissue which ultimately prove fatal to fish. Although toxicity of cadmium to fish has been studied by several workers^{1,5} yet no neoplasia is reported as a result of cadmium toxicity. The author has observed neoplasia in the kidney of *Channa punctatus* due to cadmium toxicity.

Experimental

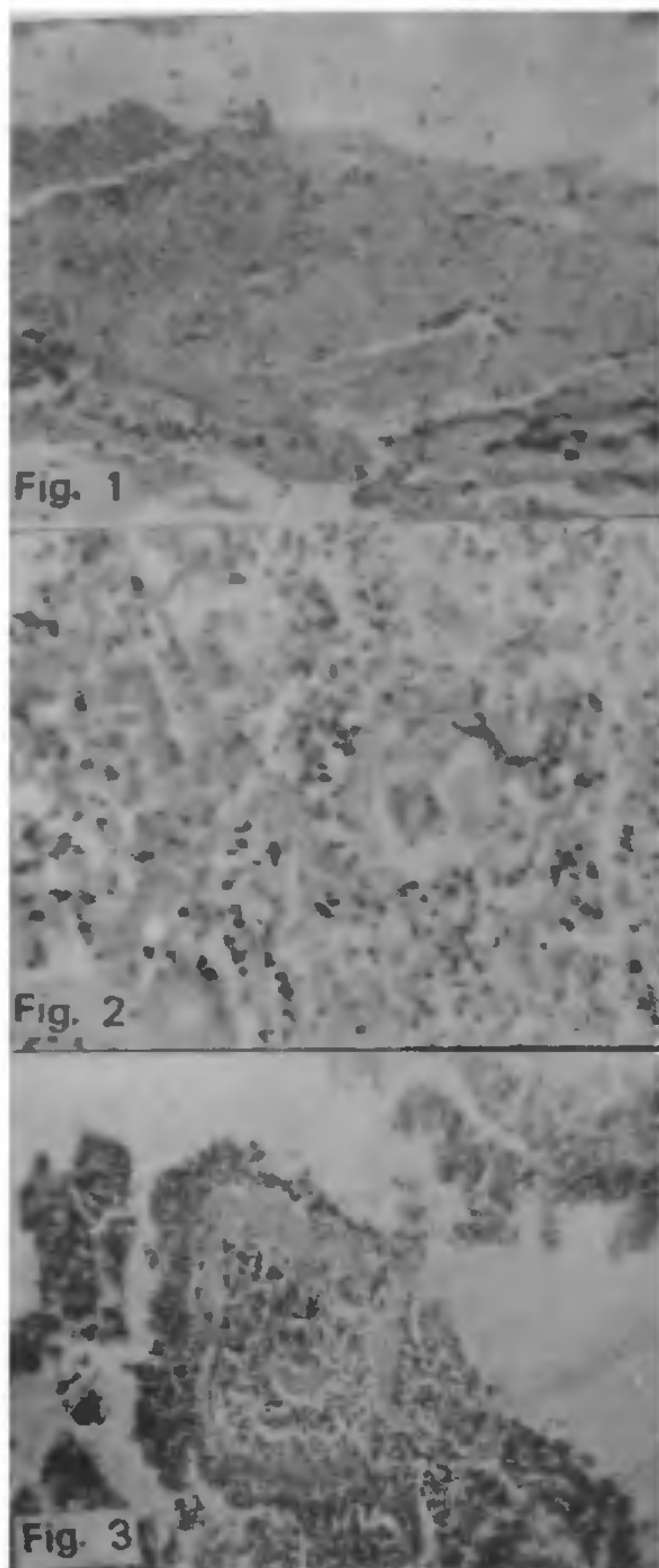
The fish *Channa punctatus* were collected from fresh waters of Ghaziabad district, were treated with 0.1% KMnO_4 to avoid any infection. The fish were then acclimatised for 15 days in the laboratory and 25 fish (8 to 13 cm in length) were transferred to test solution in which sub-lethal concentration of cadmium (15 mg/l $\text{CdCl}_2 \cdot 2\frac{1}{2} \text{H}_2\text{O}$) was dissolved. The solutions were renewed after every 96 hours for a period of 30 days after which the survived fish (eleven) were sacrificed and their kidney portions fixed in neutral formalin for histopathological study. Sections of 7 μ were cut and stained with iron haematoxylin and eosin.

Results

In the head kidney the clumping of haemopoietic tissue was observed (Fig. 1). Besides necrosed tubules the kidney showed the other changes such as degeneration of interstitial tissue and shrinkage of glomeruli. The shrinkage of glomerular capillaries, and also the swelling of Bowman's capsule, increased the Bowman's space (Fig. 2). A tumor (Fig. 3) surrounded by a sheath of connective tissue is well demarcated. Since it is encapsulated, growth is slow and localised, mitotic divisions are not visible and the cells are of uniform size and shape, the tumor is classified as benign.

Discussion

The histopathological changes that occurred in the kidney due to toxic effect of sub-lethal concentration (15 mg/l) of cadmium chloride must have caused impairment in kidney function. These pathological changes might be due to infra-renal exhaustion. This supports the view of Pflugfelder⁶ who suggested that such types of changes were mainly due to physiological response to increased excretory demands. However, Rasquin and Rosenbloom⁷ stated that metallic ions change the metabolic activity as a result of interaction of metallic



FIGS. 1-3. Fig. 1. T.S. of head kidney showing clumping of hemopoietic tissue. Fig. 2. T.S. of kidney showing shrinkage of glomerulus capillaries. Fig. 3. T.S. of kidney showing benign tumor.

ions through blood resulting in disorder of the excretory system.

Tumor formation in the kidney of the fish induced by cadmium is not reported so far. However, the development of a sacromatous tumor consisting of spindle-shaped cells has been reported by Kirkman and Bacon⁸, Gange *et al.*⁹ and Hendry *et al.*¹⁰ after administration of some toxins.

Thus it may be concluded that sub-lethal concentration of cadmium chloride 15 mg/l may have carcinogenic effect on fish kidney.

The author is thankful to University Grants Commission for the financial assistance and to Sri Aditya Parashari for technical assistance provided.

December 26, 1980.

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**MYXOSOMA MATHURII N. SP.
(PROTOZOA : MYXOSPORIDIA) PARASITIC
ON PUNTIUS SARANA (HAM.)**

M. JAYASRI, M. PARVATEESAM AND P. N. MATHUR
Department of Zoology, Government College
Ajmer 305 001, India

THE myxosporidian parasites of fish are very important as they cause severe damages to fish stocks in the fish farms. The genus *Myxosoma* was established by Thélohan¹⁶ for a myxosporidian parasite, *Myxosoma dujardini* found in the connective and gill filaments of *Scardinius erythrophthalmus* and *Leuciscus rutilus*. Since then many species were described from fresh and marine fish (Hoffman *et al.*⁵; Kudo⁸⁻⁹; Narasimhamurti¹³). In India reports on new species of *Myxosoma* are scanty. In the present paper the first report of a new species of *Myxosoma* from Rajasthan is described.