FIG. 4. Monkey liver section incubated in normal rabbit serum (control) is devoid of reaction.

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EFFECT OF MALATHION ON THE EXCRETORY PATTERN OF THE SNAIL, *PILA GLOBOSA* (SWAINSON)

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ABSTRACT

Data on the nitrogenous excretory products in selected tissues of 5 ppm malathion exposed snails shows a remarkable increase of ammonia. The per cent change of urea content in hepatopancreas of malathion exposed snail is quite significant. Total protein content decreases in all tissues. The changes in excretory products in the tissues of malathion exposed snails is discussed in relation to transdeamination and possible detoxification of ammonia by conversion to urea and uric acid.

INTRODUCTION

THE effect of pesticide on excretory pattern in animals has not been investigated so far. Since excretion plays a significant role in the physiology of organism towards maintaining homeostasis, a study of this type is felt worthwhile attempting. Hence, the widely used organophosphate pesticide-malathion was chosen to evaluate its influence on the excretory pattern of fresh water snail, *Pila globosa*, a non target species and also an inhabitant of the fresh water and crop field ecosystems.

MATERIALS AND METHODS

The snails, *Pila globosa* were collected from the ponds, present around Tirupati. They were acclimatised to laboratory conditions for a week before experimentation. They were fed *ad libitum* with *Hydrilla*. The technical grade malathion (95% liquid formulation) was obtained from Bharath Pulversing Mills Ltd., Bombay. LC_{50} and sublethal range was worked out as per the method adopted by Kabeer *et al.*[1].

At a time a batch of 6 snails weighing $20 \pm 2{\cdot}5$ g was exposed to 4 l of water containing 5 ppm malathion for 48 h. Equal number of animals kept in tap water for the same interval served as controls. After exposure, three tissues, *viz.*, foot, mantle and hepatopancreas were isolated and homogenates were prepared in ice cold distilled water for the estimation of ammonia, uric acid, proteins and in 15% perchloric acid for urea.

Ammonia content was estimated by the method of Bergmeyer[2] and urea by the method of Natelson[3]. The uric acid was estimated by the method of Brown[4]. The total proteins were estimated by the method of Lowry *et al.*[5]. The statistical analysis was done according to standard statistical procedures[6].

RESULTS AND DISCUSSION

The data presented in Table I show an increase in the excretory products in all the tissues of malathion exposed snails, the increase being in the order ammonia > urea > uric acid. The per cent increase of ammonia in all the tissues and that of urea in hepatopancreas

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TABLE I

Effect of malathion on the excretory products and proteins in the tissues of the snail, Pila globosa

	Ammonia[a]		Urea[b]		Uric Acid[c]		Total protein[d] content	
	Normal	Malathion exposed	Normal	Malathion exposed	Normal	Malathion exposed	Normal	Malathion exposed
Hepatopancreas	58·7 ± 4·4	73·0 ± 5·3	21·3 ± 3·0	28·1 ± 3·1	1·38 ±0·3	1·5 ±0·4	98·9 ± 3·6	91·8 ± 3·2
	PC = +24·40 P < 0·001		PC = +31·79 P < 0·05		PC = +14·23 NS		PC = −7·5 P < 0·02	
Mantle	55·8 ± 3·6	70·0 ± 5·0	23·5 ± 3·4	29·5 ± 3·8	0·87 ±0·21	0·97 ±0·34	81·8 ± 2·9	75·4 ± 2·3
	PC = +25·6 P < 0·01		PC = +25·64 NS		PC = +11·49 NS		PC = −7·85 P < 0·05	
Foot	29·6 ± 3·2	39·1 ± 4·6	6·6 ± 1·8	8·7 ± 2·2	0·83 ±0·2	0·85 ±0·28	84·2 ± 3·2	77·3 ± 2·5
	PC = +32·21 P < 0·05		PC = +19·33 NS		PC = +2·29 NS		PC = −8·20 P < 0·05	

a = μ moles of ammonia/gm wet wt. of tissue.
b = μ moles of urea/gm wet wt. of tissue.
c = mg of uric acid/gm wet wt. of tissue.
d = mg of total protein/gm wet wt. of tissue.
NS = Statistically not significant.
PC = Percentage change.
P = 't' test values significant at 5% level.
± = Indicates standard deviation.

were found to be significant. The total protein content decreased, in all the tissues of malathion exposed snail.

Earlier report on the same species[1] showed a decrease in free amino acid levels with associated increase in aminotransferase activity. The decrease in the total protein content (Table I) along with stepped up aminotransferase activity might result in an increase in ammonia level in all the tissues of malathion exposed snail. The order of increase of ammonia, being, hepatopancreas > mantle > foot suggests a similar pattern noticed during aestivation[7].

The increase in urea content in the tissues, more so in hepatopancreas suggests, that some quantity of ammonia is converted to urea. The occurrence of arginase in *Pila globosa* has long been reported[8]. Hence it is likely that the excess production of ammonia should have been due to the reduction of the ammonia toxicity by conversion into less toxic urea, and to tracer quantities of innocuous uric acid as observed in the present study. The presence of insignificant quantities of urea and uric acid in other tissues suggests mobilisation[9] of these nitrogenous compounds from the hepatopancreas in malathion treated snails.

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