and multiseriate. Morphactin treatment increased the length and the number of trichomes and size of stomata while causing a decrease in stomatal index.

The seeds of 'Pusa Sawni' okra (*Ambelmoschus esculentus* Moench L.) were sown in July in 12 beds with a spacing of 45 × 30 cm. One month old plants were given the first spray with 2·5 and 5·00 ppm morphactin containing Tween–20 (0·02%). Four plots each were taken for control for 2·5 and 5·00 ppm morphactin treatments. The control plants were sprayed with distilled water containing Tween–20 (0·02%). Two subsequent sprays were given at intervals of 7 days. In all three pickings were carried out on the 7th day after each spray. The epidermal peels from the pods (8–10 cm. long) were removed at random and temporary mounts were prepared with cotton blue and lactophenol. The observations were made at × 400 for epidermal cells, stomata and trichomes per unit area while the length of trichomes was recorded at × 100 by the conventional method[4]. The stomatal index was calculated by the formula described elsewhere[4].

Observations have been recorded in Table I and Fig. 1. Epidermal cells were polygonal or elongated and were irregularly arranged in various directions in the control and morphactin-treated pods. In both the cases two types of stomata, anomocytic and anisocytic were found. Inamdar and Chohan[5] also reported similar types of stomata in the leaves and floral parts of some members of *Malvaceae*. Inspite of these similarities, morphactin treated pods exhibited larger number of epidermal cells per unit area and guard cells were bigger as compared with the control. The size of the stomata was also increased by 2·5 and 5·0 ppm morphactin treatment without causing any abnormality (Table I). However, the number of stomata per unit area considerably decreased thereby decreasing the stomatal index in the treated pods. It was interesting to observe glandular, multiseriate trichomes which were more in number and much elongated in treated pods (Table I and Fig. 1). The decreased stomatal index, the increased size of stomata and the length of trichomes were in accordance with earlier findings on the leaf epidermis of *Lycopersicon esculentum* Mill[2].

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CIRCADIAN RHYTHMICITY IN BRAIN AMP DEAMINASE ACTIVITY OF *BUFO VULGARIS*

Introduction

INVESTIGATIONS on diurnal variations in metabolic system have been of interest in the recent years[1–4]. Rhythmic fluctuations have been noticed in many animals for various biological parameters[5]. Peak periods of enzymic activities during dark hours have been reported for several nocturnal animals[6,7]. However a survey of literature reveals that studies on activity rhythms of ammonogenic enzyme systems in toads are scanty. Hence, the present study was carried out to investigate the changes in the ammonia metabolism in toad brain with the changing photoperiod of the dial cycle.

Materials and Methods

The medium sized toads, *Bufo vulgaris* collected locally were maintained in wooden boxes containing mud and acclimated for one week to the laboratory (25–30° C) conditions of 12 hrs light and 12 hrs dark phases of the day. The animals were fed with earthworms *ad libitum*. Brains were isolated at the following periods of the day, *i.e.*, 8·00, 12·00, 16·00, 20·00, 00·00, 4·00 hrs and 5% homogenates were prepared in ice-cold distilled water. The AMP deaminase activity was estimated by the method of Weil-Malherbe and Green[8] with slight modifications as described by Wegelin *et al.*[9]. The ammonia content was estimated by the method of Bergmeyer[10].

Results and Discussion

The AMP deaminase activity in brain tissue showed cyclical variation with maximal activity at 20·00 hrs (0·1802 ± 0·036) and with minimal activity at 08·00 hr (0·0589 ± 0·006; Fig. 1).

The highest level of AMP deaminase at dark phase of the photoperiod might reflect the increased adenine nucleotide deammation resulting in an inceased levels of ammonia in the brain. In evidence to this, the ammonia content also showed similar rise and fall during dial cycle with a maximal content at 20·00 hr (4·857 ± 0·429) and minimal at 04·00 hr (1·80 ± 0·169). The difference between maximal

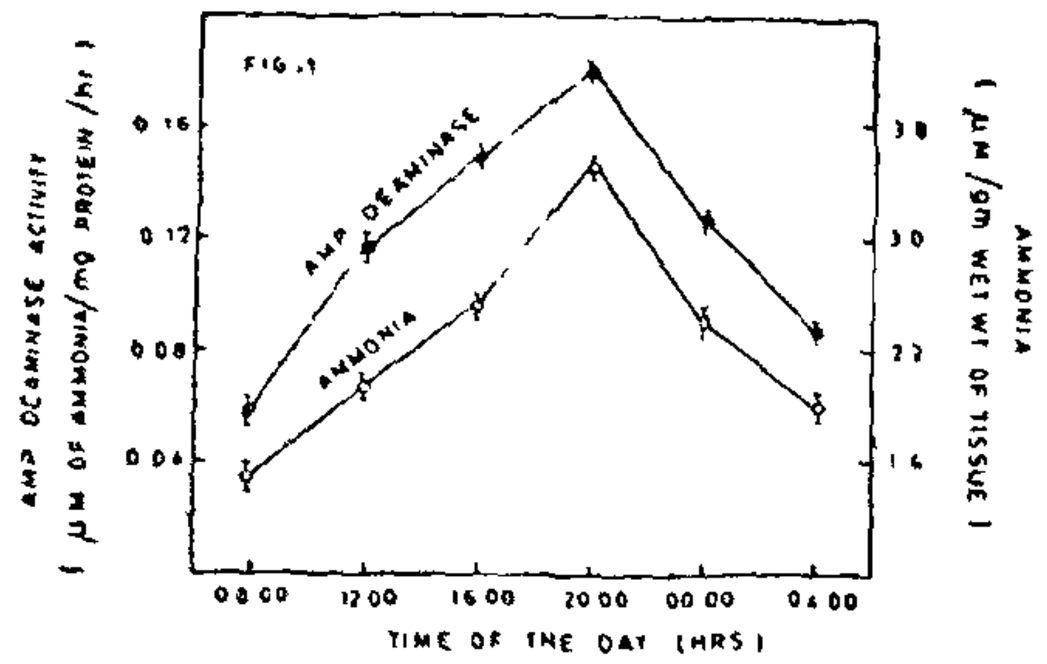

FIG. 1. Rhythmic variations in the activity of AMP deaminase and ammonia content in the brain of toad, *Bufo vulgaris* as a function of time of the day. Each point represents the mean and ± SD of six observations.

and minimal levels for AMP deaminase and ammonia was found to be statistically significant ($P < 0.001$). Similar peak activities were reported for cholinesterase[11], dehydrogenase,[12,13] and aminotranferases[4] of nocturnal animals such as slugs, cockroaches and scorpions. The cyclical variations in the AMP deaminase activity can be attributed to the overt locomotor behaviour of the animal, since the toad has been reported to be a nocturnal animal showing a peak activity just after the beginning of the dark periods[14].

Hence the increased level of AMP deaminase and consequent ammonogenesis apart from the other metabolic system at the dark phase of the photoperiod can be attributed to the periodic oscillations in the environmental light conditions.

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INCIDENCE OF TIMBER-BORING ANIMALS IN THE VELLAR-COLEROON ESTUARINE SYSTEM

TWENTY-EIGHT species of teredinid, three species of pholadid, five species and a variety of sphaeromatid and not less than nine species of limnoriid wood-borers are known to occur in Indian waters. Extensive surveys of wood boring organisms, covering all the coastal areas of India, particularly the mangrove forests have not been undertaken so far. This has become essential on account of the increasing mariculture operations along our coasts necessitating the installation of wooden piles[1]. An understanding of the species of borers occurring in a particular locality would greaty help to combat the ravages of these pests[2].

No information is available on the incidence of teredinids in the vicinity of Porto-Novo (India) which is mazed with marine, estuarine, backwater and mangrove biotopes. The extensive mangroves connecting the Vellar and the Coleroon estuaries and lying almost parallel to the sheltered Coromandel coast offers great potentialities for the exploitation of valuable aquatic resources. The marshy areas bathed by the waters of the Vellar–Coleroon estuarine system have been a fertile nursery for the juveniles of a variety of marine prawns and also an ideal locality for the culture of prawns and edible oysters.

During a survey of the marine wood-boring organisms covering all the aquatic biotopes of Porto–Novo (neritic, estuarine, backwater and mangrove) undertaken during November 1978, eight species of teredinids, two species of pholadids and two species of sphaeromatids were collected. One of the most interesting species collected during the present survey was *Bactronophorus thoracites* (Gould) from the Pichavaram mangrove forests. Three pairs of shells and pallets (Fig. 1A and B) were collected from a dried up stem of *Rhizophora mucronata.*

Bactronophorus thoracites has been recorded earlier from the Sunderbans[3,4], Mahanadi estuary[5], and