LETTER TO THE EDITOR

STUDIES ON THE SEDATIVE EFFECT OF BARBITAL SODIUM ON FROGS AND TOADS FROM DIFFERENT HABITATS

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Sir,

Extensive use of barbiturates as sedative, anti-convulsant and anaesthetic drugs is well known. Most of the information available on these drugs is on mammals (1, 2, 8, 9). It may, therefore, be interesting to study the effect of these classes of drugs on other vertebrates, such as amphibians and hence the present investigations on the sedative effect of barbital sodium on four species of frogs and a toad from different habitats were undertaken.

The frogs used were adults namely *Rana hexadactyla* Lesson, *Rana cyanophlyctis* Schneider (both aquatic), *Rana tigrina* Daud (semi-aquatic), *Uperodon systoma* Schneider (fossorial) and the toad was *Bufo melanostictus* Schneider (terrestrial), respectively (4). They were acclimatised to the laboratory conditions (25±1°C). Barbital sodium (5:5 diethyl sodium barbitone, M & B) was dissolved in distilled water so that one ml contained the dose employed. The drug was administered intraperitoneally in doses of 10, 20, 30, 40 and 50 *mg* per 100 *g* weight of the body. The aquatic and semi-aquatic species were not maintained in water during treatment due to the fact that the skin of frogs would be permeable to water (10). All the treated animals were maintained separately in humid glass aquaria. The 'sleeping time' was measured as the span of time from the loss of the righting reflex to that of gain (9) and the results were analysed statistically.

It may be noted (Table I) that the response of frogs and toads to sedation induced by barbital sodium varies from species to species. While three among the four species studied lose their righting reflex soon after the treatment one species *R. tigrina* takes some time to respond. The sleeping time appears to decrease significantly in two species adapted to a terrestrial mode of adult life as compared with others adapted to a semi-aquatic and aquatic mode of lives. The order of response may be expressed as *R. cyanophlyctis*~*R. hexadactyla*>*R. tigrina*>*U. systoma*>*B. melanostictus.*

TABLE I : Sedative effect of barbital sodium.

Species used	Treatment		Duration in minutes Loss of righting reflex	
	Barbital sodium mg/100 g b.w.	Body weight (M±S.E.)	(M±S.E.)	Sleeping time (M±S.E.)
R. hexadactyla	40 *mg*	46.60±5.00 (5)	217.40±21.67	956.00±42.87
	40 "	46.70±0.42 (9)	143.88±10.33	1098.33±58.26
	50 "	42.50±0.52 (6)	107.00±3.84	1214.16±54.56
R. cyanophlyctis	30 *mg*	27.00±0.82 (10)	66.50±1.49	901.00±134.80 (6)
	40 "	30.62±1.99 (8)	41.00±1.67	2012.25±220.64
	50 "	21.50±1.06 (10)	31.10±5.94	2411.144±99.48
R. tigrina	30 *mg*	106.00±3.27 (6)	111.60±20.58	683.60±133.33
	40 "	212.00±17.68 (6)	78.00±9.27	841.60±245.85(6)
	50 "	181.00±11.58 (6)	78.16±4.61	2577.80±149.53(5)
*U. Systoma**	40 *mg*	47.00±2.54 (5)	162.00±17.02	741.60±108.77
	50 "	51.00±2.92 (5)	67.20±19.21	900.00±29.54
B. melanostictus	30 *mg*	42.00±3.39 (5)	63.00±24.67	104.00±21.36
	40 "	43.00±1.25 (5)	20.80±3.43	285.60±40.12
	50 "	44.00±4.00 (5)	18.60±2.38	440.80±2.85

M±S.E. Mean in relation to standard error.
Number in parentheses indicates the number of animals treated.
*30 *mg* evokes no response.

			Sleeping time
R. hexadactyla	Vs *R. cyanophlyctis*	t=0.390	P>0.9
"	Vs *R. tigrina*	t=2.116	P>0.5
"	Vs *U. systoma*	t=2.90	P<0.01
"	Vs *B. melanostictus*	t=17.90	P<0.001
U. systoma	Vs "	t=2.90	P<0.01

Barbiturates seem to exert their action chiefly on the central nervous system and through the mediation of the hypothalamo-hypophyseal axis (5, 6, 8, 9). These drugs interfere with estrous cycle (5), pregnancy (2, 8) and the metabolism of tissues and body fluids (3). The treatment of frogs with nembutal blocks the release of melanophore

stimulating hormone (MSH) from the pars intermedia (7). The present investigations show that differences exist among frogs and toads in their response to sedation induced by barbital sodium. Further, species adapted to a terrestrial habitat register a significant reduction in sleeping time when compared with aquatic or semi-aquatic species. Loss of righting reflex may occur soon after treatment in some species while it may be delayed in others. However, no correlation seems to exist between the time taken to lose the righting reflex and the duration of sleep. While it may be premature to consider any ecological significance to this decreased sleeping time exhibited by species inhabiting a drier environment, an adaptational change in the physiology of their nervous system is evident. Further investigations are in progress.

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