

Under the ore microscope, nsutite is white to creamish in colour and consists of fine dusty looking aggregates or felted masses of fine delicate needles. The dusty aggregates appear nearly isotropic. Such aggregates sometimes show shrinkage cracks due to dehydration. The needle-like crystals show distinct anisotropism from grey to dark grey without development of colour and with more or less undulose extinction. Although no confirmatory etch test could be made due to its very fine grained nature, the mineral has been conclusively identified as nsutite by X-ray diffraction studies. It occurs as fine needles replacing psilomelane filling the interspaces of crushed fragments of pyrolusite (Fig. 1) or quartz or rock

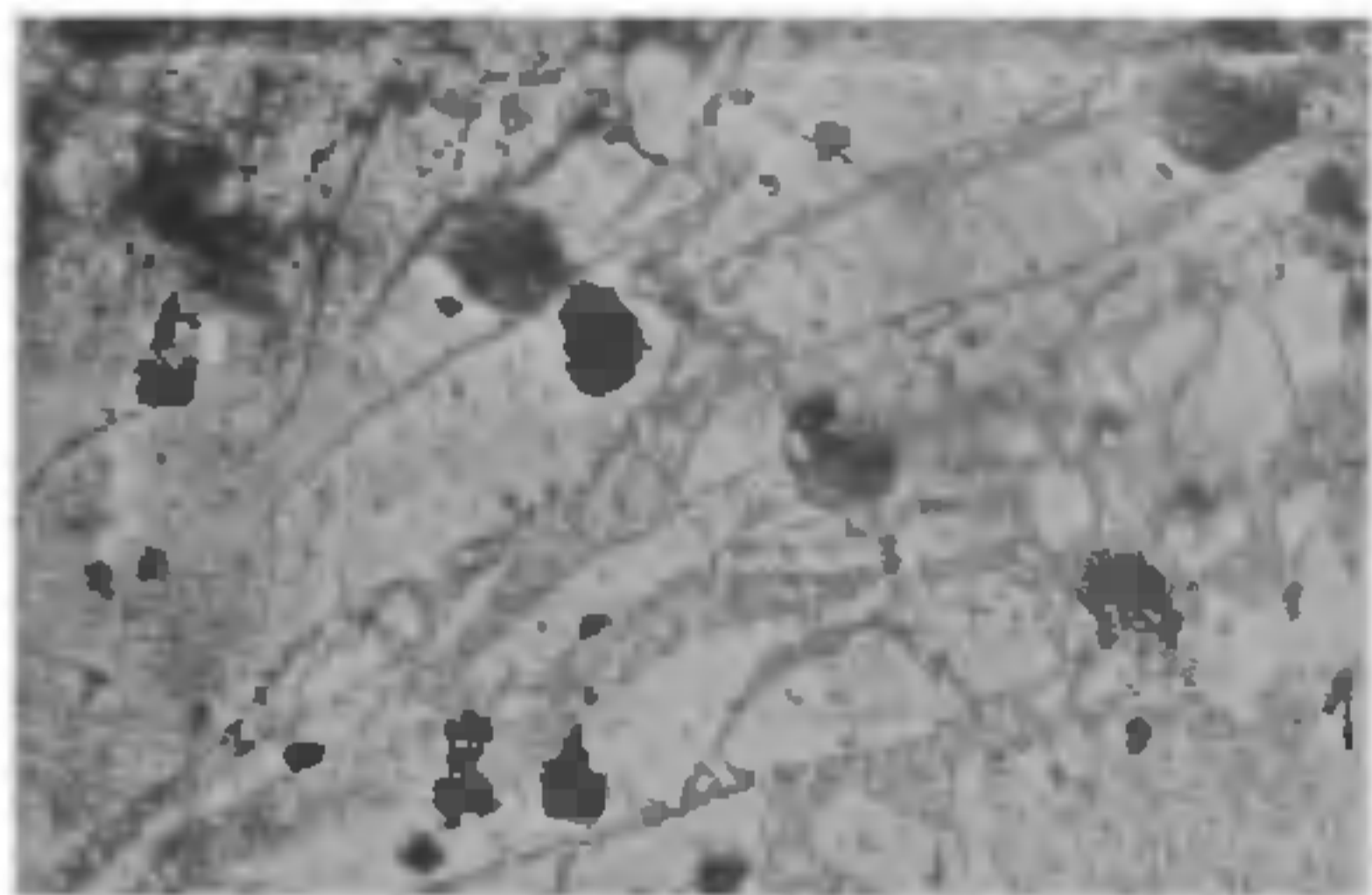


FIG. 1. Pyrolusite is light grey in colour and fractured. The fractures are filled with nsutite ( $\times 30$ ).

gangue. It also occurs forming the outermost layers on colloform psilomelane replacing it along the banding or grain boundaries or even irregularly. Sometimes, veins of nsutite are found to traverse rock fragments, which are enclosed in the base of nsutite. Presence of nsutite in secondary deposits forming outermost layers on colloform bands indicates that it has been formed from colloidal sols.

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#### CHANGES IN THE ALKALINE PHOSPHATASE ACTIVITY OF OVARIES DURING OVULATION INDUCED BY PITUITARIES IN THE FROG, *RANA CYANOPHLYCTIS* SCHNEIDER

DURING the course of our investigations on the annual variations in certain bio-chemical constituents of ovaries in the frog, *Rana hexadactyla*, a marked increase in the alkaline phosphatase activity was found to correlate with the vitellogenic processes occurring in the oocytes during the breeding season. As the oocytes became gravid the activity decreased significantly. This reduction in the enzyme activity was, also, found to correlate with a similar depletion in the ascorbic acid content of ovaries. It was, therefore, suggested<sup>1</sup> that the changes in the alkaline phosphatase activity of ovaries might be due to the release of gonadotrophins from the pituitary. However, experimental evidence in support of this presumption was inadequate. The ovaries in *R. hexadactyla* would regress soon after the breeding was over towards the end of the south-west monsoon months (June-September). Hence this investigation was undertaken in a related species namely *Rana cyanophlyctis*, which would maintain the gravidity of ovaries round the year<sup>2</sup>, as an attempt to study the gonadotrophin action on ovaries at a time when the synthesis and/or release of these hormones were considered to be at their minimum such as the post-breeding season<sup>3</sup>.

The breeding season of *R. cyanophlyctis* would commence by June and extend upto the end of September<sup>2</sup>. Adult females weighing 30-38 g were collected from the vicinity of Mysore city (India) during October and maintained separately in aerated aquaria at  $25^{\circ} \pm 1^{\circ} \text{C}$ . They were induced to ovulate with homoplastic pituitaries which were collected from females of similar weight range. The pituitaries were homogenized in distilled water in the proportion of five glands per ml and one ml of this homogenate was administered intraperitoneally into the treated ones<sup>2</sup>. Frogs receiving an equal volume of distilled water served as the controls. The autopsy was carried out at intervals after the treatment, as shown in Table I. Appropriate amounts of the ovarian tissue were weighed and used for the estimation of the enzyme activity. The procedures employed were those of Kind and Macchi<sup>4</sup> for the extraction and Fiske and Subba Rao as cited by Hawk *et al.*<sup>5</sup> for the estimations. Ovaries from a group of non-gravid females were also included for a comparison. The readings were taken from Klett-Summerson photoelectric colorimeter.

It may be observed from Table I that neither the control frogs nor the treated ones autopsied at 2 hours after the pituitary stimulation release eggs from the ovary. The release of eggs commences by about 4 hours and thereafter a progressive increase in the number of animals releasing eggs is noticed. Two distinct phases,

namely an ovarian phase from 0 to 12 hours during which ovary releases gravid eggs (ovulation) and an oviductal phase from 12 to 16 hours during which the eggs pass through the oviducts (spawning), may be recognized. The pituitary stimulation brings about a rapid decrease in the alkaline phosphatase activity of ovaries (Table II)

TABLE I  
*Response of ovary to the pituitary stimulation and ovulation in Rana cyanophlyctis*

Groups	Treatment	Weight range (g)	Number used	Number of frogs showing eggs in			Degree of response*	Per cent spawned
				Body cavity	Oviducts	Aquaria		
A	Control	30-34	10	Nil	Nil	Nil	Nil	Nil
B	Treated							
	2 hours after	30-32	9	"	"	"	"	"
C	Treated							
	4 hours after	30-37	9	4	3	1	+	11
D	Treated							
	8 hours after	30-36	10	9	9	5	+++	50
E	Treated							
	12 hours after	30-34	8	1	4	5	+++	62
F	Treated							
	16 hours after	30-38	12	Nil	4	12	+++	100

\* + = 1 to 10 eggs released  
++ = 10 to 50 eggs released  
+++ = 50 or more eggs

TABLE II  
*Changes in the alkaline phosphatase activity of ovaries in Rana cyanophlyctis*

Group	Treatment	Number used	Alkaline phosphatase activity expressed as $\mu\text{g}$ 'P' liberated at 37° C per g wt. of ovary
	Non-gravid untreated	11	2198 $\pm$ 267.7
A	Control		
	Distilled water	10	1717.3 $\pm$ 171.0
B	Treated:		
	2 hours after pit.	9	1442.6 $\pm$ 150.5
C	4 hours after pit.	9	954.9 $\pm$ 119.3
D	8 hours after pit.	10	1006.6 $\pm$ 91.8
E	12 hours after pit.	8	1073.0 $\pm$ 95.3
F	16 hours after pit.	12	1343.0 $\pm$ 14.6

Alkaline phosphatase activity.

A vs. B  $t = 1.201$   $P > 0.2$   
A vs. C  $t = 3.657$   $P > 0.001$   
A vs. D  $t = 3.667$   $P > 0.001$   
A vs. E  $t = 3.331$   $P > 0.001$   
A vs. F  $t = 1.989$   $P > 0.05$

and it is found to be significant by about 4 hours after the treatment ( $P > 0.001$ ). This decrease is maintained upto 12 hours after which the activity registers a recovery. Non-gravid ovaries record higher levels of activity than the gravid controls.

The action of gonadotrophic hormones on the ovary in lower vertebrates is relatively less understood when compared with that of mammals. The fact that the pituitary induced ovulation is blocked by actinomycin, puromycin and cyclohexamide, suggests that the action of gonadotrophins may be associated in the synthesis of mRNA and proteins<sup>5-9</sup>. The activity of alkaline phosphatases is generally associated with the growth and differentiation of diverse animal tissues<sup>10,11</sup>. A rise in the activity is reported to occur during certain stages in the development of the oocytes in *Anabas scandens*<sup>12</sup>. The changes observed in the activity of these enzymes during the present investigation seem to represent the rapid cytomorphological differentiation which the oocytes are undergoing due to the action of the pituitary homogenates. Thus, the levels of this enzyme activity may be taken as a measure of the growth and maturation of oocytes in the ovary due to the action of gonadotrophins from the pituitary in Anura.

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#### ANABOLIC STEROIDS INCREASE THE PROTEIN CONTENT OF POTATOES

POTATO proteins have been adjudged to possess the highest biological value among plant proteins<sup>1,2</sup>. But the concentration of proteins in the tubers is so low that the resultant high starch-to-protein ratio militates against the potato being an efficient source of proteins in human diet; if the protein content were increased, more proteins per joule could be supplied, promoting its role as a balanced food.

Although the variability of protein content among *S. tuberosum* cultivars is quite wide<sup>3</sup>, offering scope for increasing the protein content through hybridization techniques, results to date<sup>4</sup> have led to the view that combining high protein content with high bulk productivity holds little promise. Among other means of enriching the tubers with respect to proteins, nitrogenous fertilizers act most potently, whilst reports of the beneficial effects of 2, 4-D, simazine, maleic hydrazide, etc., have yet to receive thorough confirmation; Ora Smith has reviewed the work relating to the various factors that influence protein content in potatoes<sup>4</sup>. An improvement in the efficiency of nitrogenous fertilizers in respect of both the productivity and the protein composition of tubers is of great relevance in view of the current fertilizer price trends.

Androgens are known to promote nitrogen retention by increasing protein synthesis and decreasing the rate of amino acid catabolism in animal systems<sup>5,6</sup>. A number of synthetic anabolic steroids with varying anabolic-to-androgenic activity ratios are presently available commercially<sup>7</sup>. The present study relates to an investigation on the effect of such drugs on the plant system.

Pot culture experiments were conducted during three seasons, beginning in 1974, to find out if synthetic anabolic steroids could help to improve assimilative fixation of foliar-applied urea in potatoes. Each experiment comprised of five treatments, described in Table I, in an eight-fold replication. A 500 ppm stock solution of