

than in amphibians². The bursting takes place before the yolk has been completely resorbed resulting in ectopic yolk masses which are later resorbed by the phagocytic cells. The present paper describes a new type of atresia i.e. fibrous atresia not reported hitherto for any non-mammalian vertebrate. Several such atretic follicles were observed during the course of our study of histology of the ovaries of two species of *Rana*, *R. cyanophlyctis* and *R. tigerina*. In such atretic follicles, the theca hypertrophies and several fibrous layers are seen around the oocytes (figure 1). It is interesting to note that fibrous atresia is seen only in vitellogenic follicles. It is not known whether previtellogenic follicles also undergo fibrous atresia. The cause and consequences of fibrous atresia are not known. Recently, several other types of atretic follicles have been described in the ovary of the toad, *Bufo melanostictus*³.

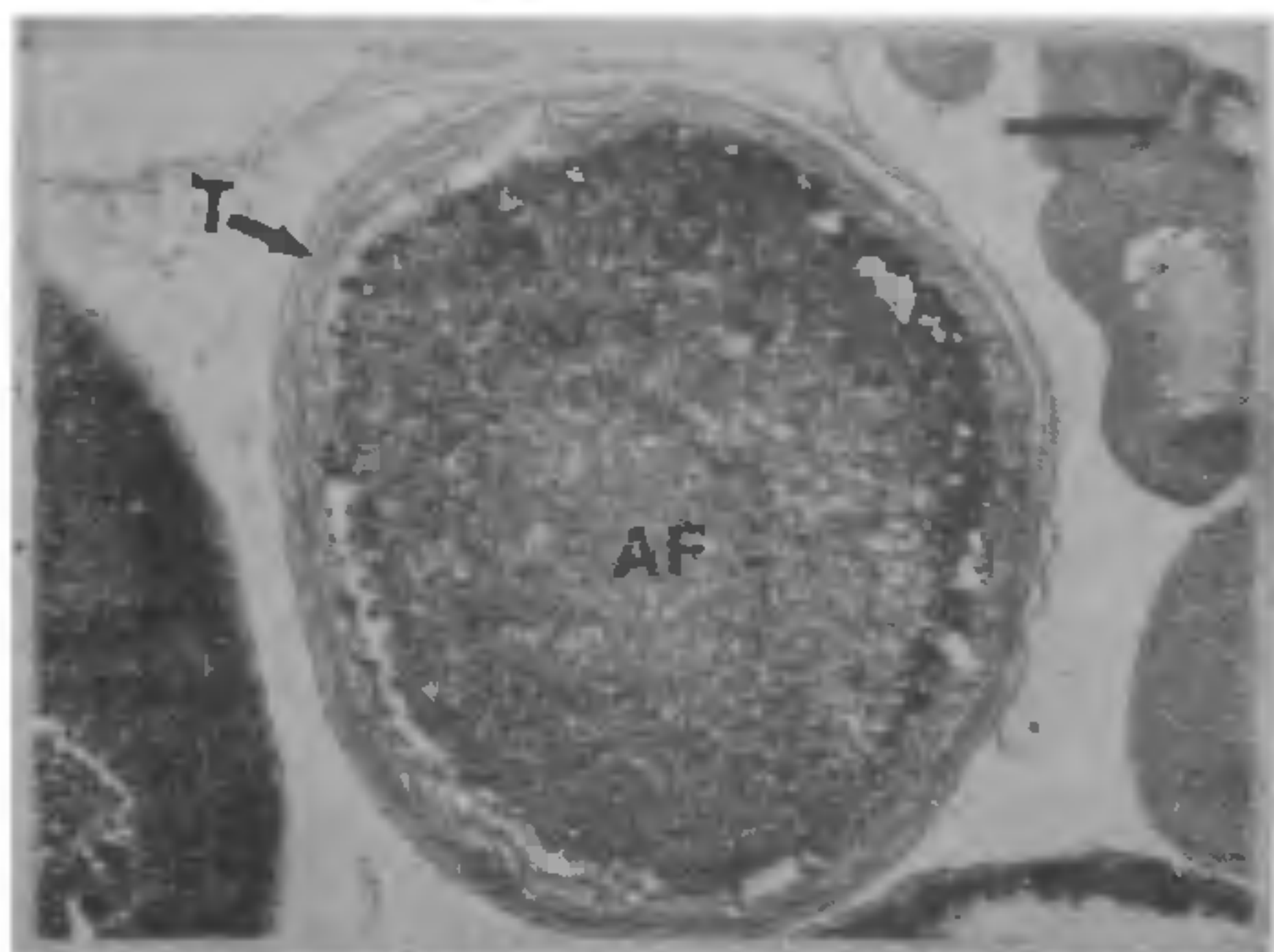


Figure 1. Cross section of *R. cyanophlyctis* ovary showing a fibrous type of atretic follicle (AF). Note the abnormal hypertrophy of theca (T). Scale line = 100 μ m.

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OVULATION INDUCTION IN THE MUSK SHREW BY CLOMIPHENE CITRATE ADMINISTRATION

JYOTI SEETAL SINGH AND C. J. DOMINIC

Department of Zoology, Banaras Hindu University, Varanasi 221 005, India

RECENT studies¹ indicate that ovulation can be readily and dependably induced in several members of the Order Insectivora by administration of exogenous gonadotrophins. Normal ovulation results in the musk shrew (*Suncus murinus*) following injections of PMSG, HCG, LH or FSH^{1,2}. Clomiphene citrate is known to induce ovulation in anovulatory women³⁻⁵ and rats³. In the present study, the ability of this drug to induce ovulation in the musk shrew was evaluated.

Twenty one adult female shrews were divided into seven groups of three individuals each. Shrews in Group I, II, III, IV, V and VI respectively received subcutaneous injections of clomiphene citrate, 100 μ g, 200 μ g, 300 μ g, 500 μ g, 1000 μ g and 1500 μ g/female, for 3 days. Shrews in Group VII were given injections of 0.9% NaCl, 0.05 ml/female/day, for 3 days (see table 1). All females were sacrificed 24 hr after the last injection and their reproductive tracts were flushed with 0.9% NaCl for recovery of ova. The numbers of corpora lutea in the right and left ovaries were also recorded.

The results (table 1) indicate that clomiphene citrate induces dose-related ovulatory response in the musk shrew which normally ovulates only after coitus. An absolute ovulatory response was obtained only when the drug was given at a dose of 1000 μ g or above, for 3 days. Eggs were found in the genital tracts and newly formed everted corpora lutea in the ovaries of ovulated females. A dose of 500 μ g induced ovulation in two females. Lower doses (300 μ g or less) were ineffective in inducing ovulations; however, the presence of well developed haemorrhagic follicles¹ in the ovaries of nonovulated females indicated that either the dose given or the duration of treatment or both were not sufficient for induction of ovulation. Exploratory studies revealed that clomiphene citrate therapy for less than 3 days is ineffective in inducing ovulation in the musk shrew. This delayed ovulatory response to clomiphene citrate administration in this species contrasts with the ovulatory response within 24 hr of single injections of FSH², HCG⁶ and prostaglandin F²₇.

It is generally believed that clomiphene citrate induces ovulation by causing the release of hypophysial gonadotrophins⁸⁻¹¹. Investigations on hypophysectomized women and those with hypopituitarism indicate that clomiphene citrate acts through the hypothalamo-hypophysial axis^{12,13}. It is suggested

TABLE I

Induction of ovulation by clomiphene citrate (CC) administration

Group and treatment	Proportion of females ovulated	Total number of ova*	Number of corpora lutea*	
			Left ovary	Right ovary
Group IV: CC, 500 μ g/female/day, for 3 days	2/3	3 (1 + 2)	1 (0 + 1)	2 (1 + 1)
Group V: CC, 1000 μ g/female/day, for 3 days	3/3	6 (2 + 1 + 3)	3 (1 + 0 + 2)	3 (1 + 1 + 1)
Group VI: CC, 1500 μ g/female/day, for 3 days	3/3	5 (2 + 2 + 1)	3 (0 + 2 + 1)	2 (2 + 0 + 0)
Group VII (Controls): 0.9% NaCl, 0.05 ml/female/day, for 3 days	0/3	0	0	0

* Numbers parenthesis refer to the number of ova/corpora lutea present in individual females.

that the close similarity between the molecular configuration of clomiphene citrate and that of 17-beta-oestradiol causes a false message of oestrogen deficiency resulting in the increased synthesis of the gonadotrophin-releasing hormone and consequent increase in the secretion of pituitary gonadotrophins⁸.

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