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THE GRAAFIAN FOLLICLE IN SOME INDIAN BATS

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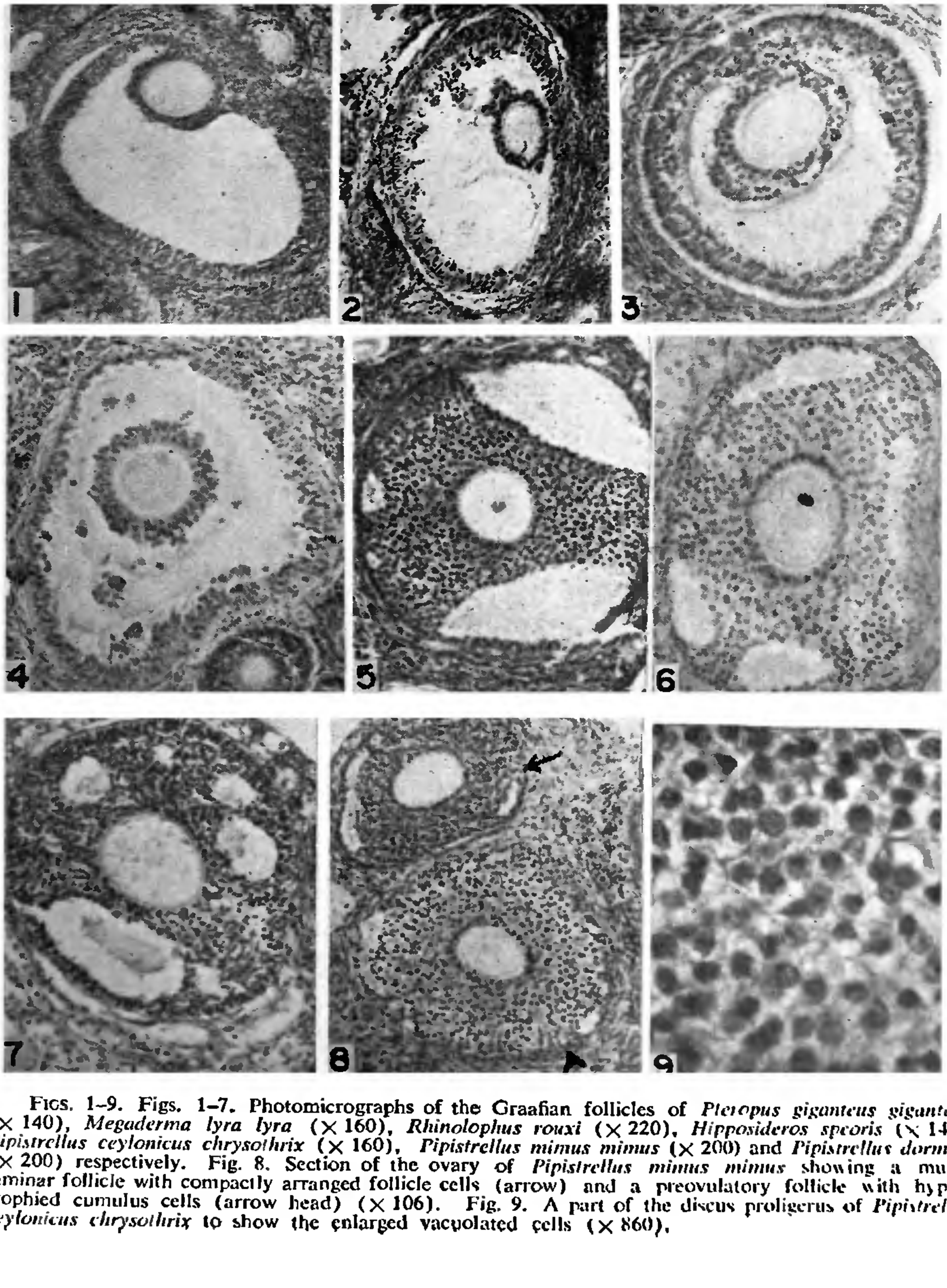
THE enormous hypertrophy of the cells of the discus proligerus (cumulus oophorus) with the near complete obliteration of the antrum of the Graafian follicle has been noticed in the ovaries of some vespertilionid bats inhabiting cold and temperate regions (Wimsatt, 1944; Sluiter and Bels, 1951; Pearson *et al.*, 1952; Wimsatt and Kallen, 1957). In all these cases the Graafian follicle remains in an almost unaltered condition during the winter months when the female undergoes hibernation after coming to oestrus during autumn. Wimsatt and Kallen (1957) noticed that the hypertrophied cells of the discus proligerus of such follicles contain abundant quantities of glycogen, and considered that these modification are "an adaptation to meet the energy requirements of the ovum-follicle complex over the prolonged period of dormancy, during which time the metabolism of the animal is drastically reduced". However, the Graafian follicles of the British rhinolophid bats do not exhibit such histological peculiarities, and the cells of the discus proligerus do not hypertrophy, although these bats also undergo a long period of post-copulatory hibernation throughout winter when the Graafian follicle with a large antrum remains almost unchanged in the ovary (Matthews, 1937).

Since the structure of the Graafian follicle varies so much even amongst the hibernating bats inhabiting cold climates, it was felt that it would be interesting to make a comparative study of the Graafian follicles of some tropical bats belonging to different families. The present report embodies the description of the Graafian follicle of *Pteropus giganteus giganteus* (Pteropidae), *Megaderma lyra lyra* (Megadermatidae), *Rhinolophus rouxi* (Rhinolophidae), *Hipposideros speoris* (Hipposideridae), *Pipistrellus ceylonicus chrysothrix*, *P. mimus mimus* and *P. dormeri* (all belonging to Vespertilionidae). None of these species undergoes hibernation as noticed in the bats of cold and temperate regions.

Figures 1–7 illustrate the structure of the fully developed Graafian follicle in the seven species of bats studied here. Whereas the Graafian follicle of *Pteropus*, *Megaderma*, *Rhinolophus* and *Hipposideros* presents a picture typical of the Graafian follicle of most mammals in possessing a large antral cavity and in having the ovum surrounded by one or two layers of small cumulus cells (Figs. 1–4), the mature follicles of the vespertilionid species (Figs. 5–7) studied here have a different structure, and are nearly similar to those of some of the hibernating vespertilionids inhabiting cold climates. In all the vespertilionids studied here the cells of the discus proligerus undergo enormous hypertrophy, and cellular bridges extend from the enlarged discus to the granulosa layers resulting in the reduction of the antral cavity to one or a few small spaces. Further, the hypertrophied cells of the discus proligerus contain numerous fluid-filled vacuoles (Fig. 9). The peculiar appearance of the mature follicle of the vespertilionid bats is, at least, partly due to the accumulation of secretions within the cumulus cells themselves. This is evident from the fact that the follicle cells are small and compactly arranged at the multilaminar and early vesicular stages of development of the follicle. Hence,

these follicles appear as dark bodies in stained sections (Fig. 8). The enormous increase in the size of the follicle after this stage is due mostly to the enlargement of individual follicle cells accompanied by an accumulation of secretions inside the cells without an appreciable increase in the number of cells. Hence, the mature follicles are lightly stained and have vacuolated cells (Fig. 8). In the



FIGS. 1–9. Figs. 1–7. Photomicrographs of the Graafian follicles of *Pteropus giganteus giganteus* (× 140), *Megaderma lyra lyra* (× 160), *Rhinolophus rouxi* (× 220), *Hipposideros speoris* (× 140), *Pipistrellus ceylonicus chrysothrix* (× 160), *Pipistrellus mimus mimus* (× 200) and *Pipistrellus dormeri* (× 200) respectively. Fig. 8. Section of the ovary of *Pipistrellus mimus mimus* showing a multilaminar follicle with compactly arranged follicle cells (arrow) and a preovulatory follicle with hypertrophied cumulus cells (arrow head) (× 106). Fig. 9. A part of the discus proligerus of *Pipistrellus ceylonicus chrysothrix* to show the enlarged vacuolated cells (× 860).

other bats the secretions produced by the follicle cells escape out of the cells and accumulate in the antral cavity so that the great increase in the size of the follicle is due to the enlargement of the antrum. Apparently, the unique histological changes resulting in the hypertrophy of the cumulus cells is a feature characteristic of some of the vespertilionids amongst the bats irrespective of their geographical location and irrespective of whether they undergo a protracted post-copulatory hibernation or not. The Graafian follicles of bats belonging to no other family have been so far shown to exhibit these modifications of the cells of the discus proligerus.

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MINERALOGY AND CHEMISTRY OF ASBESTOS FROM HOLENARASIPUR SCHIST BELT : MANGALAPUR AREA

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ABSTRACT

Asbestos from the Mangalapur area of Holenarasipur Schist belt has been identified as anthophyllite contrary to the earlier report as tremolite. The serpentines in this area are 6-layer orthoantigorites and the chlorites are 14 Å, IIb polytypes of variable Si/Al ratios. The anthophyllite is derived from the alteration of antigorite, chlorite and talc by the hydrothermal metamorphism of the ultrabasic intrusives.

ASBESTOS, a mineral of wide variety of uses, is found widely scattered in different parts of the Precambrian of Mysore. The difficulty in identifying the types of asbestos has led to erroneous conclusions regarding its geology and genesis. Since the physicochemical methods are the only means by which the asbestos minerals can be identified conclusively, the present series of investigations have been taken up. Amphibole asbestos forms the major exploitable variety in the State. One of the major workable deposits of asbestos is confined to Holenarasipur schist belt, south of 13° latitude and west of 76° 20′ E longitude. The asbestos from this area have been differently identified as tremolite-actinolite, anthophyllite and chrysotile. A systematic study of asbestos and the coexisting minerals from the southern limb of the Y-shaped schist belt, south of the river Hemavathi is undertaken. The present report is confined to Mangalapur area, north of the old Holenarasipur-Channarayapatna road and south of the river Hemavathi.

The geology of Holenarasipur schist belt has been repeatedly studied by many in the past[1-5]. The principal rock types are : the metamorphosed ultramafites, kyanite-staurolite schists and hornblende schists. The occurrence of asbestos is confined to the altered ultramafites. The veins in discconnected lenses with a general N–S trend occur in them within a span of 30 miles.

In Mangalapur region asbestos are of varying habits, fine as well as massive fibres of differing length (a few inches to 6 feet), varying in colour (grey, brown and white) and also in strength. The massive woody type and its host rock are associated with the asbestos. The minerals coexisting with asbestos are : carbonates such as dolomite, calcite and magnesite ; chlorites of flaky, coarse and massive habits ; serpentines with magnetite grains. The chlorites are contiguous with the serpentinites and is abundant towards the kyanite-staurolite schists. The asbestos bearing horizons are confined to the vicinity of serpentinite bodies in the field. The lithological features of the schist belt suggest that subsequent to the ultramafic intrusion into the pelitic sediments, the terrain has been subjected to dynamic metamorphism and deformation.

MINERALOGY OF THE ASBESTOS

The chemical analysis of a number of asbestos samples from Mangalapur area showed that they are all anthophyllites as against the reported occurrence of tremolite asbestos[3,4]. Mountain wood and its host rock are also found to be anthophyllites. The typical analyses of asbestos, mountain wood and its host rock are given in