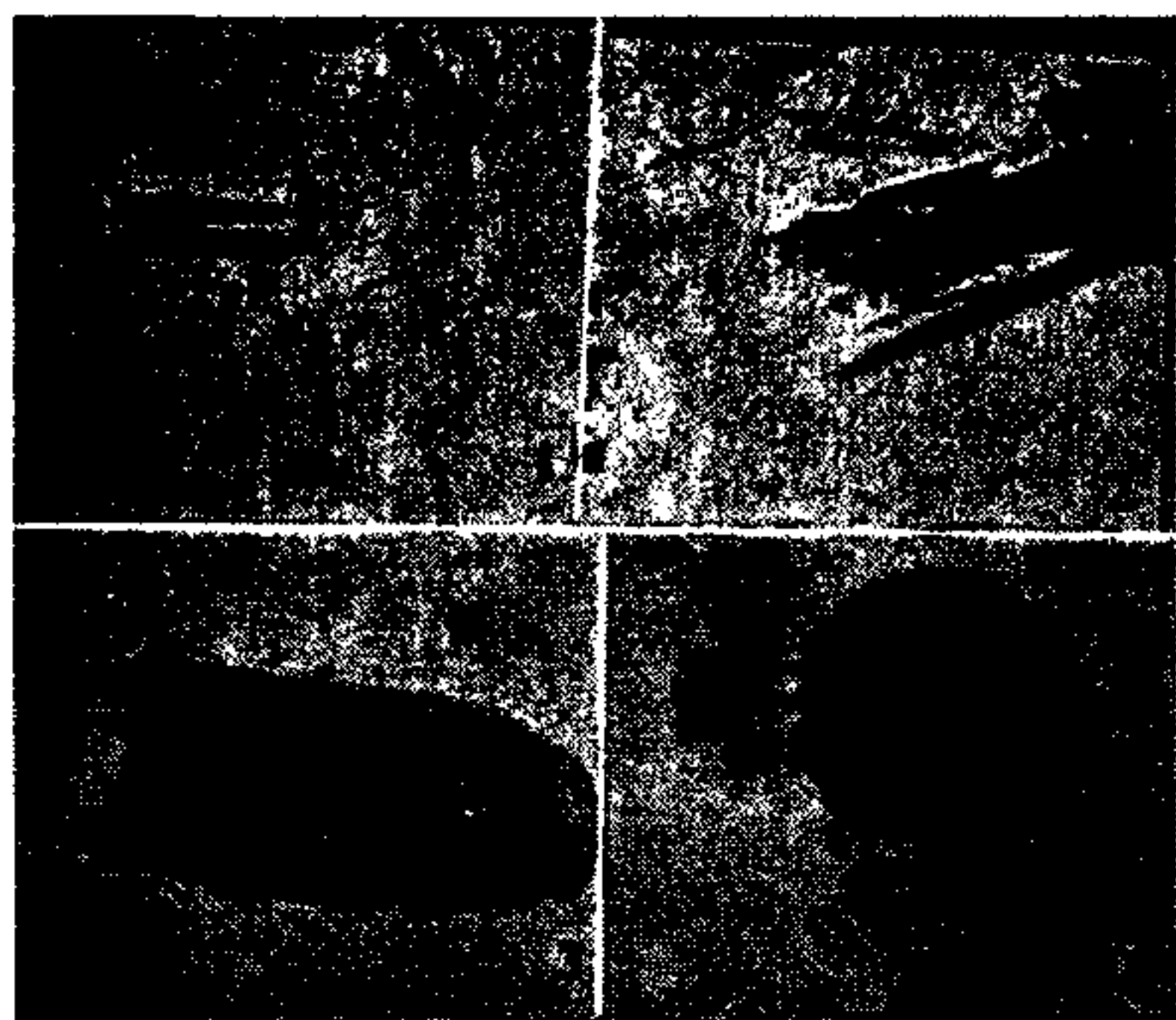


Three distinct kinds of crystallisation on amorphous substrates were observed in the electron-micrographic scannings. The first kind was in the form of rods (Fig. 1) with one



FIGS. 1-4. Different kinds of crystallization in urinary calculi. Fig. 1. Crystalline rods ($\times 4,000$) Fig. 2. Amorphous hollow fibrils in which precipitation occurs ($\times 4,200$). Fig. 3. Discrete crystallites on the surface of amorphous cylindrical substrate, white patches indicate places from which crystallites were dislodged ($\times 9,000$). Fig. 4. Globular matrix containing crystallites ($\times 12,000$).

pointed end. The density of crystalline material within these rods was not necessarily uniform; at high magnification, the opacity to electrons varied along the length of many rods scanned. Apparently, this type of precipitation occurred in fibrils, lacking any fine structure, shown in Fig. 2. The fibrils, which are not crystalline, in the sense that they do not give any electron diffraction pattern, are most probably organic in nature.

Figure 3 illustrates a second kind of crystallisation. In this case, small discrete crystallites were found lodged on the surface of hollow cylinders; the precipitation was not continuous within the amorphous cylindrical substrates. Some of the crystallites were dislodged from their positions most probably when the calculi were powdered.

Another kind of crystallisation was found to occur in globular substrates (Fig. 4). The globules have the appearance of coacervates in which crystallisation has occurred. The outer portion of the globules were amorphous to electrons.

It is clear from the above that more than one mode of precipitation of crystalline matter on amorphous organic matrices is operative in the formation of urinary calculi.

Author's thanks are due to Dr. A. L. Aurora for samples of calculi and helpful discussions,

and to Prof. R. M. Barrer, London, for making available an EM-100 electron microscope.

Dept of Chemistry, M. V. R. RAO.
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AGE OF THE TIPAM SANDSTONES

EVER since the discovery¹ of vertebrate fossils in the upper beds of the Boka Bil stage of the Surma Series in Assam, the age of the overlying Tipam Sandstones has been in doubt. On the evidence of marine invertebrate fossils² palaeontologists assigned a Pliocene age to the Tipam Sandstones but because of absence of any break in sedimentation and partly because the Tipam Sandstones laterally merge into the Boka Bil beds, field geologists urged a Miocene age for the beds, which prevailed. The mammalian fossils recently discovered in the underlying Boka Bil beds include *Dorcatherium* sp. which first appears in the Nagri stage of the Siwaliks and the Nagri stage has been dated by Lewis³ as belonging to the Pontian. The Tipam Sandstones must therefore be younger than the Boka Bil beds or at most of Pontian age, if they laterally merge with the latter.

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S. K. BOROOAH.

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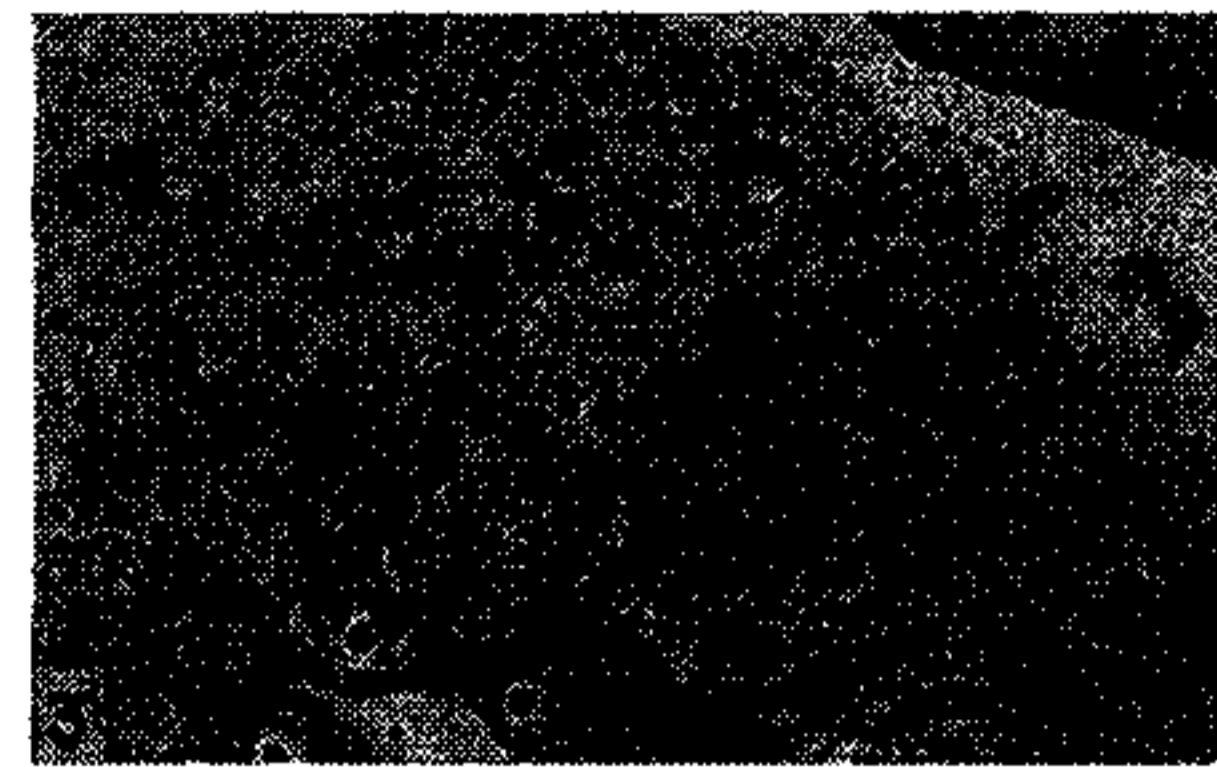
EXTROVERT CORPUS LUTEUM IN TWO SPECIES OF INDIAN BATS

THE occurrence of the extrovert corpus luteum is a rare phenomenon among the mammals and has been noticed in two species of British horse-shoe bats (Matthews, 1937), in the African insectivore, *Elephantulus myurus* (Van der Horst and Gillman, 1940, 1942), and in the mouse-tailed bat, *Rhinopoma kinneari* (Anand Kumar, 1965). While investigating the development of the corpus luteum in several species of Indian bats in this laboratory it was noticed that the corpus luteum becomes completely extroverted in *Hipposideros fulvus*.

fulvus (Family—Hipposideridæ) and partially extroverted in *Megaderma lyra lyra* (Family—Megadermatidæ). Both these species have an annual reproductive cycle and breed in a sharply defined season. Copulation takes place in the second week of November, and is immediately followed by fertilization and pregnancy. The young ones are delivered late in April. In both the species there is an unusual physiological dominance of the left ovary over the right, and a single Graafian follicle attains full development during each reproductive cycle. The pre-ovulatory follicle occurs near the periphery of the ovary near its ob-hilus end. Immediately after ovulation the granulosa cells of the Graafian follicle ooze out of the ruptured end. Within a very short period the entire granulosa layer becomes exposed and extroverted in *Hipposideros fulvus fulvus*. In the case of *Megaderma lyra lyra* only a part of the granulosa layer becomes extroverted. Hence the entire corpus luteum is outside the ovary in *Hipposideros fulvus fulvus*, whereas only a part of the corpus luteum is outside the ovary in *Megaderma lyra lyra*. When fully formed the corpus luteum of *Hipposideros fulvus fulvus* is larger than the rest of the ovary and occurs as a thick cap over the distal end of the ovary. Figures 1 and 2 are photomicrographs of the ovary with the corpus luteum in *Hipposideros fulvus fulvus* and *Megaderma lyra lyra* respectively.

The granulosa cells undergo hypertrophy and become vacuolated and luteinized, and contain a single large vesicular nucleus each (Fig. 3). The cells of the theca interna quickly migrate into the developing corpus luteum and form thin strands of fibrous-like cells between the luteinized cells. The zone between the extroverted corpus luteum and the rest of the ovary contains remnants of the theca externa and blood capillaries in *Hipposideros fulvus fulvus*. Numerous blood capillaries extend from the base of the corpus luteum and spread over distally just below the surface of the corpus luteum.

While describing the structure of the ovaries of some bats, Gopalakrishna and Moghe (1960) mentioned that in all the bats they studied including *Megaderma lyra lyra* the corpus luteum lies within the confines of the ovary. Either they did not get the very early stages of the development of the corpus luteum in this bat or they misinterpreted the vascularized peripheral surface of the corpus luteum as the cortex of the ovary.



FIGS. 1-3 Fig. 1. Ovary with the corpus luteum in *Hipposideros fulvus fulvus*, $\times 45$. Fig. 2. Ovary with corpus luteum in *Megaderma lyra lyra*, $\times 45$. Fig. 3. Part of the corpus luteum of *Hipposideros fulvus fulvus* to show the hypertrophied vacuolated luteinized cells separated by fine fibrous strands, $\times 160$.

In the two species of bats studied here the corpus luteum is short-lived and starts regressing soon after the embryo is completely implanted. In both the species the corpus luteum becomes completely regressed after the formation of the chorio-vitelline placenta. It is pertinent to mention here that the chorio-vitelline placenta becomes completely organized at a very early stage of gestation. Perhaps the early regression of the corpus luteum in these bats may be related to the fact that its endocrine function is taken over by the well-organized placenta at an early stage of pregnancy.

Whereas the corpus luteum normally develops within the confines of the ovary in most mammals, the reasons for the formation of the extrovert corpus luteum in a few mammals are not known.

Dept. of Zoology,

Institute of Science,

Nagpur, May 20, 1970.

A. GOPALAKRISHNA.

D. R. PATIL.

MISS R. NAGARAJAN.

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