The bond lengths and bond angles in the structure are normal. The phenyl and the pyrazolone rings in the molecule are planar and the gross molecular features are similar to those observed in some metallic complexes of antipyrine[3]. However, there are some significant differences, the most important of which pertains to the hybridization state of the two hetero nitrogen atoms in the five-membered ring. In the metallic complexes, the disposition of bonded atoms around the nitrogens is nearly planar whereas in the free molecule it is pyramidal with the N1-C6 and the N2-C5 bonds trans to each other.

Further refinement of the structure is in progress. The details of the analysis and the full results will be presented elsewhere.

The author thanks Professor Dorothy Hodgkin for making her four-circle diffractometer available to him and Dr. Kalyani Vijayan for discussion on symbolic addition procedure.

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Bangalore-12, *July* 31, 1971.

1. Vijayan, M., *Curr. Sci.*, 1971, **40**, 262.
2. Karle, J. and Karle, I. L., *Acta Cryst.*, 1966, **21**, 849.
3. Vijayan, M. and Viswamitra, M. A., *Ibid.*, 1968, **24 B**, 1067.

## DEVONIAN FOSSILS FROM THE LESSER HIMALAYAN ZONE OF CENTRAL BHUTAN

THE present note records the occurrence of Devonian fossils from the Lesser Himalayan Zone of Central Bhutan. The fossiliferous locality was discovered by Prof. A. Gansser during geological investigations in that area and he was kind enough to send a few photographs to the author for identifications. The fossiliferous locality lies in the Tangchu basin and the rocks exposed in this basin form part of Tangchu Series.[1]

The present note is important in that it has a bearing on the palaeogeographic and geosynclinal history of the Himalayas. Fossils discovered by Prof. Gansser are in fairly good state of preservation and include representatives of brachipods, bryozoans and crinoids. Figure 1 clearly shows a well-preserved specimen of *Atrypa reticularis*, *Euryspirifer* (?), *Fenestella* and part of crinoid stem. A preliminary look at the photographs shows that the brachiopods are quite similar to those described by Gupta[2,3] from the Middle Devonian rocks of Kashmir, Ladakh, Lahaul and Sipti Valleys.

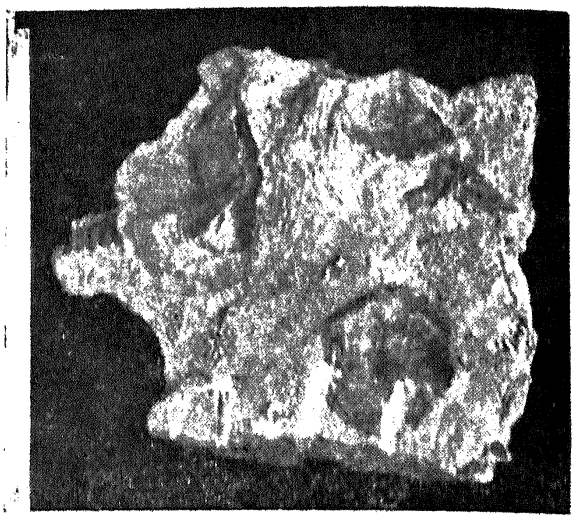

FIG. 1. Brachiopods, *Fenestella* and crinoid stem from the Devonian rocks of the Lesser Himalayan Zone of Central Bhutan (Photo by Gansser).

The author is grateful to Prof. A. Gansser of Zurich for sending me the photographs of the specimens which he recently collected from the Lesser Himalayan Zone of Bhutan.

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Chandigarh, *May* 5, 1971.

1. Gansser, A., *Geology of the Himalayas*, Interscience Publishers, London, 1964, p. 205.
2. Gupta, V. J., *Rec. Bull. (N. S.)*, Panj. Univ., 1970, **21**, 1.
3. —, *Publ. Cent. Adv. Stud. Geol.*, Panj. Univ., 1971, **9**, 46.

## LOCALIZED PROGESTATIONAL ENDOMETRIAL REACTION IN THE UTERUS OF THE INDIAN FRUIT-BAT, *ROUSETTUS LESCHENAULTI* (DESMARET)

CERTAIN interesting peculiarities in the reproductive habits of the Indian fruit-bat, *Rousettus leschenaulti*, have been reported earlier (Gopalakrishna, 1964, 1969). This bat is unique in several respects. It breeds twice a year in quick succession, and successive pregnancies alternate between the two cornua of the uterus. It was shown (Gopalakrishna, 1969) that the alternation of the two ovaries in producing the mature follicle during successive breeding cycles is due to the fact that a large corpus luteum almost completely filling the ovary persists until mid-gestation of the following pregnancy.

A large number of females of *Rousettus leschenaulti* carrying very early stages of pregnancy were obtained during the early part of the breeding season. The cranial part of the uterine cornu of the prospective pregnant side becomes markedly swollen immediately after ovulation, and becomes progressively enlarged during the tubal journey of the egg. The examination of the sections of such uteri showed that the uterine cornu undergoes profound progestational changes in a very small segment of the uterus near its cranial end even before the blastocyst reaches the uterus. In this region of the uterus the uterine lumen has enlarged, the epithelium of the uterus has become tall and the cells have become vacuolated, the glands have increased in length and have become coiled and the lumina of the glands contain secretion. The endometrium shows a distinct edema, which is characteristic of progestational reaction. On the other hand, the middle and the caudal regions of the uterus do not show such progestational reaction. Further, the examination of the uteri of specimens carrying early stages of implantation reveals that the blastocyst implants at the cranial end of the uterus in a pre-formed implantation chamber.

The question that would necessarily arise concerns the mechanism by which only a small segment of the uterus is activated to undergo progestational changes. It is evident that progesterone secreted by the corpus luteum has to be supplied to a part of the uterus only. Marshall (1953) indicated that in the fruit-bat *Pteropus giganteus*, there is a distinct connective tissue isthmus between the ovary and the uterus of the respective side, and progesterone may be carried to the respective uterine cornu through this connective tissue isthmus. This results in unilateral progestational reaction in this animal. Gopalakrishna and Murthy (1960) demonstrated the presence of a portal system between the ovary and the uterus of the corresponding side in *Cynopterus sphinx gangeticus* and *Taphozous longimanius*, and postulated that the flow of progesterone is short-circuited into the respective uterine cornu through the portal vessel. *Rousettus leschenaulti* is unique in showing progestational endometrial reaction in an extremely localized region at the cranial end of the uterus. The exact mechanism by which this is brought about in this animal is not known.

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Nagpur, *May* 24, 1971.

1. Gopalakrishna, A., *Curr Sci.*, 1964, **33**, 558.
2. —, *Ibid.*, 1969, **38**, 388.
3. — and Murthy, K. V. R , *Bull. Zool. Soc., Coll. Sci., Nagpur*, 1960, **3**, 19.
4. Marshall, A. J., *Jour. Endocrinol.*, 1953, **9**, 42.

## ON THE VARIATION OF LIMNOBIOTIC CONDITIONS ALONG A HOT SPRING THERMAL GRADIENT

No information is available on the species composition of biota along any hot spring thermal gradient in India, though a few workers[1-5] have reported the systematics of thermal algae without any ecological interpretation earlier. Jana[6] and Jana and Sarkar[7,8] have recently investigated the limnological and bacteriological characteristics of some of the thermal springs of West Bengal and Bihar. The present communication describes the variation of planktonic composition as well as chemical factors along a hot spring thermal gradient in Tantloi, Bihar.

All results reported here were obtained on hot springs of Tantloi, Santal Parganas, Bihar. Two thermal springs enclosed by cemented cisterns, $2 \times 1 \times 0{\cdot}7$ meters, are located in the bed of one of the channels of the main river. It bubbles continuously at the orifice. The hot springs occur in the region of Rajmahal Hills and their outflow has been estimated as 5,000 gallons/hour. The excess water flows out through a single channel about 0·75 meter wide and one meter deep which flows east. The channel gradually widens and bends several times and eventually spreads out into a marsh which also receives the overflow of the main river.

Five locations with temperature ranges of 44° C, 41·5° C, 40° C, 37·5° C and 35° C, along a hot spring thermal gradient, were selected for the present study, which was carried out in summer 1969. The physico-chemical variables were determined according to the Standard Methods.[9]

Temperature of these thermal springs is often remarkably constant at the source. As the water runs away from the source, the temperature falls down gradually and the rate of cooling is a function of initial temperature, channel dimensions and volume of water. The variation in the wind speed is more important