

first time, protodolomite of biogenic origin is reported from a geological formation.

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FEEDING ZONES AND INTERSPECIFIC ZONATION IN EARTHWORMS

THE feeding and subterranean activities of earthworms are not well understood, although their role in mobilization of nutritive substances in soil has been described in detail¹. The present report describes the variations in the feeding and interspecific zonation of three species of earthworms available in and around Bangalore.

We have observed the activity of earthworms (100–200) in glass cages containing different layers of soils varying in organic matter (dry leaf litter) continuously for 3 weeks. Cages were filled with (a) Brown clay loam soil; (b) soils of varied concentration of organic matter, prepared from dry leaf; (c) organic matter prepared from different materials like hay, dung, mango, tamarind and guava leaves and wood ash in the proportion of 19:1; (d) wet sand at the bottom (2 kg) and soil containing dung matter (1.5 kg soil + 500 g dung).

Pheretima elongata burrowed deep in cages and aggregated as clumps invariably at 22"–28" depth. *Megascolex mauritii* distributed throughout the length of the cage but showed a relatively greater aggregation at the depth of 4"–10". *Pontoscolex corethrurus* was always seen in the subsurface within 5" layer. This interspecific zonation was noticed only in cages with uniform composition of organic matter and it was lost when the cage was filled with different layers of soils varying in organic matter content.

All the three species showed preferential selection of a soil layer rich in humified matter in the cages containing different layers of soils for feeding. The mean rate of soil consumption varied with reference to the species, its size, nature of the soil and the organic matter content of the latter. These findings are in concomitant with those of Bhat *et al.*².

The feeding activity (in all the three species) was restricted to the dark phase of the day. During the light phase, the worms migrate to a layer poor in organic matter and settle there till nightfall. Thus they establish different zones for settlement and feeding.

Chemical analyses³ of soils from these zones revealed a 2 to 5 fold increment in Ca^{++} and oxidizable C content in the settlement layer. Due to defaecation activity in this layer, the soil accumulates urea and non-protein nitrogen.

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ISOENZYMIC PATTERN OF LACTATE DEHYDROGENASE IN VARIOUS TISSUES OF INDIAN PALM SQUIRREL, *FUNAMBULUS PENNANTI* (WROUGHTEN)

EARLIER studies have indicated that there are two primary types of lactate dehydrogenase (LDH; EC 1.1.1.27) in most animals¹⁻³. The two types are designated as H- and M-LDH which in different combinations make five isoenzymic forms. The LDH polypeptide subunits of vertebrates are encoded in at least two genetic loci, A and B⁴. On the other hand a third locus E functions in some fishes resulting in the formation of E₄ isoenzyme⁵, whereas birds and mammals possess yet another locus C functioning in the primary spermatocytes^{6,7}. The present report examines the isoenzymic pattern of LDH in various tissues of common Indian palm squirrel, *Funambulus pennanti* (Wroughten).

The squirrels were locally collected and kept for a week in the laboratory conditions. They were killed by cervical dislocation of the neck, and the organs spleen, muscle (gastrocnemius), heart and testes were immediately removed and frozen. A 10% (w/v) homogenate of each tissue was prepared in phosphate buffer (0.1 M, pH 7.4). The homogenate was then centrifuged at 14,000 × g for 30 mins. in Pr-6 International refrigerated centrifuge. The supernatant was collected and used as

the source of enzyme. Protein content of this supernatant was determined⁸ using Unicam S₇-500 spectrophotometer.

Polyacrylamide gel electrophoresis was carried out to study the pattern of LDH isoenzyme⁹. 7.5% gels were used and each was loaded with 100 µg of the enzyme source protein in 10% sucrose. The electrophoresis was then carried out at room temperature in tris-glycine buffer (0.1 M, pH 8.75) using 4 mA of the current per gel for 4 hours. After the run, gels were removed and LDH was specifically stained for localization¹⁰. The stained gels were photographed in transmitted light.

Figure 1 shows the pattern of LDH isoenzymes in testis, heart, skeletal muscle and spleen. In all these four tissues five isoenzymes are seen; M₄ near the origin and H₄ as the fastest moving band on the gels. The hybrids M₃H₁, M₂H₂, and M₁H₃ occupy the intermediate positions between the extremes. Two different patterns are visible, one shown by the testis and heart and the other by skeletal muscle and spleen.

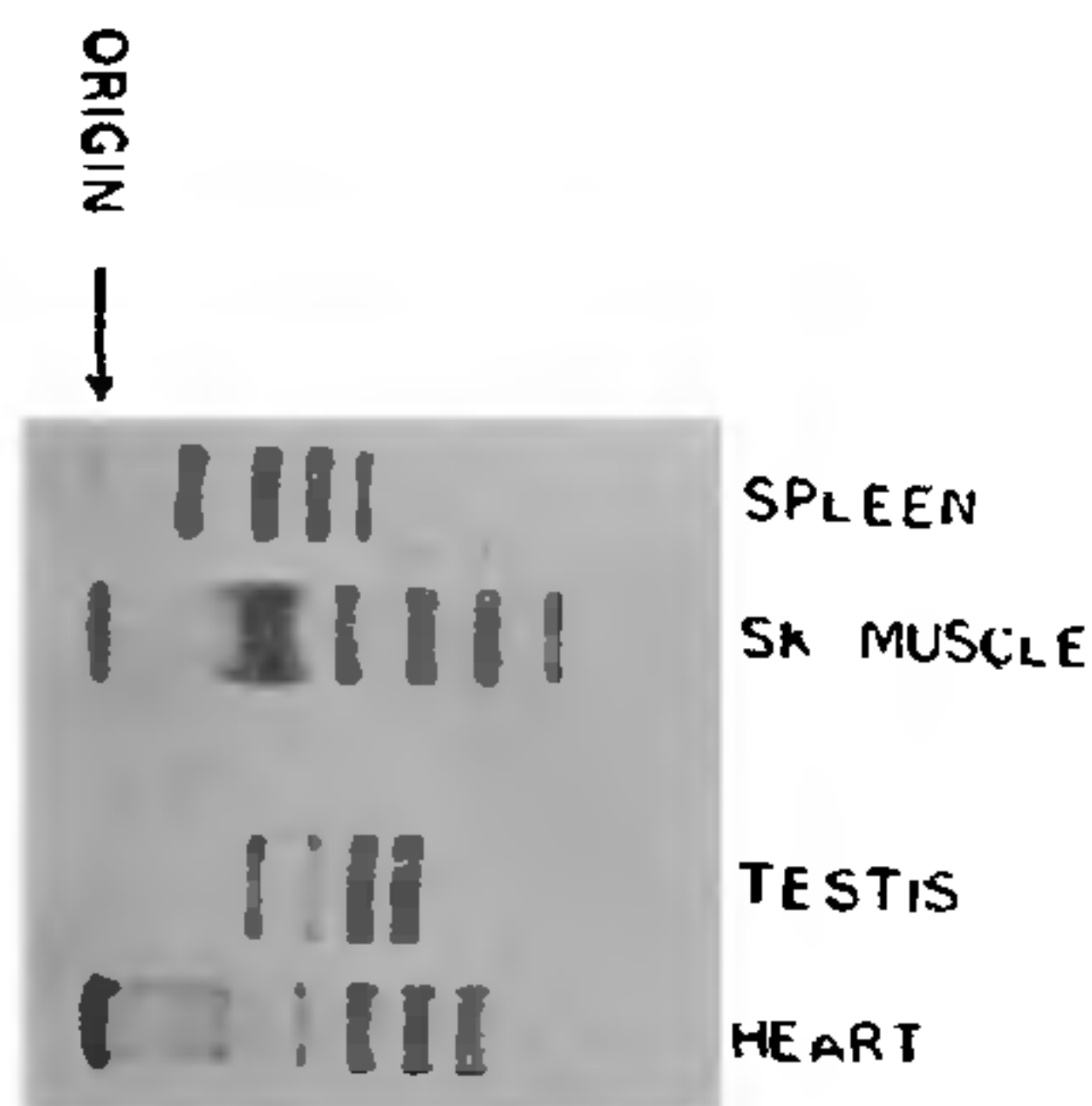


FIG. 1. Lactate dehydrogenase isoenzyme pattern in different tissues of *Funambulus pennanti*. Different bands are localized on the polyacrylamide gels according to the method described in the text.

In testis and heart, the preponderance of H₄ isoenzyme may be one of the adaptations of the enzyme to aerobic nature of the tissue. However, tissue specificity is seen in the difference in electrophoretic mobility of the enzyme in these two tissues. The other pattern of skeletal muscle and spleen shows M₄ to be the dominant isoenzyme. It is notable that the preponderance of M₄ is indicative of anaerobic tissues. Here also a difference in electrophoretic movement of the enzyme bands are apparent. Further, in spleen H₄ and M₄ are relatively lower in concentration as compared to skeletal muscle. The observed pattern of five isoenzymes bears resemblance to that of the rat tissues indicating the presence of two genetic loci in contrast to that

of the lens and spermatocytes of fish and birds respectively.

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A NEW SENSE ORGAN IN THE POSTERIOR LABIAL FOLD OF A TORRENTIAL FISH, *DISCOGNATHUS (GARRA) MODESTUS* (DAY)

THE presence of a unique sense organ, not hitherto reported in fishes, was observed in the epidermal region of the posterior labial fold of *Discognathus (Garra) modestus* (Day) (Cypriniformes, Cyprinidae). The sense organ was located in the blunt knob-like projections of the epidermis. The sense organ is spherical in shape and is about 48 µ–72 µ in diameter. The two sides are demarcated by common epidermal cells, whereas the front is guarded by curved cuticular spines. The basal portion is supplied with nerve endings from the dermis situated just below it. The sense organ does not open to the exterior by any pore. At least two types of cells are distinct in it—the proximally situated large neuroepithelial cells and below these, the slender sustentacular cells (Figs. 1 and 1a).

The neuroepithelial cells represent the main mass of the sense organ forming a somewhat spherical body. These well-marked cells (length—14 µ–21 µ; breadth—10 µ–17 µ) with prominent nuclei are bigger than the other cells of the epidermis. The sustentacular cells are slender and elongated. They are of varying lengths and breadths. Their nuclei are located in the basal portions of the cells.

Though the sense organ, under reference, resembles a gustoreceptor by its location, nature of nerve