will settle this interesting problem and such an investigation has been taken up.

CSMCRI Marine Algal Research Station, Mandapam Camp, *March* 4, 1969.

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SCHISTOSOMA (?) *INDICUM* IN AN ELEPHANT

Schistosoma indicum has been reported by several workers in various types of domesticated animals.[1] But so far no incidence has been recorded in the elephant (*Elephas maximus indicus*), though Mudaliar and Ramanujachary[2] described *Schistosoma nairi* from it.

Fæcal samples were collected from elephants at Tirupati and examined for parasitic infestations. One animal revealed ova resembling those of *Schistosoma indicum*. On further daily examination for about a week, same type of eggs were observed.

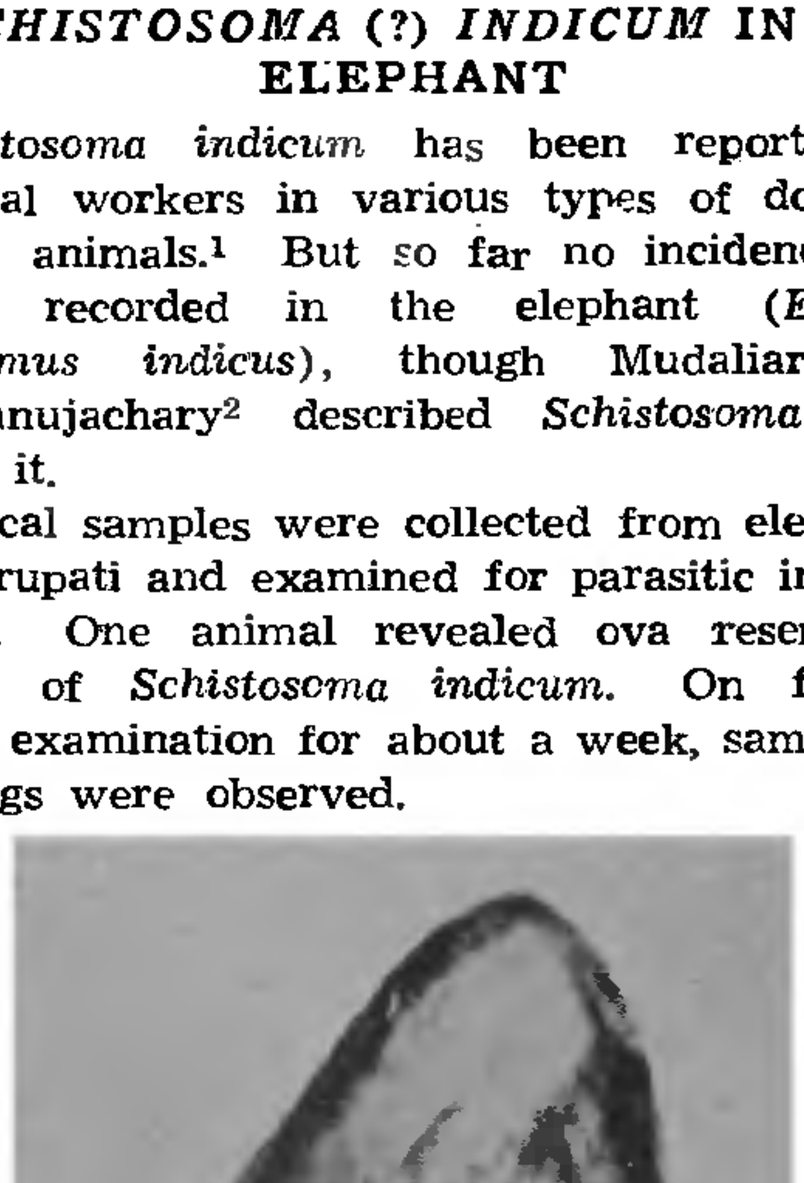

FIG. 1. Photomicrograph of an egg of *Schistosoma indicum*, × 525.

The eggs were elongately oval, with smooth cuticle and a spine at one end. They measured 112–156 μ (average 133 μ) in length and 58–82 μ (average 72 μ) in breadth. The length of the spines ranged from 7 to 13 μ (average 9·5 μ) and the width was 4 to 8 μ (average 6·2 μ) at their base. The tips were blunt. Most of the eggs contained fully developed miracidia except a few in which the miracidia were in developing stages.

This differs from *Schistosoma nairi* (80 μ × 30 μ) being bigger in size with both ends alike and also by the absence of shell ridges or rugæ. The eggs described here are similar to that of *Schistosoma indicum*,[1] but the precise identity of the worm and its location are yet to be determined.

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NEW RECORDS OF INTER-TIDAL BARNACLES FROM INDIA

THIS preliminary note communicates the occurrence of two forms of sessile barnacles which are new additions to the known Cirripedian fauna of India. They are *Tetraclita (Tetraclita) squamosa rufotincta* Pilsbry, 1916; and *Balanus amphitrite* var. *stutsburi* Darwin, 1854.

The specimens of *T. s. rufotincta* were collected at Okha (Lat. 22° 28′ N., Long. 69° 05′ E.) and Veraval (Lat. 20° 54′ N., Long. 70° 22′ E.). They were well developed, having rostro-carinal diameter of 20–25 mm. The colour of the shell is reddish-pink. The surface of the shell is eroded, showing fine short ridges. The sutures are not visible externally. The opercular valves are more whitish on their inner sides resembling to the forms described from Prison Island, Zanzibar. The rest of the description agrees very well with the original one given by Pilsbry. The shells were encrusted with *Chthamalus* sp. indicating their position in the inter-tidal zone.

Forms of *B.a. stutsburi* were observed at three widely separated localities. They were Trombay—near Bombay (Lat. 19° 00′ N., Long. 72° 55′ E.), Panaji—Goa (Lat. 15° 25′ N., Long. 73° 54′ E.) and Mangalore (Lat. 12° 51′ N., Long. 74° 50′ E.). The specimens collected from Bombay are typical or fully coloured, much larger in size and possess comparatively stronger shell compartments. As described by Stubbings (1961) the shell is conical and has a robust appearance. There is also incurving of compartments towards the shell opening, so that the shell presents a convex appearance in profile. As compared, the specimens collected at Panaji and Mangalore are smaller and their shells are devoid of pigment. This variety is distributed on West African coast. An interesting point about the occurrence of these forms is that all the three localities where they were collected are situated near the openings of river-mouths into the sea. Thus, there seems to be some resemblance to their ecological conditions.

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PRESENCE OF ACID MUCOPOLYSACCHARIDE IN THE CUTICLE OF A MILLIPEDE *CINGALOBOLUS BUGNIONI*

STUDIES on calcification of tissues in vertebrates showed the essential role of acid mucopolysaccharides in biological calcification.[1] Mucopolysaccharides seem to be important in calcification of tissues in the digestive gland of molluscs and cuticle of crustaceans.[2-4] The cuticle of millipedes is known to be heavily calcified[5,6] but it is not known if mucopolysaccharides are involved in the calcification. The present study on the millipede *Cingalobolus bugnioni* Carl was undertaken with the object of investigating the nature and role of mucopolysaccharides, if any, in the calcification of the cuticle. The histochemical tests employed for this purpose include Periodic acid-Schiff (PAS) test as modified by Gomori,[7] Mowry's modification of alcian blue method,[8] toluidine blue method of Kramer and Windrum[9] and the methylene blue extinction technique.[10]

The cuticle of *Cingalobolus bugnioni* was positive to PAS reaction even after preliminary digestion with diastase and after pyridine extraction suggesting that the PAS-positivity may not be due to glycogen or lipids.[11] It is known that diastase-stable PAS-positive compounds include such carbohydrate substances as acid mucopolysaccharide, mucoproteins or neutral mucopolysaccharide and such lipid compounds as glyco or phospholipids and lipoproteins.[11]

Acid mucopolysaccharide may be distinguished from mucoprotein and neutral mucopolysaccharide by the ability of the former to exhibit gamma-metachromasia. The cuticle of *Cingalobolus* when treated with toluidine blue demonstrated gamma-metachromasia by staining reddish-purple, suggesting the presence of acid mucopolysaccharide. The metachromasia was not removed by washing with 95% ethanol indicating the presence of ester sulphate groups.[9]

Alcian blue stained the cuticle an intense blue-green at pH 2·7. There was staining at pH 1·8 also, but the reaction was not so intense. Staining at pH 2·7 indicates the presence of acid mucopolysaccharide and staining at pH 1·8 indicates acid mucopolysaccharide containing sulphuric acid groups.[8,11] The presence of compounds with strong acid radicles is confirmed by methylene blue staining at pH 2·7.

A chromatographic analysis of the material in question indicates that the sugar components in it are fucose, galactosamine and mannose. In *Hemigraspus nudus* the acid mucopolysaccharide was shown to contain sugars like fucose, galactose and glucose. The work of Leblond *et al.*[12] suggests that the mucopolysaccharides in calcified tissues may show a variety of sugars such as galactose, fucose and sialic acid.