

Holotype Q India, Andhra Pradesh, Prakasam, Chirala, on *Cupressus* sp., 13. iv. 1979 (R. K. Avasthi). Type deposited in Zoological Museum, Aligarh Muslim University, Aligarh, India.

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HOLOCRINE SECRETION IN THE HEPATOPANCREAS OF *ALPHEUS EDWARDSI* (AUDOUIN)

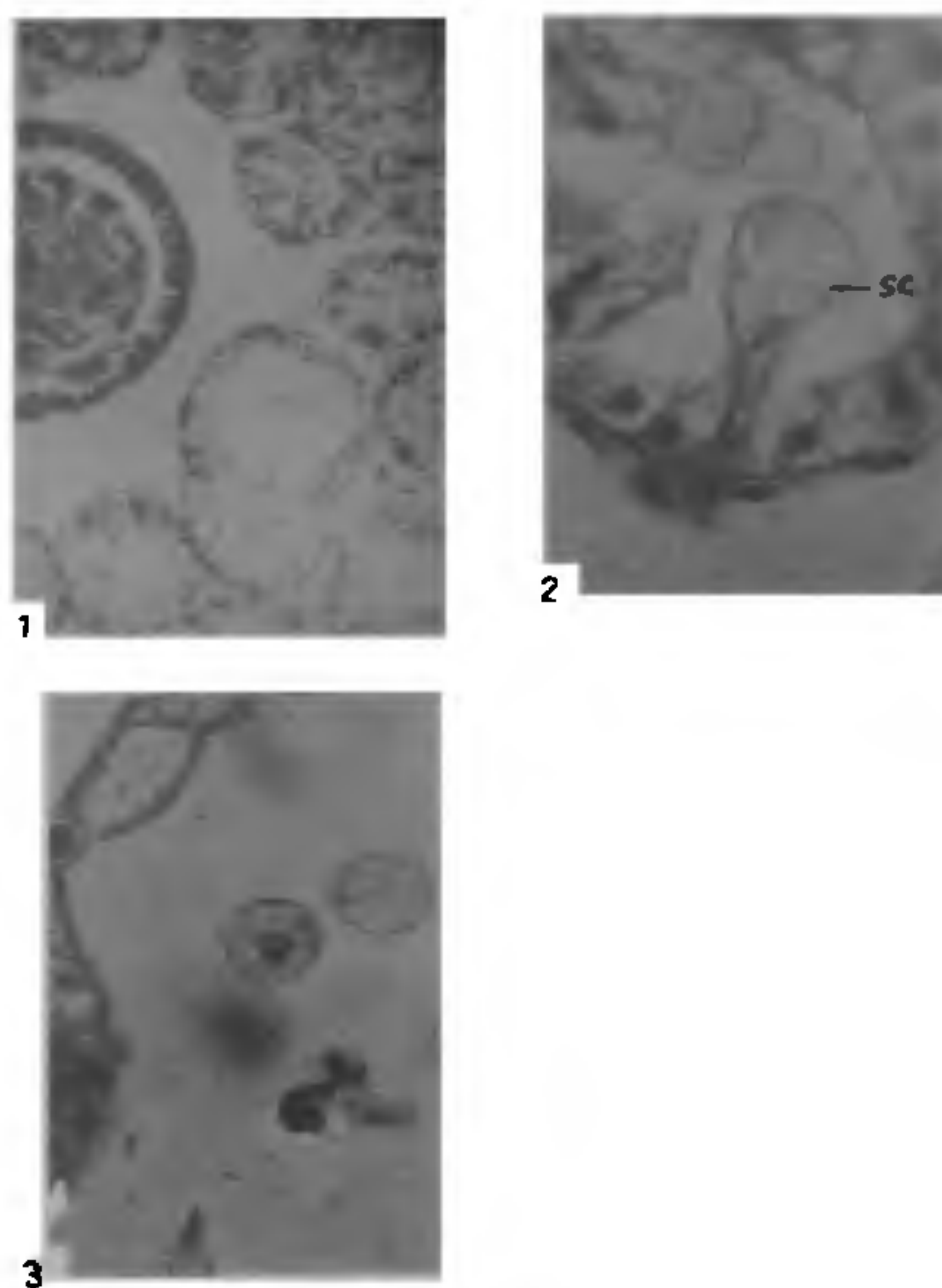
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THE hepatopancreas, an important digestive gland associated with the alimentary canal of crustaceans has been studied. But comparatively little attention has been paid to study the histological and histochemical aspects in the shrimps. The study of the hepatopancreas of an intertidal shrimp *Alpheus edwardsi* can provide information on its histophysiology.

The hepatopancreas in *A. edwardsi* is a large well demarcated structure, yellowish brown in colour. It occupies most of the posterior part of the cephalothorax and envelops the posterior portion of the stomach and anterior region of the midgut. Basic studies on the histology of the hepatopancreas of the decapods have already been made¹⁻³. The hepatopancreas consists of two main lobes each of which is formed by three small lobes, which are formed of numerous tubules. Each tubule in turn possesses epithelial cells of different types (figure 1). On the basis of the cytoplasmic contents and the phase of secretory activity four types of cells, viz., secretory, absorptive, storage and replacing cells could be recognized. In sections the secretory cells appear large, vacuolated and club shaped (figure 2). The basal portion of the secretory cells are narrow and the conspicuous nuclei are placed at this narrow stalk-like region. The distal portion is bulbous. The cytoplasm of the cell usually appears fully loaded with secretion. Adjacent to the secretory cells, nonvacuolated



Figures 1-3. 1. Section of hepato pancreatic tubule. 2. Secretory cell (SC), 3. Secretory cell after extrusion in the lumen showing the holocrine type of secretion.

absorptive cells are present, with prominent round nuclei situated centrally. The secretory cells, when fully grown, extrude from the base and get ruptured.

This characteristic activity of fully grown secretory cells, their extrusion from the base, rupture and emptying their secretions into the lumen of the tubule is to be reckoned as holocrine. This is further confirmed by the observation of few secretory cells with their nuclei in the lumen of the tubule (figure 3). We can therefore conclude that holocrine type of secretion is apparent in these shrimps. Although merocrine secretion cannot be precluded, evidence of intense holocrine secretion is presented here.

The mode of secretion in the hepatopancreas has been differently reported in crustaceans. Travis^{4,5} described apocrine secretion in *Panulirus*. Van Weel⁶ reported merocrine type in *Atya spinipes*. The phenomenon of secretion and restitution of gland cells of the hepatopancreas has been elucidated by Hirsch and Jacobs^{7,8}, who reported holocrine type of secretion in *Astacus leptodactylus*. Similar type of secretion was also reported in amphipod *Telorchestia martensii*⁹, and *Homarus gammarus*¹⁰.

30 November 1981

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ISOLATION OF *BORDETELLA BRONCHISEPTICA* FROM A CASE OF BOVINE MASTITIS

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MILK from a cow suffering from clinical mastitis was collected aseptically for bacteriological examination. The sample milk which was yellowish, watery and containing clots was inoculated in serum broth and incubated for 18 hr at 37°C. Streaking of the growth on blood agar plates, resulted in the appearance of tiny, dew drop-like colonies after 48 hr. The organisms were gram-negative, short slender rods, which were motile, non-sporing and non-capsulating. The pure culture was oxidase-positive. Based on other specific biochemical and sugar fermentation tests, the organism was typed out as *Bordetella bronchiseptica*¹. The organism was sensitive to neomycin, streptomycin, polymixin-B and was resistant to ampicillin, kanamycin, furadantin, erythromycin, penicillin, oxytetracyclin, and chloramphenicol.

B. bronchiseptica is known to be widely distributed in nature and is usually transmitted by contact. The association of this organism with bronchopneumonia in rodants, dogs, swine and man has been established^{2,3}. But the role of this organism in inducing bovine mastitis is not clearly understood.

4 July 1981

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KARYOLOGICAL STUDY IN THE DIGENETIC TREMATODE *NOTOCOTYLUS ATTENUATUS*

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KARYOLOGICAL investigations of digenetic trematodes, although meagre and sporadic, have been the subject of speculation and divergent views. Some of the earlier reports on chromosome number and morphology are based on paraffin sections. Much reliance cannot be placed on these sections for an accurate number and position of centromere. The genus *Notocotylus* has more than 29 species¹. The diploid chromosome number has been described as 14 for *Notocotylus filamentis* from sectioned material². The chromosome studies investigated in *N. attenuatus* are described here for the first time.

The mature parasites of *N. attenuatus* collected from the intestine of wild duck *Anas creaca*³, were processed by the technique described earlier⁴. All the divisional stages were observed from testes squashes. Karyotype analysis was made from six spermatogonial metaphases. Chromosome measurements were made for computing the relative length, arm ratio, centromeric index and construction of karyotype⁵⁻⁷.

The diploid chromosome number of the parasite *N. attenuatus* consists of twenty chromosomes studied from gonial metaphases. They fall into three groups. One pair of large chromosomes with total length of 2.57 μ is found in this group and designated as submetacentric. Median chromosome pairs two to four with total length ranging from 1.77 μ to 1.48 μ . Third pair is submetacentric and the rest are telocentric in nature. The rest of the six pairs of small chromosomes are telocentric and ranging from 1.12 μ to 0.96 μ . The ratio between the shortest and the largest chromosome is 1:2.6.

The karyotype constructed from the data (table 1) clearly shows that the first and the third pairs are submetacentric and the others are telocentric. A careful perusal of diplotene and diakinesis indicates one large, three median and six small bivalents which confirm the gonial chromosome gradations.

The chromosome number of *N. filamentis*² was found to be 2n-14. These chromosomes can be classified into 2 short pairs (1 μ), 2 median pairs, and 3 long pairs (2.4 μ) with ambiguous position of