for anthocyanin synthesis. The change of colour from ivory-white to pink-red through light rose is, therefore, attributable to the absence of the anthocyanin in the morning and the progressive development of the colour due to anthocyanin synthesis as the day passes and its masking the ivory-white colour (due to flavonols) as suggested by Harborne, the concentration of the anthocyanins reaching the maximum quantity by the evening. Both the five-petalled and the multi-petalled varieties had the same flavonoid pattern.

The colour change of the petals has also been observed, in the laboratory, to take place in the case of flowers plucked out of the plants and kept moist at the room temperature as under hydroponic conditions. In such cases, a temperature range of 10 to 40°C and pH 5 to 9 have been found to be favourable for the anthocyanin synthesis and outside these ranges the morning colour remains almost unchanged.


6. [Note by Referee: The anthocyanins are not the floral pigments: Vide, Current Science, 1960, 38, 179 & 461.]

A STUDY OF HAEMOCYTES OF A CENTIPEDE ETHMOSTIGMUS SPINOSUS (CHILOPODA: MYRIAPODA)

Bucheli and Greigo described two kinds of haemocytes, amebocytes and hyaline cells, in Scolopendra viridicornis and Lithobius forficatus. In addition to these, a third type known as lymphocytes was described from Scolopendra moritans. These authors have taken into consideration the shape of the cells and the presence or absence of granules in the cytoplasm as basis for classification of haemocytes in these centipedes. In the light of recent observations of Jones and Sundara Rajulu et al., the criteria applied by workers on centipede haemocytes is of little importance as the characters taken into consideration by these authors are found in more than one type of haemocytes and are known to be variable in the same haemocyte during different growth stages. It is therefore felt that a study of the haemocytes in centipedes in the light of recent observations would be of interest.

The centipedes of the species Ethmostigmus spinosus, collected from Alagarkoil Hill region, were the materials used. The methods of collection of haemolymph and preparation of smears and the stains employed were the same as given elsewhere. The haemocytes were examined with phase contrast microscope and classified using the nomenclature suggested by Jones.

Five types of haemocytes are distinguishable from the blood of Ethmostigmus spinosus.

Type 1.—These are round cells appearing pale gray and homogeneous (Fig. 1). They measure 5 to 7 μ in diameter. The nucleus is round and occupies nearly the entire cell, leaving only a thin band of peripheral cytoplasm. The nucleus shows evenly distributed chromatin granules. These haemocytes recall the prohaemocytes of insects.

Type 2.—The haemocytes of the second type are characterized by their morphological variability. They measured from 15 to 20 μ in diameter. The common variety was ovoid with a large centrally placed nucleus containing many chromatin granules (Fig. 2). The cytoplasm is devoid of any inclusions. In fresh preparations, a few of this type of cells send out minute, thread-like pseudopodia (Fig. 3). These cells ingest indigo carmine particles injected into the blood. These

FIGS. 1-6. Haemocytes of Ethmostigmus spinosus
Fig. 1. A prohaemocyte. Fig. 2. A normal plasmatocyte. Fig. 3. A plasmatocyte with thread-like pseudopodia. Fig. 4. A granular haemocyte. Fig. 5. A spherule cell. Fig. 6. An oecytoid.
characters would relate this type of haemocytes to the plasmatocytes of insects.4

Type 3.—These haemocytes are round cells measuring 25 to 30 μ in diameter. They are filled with numerous discrete round granules (Fig. 4). The granules often mask the centrally placed small nucleus. In unfixed toluidine blue-stained preparations, the granules stain pink and the cytoplasm blue, while the nucleus stains pale red. When left unfixed, these cells degenerate within 10 to 12 minutes, ejecting the granules. The ejected granules remain intact for more than 30 minutes.

These cells actively ingest carmine particles injected into the blood; therefore, these haemocytes strongly recall the granular haemocytes of insects.7

Type 4.—These are the largest haemocytes of oval shape measuring 48 to 52 μ in diameter. They contain several large spheroid inclusions which fill up the whole cell (Fig. 5). The nucleus is centrally placed and is often obscured by the spherules. These are very unstable cells; often they rupture releasing the spherules which disintegrate quickly. Phagocytosis was not observed in these cells. These characters may relate this type of haemocytes to the spherule cells of insects.8

Type 5.—These are ovoid or irregularly shaped haemocytes, measuring 20 to 22 μ in diameter. The nucleus is characteristically eccentric (Fig. 6). The cytoplasm contains fine granular network. These cells exhibit amoeboid movements in fresh preparations. These features recall those of the œnocyctoids of insects.9

The foregoing observations may indicate that there is close resemblance between the haemocytes of the centipede and those of insects. However, cystocytes which are commonly seen in insects10 are not found in the centipede. The amoeboid haemocytes described from Scolopendra viridicornis1 may correspond to the plasmatocytes with hyaloplasmic extensions and hyaline cells from Lithobius forcatus2 to the granular haemocytes while the lymphocytes from Scolopendra morsitans8 may correspond to the prohaemocytes of Ethmostigmus spinosus.

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IDENTITY OF THE THREE HETEROPHYID METACERCARIAE INFesting SOME OF THE FRESHWATER FISHES

Heterophyid flukes widely distributed in fish-eating vertebrates constitute an important group of intestinal parasites. Some of the species have a zoonotic significance.12 Lifecycle studies, undertaken with some of the representatives of Heterophyes Cobbé, 1886.; Heterophyopsis Tubangui et Africa, 1938.; Centrocestus Looss, 1899.; Haplorchis Looss, 1899.; Procerovum Onji et Nishio, 1916.; Metagonimus Katsurada, 1913.; Stellantchasmus Onji et Nishio, 1915.; Stictodoras Looss, 1899.; Apophallus Lühe, 1909.; Pygidioptera Looss, 1907., have revealed a number of freshwater fishes as second intermediaries. In view of the role in helminthic zoonosis, observations on infectivity, development, maturity and recovery rates of important species, like M. yokogawai (Katsurada, 1912) Katsurada, 1913, in hamsters, cotton-rats, guinea-pigs and mice, orally infected with the metacercariae, have been reported.13

In addition to the occurrence, in dogs and cats, of Heterophyes heterophyes (Siebold, 1852) Stiles et Hassall, 1900 and Stictodoras manilensis Africa et Garcia, 1935, in dogs,6 the earlier reports on Haplorchis taihui (Nishigori, 1924) and H. yokogawai (Katsuta, 1932) and their hosts, domestic and wild, have been referred by Gupta et Pande,2 Simha et Deshpande,11 Sahasrabudhe et Shah,8 Sahasrabudhe et al.,9 Prakash et Pandé12 and Sahai.7 H. vagabundus Baugh, 19631 and H. guajvari Jain, 19688 are described from birds, Dendroctyta vagabunda and Milvus migrans respectively. Dryophysis myxica horizontalis, a green tree-snake, has been named to harbour H. solus.10