

II. THE PARENCHYMA

The parenchyma occupies major portion of platyhelminth interior. It essentially comprises a network of loosely spaced connective tissue with large, closely apposed cells appearing polygonal in sections. The anastomoses of these cellular processes form a reticulate network all over. Dispersed within this connective tissue, are found certain specialized large cells, sparsely distributed throughout the body. These have been described in detail in Chapter V.

There are frequently present large spaces of various size within the parenchyma cells. In between the adjoining parenchyma cells, distinct spaces have been reported. The nature of the spaces has been subject to much speculation. Some investigators considered them intracellular and some as extracellular (Wisniewski, 1930). However, the latter view, mainly based on the descriptions of Ortner-Schoenbach (1913) and Prenant (1922) is widely upheld, and has further been supported by Alvarado (1951), and Bjorkman and Thorsell (1962) who have substantiated this view through ultra-structural investigations. The findings of Threadgold and Gallagher (1966) and Gallagher and Threadgold (1967) on F. hepatica lend further credence to this hypothesis.

In Fasciola gigantica, the parenchyma is essentially a compact network inbetween the various systems and structures

throughout the body, even inbetween the radial muscle bundles of the suckers and the pharynx. It comprises closely apposed cells which considerably vary in shape and size. Some are small and round, whereas others are elongated, measuring approximately 25-35 μm in cross sections (Pl. IV, 1). The shape and size of the nuclei also vary considerably (Pl. IV, 4), measuring from 5 - 6 μm , being spherical, oval, or reniform, with a small spherical or amoeboid median nucleolus. The nucleus essentially lies towards one side of the cell. The cytoplasm of the parenchyma cells appears granular and vacolated (Pl. IV, 1). The vacoules do not appear so frequently and large in Best's carmine and PAS stained preparations (Pl. XVI, 3; XX, 4 and XXVII, 5). The majority of the cell inclusions within these vacuoles are certainly glycogen deposition of various macromolecular size, sometimes appearing exceptionally large and rounded in shape (Pl. IV, 1). This distribution of glycogen appears intense in both the anterior as well as in the posterior regions. The cytoplasm is moderately protenaceous (Pl. XXIV, 2). This protein moiety is not basic, and the amount of bound proteins invariably appear scanty (Pl. XXVII, 2). Fat droplets are sparcely found in these cells (Pl. XXV, 4), while some bound lipid is present (Pl. XXIV, 3). The general cytoplasm of paranchyma cells do reveal the presence of RNA (Pl. XVII, 4).

The cell boundaries are well defined in *E. gigantica*,

measuring generally about 2 μm in thickness. Sometimes the two adjacent plasma membranes are separated by a much thicker intercellular material (Pl. IV, 1-3), which varies greatly in thickness at different places. The intercellular material shows a hyaline appearance including non-homogenous, reticulin. There also appears ample quantity of bound lipids within this intercellular material and also sometimes fine granules of PAS positive non-glycogen material.

The parenchyma cells are in close association with the intestinal crura, the reproductive system, body wall, and the excretory system. The cells, surrounding the intestinal caeca seem to possess short pseudopodia-like projections towards the base of the intestinal epithelial cells passing through the circular muscle bundles, interstitial material, and probably reaching the basement layer, which is not so clear under light microscopy (Pl. IV, 2, 3). The membranes of the parenchyma cells and intestinal epithelial cells appear comparatively thin at this point.

The close association of the paranchymatous cells with the tegument seems similar to that of the intestinal caeca except the pseudopodial projections which do not reach up to the cuticular base.

Details of various histochemical tests performed on the parenchyma have been furnished in table IV.

The parenchyma of F. gigantea is essentially similar to that of F. hepatica. Threadgold and Gallagher (1966) considered intercellular material as the interstitial material in F. hepatica. The exact chemical and functional nature of this material is still unknown, nevertheless the result of present study enables the writer to regard it as reticulin, which has also been reported in F. hepatica (Prenant, 1922 and Alvarado, 1951). Either these are secretory products or of some other origin. This is still unknown although, Alvarado (1951) has suggested it as a secretory product of the mesenchyme. The present author is of the view that these materials; appearing within the intercellular spaces are usually under the inter-cellular transit.

The vacuoles are presumably sites of glycogen deposits, which are either lost as a routine fixation artifact or they might remain ill-defined or even unstained with routine stains. Pantelouris (1964) also postulated similar idea about such vacoules.

As present study reveals, the parenchyma beyond a packing system is a major glycogen storage organ, similar to the one in F. hepatica (von Brand & Mercado, 1961), and is probably metabolically and physiologically active, as was suggested by Halton (1967a) for F. hepatica.

The presence of cytoplasmic RNA also suggests the presence of granular endoplasmic reticulum in these cells.

The closest association of this system to all other systems, particularly such as the intestinal crura and tegument also suggests the probable distributory performance of this tissue to various systems, and this aspect is a compensation to the absence of a circulatory system.

The presence of fat is mostly in the form of bound lipids and this moiety is probably derived through the sterols present in the host blood, and is converted to bound lipids metabolically within the parenchyma. This confirms the fact that it also feeds on host blood in the sinusoids as was suggested by Dawes (1963a, c) for F. hepatica.

TABLE - IV

Results of various histochemical tests performed on the parenchyma
of Fasciola gigantica

Test performed	Parenchyma		
	Ant.region	Post-region	Intercellular material
PAS	+++	+++	++
PAS, after diastase digestion	-	-	+
Best's Carmine	+++	+++	++
Best's Carmine, after diastase digestion	-	-	-
Mercury bromophenol blue	++	++	+++
Acid Solochrome cyanine	-	-	+
Alcian blue	-	-	-
Pyronin Y & Methyl green	+ Pink*	+ Pink*	+ Pink
Sudan black B	++	++	-
Acetone Sudan black B	+	+	-
Silver impregnation	-	-	+
Indoxylacetate	-	-	-
Indoxyl acetate, after Eserine	-	-	-
Acetylthiocholine iodide	-	-	-

* Confined to perinuclear region

+++ = intensely stained; ++ = moderately stained; + = Slightly stained; - = no stain.