The present thesis is entitled, 'Studies on the structural and functional aspects of the heart and circulating cells in *Lamellidens marginalis*. It consists of five significant chapters on the morphology, histology and the ultrastructure of the heart of *Lamellidens marginalis* and light and scanning electron microscopy (SEM) of the blood cells or corpuscles of this bivalve mollusc. Each of these chapters is primarily based on the results obtained by a particular methodology as applied during investigation. Another important fact that emerges from the thesis is that the experimenter has employed more than one methodology starting from the usual classical ways of studies, like, morphology and histology as well as the inclusion of transmission electron microscopy (TEM) and scanning electron microscopy (SEM). Most of the results gleaned through the use of the sophisticated techniques are hardly isolated pieces of information, but are un-insulated from one set of information to another so that a single comprehensive continuum has been established in this thesis. The reasons behind the development of a central story on the above subject are not far to seek. The morphology or anatomy of the heart of the freshwater bivalve is critically examined through histology and fine structure. Further such static descriptions of the multi-chambered heart
become more meaningful when the data are gradually fed in to explain cardiac contraction and tension. Attempts have been taken to examine the types, nature and functions of the blood cells or haemocytes of this bivalve. Although the total weight wet of the haemocytes and haemolymph is significantly low in comparison with the shell, muscles, digestive glands, etc., the tissue 'personality' of the amoebocytes/haemolymph is admittedly unique, in the general biology of this organism. This will be reflected from the various chapters of this thesis. The amoebocytic cells are mobilised in a number of ways: (a) transport, (b) storage, (c) phagocytosis, (d) cell clumping, (e) defense, (f) shell regeneration, etc. The data on the scanning electron microscopy of the blood cells are highly valuable to explain the varied morphology and the functions of the principal types of haemolymph cells. It is needless to point out that this thesis would answer several outstanding questions as well as raise numerous problems for the future. However, this is the first report on the electron microscopy of the heart cells or fibres of an invertebrate from the Indian subcontinent. The ultrastructural descriptions of both epicardium and myocardium of L. marginalis would try to account the phenomenon of contraction in the principal organ of circulation in this bivalve. In view of the search for an excellent model system on the cardiac physiology among the invertebrates, the substructural organisation of the heart of L. marginalis would answer several questions. The outstanding controversy on the sliding filament hypothesis and the 'catch'
According to Sanger (1979), among the outstanding problems on the fine structure of the heart of bivalves, four subsystems, viz., (a) contractile apparatus, (b) sarcoplasmic reticulum and surface invaginations, (c) cell to cell junctions, and (d) nerves require thorough investigations. Compared to the situation obtaining in the heart of *B. canaliculatum* the hearts of bivalves rarely possess plasmalemmal invaginations (Sanger, 1979). This thesis would make an inventory on the four sub-systems in the heart of *L. marginalis*.

The controversy on the mechanism of contraction of muscles in bivalves is still in vogue. The classical theory of the sliding filament of Huxley envisages that during muscular contraction the thick and thin myofilaments do not themselves shorten but slide over each other. During this event another important phenomenon takes place, i.e., cross-bridge interaction between thick and thin filaments is switched on. The opposite school of thought believes in the 'catch' mechanism of muscle contraction in bivalves, because these muscles contain a large amount of paramyosin instead of myosin. It is thought that paramyosin is responsible for maintaining the 'catch'. This mechanism exists independent of a separate actin - myosin system. This catch mechanism is exceedingly peculiar in obtaining a prolonged contraction, as in adductor muscles, with a minimum of energy expenditure.
The mapping of the details (cellular and subcellular) of blood cells, muscle cells and epicardial cells and their implications in the regulation of cardiac activity have been openly discussed in the light of the present-day knowledge on the subject. Therefore, it is extremely difficult to escape from the conclusion that the aesthetically pleasant biplaner pictures or micrographs are often inadequate in informational contents (exactness) to what actually dramatise the deeply-involved phenomena.