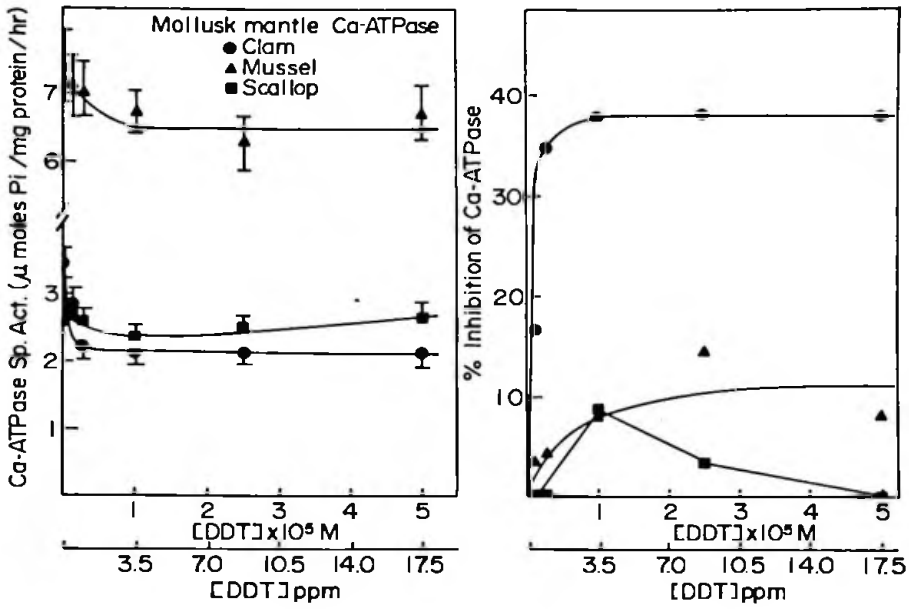


Figure 1. Effect of DDT on Ca-ATPase in vitro. The assay was performed at 30°C. Each value represents the mean ± SE of five separate determinations.

higher value, 7.5 μmoles $P_i$/mg protein/hr, indicative of greater transport capacity. The Ca-ATPase from the clam was highly sensitive to DDT with significant inhibition at 0.5 ppm (1.43 μM) and nearly maximal inhibition at 1.0 ppm (2.68 μM). In contrast, mussel Ca-ATPase showed minimal inhibition; there was no significant effect on scallop Ca-ATPase.

In summary, DDT shows significant inhibition of clam mantle Ca-ATPase in vitro; Ca-ATPase from mussel and scallop was only minimally affected. Although no in vivo studies have yet been made, DDT appears to be a potential threat for normal growth and development in sensitive species of molluscs. Furthermore, it is sugested that measurement of calcium fluxes in the mantle tissue of a sensitive species of mollusc, such as the clam, might provide a model system for examining the mechanism whereby the organochlorine pesticides alter calcium transport.

## BILE SECRETORY FUNCTION IN ISOLATED PERFUSED LIVER OF THE LITTLE SKATE, *Raja erinacea*. III. OXYGEN CONSUMPTION

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In livers isolated from 1.0 Kg male skates and perfused at 12-15°C with well oxygenated, red cell free elasmobranch Ringers, there is a linear relationship between portal cannula pressure and perfusate flow over a 0.5 to 10.0 cm $H_2O$ range in hydrostatic pressure. Flow increases approximately 0.3 ml $min^{-1}$ $g^{-1}$ liver for each 1.0 cm $H_2O$ elevation in portal pressure. To establish optimal flow rates for adequate oxygen delivery in this isolated organ, we measured hepatic capacity to consume oxygen in eight experiments in which $O_2$ extraction was measured. Mean flow rates ranged from 0.16 to 3.03 ml $min^{-1}$ $g^{-1}$ liver and were achieved by varying perfusate pressure. The perfusate was oxygenated by bubbling 99% $O_2$, 1% $CO_2$ through an air stone in the pre-liver reservoir which achieved a $pO_2$ between 600-800 mm Hg. Simultaneous perfusate

samples were obtained from the portal vein inflow cannula and hepatic venous sinus outflow. $O_2$ content was determined using a polaragraphic $O_2$ electrode (Radiometer, Copenhagen) equipped with a constant temperature cell maintained at 15°C (kindly provided by Dr. Patricio Silva). $O_2$ consumption was calculated using a solubility constant of 34 µl $O_2$ $ml^{-1}$ Ringers buffer at 760 mm Hg and 15°C, and was expressed as µmoles $O_2$ $min^{-1}$ $g^{-1}$ liver after correction for the appropriate perfusate flow rate. As shown in Figure 1, $O_2$ consum-

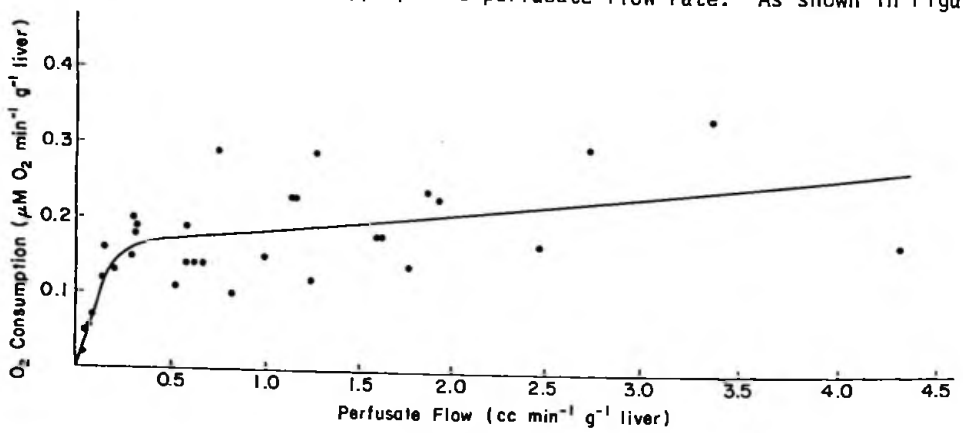

Figure 1

rose steadily as perfusate flow increased from 0.05-0.40 ml $min^{-1}$ $g^{-1}$ liver but at higher flow rates remai essentially constant. Although there was variation in the amount of $O_2$ consumed between individual experiments, $O_2$ consumption remained relatively constant within individual experiments over 4 hours. We conclu that perfusate pressures of 1.5-2.5 cm $H_2O$, which achieve perfusate flows greater than 0.40 ml $min^{-1}$ $g^{-1}$ liver, provide optimum $O_2$ delivery in this isolated perfused skate liver model.

## BILE SECRETORY FUNCTION IN ISOLATED PERFUSED LIVER OF THE LITTLE SKATE, *Raja erinacea*. IV. STUDIES OF INTERCELLULAR JUNCTIONAL PERMEABILITY

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Previous studies in the isolated perfused skate liver (Bulletin, MDIBL, 1976) demonstrated high bile to plasma inulin ratios and also suggested that hydrostatic filtration may contribute to the formation of bile in this species, unlike the isolated perfused rat liver. These findings suggest that water and solu might enter bile in part by passage through intercellular junctional complexes at the bile canaliculus, a conclusion consistent with previous electron micrographs which suggested that these junctions were leaky (Bulletin, MDIBL, 1974). To define more clearly the permeability of these paracellular pathways, we util ionic lanthanum ($LaCl_3$) which previously has been used to demonstrate junctional complex permeability in epithelial tissues (Martínez-Palomo, Erlij and Bracho J. Cell Biol. 50:277, 1971). In four studies a w oxygenated Tris-buffer Elasmobranch Ringer's (NaCl 286 mM, urea 350 mM, $CaCl_2$ 5 mM, $MgCl_2 \cdot 6H_2O$ 3 mM, Tris buffer 3 mM, pH 7.40) containing 3-5 mM $LaCl_3$ was exchanged for the standard Elasmobranch Ringer's buffer with bicarbonate. After perfusion for 10 min at 2.5 cm $H_2O$ pressure, the liver was fixed by perfusion wi 2.5% glutaraldehyde in 0.1 M cacodylate buffer. Sections of liver were examined by electron microscopy. shown by Figure 1, the electron dense lanthanum could occasionally be demonstrated within the junctional complex at the bile canaliculus as well as within the canalicular lumen. These findings provide more dir evidence for biliary permeability to water and electrolytes at the level of the junctional complex which