

Martonosi et al. (70) on the apparent detergent-induced uncoupling of Ca^{2+} transport from Ca^{2+} -ATPase activity in sarcoplasmic reticulum vesicles. They noted that ATP-dependent transport of Ca^{2+} was drastically inhibited under conditions in which Ca^{2+} -dependent ATPase activity was activated. Herman has also noted similar differential effects of sulfhydryl group modifiers on heavy meromyosin medium exchange relative to Mn^{2+} -ATPase activity (30). Apparently low amounts of detergents or sulfhydryl modifier induce subtle structural perturbations of the protein conformation resulting in a disengagement of components necessary to effect functional aspects of the ATPases. Equally surprising in this regard was that the apparent uncoupling of the $\text{P}_i \rightleftharpoons \text{HOH}$ exchange could be prevented by ATP and Na^+ as was evidenced by the relatively constant amount of ATP-induced medium exchange. Structural perturbation effects by nucleotides in the presence of Na^+ have been alluded to previously.

There are an increasing number of instances where functional aspects of ATPase systems are apparently more susceptible to disruption than ATPase activity. An example is the elimination of the characteristic oxygen and nucleotide exchange reactions of the mitochondrial and chloroplast ATP synthetases while retaining ATPase activity. Perhaps, restoration of oxygen exchange capacities in the $(\text{Na}^+, \text{K}^+)\text{-ATPase}$ may provide pertinent insights for future attempts at functional reconstitution or may, at least, provide a useful criterion for establishing such a reconstitution.

There is additional evidence that the oxygen exchanges of energy-transducing ATPases are more closely related to the function of the system rather than the rate of ATP