STUDIES OF ENZYME EVOLUTION BY SUBUNIT HYBRIDIZATION

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1. Introduction

Like many evolutionists in this era of molecular biology, I have been trying to assess the importance of natural selection at the molecular level.

Surely no one approach or single technique, or, in fact, no series of investigations which approaches the problem from just one direction will settle the dispute between the Darwinian and non-Darwinian camps. The final verdict will be pieced together from many experimental facts and theoretical insights. In this paper, I will present a progress report on a technique which will not by itself answer that outstanding question but which will, I hope, add to the evidence which will eventually decide the issue.

While initial results have been encouraging, there are still some outstanding questions. Specifically, does the technique measure what I think it does? And, do the differences in protein structure which it detects have any functional (and, thus, selective) significance?

2. Some background

Before I describe the technique, analyze the preliminary results, and discuss these questions, I will try to explain why I presently prefer the biochemical approach to the question of the importance of natural selection.

I began my research career as an experimental population geneticist interested in the adaptive significance of enzyme polymorphisms. My organism of choice was and still is, *Drosophila melanogaster*. However, I became rather profoundly pessimistic about my own or indeed anyone's ability to measure selective differences between the carriers of different electrophoretic variants of enzymes, or allozymes as they have been called (Prakash, Lewontin, and Hubby [17]). If, in fact, differences exist, we may not be able to measure them with present techniques. Why is this so? If one chooses to work with *Drosophila*, he may want to use population cages, the classical tool of the experimental population geneticist, to detect these selective differences in laboratory populations. Available evidence from population cages leads to a rather unsatisfactory conclusion, namely, if selective differences exist between different allozyme carriers, they must be very small.