EVOLUTION OF MAMMALIAN DNA

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1. Introduction and rationale behind experiments

This communication describes the measurement of DNA nucleotide sequence changes which have occurred since the divergence of various primates. These measurements, coupled with paleontological evidence for times of divergence of primates, allow an estimation of the rate of nucleotide sequence change during different periods of primate evolution. These data strongly suggest the possibility that the rate of nucleotide sequence change may have been a function of the generation times of the species involved. The rate appears to be faster in species with short generation times. This suggests that the rate of molecular evolution has not been constant through evolutionary time.

A great deal of information about evolutionary events and processes has been inferred from careful studies of fossil records. Early DNA studies [1], [4], [11] generally corroborated classical evolutionary findings, and at the same time provided some new understanding of molecular processes in evolution. For the most part, the early work with DNA simply measured the quantities of DNA which would reassociate when mixtures of DNA from various species were allowed to react. Repeated sequences had not been recognized and their significance was not appreciated [2]. At present it is possible to separate the repeated sequences from the nonrepeated sequences and to measure relationships between species using either fraction.

DNA reassociation is the primary tool used for exploring the evolution of DNA. Since a wide variety of scientists are interested in evolution, an attempt has been made to provide enough background material to be helpful to those with little knowledge of DNA. Readers well versed in DNA lore could well ignore this material and skip to another section.

1.1. *Basic characteristics of* DNA. DNA is a long linear polymer constructed of four distinct chemical subunits called nucleotides. These nucleotides differ in their bases, containing either Adenine (A), Guanine (G), Cytosine (C), or Thymine (T). The biological information of the DNA molecule is stored in the ordered sequence of its bases. In its natural state DNA exists as a double strand