GENERAL SCIENCE NOTES

FRESH BREAD; OLD FOSSILS

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INTRODUCTION

Homemade bread fresh out of the oven has a unique taste that for many of us is among our treasured memories. All too soon, subtle chemical changes produce markedly inferior, stale bread. The duration of choice flavor can be prolonged by keeping the bread in a refrigerator, and greatly extended by storage in a freezer. But eventually the breakdown of complex molecules converts the best bread into undesirable food. Statements such as "Better if used before (date)" or "Discard (date)" are commonly found on packages containing food or medicine.

ORGANIC MOLECULE DEGRADATION

The degradation of organic material is a familiar experience. Organic molecules are high energy configurations of carbon, hydrogen, and oxygen atoms. These configurations may also contain nitrogen and a small proportion of other elements such as sodium, phosphorous, sulfur, potassium, calcium, and iron. The atoms in these molecules tend to reorganize into arrangements that have a lower energy, and eventually break down into water, carbon dioxide, and relatively simple compounds of carbon and the other elements. Organisms such as bacteria derive energy from the more complex organic molecules by enzymes that vastly increase the rate of breakdown (digestion).

An allusion to this breakdown process may have been included in the statement "dust thou art, and unto dust shalt thou return" (Genesis 3:19). If all life (the ability to produce high energy organic molecules from simple ingredients) were to become extinct, in an ordinary chemical environment the more complex organic molecules such as DNA would eventually disappear.

DNA RESIDUE IN FOSSILS

The superficial tissue of an Egyptian mummy with a carbon-14 age of 2430 years has been determined to have 20 micrograms of DNA per gram of dried tissue (Pääbo 1985), about 5% of the amount of DNA

expected from fresh human tissue. A 95% decrease in 2430 years is represented by a 562 year half-life (reduction by ½ every 562 years), if the process proceeds at a uniform rate. The inner tissue of this mummy is less well preserved, and has even less than the 5% level of DNA. The DNA sequences there are more broken up than are those from the skin. These differences have been explained as due to relatively more rapid dehydration of superficial tissues in the mummification process, making the effective time for hydrolytic processes relatively shorter there than in the interior tissue (Pääbo 1985). In his 1985 report Pääbo states that "most mummy samples are seen to be devoid of nucleic acid." The rate of DNA degradation is critically dependent on the chemical environment.

DNA at a concentration level of one microgram per gram of dried tissue has been extracted from a Ground Sloth carcass which has a 13,000 year carbon-14 age (Pääbo 1989). On the basis of the 562 year half-life representation for the 2430 year old Egyptian mummy, the DNA in this Ground Sloth carcass would be expected to be only about $^{1}/_{100,000}$ of one percent of the level in a living organism, whereas in fact it is $^{1}/_{10,000}$ of one percent. At such a relatively infinitesimal concentration level, there would still be sufficient DNA molecules to be detectable by sensitive modern techniques.

The oldest DNA reported so far is from leaves in a Miocene lake deposit of northern Idaho (Golenberg et al. 1990). From laboratory estimates of hydrolysis rates, no initial DNA sequence is expected to remain intact in the natural environment much beyond 10,000 years (Sykes 1991), about $^{1}/_{2000th}$ the presumed 17-20 million year age of the leaves. Yet the DNA sequences in fossil magnolia leaves from this deposit are sufficiently preserved to permit identification and comparison with modern species of magnolia (Golenberg et al. 1990).

AMINO ACID RESIDUE IN FOSSILS

One does not need to be biased by chronological specifications in the Bible to have these observations regarding residual DNA produce doubt concerning the conventional geological and radiometric time scale. Similar evidence from the amino acid residue in fossil material has been treated in an earlier issue of *Origins* (Brown 1985). In that treatment attention was called to graptolites from a Silurian formation (presumed age in the 400-440 million years range) that contain residual amino acid,

contrary to expectation based on the rates of decomposition of amino acids observed over historically defined time spans.

The principal difficulties presented by the data on DNA and amino acid content in fossil material are removed when fossil deposits are treated as having been formed during, or since, a universal reformation of planet Earth's surface about 5000 solar years ago, according to the data in chapters 6-11 of the book of Genesis.

CARBON-14 RESIDUE IN FOSSILS

The observed upper limit in the 40,000 carbon-14 year range for supposedly infinite age (undetectable carbon-14) samples of anthracite, bone, calcite, shell, and wood is also readily explainable on the same basis (Brown 1988a, 1988b: Brown & Webster 1991).

SIGNIFICANCE OF RESIDUAL DNA, AMINO ACID, AND CARBON-14

Individuals who have confidence in the historical validity of the data/specifications in the first eleven chapters of Genesis may be widely ridiculed within the scientific community, but these individuals can offer a better *scientific* explanation for the DNA, amino acid, and carbon-14 data on ancient and fossil organic material than can be constructed in accordance with the prevailing dogma concerning the history of planet Earth. There is an increasingly broad basis for confidence that a correct interpretation of the first eleven chapters of Genesis and of the data from investigations in natural science will be mutually supportive.

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