authenticated human fossils have been found yet in material having the suggested antiquity of coal.

Editor's *Note:* Time estimates given above are based on acceptance of radioisotope dating, and usual geological time scales. For a discussion of reasons many members of the Creation Research Society question these suggested dates see the September, 1968, *Quarterly* "Radiocarbon Dating," "Radiological Dating and Some Applications," and "Radiocarbon Confirms Biblical Creation."

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SQUARE PEGS IN ROUND HOLES OR RIDICULOUS "CONVERGENCES"

EVAN V. SHUTE*

An extensive presentation is made of a remarkable series of identical biochemical entities which are found in organisms widely separated taxonomically. Enough data are provided to illustrate that one can propose the most unlikely relationships based upon biochemical information, when employing the idea that resemblance means relationship–the assumption upon which the theory of evolution is based. What do biochemical affinities really mean—relationship by descent from a common ancestor, parallel variation, or are they examples of God's quotation of His previous work?

If such biochemical entities as the serological blood groups are good criteria in evolutionary phylogenies–and in this day of molecular biology we are beginning to pay more attention to biochemistry than to anatomy in taxonomic studies-I am equally interested in other biochemical species and genus markers. What do *they* say? Do they thunder as faintly as the blood groups about our "prehuman" parents? Or is their language unequivocal and congruent with blood group findings? If not, which shall we believe—or shall we discard evolutionary taxonomy on the molecular level?

Fundamentally the theory of evolution is based on the idea that resemblance means relationship. This is as true among the insects as the primates, but means more to us in the latter connection because the concept bears directly upon the origins of mankind. We may accept this axiom or not–but we can scarcely have it both ways at once. The evolutionist is uncomfortable here–or was till he invented the term "convergence." Now he has an "out" wherever resemblances bear down embarrassingly hard on his theory. Still there are too many biological facts, if he looks closely enough, which do not fit into the phylogenies he has carefully drawn up against an evolutionary backdrop.

Let us see what enzymes and tissue fluids add to the picture.

Glands Producing Defensive Secretions

Glands of this type are so variable in every way as to demonstrate that they have arisen independently in the course of "evolution."[1] Should we insist that they are vital to phylogeny?

Arthropods of very diverse types may produce similar components in their defensive secretions. Thus the spray trans-2-hexenal occurs in Hemiptera, cockroaches, a myrmecine ant and many plants. Formic acid is secreted by ants, carabid beetles and notodontid caterpillars. The p-benzoquinones are found in beetles, earwigs, millipedes, a cockroach and a phalangid spider.

On the other hand, the defensive glands in the

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carabid beetles produce compounds as different as m-cresol, p-benzoquinones, salicylaldehyde, formic, tiglic and methacrylic acids. Among millipedes the orders Julida, Spirobolida and Spirostreptida secrete p-benzoquinones; the *Polydesmida,* cyanogenic agents; and a species of *Chordesmida* produces a phenol. The saliva of the reduvid bug *Platymeris radamantus* resembles snake venom, both in number of proteins and in enzyme activity.

What is more surprising is that agents like 2-hexenal and alpha-pinene found in insects and termites respectively are very widespread in plants. Moreover, in cyanogenic plants, hydrogen cyanide is generated by hydrolysis of cyanohydrin glycosides. How amazing then that the polydesmid millipede, *Apheloria,* also generates hydrogen cyanide by the dissociation of mandelonitrile, the cyanohydrin of benzaldehyde! Citronella was first derived from plants, but now is known to be produced in the glands of an ant, *Acanthomyops.* Surely you are now convinced! Likeness means relationship!

Examples of Biochemical Identity in Organisms Widely Separated Taxonomically

The A enzyme of the deer mouse and the erythrocyte (red blood cell) enzyme of man are homologous.[2] Also the B enzyme of the deer mouse, *Peromyscus,* is homologous with another form of glucose-6-phosphate-dehydrogenase found in human tissues. Both types of glucose-6-phosphate-dehydrogenase are also found in horse liver! Are these enzymes residual chemical identities indicating the common origin of the deer mouse, horses and human beings? If so are they present in other "related" species, genera, and families? Let us have a look at some other strange identities in various organisms.

The phosphagen in the muscles of invertebrates is a compound of arginine, but the phosphagen in vertebrate muscles includes a compound of creatin. However, Echinoderm (starfish) serum contains creatin! Are starfish our cousins, Burton[3] asks?

Various species of Western American semi-aquatic salamanders or newts of the genus *Taricha* contain in their eggs, embryos and adults a highly toxic poison, tarichatoxin, identical with that of the Japanese *Fugu* or puffer fish-no other occurrence is known in all nature![4] Here is an obvious relationship, surely!

The enzymes e-gulonolactone oxidase and d-glucurono-reductase are not found in primates, guinea-pigs, one fruit-eating bird (red-vented bulbul) and the Indian fruit-eating bat. These enzymes enable other animals to make ascorbic acid out of glucose. Hence these four types of animals can get scurvy due to a genetic limitation.[5]

Sperm whales have an insulin identical with that of pigs and still quite different from that of sei-whales. Yet pigs and whales are from different orders and cohorts.[6]

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All marine fishes but the wrasse fishes (the cunner and tautog) possess rhodopsin as the characteristic visual pigment.[7] All freshwater fishes have porphyropsin, another pigment. The sea lamprey, a vertebrate, has porphyropsin as an adult—all other vertebrates seem to have rhodopsin. The common New England spotted newt has porphyropsin exclusively, unlike frogs, but tadpoles have porphyropsin and only change later to rhodopsin. However, the frogs *Rana esculenta* and *R. temporaria* and the toad *Bufo boreas halophilus* do not change visual pigment at anatomical metamorphosis, continuing to have porphyropsin as the visual pigment. The mudpuppy, *Necturus maculosus,* has only porphyropsin, like the freshwater fish, and like the clawed toad *Xenopis laevis.*

The chick also reverses the "evolutionary sequence" in its urea metabolism. It used to be said by evolutionists to excrete ammonia like a fish, later urea like the amphibia, finally uric acid like adult birds. But recent work shows that its ammonia remains constant throughout and is never excreted. Urea is excreted from the fifth day on, but the chick embryo is never able to synthesize it. Its metabolism differs from the usual biochemical metamorphosis, therefore.

Wald cites other changes in development from the embryo to the adult in frogs and chicks, but is not sure if these are true metamorphoses, or if they are too continuous and begin too early in development to be ascribed to that.

* * * * *

Once the female sex hormone, oestrone, was believed to be produced by animals only. Now it is known in pussy willows, various palms such as the date palm and the pomegranate. Progesterones are found in an African shrub and perhaps in the jimmy weed.[8]

Histamine has been isolated from the venom of the red bull ant, relating it to that of the honey bee. But the venom of the common wasp *(V. vulgaris),* supposedly a closer "relative," contains both histamine and serotonin.

Dolichodial or dialdehyde, is found in ants and the structurally identical anisomorphalin phasmids–widely separated insect groups.[9]

The electrophoretic mobility of liver preparations of the enzyme galactose dehydrogenase from 11 mammalian species have been studied.[10] The major bands of human and dog livers were indistinguishable—much closer than the bands of man and monkey. How are we to weigh such evidence?

* * * * *

The luciferins and luciferases have been held specific for a given type of invertebrate or fungus, cross reactions being very rare–and then only between such closely related forms as two genera of ostracods or two families of fireflies. But there are profound differences in various emission spectra, and there is an utterly random occurrence of bioluminescence in protozoa, fishes, bacteria and fungi.

Now Johnson *et al*[11] have found a reciprocal cross reaction between these systems in the fish, *Parapriacanthus,* and a second fish, *Apogon,* from a different family. For further confusion, the latter fish has some cross reaction with the crustacean *Cypridina,* from a totally different phylum!

This could be a convergence, but "more likely represents some biochemical unity"!

Bone in the "lower" forms is probably not needed, but the characteristic bone salt, hydroxyapatite, is found in some unicellular flagellates where it seems to be correlated with muscular work!

All this is very puzzling to the evolutionist. Is it the "unity of biochemistry" and an "assumed evolution by implication?"[12]

* * * * *

Numerous reactions of the ornithine cycle in mammalian liver are seen in the biosynthesis of arginine and its degradation to urea in many microorganisms. Enzymes able to synthesize carbamyl phosphate are found in many bacteria and fungi and in the livers of ureotelic animals, but the carbamyl phosphate synthetase of the latter is unique and characteristic of ureotelism. The bacteria use carbamate kinase instead.

Choline esters are found in marine gastropod and some Crustacea and Insecta. For example, senecicylcholine is found in the common garden tiger moth, *Arctia caja,* acetylcholine in *Homarua americanus,* a crustacean and urocanylcholine in many gastropod or snails of the family Muricidae.[13]

Bile salts differ in different species. The coelocanth has bile salts of the alcohol-sulphate type–no other animal has these. Only sharks (selachii) possess scymnol. It is found nowhere else in nature. Teleostii have C_{24} bile acids such as cholic acid, conjugated with taurine. Such bile acids are found in snakes, birds and mammals–but can't prove a close relationship, surely! Marine teleosts do not contain cyprimol. The latter is seen in all fish of the family Cyprinidae and in some frogs (Ranidae). Cetacea (whales) share bile salts with the modern Eutheria. Seals and walruses share C_{23} hydroxylated bile acids only with snakes—much different from those of the Cetacea.[14]

Amino acid sequences should be a powerful tool in the classification of beasts. But the artiodactyls are puzzling. Sheep and goats have identical peptide sequences, but these are closer to the fibrinopeptides of the reindeer than of the ox! This is exactly the opposite of what the usual taxonomy would indicate. Indeed, the pig and ox are identical in some respects in their sequences.[15]

Species specificity for growth hormones was established in 1954, and varies from a molecular weight of 21500 for the human being to 47800 for the sheep. The monkey weight is 23000. The whale and pig are very close at 40000, and the ox and sheep also are close at about 45000.[16]

As regards cytochrome-c, the penguin is closely associated with the chicken, which is identical to the turkey. The kangaroo is closely associated with non-primate mammals, although its relationship to placental should be distant! The turtle is closer to birds than to the rattlesnake. The cytochrome-c of cow and sheep are identical with that of the pig.[17]

Williams[18] also mentions that the differences in the cytochromes of Neurospora and yeast are very large–yet these are in the same class of fungi! How shall we work these data into our phylogenies?

The distribution of acid and alkaline phosphatase in the elephant placenta is identical to that in the cat and dog, say Cooper *et al.*[19]

Comments

The dubious values of chemical paleogenetics are illustrated by Zuckerkandl.[20] Enough has been provided above to illustrate that one can propose the most unlikely relationships in all nature by biochemical data. Convergence again? Perhaps! Who can say? Who can even say whether convergence exists, or if God merely quotes Himself sometimes. Why should He not do so? Note the following points, in summary:

1. In nature we find defensive substances produced by widely different families of insects and even shared by plants.
2. An enzyme of our blood is also found in the deer mouse and the horse liver.
3. A highly specific, complex toxin is found **only** in Western American semi-aquatic salamanders and the Japanese puffer fish.
4. The inability to make ascorbic acid out of glucose is common to primates and the fruit eating bird called the red-vented bulbul, as well as the guinea-pig and Indian fruit eating bat.
5. Sperm whales share an insulin with pigs, but not with other kinds of whales.
6. Human and dog livers are almost identical in galactose dehydrogenase.
7. The bone salt, hydroxyapatite, is shared by one-celled flagellates and vertebrates.
8. Choline esters are shared by snails and tiger moths.

9. Certain complex bile acids are found only in seals, walruses and snakes.

10. Nearly identical amino-acid sequences are found in the pig and the ox.

11. Growth hormones of the whale and pig are very similar.

12. Phosphates of the elephant placenta are identical to those of the dog and cat.

All this information makes one think nature is laughing at us and having high jinks with enzymes and secretions without caring what harm she does to our most carefully drawn up taxonomic structures. What do biochemical affinities really mean—relationship by descent from a common ancestor, parallel variation, or are they examples of God's quotation of His previous work?

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A SIMPLIFIED EXPLANATION OF THE FIRST AND SECOND LAWS OF THERMODYNAMICS: THEIR RELATIONSHIP TO SCRIPTURE AND THE THEORY OF EVOLUTION

EMMETT L. WILLIAMS, JR. *

Evolution simply could not have occurred unless both the first and second laws of thermodynamics were violated many times. After explaining thermodynamics in non-mathematical language, relation of the first law to evolution, and relation of the second law to evolution, is given extensive consideration. Three arguments, which are often offered to "defend" the occurrence of evolution in spite of thermodynamics, are studied carefully. It is concluded that the first and second laws of thermodynamics overrule evolution.

Introduction

Many Christians have heard that there are scientific laws derived from the field of thermodynamics, and that these laws are opposed to the theory of evolution. However, many of these Christians do not know exactly what is included in the science of thermodynamics. The purpose of this article is to give a simplified, non-mathematical explanation of the first two laws of thermodynamics, so that Christians may be better equipped to use their knowledge against the tenets of evolution.

In preparing this article, no apology is made for relying heavily on Henry M. Morris' excellent book, *The Twilight of Evolution.*[1] Morris has ably shown that the first two laws of thermodynamics are opposed to the theory of evolution. His book contributes much to an understanding of the subject, but it was not his primary intent to develop the methodology of thermodynamics --which will be undertaken here.

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What is Thermodynamics?

First, consider the word *thermodynamics. Thermo-* is a combining form from the Greek word *therme-* (heat). Dynamic comes from the Greek word *dynamis* (power). Thus, thermodynamics is the study of heat power. The subject of thermodynamics arose historically from the study of heat engines, and the problems involved in converting heat into mechanical work.[2] One may legitimately ask how the study of heat