IS MOLECULAR EVOLUTION OF PROTEINS POSSIBLE?

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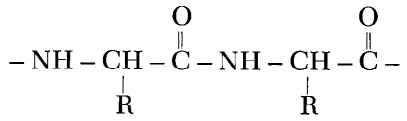
By statistical considerations, the probability that amino acids and other components would combine spontaneously to form a protein with a chain of one hundred amino acids is examined. The conclusion is that there are not enough amino acids available, nor enough time from the beginning of the earth, even according to the most liberal estimates made nowadays, to bring about even one molecule of any type of protein.

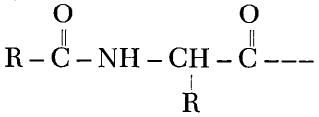
Introduction

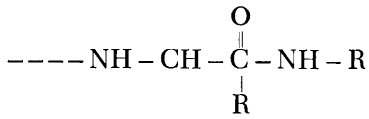
Proponents of molecular evolution try to explain random emergence of protein or protides molecules as the result of polymerization of amino acids. Polymerization may have occurred in several ways, e.g. by thermal dehydration in hypohydral conditions,[1] by condensing agents such as dicyanamide,[2] or by activation on a mineral matrix.[3]

The general form of a peptide bond which joins two amino acids is:

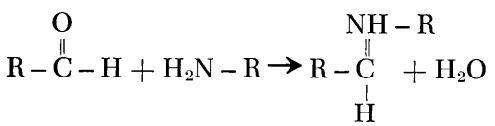


where the carbonyl moiety is from one amino acid, and the amine moiety from the other. The same thermodynamic conditions producing the polymerization could just as easily have brought about the production of an acyl amide bond of any organic acid with the amine of an amino acid, or an amide bond of an amino acid with any organic amine, as follows:





If any of these forms are produced, there will no longer be a possibility of lengthening the polypeptide polymer from the terminal amino group, or from the terminal carbonyl group. Condensation of an aldehyde with an amine group, according to the reaction:



will also prevent further polymerization from the side of the terminal amino group.

Generally Accepted Reasoning

According to the generally-accepted hypothesis, amino acids were originally formed from the first substances that were present at the primordial time. These substances are presumed to have been: formaldehyde, cyanic acid, ammonia, hydrogen, carbon monoxide, methane, and water. Supposedly this mixture of compounds underwent changes into more complex organic substances because of thermal energy, ionizing radiation, and electrical decomposition.

It is difficult to estimate the premise quantitative ratios of the various primordial substances, and also to determine the type and amount of the energy required. Nevertheless, the possibility of some such production of carbohydrates, organic acids, aldehydes, and amines, as well as more complex substances such as amino acids, hydroxyacids, sugars, purines and pyrmidines, has been demonstrated by laboratory experiments.

Any estimation of the relative amounts of these secondary substances produced is purely speculative, since it is impossible to reproduce precisely the primaeval conditions which may have prevailed. However, it is clear that there must have been considerably more simple-organic-acids or aldehydes, both lacking an α-amino group, or simple amines lacking an α-carboxylic group than α-amino acids.

It is reasonable to assume that the amount of organic acids and aldehydes was at least 10 times greater than the amount of amino acids produced.

In such a system, the probability of emergence of any polypeptide chain consisting of 100 amino acids, which would be capable to being a backbone for an enzyme, may be calculated with the aid of statistical modeling.

Assumptions and Calculations

Let us assign the symbol A–C to indicate an amino acid, where A represents the amino group and C the carboxyl group. Then the polypeptide polymer will have the form .... A – C – A – C – A – C – A – C – .... The second group of substances can be described as A –, containing only the amino group, and the other – C, having only a carboxyl or aldehyde group. When – C binds with an A –, or when A – binds with a terminal – C, the polymerization is then terminated.

In this framework the problem can be stated

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as follows: Let us assume that there are n molecules of the form A –, also n molecules of – C, and r molecules of the form A – C, and we wish to know the limit probability of a chain consisting of P molecules of the form A – C.

For this purpose let us imagine a model consisting of n chains terminated by A and by C, in which it is possible to introduce all the r molecules A–C. It is required to calculate the limit of the probability of the appearance of a chain which includes P A –C (amino acids).

Each amino acid is represented by the sign of its chain. If all signs will be delineated in a single line they will form a word. Let us find the limit for the amount of possible words such that each consists of one letter, at least P times, among others, from a language of n letters. This limit will be:

$$n^{r-P+1}\binom{r}{P}$$

This limit has to be divided by the number of words that could be built by the language in all possibilities. This is n^r and the probability limit will be:

$$\frac{n^{r-p+1}\binom{r}{p}}{n^r}$$

or:

$$\binom{r}{p}/n^{P-1} = r!\ /n^{p-1}p!\ (r-P)! \leq r^P/n^{P-1}\ P!$$

$$= n\left(\frac{r}{P}\right)^P /P!$$

The percentage of nitrogen in the earth's shell (lithosphere, hydrosphere and atmosphere) is estimated as 0.03%, i.e. about 10^{22} grams. Even if we assume that all the nitrogen was bound in the form of simple amino compounds, then the number of molecules would be about 10^{44}.

The weight of all the carbon on the earth is also approximately 10^{22} grams, and even if we assume that all the carbon was bound in the form of simple acids containing two carbons, the number of molecules would then be 10^{43}.

According to the previous assumption that 1/10 of all the existing acids were amino acids, then the number of amino acids would be 10^{42}, the number of carboxyl acids, aldehydes, or amines is at least one order of magnitude greater, that is 10^{43}.

If these values are placed in the equation given above, then:

$$10^{43}\left(\frac{1}{10}\right)^{100}\frac{1}{100!} = \frac{1}{10^{57}}\frac{1}{100!} \leq \frac{1}{10^{57}}\cdot$$

$$1/(1\,.\,2\,.\,3\ldots\ 8\,.\,9)\ (10\,.\,20\,.\,30\ldots\ 90) =$$

$$\frac{1}{10^{57}}\frac{1}{91^2\ \ 10^{90}} \leq \frac{1}{10^{147}\ \ 3000000^2} \leq \frac{1}{10^{157}}$$

This figure, then, is the probability of obtaining a protein with a chain of 100 amino acids, as a random product built from amino acids, carboxyl acids, aldehydes and simple amines. This number is so small that there are not enough amino acids (10^{42}), and not enough time from the beginning of the earth (10^{17} seconds, according to accepted geological time scale), in order to produce enough fast reactions (10^{13}/sec.), which could result in the number of peptide bonds (10^{72}) required to produce even one molecule of any type of protein.

References

[1]Fox, S. W. 1971. Self-assembly of the protocell from a self-ordered polymer. (in) Prebiotic and biochemical evolution. North-Holland Publishing Company, p. 8.

[2]Steinman, G. 1971. Non enzymatic synthesis of biologically pertinent peptides. *Ibid.*, p. 31.

[3]Degens, E. T. and J. Matheja. 1971. Formation of organic polymers on inorganic templates. *Ibid*, p. 39.

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News Release

SECOND CREATION CONVENTION

Milwaukee, Wis.—Hundreds of scientists, educators and laypersons will convene in Milwaukee, Wis., August 18-24, 1974, to discuss techniques for presenting the creationist (as opposed to evolutionist) view to the public. Sessions will be held in the Red Carpet Inn, across from Mitchell Field Airport.

Spurred by encouraging discoveries in geology, space and oceanography, over 20 scientists will present data disabling evolutionary doctrine in all disciplines.

Creationists will concentrate on means for removing the "sacred cow" status of evolutionary thought which has engendered censorship of scientific data and opinion conflicting with evolution. Creationists want to facilitate free and open discussion of all scientific information in educational institutions.

Methods will be devised to supply the many speakers and scientific books, visual aids, etc. now in great demand by school boards and interested organizations. Many of these new materials will be on display.

Registration is $35 for individuals, $50 for families; students are $25. The convention is sponsored by the Bible-Science Association, Box 1016, Caldwell, Idaho 83605 (208-459-0268), a national organization of scientists, clergy and laypersons interested in furthering scientific support for the creationist viewpoint.