

Linus Pauling on Collagen

In 1951 Professor Corey and I proposed a structure for collagen, involving three polypeptide chains twisted about one another. In devising this structure we had found it necessary to assume that in each polypeptide chain there is an alternation of two amide groups with the *cis*-configuration and one with the *trans*-configuration. It is well known that our structure turned out not to be right. In a lecture on the stochastic method and the structure of proteins that I gave in Stockholm in 1953, at the Thirteenth International Congress of Pure and Applied Chemistry, I pointed out that in applying the stochastic method the first step is to make a hypothesis, a guess. The second step is to test the hypothesis, by some comparison with experiment. In general the test cannot be sufficiently thorough to provide rigorous proof that the hypothesis is correct: it may happen that it can easily be shown that the hypothesis is incorrect, through the discovery of a significant disagreement with experiment, but agreement on a limited number of points cannot be accepted as verification of the hypothesis. In order for the stochastic method to be significant, the principles used in formulating the hypothesis must be restrictive enough to make the hypothesis itself essentially unique; in other words, an investigator who makes use of this method should, I contended, be allowed only one guess. If he were allowed many guesses he would sooner or later make one that was not in disagreement with the limited number of test points, but there would then be little justification for accepting that guess as correct. At that time (1953), however, I contended that Professor Corey and I together should be allowed two guesses on collagen, and I stated that we were determined that our second one would be right.

As you all know, it turned out that Professor Corey and I did not get to make our second guess. In 1955 Professor Ramachandran and his coworker G Kartha described the striking triple-helical structure of collagen that is now generally accepted as being essentially correct. Although I may have some feeling of regret that Professor Corey and I did not succeed in making our second guess (which I trust would have turned out to be the right one) I may point out that the problem was a very difficult one, and that Professor Ramachandran and his coworkers deserve great credit for their successful attack on it, and for their continuing vigorous effort in the solution of the many difficult problems in the field of protein structure and other aspects of structural chemistry to which they have devoted themselves for many years.

From Pauling's presidential address at the International Symposium held at the University of Madras, 18-21 January 1967. *Conformation of Biopolymers*, (ed. Ramachandran, G N) Academic Press, New York and London, 1967, pp. 4-5.

