teins, together with the importance of optical configuration in the reactivity of proteins, point to certain conclusions in regard to the origin and reproduction of the fundamental constituents of living material: proteins, enzymes, and genes. Viruses are to be included in the same category. The salient points are briefly as follows:

The almost universal optical activity of biological compounds shows the general importance of secondary bonds of the catalyst for the specificity of the reaction. The overwhelming preponderance of these compounds have the *l*-configuration, yet if the whole biological world could be reflected through a mirror, the new world with its *d*-configuration would work exactly as well as the present one. On the other hand, if only certain *key* catalysts in an individual organism were replaced by their optical isomers the organism would perish, since its reactions would be out of balance. The fact that one optical type is so preponderant in nature strongly suggests a common origin of living things, perhaps through the chance formation of a single protein molecule which happened to be of the *l*-configuration. Alternatives to this view necessarily assume the operation of extramolecular forces, as suggested by Oparin (23), in causing a large number of molecules to be formed of similar optical type. Apart from "special creation" (which in any case is not excluded), it is hardly reasonable to believe, however, that any of the known extramolecular forces, such as the asymmetry of the earth's magnetic field or polarized light from the skies, could possibly have been effective in this regard, since such feeble influences act only to weight slightly the probability of the formation of one configuration over the other. By the laws of chance, a racemic rather than an optically active living world would result if any vital process traces back to the initial appearance of more than a single enzyme molecule which was the prototype of those to follow. The probability that two or more molecules will accidentally be of the same optical type decreases as one-half raised to the power of the number of molecules. Consequently, if a particular life process, of significance in survival, began more than once on this earth, subsequent beginnings of the opposite configuration were overwhelmed by earlier life which had already set the pattern and conquered the food supply of the world.

The exceptions to the *l*-type of compound are very likely due to Walden inversions, which must have occurred from time to time since the origin of life phenomena. When the inversion brought about a critically unfavorable change the individual perished, but some non-critical changes of this sort might easily survive, e. g., the production of *d*-pinene by European conifers which in this country produce *l*-pinene. A rough estimate of the probability of observing an example of something which has changed from one optical form to another can be given, as shown in the following paragraph.

Letting k_i represent the chance that a molecule suffers a Walden inversion, n_i the number of such molecules, and t the time, we may suppose that the rate at which a molecule changes over in unit time is given by the equation:

$$\frac{dn_i}{dt} = k_i n_i \qquad (3)$$