closed polypeptides may polymerize, we can build a linear polymer from substituted diketopiperazines (Fig. 1). Similarly, the hexapeptide anhydride can build a surface polymer (Fig. 2). Mixed polymers may also be constructed. Hydrogen bond polymerization (like lactam-lactim polymerization) thus allows the construction of laminar molecules of considerable extent having characteristic densities and characteristic lacunæ. The laminæ need not be plane. The use of hydrogen bonds also for intra-molecular links in polypeptides is under consideration.

In putting forward the two postulates we would stress the fact that there is no conflict between them. Indeed the formation of a hydrogen bond may be an intermediate step in the lactam-lactim transformation. Further, the hydrogen bond can be the mechanism of polymerization not only of polypeptides such as those shown in Fig. 2 but also of the cyclized polypeptides which are derived from the earlier postulate, for example, of cyclol 6, as shown in Fig. 3. It may also be pointed out that these postulates yield deductions which lend themselves to testing by experimental methods. As an example we take the deduction that individual protein films have characteristic lacunæ—and so characteristic permeabilities—and characteristic densities.

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Reaction Kinetics and the Walden Inversion

DESPITE forty years of research, much mystery still surrounds the conditions determining the occurrence or non-occurrence of the Walden inversion. This is partly due to the difficulty of relating rotation to configuration; but it is due even more to the evident circumstance that these conditions must be intimately connected with the mechanism of substitution: it is only in comparatively recent years that the mechanism of aliphatic substitution has been fruitfully studied. In this field, mechanism has revealed itself principally through the examination of reaction kinetics; and by this means mechanism has been brought into intelligible relation with the structures of reactants and the conditions of reaction. For details we may refer to an early note in NATURE[1], and to a number of papers on the subject which have since appeared mainly in the *Journal of the Chemical Society*. It is an obvious sequel to apply the same weapon, the study of kinetics, in attacking the problem of the Walden inversion; for it should certainly be possible to trace a connexion between inversion and kinetics, and thus, with the aid of the knowledge already gained, to relate inversion to mechanism and its determining factors, structure and conditions.

This was our point of view a year ago when we commenced this method of approach. It is now no longer hypothetical that kinetics is able to link inversion with mechanism of substitution, and thus with structure and conditions.

It is not the purpose of this note to summarize interim results, the presentation of which would require too much space: our primary object is to direct attention to a highly effective method of investigating this problem. It seems appropriate, however, to give in outline a single illustration of the type of observation which in our view supplies the missing link in the argument connecting the occurrence of inversion with structure and conditions.

The hydrolysis of optically active α-bromopropionic acid was studied by E. Fischer[2], who obtained lactic acids of opposite sign of rotation according to whether he used silver carbonate or potassium hydroxide; much discussion has been based on this contrast, especially since in the case of some other halogeno-acids the two reagents give products having the same sign of rotation. Now Fischer was not in a position to know what we were able to predict from the electrical properties of the groups concerned, namely, that the α-bromopropionate ion is a critical structure for hydrolysis: the rates of halogen-ionization and of bimolecular replacement being comparable, it is possible to make either the unimolecular or the bimolecular mechanism dominant by changing the concentrations. He could not know either that in his hydrolysis with potassium hydroxide he was working in the range of the bimolecular mechanism, which, with moderate dilution, would have given place to the unimolecular mechanism; or that unimolecular hydrolysis would have given the opposite result, and, therefore, the same result as silver carbonate. In the scheme

l-α-Bromopropionic acid (as anion) { *Unimolecular* *l*-Lactic acid (S_N1) / *Bimolecular* *d*-Lactic acid (S_N2) }

the prefixes refer to configuration, signs of rotation being in this case oppositely related.

The principles underlying the dependence of inversion (including racemization) on the kinetics of substitution were considered in a previous paper[3]. The hydrolysis of α-halogeno-acids is one of the cases in which the two mechanisms, S_N2 and S_N1, lead to stereochemically different forms, and the identity or non-identity of the hydroxy-acids obtained with the aid of silver oxide and potassium hydroxide depends jointly on the constitution of the halogeno-compound and on the mechanism of the substitution. Several experimental studies of the nature illustrated have now been completed and will shortly be published, together with a general survey of the relevant theoretical principles.

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Linkage in Man

SINCE hæmophilia and colour-blindness are both sex-linked conditions, the genes determining them may be expected to show linkage. That is to say, if a hæmophilic is colour-blind the majority of his hæmophilic relatives should be colour-blind, and the majority of his non-hæmophilic relatives should not be so. Similarly, if a non-hæmophilic brother of a hæmophilic is colour-blind, a majority of his hæmophilic brothers and other relatives should not be colour-blind; a majority of his non-hæmophilic brothers should be colour-blind, while most of his sisters should be transmitters of hæmophilia or colour-blindness, but not of both or neither.