Thus if two atoms shaded near the organic ion at the center of Fig. 1(*a*) are added and if the broken lines which show hydrogen bonds are drawn from these newly added atoms, the figure will show approximately the structure of TDA.HCl projected onto the (001) plane. And in Fig. 1(*b*), if the TDA ions are replaced by EDA ions in the manner shown by a shaded molecule at one site, that will correspond approximately to the structure of EDA.HCl projected onto the (010) plane. Each nitrogen atom in both crystals is linked to three Cl^- ions by hydrogen bonds, being separated from them by distances from 3·14 to 3·28 Å. And these hydrogen bonds make infinite two-dimensional networks parallel to the (001) planes as are shown in Figs. 1(*a*) and 1(*b*). These facts explain a perfect cleavage perpendicular to the *c* axes of both crystals.

Because both the EDA and TDA ions are centrosymmetrical, the skeleton of the EDA ion and the carbon chain of the TDA ion are geometrically planar (*trans*). The terminal N atoms of the TDA ion were found to be in the plane of the carbon chain (the deviations of the N atoms from the plane are less than 0·001 Å). Thus both EDA and TDA so far determined can be either *gauche* or *trans* forms, depending on the structures of the crystals.

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Helical features in the X-ray pattern of poly-(γ-hydroxypropyl)-L-glutamine.

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Yaron, Lupu, Berger & Sela (1962) have reported optical rotatory and viscosity measurements of solutions of poly-(γ-hydroxypropyl)-L-glutamine (Fig. 1) in a series of methanol-water mixtures. They concluded from these studies that the polymer exists in the α-helical conformation in methanol, and that, though the addition of water tends to destroy this structure, it is maintained to a substantial extent even in pure water. Evidence that this polymer has an α-helical structure in the solid state has now been obtained from X-ray diffraction.

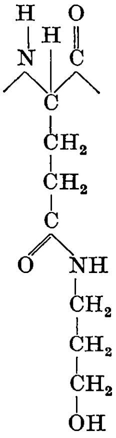

Fig. 1. Residue of poly-(γ-hydroxypropyl)-L-glutamine.

Poly-(γ-hydroxypropyl)-L-glutamine of 50,000 molecular weight was kindly provided by Dr A. Yaron. X-ray powder photographs of some of this material recrystallized from methanol show a crystalline pattern of about a dozen fairly sharp lines. These include several strong reflexions in the region 4 to 5 Å and an outstanding reflexion at 1·50 Å. Both of these features are commonly observed in X-ray patterns of α-helical structures.

Further strong evidence for an α-helical structure was obtained from photographs of an oriented fibre drawn from a concentrated solution of the polymer in methanol. The oriented diffraction pattern shows only two strong layer lines, one equatorial and the other with a layer-line spacing of about 5·4 Å, the value characteristic of the α-helical pattern (Crick & Kendrew, 1957). The moderately strong equatorial reflexions at 14·3 and 11·6 Å are consistent with the close packing of α-helices with the large side chains of poly-(γ-hydroxypropyl)-L-glutamine.

Powder photographs were also taken of a sample of the polymer recrystallized from water. They show a pattern which, though not identical with that obtained from the methanol preparation, includes all the stronger lines of the latter and in particular those in the 4 to 5 Å region and at 14·3, 11·6 and 1·50 Å. It therefore seems probable that this preparation too contains some material with an α-helical structure.

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