Milder conditions of hydrolysis have been to no avail in producing a peptide longer than the tetrapeptide. The peptide bond between the fourth and fifth amino acids clearly is a labile one. The work of Synge[3] and of Desnuelle and Casal[4] indicates that if the fifth amino acid were serine or threonine the bond would indeed be labile and it may also be that tryptophan which is sensitive to acid would behave similarly.

Several authors[5,6] have concluded that lysozyme contains one or at most two peptide chains. Thompson[7] after applying corrections could account for little more than half an end-group per molecule. In previous work[1] and in the present study, the actual uncorrected amount of α,ϵ-di-DNP-lysine which was isolated accounted for more than 0.6 end-group per molecule. Our analyses of the peptides which were isolated from DNP-lysozyme and also of model synthetic peptides demonstrate that 25 to 40% of α,ϵ-di-DNP-lysine may be destroyed during hydrolysis. Our results agree with those of Thompson[7] that a complete hydrolysate of DNP-lysozyme contains no DNP-amino acids other than α,ϵ-di-DNP-lysine and ϵ-DNP-lysine. We may, therefore, conclude that lysozyme has a single polypeptide chain and, from the present work, that the sequence on the amino end of this chain is lysyl-valyl-phenylalanyl-glycyl—.

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(6) H. Fraenkel-Conrat, A. Mohammed, E. D. Ducay and D. K. Mecham, THIS JOURNAL, **73**, 625 (1951).
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CONTRIBUTION NO. 1622
GATES AND CRELLIN LABORATORIES OF CHEMISTRY
CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA 4, CALIFORNIA W. A. SCHROEDER

RECEIVED NOVEMBER 15, 1951

A SECOND CRYSTALLINE MODIFICATION OF POLYTHENE

Sir:

We have obtained conclusive evidence of the occurrence of a second crystalline modification of polythene in films of this polymer subjected to the mechanical process of redrawing.[1] The new modification is characterized by the appearance of two strong crystalline interferences in the X-ray pattern, corresponding to spacings of 4.23 and 4.55 Å. Four to seven successive redrawings were necessary to obtain a high degree of sharpness and intensity in the new diffraction peaks. The two strong peaks, 110 and 200, of the usual orthorhombic modification of polythene,[2] with spacings to 3.78 and 4.17 Å., remained strong, indicating only partial conversion to the new modification.

A polythene film[3] subjected to seven redrawings was mounted successively in each of three orientations with respect to the X-ray beam: (A) beam normal to the film plane; (B) beam parallel to the film plane but normal to the last direction of draw; (C) beam parallel to the film plane and to the last direction of draw. Flat camera photographs of moderate exposure were taken for each orientation. Orientation A showed only the two equatorial spacings 3.78 and 4.17 Å. characteristic of the well-known modification. Orientation B showed only the two equatorial spacings 4.23 and 4.55 Å., characteristic of the new modification, while orientation C showed all four spacings, with 3.78 and 4.17 Å. doubled on equatorial lines about 65° each side of the single equator of the 4.23 and 4.55 Å. spacings. This suggests that the familiar modification had undergone twinning by a glide process similar to that observed by other investigators[4,5]; in this case the glide was probably parallel to the two sets of 110 planes.

Additional spacings corresponding to the new modification have not yet been obtained; hence, it is not possible to determine either the shape or the dimensions of the unit cell. A more detailed report of our work will be submitted to THIS JOURNAL at the conclusion of the research.

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POLYCHEMICALS DEPARTMENT R. H. PIERCE, JR.
EXPERIMENTAL STATION LABORATORIES J. P. TORDELLA
E. I. DU PONT DE NEMOURS & COMPANY, INC.
WILMINGTON, DELAWARE W. M. D. BRYANT

RECEIVED NOVEMBER 7, 1951

ABSENCE OF DETECTABLE POLY-*CIS* FORMS FROM HEAT-ISOMERIZED LYCOPENE SOLUTIONS

Sir:

While poly-*cis* lycopenes, $C_{40}H_{56}$, are occasionally found in nature,[1] it has not been possible so far to obtain such forms *in vitro*, by submitting all-*trans* lycopene to any of the well known stereoisomerization methods.[2] Since, however, all pertinent experiments had been carried out with only small amounts of starting material so far, we endeavored to investigate the thermic *trans* → *cis* isomerization of lycopene on an unusually large scale, under conditions which would allow the recovery of even a trace of poly-*cis*-lycopene formed.

Thirty grams of analytically pure and chromatographically homogeneous lycopene was prepared from 180 kg. of commercial tomato paste.[3] Two-gram portions of this pigment were refluxed in 2 l. of benzene (per portion) in diffuse daylight for one half hour. A subsequent resolution on fifteen, slightly conical percolators (50 × 24 cm.) filled with lime–celite, yielded 30 l. of a weakly colored chromatographic filtrate that was free of all-*trans* or *neo* forms which were held strongly by the adsorbent. This filtrate underwent further resolutions on alu-

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(2) L. Zechmeister, *Chem. Rev.*, **34**, (1944); *cf.* also L. Pauling, *Helv. Chim. Acta*, **32**, 2241 (1949).
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