

product to indicator yellow, there being no sign of 'regeneration'.

It is interesting to note that Lythgoe and Quilliam⁷ found that the velocity constant for the thermal conversion of visual purple to indicator yellow at 36° C. was diminished about five times in the presence of 2 M sodium chloride. The effect was probably due to the stabilization by salt of an orange intermediate.

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Amino-Acid Sequence in a Fraction of *Bombyx* Silk Fibroin

WHEN an aqueous solution of the fibroin of *Bombyx mori* is acted upon by chymotrypsin, a precipitate is formed¹ through the specific action of the enzyme on the α -carboxyl groups of the tyrosine residues. This precipitate contains 62 per cent of the total nitrogen and represents 58 per cent of the total weight of the protein. It consists almost entirely of glycine, alanine, and serine, together with a little tyrosine, the molar ratios of glycine to alanine to serine being 3 to 2 to 1. The fraction has a high degree of crystalline order as shown by X-rays, and a molecular weight of about 4,000.

A detailed analysis² of this chymotryptic precipitate has established its formula as Gly.₂₉ Ala.₂₀ Ser.₉ Tyr.₁, and the C-terminal position has been shown to be occupied mainly by tyrosine³.

We have recently investigated the sequence of the amino-acids in the chymotryptic precipitate. This investigation has been greatly facilitated by the absence from hydrolysates of the chymotryptic precipitate of Gly.Gly, which could not be detected even after careful search in a number of separate experiments. The absence of Gly.Gly bonds, and the analytical values showing that one half of the total residues are glycylic, mean that every alternate residue must be glycine. If the seryl residues are evenly spaced within the molecule, they will occupy every sixth position, and a repeating hexapeptide sequence of the form Ser.Gly.Ala.Gly.Ala.Gly would be a dominant feature of the molecule.

By using the N-acyl to O-acyl transformation that occurs at the seryl residues when proteins are dissolved in anhydrous mineral acids^{4,5}, followed by specific fission at these residues, we have been able to isolate and identify 36 per cent by weight of the chymotryptic precipitate as this hexapeptide in the form of its dinitrophenyl derivative. The yield would undoubtedly be considerably greater, but for the difficulty of preventing unwanted fission and re-combination during the treatment.

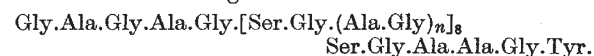
The products of the partial hydrolysis of the chymotryptic precipitate have also been examined, the dinitrophenylated mixtures being separated by

column chromatography into their constituents, which were estimated quantitatively, a maximum recovery of 87 per cent, on a nitrogen basis, being obtained. The only dipeptides recovered were Ala.Gly, Gly.Ala, Ser.Gly, and a very small amount of Ala.Ala. The only tripeptides obtained were Gly.Ala.Gly, Ala.Gly.Ala, and Ser.Gly.Ala. The molar ratio of Ala.Gly to Gly.Ala in hydrolysates of periods longer than five hours was consistently 2 to 1. Serine was never recovered in peptide form except as the N-terminal residue, and was followed always by glycine, and not by alanine.

The N-terminal amino-acid residues of the chymotryptic precipitate have been determined by treating it with 1-fluoro-2:4 dinitrobenzene, hydrolysing, and separating and estimating the dinitrophenyl-amino-acids. Glycine occupied 84 per cent of the N-terminal amino positions, serine 10 per cent and alanine 4 per cent. Dinitrophenyl-Gly.Ala, dinitrophenyl-Gly.Ala.Gly, and dinitrophenyl-Gly.Ala.Gly.Ala were isolated from the N-terminal sequence, and, together with the recovered dinitrophenyl-glycine, they constituted 78.5 per cent of the total N-terminal glycine.

Consideration of all the evidence leads to the conclusion that the chymotryptic precipitate is composed mainly of a repeating sequence of the form Ser.Gly.(Ala.Gly)_n, where *n* is usually 2, and must have, by requirement of the analytical data, an average value of 2. In addition to this principal constituent, a small amount of Ala.Ala is present, together with a C-terminal tyrosine residue and an N-terminal sequence in which mainly glycine provides the N-terminal amino residue.

The chymotryptic precipitate is thus composed of an aggregation of sections of the fibroin molecule, these sections having the formula



where *n* is usually 2, and always has a mean value of 2.

A detailed account of this work has been prepared, and is being submitted for publication elsewhere.

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Interrelation between Photosynthesis and Respiration in the Marine Flagellate, *Dunaliella euchlora*

THE photosynthetic assimilation of carbon-14 from the external medium by unicellular algae appears to proceed at a rate which is equivalent to the plants' net photosynthesis (the difference between photosynthesis and respiration). This was demonstrated in experiments in which the assimilation of carbon-14 was compared simultaneously with the evolution of oxygen¹, and was most apparent under conditions of low light intensity or nutrient depletion where respiration approached or equalled photosynthesis. For example, at or below the compensation-level no significant uptake of carbon-14 could