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Structure of Elastin

1. Analysis of Some Acid Peptides

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This preliminary communication is meant to contribute to the discussion on the relations between collagen and elastin. Burton and co-workers¹ claimed, mainly on electronmicroscopic evidence, that collagen is transformed to elastin without being degraded to amino acids. If this theory were correct, the peptides from elastin should present similarities with those known from collagen²⁻³.

Elastin was prepared from bovine nuchal ligament. Other non-collagenous proteins were extracted from the finely ground tissue exhaustively with 0.2 M disodium phosphate solution, and collagen subsequently with boiling water for five days.

Partial hydrolysates were made with hydrochloric acid² (5% protein in 4 N acid was kept for a week at +37° C). The acid was removed by repeated evaporations and a sirupy dark-brown mass obtained. It dissolved completely in 10% trichloroacetic acid. This material was fractionated using the method by Moore and Stein⁴ with slight modifications. The resulting curve is presented as Fig. 1.

It is quite obvious that this procedure does not provide a very suitable method for structural analysis of elastin. The separations are not clear and the number of peptides produced seems small.

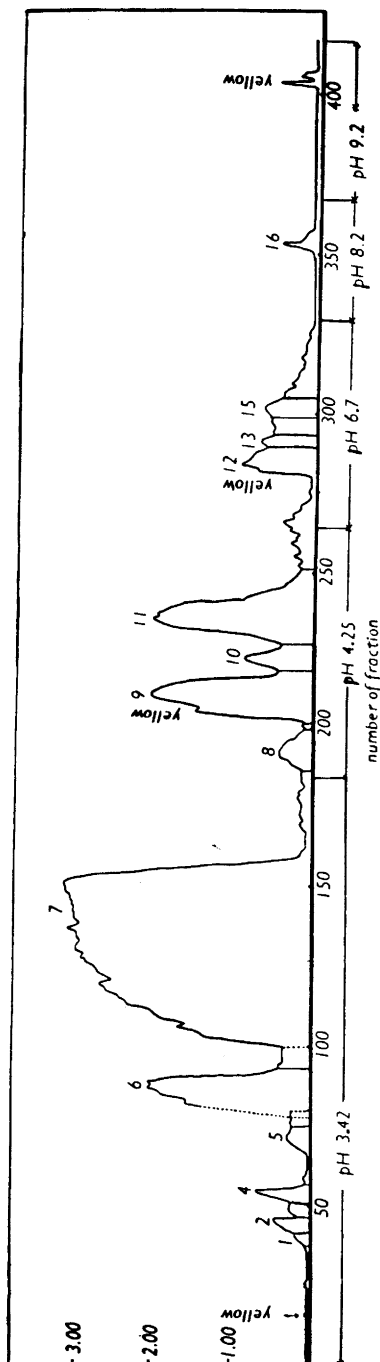


Fig. 1. Fractionation of partial hydrolysate of elastin (360 mg, for preparation see the text) in Dowex-50 column⁴. The last peak was obtained with 0.2 N NaOH. Two-ml fractions were collected (from pH 9.2 onwards 4 ml). The colour was developed from 0.2 ml samples taken from the fractions and the ordinate indicates the extinction in 1 cm cell. The numbers outside the curve refer to the text.

Fractions 6 and 7 were analysed by the dinitrofluorobenzene method following mainly Schroeder's instructions. The chromatography of DNP-compounds was, however, made according to Blackburn and Lowther⁵. The non-terminal amino acids were also converted to DNP-compounds and chromatographed. DNP-proline was identified additionally by the spectrum. All the DNP-amino acids were chromatographed with mixed crystallised references.

The following results could be obtained for peptides eluted at pH 3.42. (The asterisk indicates comparatively small amount.)

Fraction 6, peptide 1*: Glu-(Asp, Gly, Val*, Leu*)
peptide 2: Pro-(Asp, Glu, Gly, Val*, Leu*);

this peptide may be contaminated with another with valine as N-terminal amino acid.

Fraction 7, peptide 1: Gly-(Asp, Glu, Val*, Leu*, Gly?)
peptide 2: Ala-(Asp, Glu, Gly, Val*, Ala?)
peptide 3*: Val-(Asp, Glu, Gly, Ala, Pro)

The remarkable point is the abundance of aspartic and glutamic acids, which are present in small amounts in elastin, and the peptide breaks easily at aspartic acid. Common constituents are in these peptides Asp, Glu, Gly and in traces Val. Further investigation will show whether they form a characteristic sequence. In gelatin this region (pH 3.42) contains only two peptides Ala-Asp and Gly-Asp in quite small amounts, while proline and glycine peptides form the main part of the hydrolysate².

The form of the fractionation curve or the composition of the peptides which emerge at pH 3.42 do not support the concept of conversion of collagen to elastin at peptide level.

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Diamagnetism of LiNO, NaNO and KNO

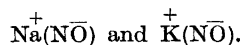
Studies in Magnetochemistry 19*

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The direct reaction between sodium metal and nitric oxide results in a reduction of nitric oxide. If, however, the process is carried out in liquid ammonia the result of the reaction is the formation of sodium nitrosyl (NaNO). Joannis¹, who first studied this reaction, prepared the sodium and potassium compounds and considered these substances as hyponitrites. Zintl and Harder² reprepared the sodium nitrosyl. Frazer and Long³ measured the magnetic susceptibility of sodium nitrosyl and state that the compound is diamagnetic but give no numerical value.

The alkali metal nitrosyls are colourless or nearly colourless crystalpowders. The X-ray powder photo of the sodium compound is different from that of anhydrous sodium hyponitrite. The lines are very diffuse, an indexing could not be carried out (cf. also Zintl and Harder²). The aqueous solution is not stable; also at 0°C the solution is decomposed under evolution of nitrous oxide. Under corresponding conditions a sodium hyponitrite solution is stable or decomposes very slowly. These facts indicate that the compounds are not hyponitrites but may be considered as (NaNO)_n and (KNO)_n. We may propose the ionic structures



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