To show this, let $V_x$ represent the volume enclosed by a surface of area $S_x$, which itself is contained in a substance $y$ of volume $V_y$, and let $h_x$ and $h_y$ represent the hits recorded in $V_x$ and $V_y$ respectively. The equation developed by Chalkley *et al.* is then $V_x/S_x = rh_x/4c$, in which $r$ is the length of the needle or test line and $c$ is the number of cuts recorded. But $V_x/V_y = h_x/h_y$. Hence $V_y/S_x = rh_xh_y/4h_xc = rh_y/4c$, which is the ratio of the volume of $y$ to its internal surface area. Obviously, $V_x$ and hence $h_x$ may approach arbitrarily close to zero, so that this expression is valid for finite surfaces enclosing infinitesimal or zero volumes. This being true, the expression is also valid for open three-dimensional figures.

An example of a case to which this equation might be applied is the determination of the internal surface area of an incipiently fractured material by means of measurements on random polished sections.

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## The Structure of the Acropeptides

In the 1949 edition of R. A. Gortner and W. A. Gortner's *Outlines of Biochemistry* (New York: John Wiley & Sons, 1949) reference is made on page 366 to our work on the nature of the acropeptides, viz., the products of the nonhydrolytic breakdown of various proteins (Fodor, A. and Kuk, S. *Biochem. Z.*, 1931, **240**, 123; 1932, **245**, 350). Our claim that they are closed polypeptide rings with neither *terminal* amino nor carboxyl groups is reported to have been disproved by T. S. Reid (Ph.D. thesis, Univ. of Minnesota, 1943), who insists that they are products of an alcoholysis brought about by resorcinol. We therefore wish to state the following facts:

(1) We have noticed that heating proteins in media such as ß-naphthol or resorcinol results in products which contain as a maximum 2% of these substances. Use of these media was therefore abandoned in favor of dry glycerol.

(2) We were able to prove the ring structure of the acropeptides by means of a simple calculation, based on experimental data: The number of the hexone bases—histidine, arginine, and lysine—was estimated quantitatively in acropeptides from casein. Each of these amino acids possesses, in addition to the α-carboxyl amino group which partakes in the peptide linkages and therefore cannot be estimated by titration, one more group of amino or imino nitrogen which *is* titrable by Linderstrom-Lang's titration method. The various fractions obtained from the crude breakdown product, however, gave a considerable titer in acetone, which equaled exactly the sum total of the number of (amino + imino)-nitrogen groups located in the side chains of histidine (imidazolyl ring), arginine (guanidino group), and lysine (ε-amino group) estimated quantitatively. This, in our opinion, is the most conclusive evidence for the absence of either terminal amino or imino groups in those products. If strictly nonhydrolytic conditions were observed the lowest molecular weights of our various fractions were never below 900 (Fodor, A., Fodor, P. J., and Kuk-Meiri, S. *Enzymologia*, 1947, **12**, 101).

(3) It cannot be discussed here whether the acropeptides are already preformed in the proteins or whether they are formed in the process of heating by virtue of the existence of juxtaposed carboxyl and α-amino groups, a possibility which has been envisaged before (Fodor, A. *Enzymologia*, 1939, **6**, 207). It should be mentioned in this respect only that enzymatically their behavior is in good agreement with what is known today on the correlation between the occurrence of certain amino acid residues in proteins and synthetic peptides and the specific action of proteinases.

(4) The review in Gortner's book on protein structure refers in general to the more recent publications but those of our papers that he mentions date back to 1936, although we made a comprehensive report as late as 1947, which we have already cited.

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## The Conversion of Phosphorylase A to Phosphorylase B by Blood Tryptase

Cori and Green (Cori, G. T. and Green, H. A. *J. biol. Chem.*, 1943, **151**, 31) have shown that the proteolytic enzyme found in muscle and spleen converts phosphorylase A to phosphorylase B. They observed also that trypsin, acting at pH 6.0–6.2 brings about this change. I have demonstrated that the blood protease known as "tryptase" and also called "plasmin" and "fibrinolysin" (Ferguson, J. H. *Science*, 1947, **105**, 488) forms phosphorylase B from phosphorylase A. I have made quantitative determinations of phosphorylase A according to Cori and Cori and Green (*J. biol. Chem.*, 1943, **151**) and of phosphorylase B after addition of adenylic acid. The tryptase was a lyophilized preparation obtained from the Parke, Davis and Company.

It is already known that both plant and animal substances can inhibit tryptase (Christensen, L. R. and MacLeod, C. M. *J. gen. Physiol.*, 1945, **28**, 559; Mirsky, I. A. *Science*, 1944, **100**, 198) and I have found that soybean antitrypsin is very effective in preventing tryptase from converting phosphorylase A into phosphorylase B. Glycogen also inhibits this tryptase action but not completely.

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