Wood all those *Microscopical* pores which appear in Charcoal perfectly empty of anything but Air."[2] Or again, in speaking *"Of* Petrify'd Wood," he remarked "and with a *Microscope,* I found, that all those *Microscopical* pores, which in sappy or firm and sound Wood are fill'd with the natural or innate juices of those Vegetables, in this they were all empty, like those of *Vegetables* charr'd."[3] Hooke mentioned repeatedly the *"Succus nutritius,* or natural juices of Vegetables"[4] and was definitely aware that cells in living plants had contents.

According to the preface of his well-known book on "The Anatomy of Plants," published in 1682, Nehemiah Grew began his study of the structure of plants in 1664. His work on plants was much more intensive than that of Hooke. No one can read the philosophical discussions and speculations of Grew and not be impressed by his concept of the plant as a whole, and of its functions, even though he was incorrect in many of his deductions. Grew discussed at considerable length the "Infinite Mass of little *Cells* or *Bladders"* of which the parenchyma of the root, for instance, is composed. He mentioned their size variations, their arrangement in rows—"they visibly run in Ranks or trains"—and their contents. "They are the Receptacles of *Liquor;* which is ever Lucid; and I think, always more Thin or Watery. They are, in all *Seed-Roots,* filled herewith; and usually, in those also which are well grown, as of *Borage, Radish,* etc."[5] In other places Grew referred to such *"Bladders"* as "fill'd with Sap"[6] and as *"Cisterns* of *Liquor."*[7]

From these quotations it is evident that Hooke and Grew fully realized that cells in living plants had contents. Of course they had no knowledge of the internal structure and organization of the cell, of its nucleus and other constituent parts, of the protoplast as we know it to-day. They apparently did not appreciate the importance of the cell as a unit in the organism. However, they thought of liquids or juices moving within the plant through the cells, foreshadowing, unconsciously, much more recent work on hormones, vitamins, viruses and the translocation of substances in plants.

Hooke's use of the term cell is often condemned as a "biological misnomer" because the protoplasm is of course the important part rather than the wall. However, in justification it may be pointed out that in plant tissues, at least, the wall is of marked significance; and further, there is nothing either in the etymology of the word or in its use in ordinary parlance that requires that the cell be empty. The Romans used the word *cella* to refer—among other things—to the cell of a honeycomb or to a storeroom for wine, grain, oil, honey, etc. Certainly in such instances the contents were quite important.

In summary, Robert Hooke and his illustrious contemporary Nehemiah Grew knew that cells in living plants had contents; they did not think that they were merely "empty boxes."

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[2] R. Hooke, "Micrographia," p. 116, 1665.
[3] *Ibid.,* p. 107.
[4] *Ibid.,* also p. 114.
[5] N. Grew, "The Anatomy of Plants," Book II, p. 64, 1682.
[6] *Ibid.,* Book I, p. 25.
[7] *Ibid.,* Book III, p. 126.

THE HYDROLYSIS OF d-PEPTIDES

IT is by now well known that peptidases from many different sources can hydrolyze unnatural peptides containing a d-amino acid radicle. Cleavage proceeds more slowly than it does in the hydrolysis of corresponding compounds containing the l-isomer; Berger, Johnson and Baumann,[1] for example, find that peptidases from chick mucosa, yeast autolysate and malt can split d-leucylglycine about one thirtieth as rapidly as they split the racemic mixture. This is in accordance with the theory of steric hindrance, developed by Bergmann and his coworkers[2] to explain the fact that l-leucyl-d-alanine is split more rapidly than glycylglycine but less rapidly than l-leucyl-l-alanine by yeast dipeptidase and erepsin.

Evidence from different sources suggests that the presence of one isomer may interfere with the hydrolysis of the other. Thus Palmer and Levy[3] found that the presence of d-alanylglycine strongly inhibits the hydrolysis of the l-isomer by chick embryo extracts, although it is not itself hydrolyzed. On the other hand, Bamann and Schimke[4] find that the dipeptidase of human ovaries will hydrolyze d-leucylglycine but has little action on the d-isomer when dl-leucylglycine is used as substrate. Both Palmer and Levy, and Bamann and Schimke note that the reaction is inhibited by the products of hydrolysis.

It seems probable that the true explanation of these phenomena lies in the effect of the pH change which accompanies dipeptide hydrolysis.[5] In the alkaline range, the dissociation constants of the dipeptides concerned lie between 8.0 and 8.4, while those of the amino acids lie between 9.8 and 10.0. Even with moderate buffering there is a marked alkaline shift during hydrolysis, so that the pH of the digest rapidly passes beyond the optimum and inhibition of enzyme action ensues. In the experiments of Palmer and Levy the presence of the non-hydrolyzable d-isomer presumably

[1] J. Berger, M. J. Johnson and C. A. Baumann, *Jour. Biol. Chem.,* 137: 389, 1941.
[2] M. Bergmann, L. Zervas, J. S. Fruton, F. Schneider and H. Schleich, *Jour. Biol. Chem.,* 109: 325, 1935.
[3] A. H. Palmer and M. Levy, *Jour. Biol. Chem.,* 136: 407, 1940.
[4] E. Bamann and O. Schimke, *Naturwiss.,* 29: 365, 1941.
[5] G. E. Pickford, *Jour. Exp. Zool.,* 92: 143, 1943.

gave better buffering and the assumption is that the pH of the digest never reached the optimum so that an apparent inhibition resulted. These authors state that the pH optimum was at 7.8, the pH at which they worked, but this is not in agreement with the results of Berger and Peters,[6] who found, with three different buffer systems, that the peptidase of the chick embryo had a pH optimum at about 8.5. The latter agrees well with the more alkaline pH optimum of the salamander dipeptidase.

Failures to detect hydrolysis of the d-isomer in racemic mixtures would result from the more rapid hydrolysis of the l-isomer which, when completely split, would carry the pH of the digest beyond the optimum so that continued slow hydrolysis of the d-isomer would be prevented. It is evident that conclusions with regard to the hydrolysis of d-peptides must not be based on the results of hydrolysis of racemic mixtures, a fact that has been overlooked by many authors, including myself.

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U. S. TEXT-BOOKS FOR STUDENTS IN LATIN AMERICAN UNIVERSITIES

PRESENT SITUATION

MOST texts used for advanced study are French and Spanish, despite the expressed desire of many professors to use United States texts. Texts in English from the United States are not used because the texts are too expensive; the 5 to 1 ratio of exchange, with Mexico for example, makes an imported text there cost 25 pesos that costs 5 dollars in the United States. The texts referred to are mostly those used in such small numbers by advanced classes in specialized subjects that a Spanish translation will not pay for itself.

Yesterday I learned of one course in which the students this year at the Universidad Nacional de Mexico effectively objected to purchasing a 25 peso United States text assigned by their professor. He admitted (to them and to me) that they could not afford it. French and Spanish texts cost less in Mexico where potential volume of sales does not justify publication within the country itself of texts in specialized subjects.

Professors in Latin American universities find United States text-books superior for many courses because these books treat of American materials. For example, a botanical text from the United States in illustrating structure, physiology, etc., employs kinds of plants found in America, whereas the European texts and illustrations treat of unfamiliar kinds of plants characteristic instead of Europe and Asia.

[6] G. Berger and T. Peters, *Zeitschr. physiol. Chem.*, 214: 91, 1933.

REASONS FOR MAKING U. S. TEXTS AVAILABLE IN LATIN AMERICA

(1) Several professors in Latin America have expressed a desire for United States texts and the demand and plea is of constant growth.

(2) As already noted, some United States texts are best because they treat of American materials.

(3) Use of United States texts by Latin Americans in process of intellectual training is tremendously effective propaganda in that it brings fuller understanding of English-speaking Americans to the Latin Americans; evidence is provided of United States accomplishment in science, art and literature. This evidence needs to be placed in the record for the benefit of the many Latin Americans who heretofore have known principally of our accomplishment in material matters—typewriters, automobiles and dollars.

MEANS OF ACCOMPLISHMENT

(1) Learn precisely which text-books are desired and where and in what quantities. (2) Make these available at a cost within reach of the students for whom they are intended.

One United States professor in Mexico and Central America, and two or three in South America, by conference with university professors there, and with guidance from Cultural Relations representatives in United States Embassies, should most effectively obtain the requisite information.

The United States professors might well explain the rental system in use on campuses of some United States universities whereby for one course at a cost of only $1.00 a student has the use of a text-book which costs $7.50 new.

To make copies of these texts available at a price within reach of the Latin American students is a most worthy aim. It seems not unfair to place before the people of the United States the opportunity and responsibility for achieving this end.

Possibly no subsidy at all would be required, or at most a smaller one than at first thought would seem necessary, if Latin American students are as much interested in used copies as are United States students, many of whom obtain their copies at a fraction of the list price. Here is how the system operates:

Professor Torrey in 1941 adopted for his advanced course in biology the new text-book by the two authors Peralta and Smith. Each of 150 students in Professor Torrey's class was required to purchase a copy of the text, which cost $7.50. At the end of the course, 50 students retained their copies, but the other hundred students resold theirs to the local book-dealer at $2.00 each. In 1942, the 150 students in Professor Torrey's class rushed to purchase texts. "First come first served" is the rule. One hundred pupils purchased