to be known as the Amateur Astronomers Medal to stimulate interest in astronomy and to commemorate the quadricentennial of the death of Copernicus. The medal will be given from time to time to an amateur astronomer or layman who performs an outstanding service to astronomy.

It is reported in *The New York Times* that Arthur Curtiss James, railroad industrialist, who died on June 4, 1941, left a gross estate of $37,771,613 and a net of $34,771,702. Charitable, religious and educational institutions share $25,317,154, of which the James Foundation gets $23,030,387. The James Foundation, which was created to aid charitable, religious and educational institutions, will receive eight tenths of his residuary estate. In addition to this it also receives art and real estate worth $574,085 and remainder interests in trusts set up in his will valued at $1,202,682. Mr. James requested the foundation to aid institutions which he had helped during his lifetime. Among these are Amherst College, Hampton Normal College and the Tuskegee Normal and Industrial Institute.

According to the *Harvard Alumni Bulletin,* gifts to the university for the year to the date of commencement amounted to $5,144,255, a million and a half larger than the total amount received over the preceding year. The gifts for immediate use ($1,078,574) were lower than for any year from 1933–34. But capital gifts of $4,065,681 were larger than for all except three years of the last ten; and of these the unrestricted gifts—the most valued and most needed by the university—amount to $3,320,884, or to more than the total unrestricted gifts for capital to the university in the eight years preceding. At the commencement ceremonies the marshal, David M. Little, presented to the university on behalf of the class of 1918 a check for $100,000.

The Academia Nacional de Medicina of Buenos Aires has recently established the Hirsch Medical Scholarship with a fund of 500,000 pesos given by Alfredo Hirsch, of Buenos Aires. Selected students will follow medical studies in the United States or Great Britain for two years, beginning in the middle of 1943. For the first ten years the scholarships will be given for studies on cancer, leprosy and infantile paralysis.

The San Diego Society of Natural History, whose museum in Balboa Park has been taken over by the U. S. Navy for hospital purposes, has been allowed to retain a considerable section of the ground floor, according to Clinton G. Abbott, director. Here the extensive study collections and departmental libraries have been gathered, and the research and publication activities of the staff are being continued. The main library has been moved to San Diego State College for the duration. The exhibits have been stored.

Nature reports that ten Chinese students, the first to visit Britain under a new scheme operated by the British Council, are now on their way to Great Britain. They have been given scholarships by the council, and will study some branch of engineering and will work at the university or college most suited to their special qualifications. Their training is expected to be of special value both because it will equip them for reconstruction work in China, and because their familiarity with British engineering practice and equipment will furnish a link between Great Britain and China.

DISCUSSION

THE CONCEPT OF CELLS HELD BY HOOKE AND GREW

References to historical topics in current text-books of biology, botany and zoology can be counted in most cases on the fingers of one hand. In view of the decided lack of any historical approach, it seems rather anomalous that two concepts that are presented from this standpoint are so often either incorrect or distinctly misleading. The first of these—namely, that Schleiden and Schwann were the real originators of the cell theory and enunciated it before any one else—has been disproved in scholarly fashion by Karling.[1]

The second general error is a misunderstanding of the conception of the cell held by the early microscopists, especially by Robert Hooke and Nehemiah Grew. Almost all the biological text-books, including those of botany and zoology, if they refer to the topic at all, either state or imply that Hooke saw merely the *walls* of cork, pith and charcoal. To be sure, he did see the walls of such cells, and with his ineffective microscope, they must have stood out more clearly in such tissues than in living material.

[1] J. S. Karling, *Amer. Nat.*, 73: 517–537, 1939.

However, Hooke was perfectly aware that cells in living plants had contents. This is stated very definitely in his "Micrographia," published in 1665. "But though I could not with my *Microscope,* nor with my breath, nor any other way I have yet try'd, discover a passage out of one of those cavities into another, yet I cannot thence conclude, that therefore there are none such, by which the *Succus nutritius,* or appropriate juices of Vegetables, may pass through them; for, in several of those Vegetables, whil'st green, I have with my *Microscope,* plainly enough discover'd these Cells or Poles fill'd with juices, and by degrees sweating them out: as I have also observed in green

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."

Edwin B. Matzke

[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.