interpret as direct excitation of nerve fibers. This does not prove that an electrical disturbance *localized in the retina,* like a nerve action current, might not stimulate the photosensory mechanism directly.

It is worth noting that the phenomena reported by Nodon[3] of photographic effects from organic substances, which he interprets as due to "radiations" and which Mrs. Ladd-Franklin cites in support of her theory, have long been familiar. The subject has been reviewed by Keenan[4] and the weight of evidence points to the evolution of traces of hydrogen peroxide as the explanation.

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THE ANTIQUITY OF THE DEPOSITS IN JACOBS CAVERN

NELS C. NELSON in SCIENCE, for September 16, 1927, criticizes the article by me on "The Antiquity of the Deposits in Jacobs Cavern," printed in *Am. Mus. Nat. Hist.,* Vol. XIX, Part VI.

Admittedly *not* found in undisturbed strata, the Jacobs Cavern carved "Mastodon" bone must stand or fall upon its own merits. X-ray photographs and specific gravity determinations show this bone to be mineralized; inspection shows that mineralization occurred *after* the carving. Comparative photographs under six definite wave-lengths of light indicate that the bone is old and likewise the carving. Chemical and physical analyses (by experts in these fields) of samples taken in the presence of Mr. Nelson (and their position recorded photographically) show the presence of a second, lower, inhabited layer not examined by Mr. Nelson. The perforation of the carved bone was from both sides; these two holes taper and meet at a slight angle—the shortness and taper of these holes are characteristic of stone drills. The head of the elk-like effigy on the reverse apparently takes advantage of a crack, while the wavy marks on the same side ignore several cracks.

Against these definite data stands the sincere guess of an eminent archeologist.

VERNON C. ALLISON

THE MISPRONUNCIATION OF "DATA"

APROPOS of the controversy concerning the singular and plural usage of "data," may attention be called to the fact that this word is mispronounced much more commonly and with less justification than it is incorrectly used in writings. Probably no other word in the vocabulary of the average scientist is mispronounced more generally. Merely as an example of this fact, the incident mentioned below is noted from the last annual meeting of the Pacific Division of the American Association for the Advancement of Science. The pronunciations "dāta" and "dăta" were used by two different persons on the program at one of the general meetings. In a meeting of the section on entomology one speaker pronounced the word "dāta" another pronounced it "dăta" and a third said "däta." The leading dictionaries including Funk & Wagnall's New Standard and Webster's New International give only one pronunciation, namely, dāta.

In some respects this matter may seem too trivial to be mentioned. However, the student in high school, college and university, and Mr. Average Citizen have come to regard the scientist as one who is peculiarly exact and correct, and this ideal is not enhanced when scientists, in classroom instruction and in public addresses, are careless to the extent of mispronouncing a word that is used so commonly by scientists in general.

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[3] Nodon, A., 1924. *Comptes Rendus,* clxxviii, 1101.

[4] Keenan, G. L., 1926. *Chemical Reviews,* iii, 95.

SCIENTIFIC BOOKS

Les problèmes de la physiologie normale et pathologique de l'os. R. Leriche et A. Policard. Masson et Cie, Paris, 1927.

THIS book of 229 pages, including 23 text figures and an extensive bibliography of 219 titles, is dedicated to the memory of Leopold Ollier, "originator of modern bone physiology." The book represents the fruit of a collaboration extending over a period of ten years. It assembles in a convenient and logical unit much of what had been scattered under separate and joint authorship through various journals since 1909. A new theory of osteogenesis is here developed and firmly based on a large body of data, histological, experimental and radiographic. This theory furnishes a consistent interpretative key for the explanation of certain apparently contradictory facts in normal bone development and regeneration. It explains, moreover, diverse and obscure pathologic condition of bone formation. It reconciles the paradoxical aspects of the current view of osteogenesis which regards the so-called osteoblast, when operating alone, as a bone builder, and when fused in masses, as a bone destroyer or osteoclast.

Osteogenesis is interpreted in essence as a condition of osseous metaplasia of fibrous connective tissue. This is shown to occur in four stages, whether the connective tissue be embryonal, or mature fibrous: a, edematous infiltration; b, multiplication of fibrils; c, conversion of the interstitial fluid into a gelatinous

preosseous substance; d, deposition of calcium phosphates and carbonates. These processes are dependent upon humoral and interstitial rather than upon cellular factors.

Osteoblasts are regarded as fibroblasts with only a feeble osteolytic capacity. Their function is to oppose and restrict osseous extension. Cases are cited in which new formation of bone, as disclosed by skiagraph, is unaccompanied by osteoblasts. Conversely, osseous areas in which there is no new formation of bone are covered with osteoblasts of typical epithelioid character. Osteoblasts become secondarily involved in osteogenesis and thus are incorporated as osteocytes. As such they have no osteogenic nor nutrient functions; they are "useless parasites of osseous tissue." However, under the influence of certain pathologic factors they may have their original osteolytic capacity greatly stimulated. Osteolysis also is primarily dependent upon humoral processes. Osteoclasia, by action of osteoclasts, is said to be a relatively minor factor in bone resorption.

The results of experiments with rabbits, involving resections, fractures and transplants, are in accord with the earlier ideas of Havers, Bichat, and Macewen, who regarded the periosteum simply as a structure limiting ossification. The periosteum "blocks osteogenesis." The so-called osteogenetic layer of the periosteum is not a bone-forming tissue; it opposes and restricts the spread of bone. New formation of bone is invariably associated with bone resorption. The formation of callus in the repair of fractures is preceded by resorption of the broken extremities of the bone. Likewise, in the case of bone transplants; the transplant is resorbed before new bone appears. Such resorption supplies the necessary local excess of calcium for the stimulation of the osseous metaplasia. Osseous metaplasia of connective tissue is a reversible process. Bone resorption follows upon increased circulatory activity locally, a condition dependent upon vasomotor control. The authors believe that the results of their investigations open a new chapter in bone pathology, that of bone diseases of vasomotor origin.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

METHODS FOR DETERMINING THE COLOR OF OBJECTS IN MICROSCOPIC MOUNTS

MICROSCOPISTS who have attempted to determine the color of minute objects in microscopic mounts, such as fungous spores, have felt the need of improved methods.

The method commonly employed for this operation is to observe the object through the microscope, form a mental color image and match this, as soon as possible, with a color on a color chart. However, the color chart is sometimes omitted and an opinion rendered. The results obtained by these methods have been uncertain since an accurate mental color impression of sufficient duration and intensity could not be retained until the observer had made proper comparisons with the standard colors, or his memory of color standards was inaccurate. These difficulties might be overcome if the microscopic object could be projected on a color chart or images of the microscopic object and the color chart observed simultaneously.

Krieger[1] has described a method for determining the color of spore prints made from *Volvaria speciosa Fr.* as a type. However, a good method for determining the colors of spore mounts by microscopic examination remained to be described. The writers have devised methods by which the object in a microscopic mount may be projected and observed simultaneously with those on a chart of standard colors.

In the first method employed by the writers, the apparatus consisted of a microscope equipped with Abbé condenser, camera lucida with drawing board, two table lamps each bearing a 75-watt daylight ground glass bulb, a Ridgway color chart, and a comparing screen which consists of a sheet of gray paper about 8 x 10 inches with a slit 1 x 0.75 inches cut in the center. The color standards were lighted by one of the lamps and the microscope by the other. By properly adjusting the Abbé condenser, the two lamps and the camera lucida, an image of the colored microscopic object was superimposed on the comparing screen beside the slit. While the comparing screen was held stationary, the color standards were moved so that an analogous color showed through the slit. The color standards were further adjusted and proper comparisons made until the slit contained a standard color which matched favorably with that of the microscopic object. By this method, the observer can compare the colors as accurately as his ability will permit. When one type of microscope was used, the microscope was placed on a plane about three inches above the level of the drawing board but when another type was employed, the best results were obtained when this distance was increased to five inches. How-

[1] Krieger, L. C. C. "Observations on the Use of Ridgway's New Color Book. The Color of the Spores of *Volvaria speciosa Fr.*" *Mycologia* 6: No. 1: 29–31. 1914.