was participating in Amundsen's expedition to the North Pole.

NATURE states that further details of Miss Garrod's discovery of a skull, presumably of Mousterian age, at Gibraltar, tend to confirm the first impressions of its importance. In addition to the frontal bone another large piece of bone was found, but owing to the hardness of the matrix in which it is imbedded it is impossible yet to say whether it is the parietal or the occipital. Decision on this and other points must wait until it has been cleared.

UNIVERSITY AND EDUCATIONAL NOTES

CHARLES HAYDEN, a New York banker, retiring president of the Alumni Association of the Massachusetts Institute of Technology, has given $100,000 toward the dormitories to be erected at the institute, planned to accommodate 800 students.

DEAN ARTHUR M. GREEN, Jr., of the engineering school at Princeton University, has announced plans for a proposed half-million-dollar engineering building. The Princeton Engineering Alumni Association is raising an additional $350,000 to equip the building. The new building will be of stone, three stories high, with a basement for service rooms, and will provide 70,000 square feet of floor space. It will house the mechanical engineering laboratory, the electrical laboratory, the hydraulic laboratory and the machine shop.

DR. WILLIAM BENJAMIN SMITH, professor of physics in the University of Missouri, 1885–88, and professor of mathematics, 1888–93, has given to the university library 325 volumes in the field of mathematics and physics; 300 volumes in philosophy; 900 volumes on theology and religion, and 525 volumes on history, literature and the world war. Dr. Smith's library includes numerous rare books.

LAFAYETTE COLLEGE has appointed Freeman Ward, Ph.D., professor of geology at the University of South Dakota and state geologist of South Dakota, to the chair of geology vacant by the death of the late Professor Peck.

AT Brown University, Dr. Mark H. Ingraham, of the University of Wisconsin, has been appointed assistant professor of mathematics, and Paul N. Kistler, of Lehigh University, assistant professor of mechanical engineering.

DR. DAVID H. BERGEY has been promoted to an assistant professorship of hygiene and bacteriology in the medical school of the University of Pennsylvania. Dr. Morton McCutcheon has been appointed assistant professor of pathology.

THE following promotions will take effect at George Washington University next autumn: Dr. Edwin A. Hill, to be professor of chemistry; Arthur F. Johnson, to be associate professor of mechanical drawing; Norman B. Ames, to be associate professor of electrical engineering, and Paul H. Brattain, to be assistant professor of chemical engineering.

DR. W. E. H. BERWICK, reader in mathematics in the University of Leeds, has been appointed to the chair of mathematics at the University College of North Wales, Bangor.

ARTHUR HUTCHINSON, F.R.S., fellow of Pembroke College, University of Cambridge, has been elected to the professorship of mineralogy, in succession to the late Professor W. J. Lewis.

DISCUSSION

THE STRUCTURE AND FORMATION OF BAST FIBERS IN FLAX

MICROCHEMICAL work upon the history of bast fiber wall development in flax (Linum usitatissimum) has led to a somewhat different conception of cell wall formation and to the discovery of some interesting facts concerning cell wall structure. Bast fiber cells are distinguishable in the stem tip about the time that the vascular elements are clearly differentiated. The primary walls consist of cellulose containing pectose in the region of the middle lamella. Subsequent additions to this membrane are not continuous and gradual but by successive deposits of definite cellulose lamellae. The lamellae first appear in a gelatinous and much infolded condition, out of contact with the existing wall. Each lamella is pushed against the already existing cell wall, where its gelatinous consistency permits it to be closely fitted. In this position it loses its gelatinous consistency and becomes a part of the wall itself. The wall of the bast fiber then is formed by periodic deposits of cellulose lamellae. There is no cementing material between the lamellae, and by the use of suitable reagents the layers may be readily separated from each other, even in mature fibers. The zonation visible in the cross-section of the bast fiber results from these periodic deposits. The fine dark lines do not represent actual material, as has been supposed, but are merely boundaries between the successive lamellae.

When swollen with concentrated sulfuric acid and subjected to pressure while in the swollen condition, the lamellae reveal their basic structure. Each lamella is formed of spirally wound fibrillae and the direction of the spiral is reversed in each successive lamella. The fibrillae give parallel extinction under polarized light and have a high birefringence. The fibrillae are therefore crystalline. The bast fibers of

flax must be regarded as aggregates of innumerable spirally wound crystalline fibrillae, the spirals being alternately right and left handed in successive lamellae.

The alternate layers of right and left hand spirals may be due to different forms of isomeric celluloses. A lamella with right-hand spirals may possibly be the result of the condensation and crystallization of a dextro form. This may leave the laevo forms in excess and so may influence the formation of more laevo forms. These on reaching the saturation point may crystallize out as a definite lamella of laevo crystals, *i. e.*, a lamella with left-hand spirals, and leave the dextro forms once more in excess. A continuation of this process would account for the alternation of right and left hand spirals in consecutive lamellae. It may also explain the sudden and periodic deposits of cellulose lamellae. Work with the aim of establishing or discrediting this hypothesis is now under way.

This much is known:

(1) Flax bast fibers are formed by the periodic addition of definite lamellae of pure cellulose to the existing walls and not by a continuous and gradual acquisition of cellulose particles.

(2) The lamellae are deposited out of contact with the existing wall in a much infolded, gelatinous condition and are subsequently pushed to the walls.

(3) There is no cementing material between the lamellae and they may readily be separated with proper treatment.

(4) The lamellae are composed of spirally wound crystalline fibrillae.

(5) Consecutive lamellae have spirals in opposite directions. This may be the result of the presence of isomeric forms of cellulose.

(6) These facts have an important bearing upon the elasticity, permeability, strength, durability and adsorptive powers of such fibers.

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SHOULD NEW FOSSIL SPECIES BE DESCRIBED FROM WELLS?

SUBSURFACE correlation work in various oil fields has brought to light a number of species of microscopic fossils that are new to science. There has been much informal discussion of the question which this paper now places before paleontologists—that is, should fossils found in wells be described as new species and published as such in recognized journals?

There are certain arguments against describing new species from wells. Chief among these is the impossibility of obtaining topotypes from "type localities." This was pointed out by Joseph A. Cushman when he stated the following:

> It is a rule of paleontology that new species should not be described from well borings because of the uncertainty of depth and the impossibility of giving a type locality from which future collections may be made.[1]

With improved methods of drilling, should this rule of paleontology be abandoned? If it is, how would future collectors obtain topotypes from type localities? Of course, a new rule might be established requiring that authors describing new species from wells deposit specimens, with complete data as to locality, in some recognized institution, such as the United States National Museum, or in several institutions prepared to care for type specimens. This method would overcome the objection to indefinite locations such as that in a paper by Frederick Chapman,[2] where a species is described "from a well in Santa Clara County."

There are a number of reasons in favor of so describing such fossils. The foremost of these is that a well sample is just as accurately located as a dredged sample, except insofar as age is concerned. Moreover, some formations are discovered in wells that are not present locally at the surface, as in the case of certain areas in Texas, Louisiana, Oklahoma and elsewhere. The description of new species from wells in these localities might aid in subsurface correlation. G. Dallas Hanna and E. G. Gaylord, with this in mind, described *Scalez petrolia* from the Midlands Oil Company's Well No. 1, San Joaquin Valley, California.[3] This fossil, according to Dr. Hanna,[4] has turned out to be an especially valuable "marker" in economic work. Esther Richards Applin doubtless adopted the same point of view when she described several new species and varieties of foraminifera from wells in the coastal plain of Texas and Louisiana.[5]

Even with the precautions mentioned above, should this procedure be recommended? The consensus of opinion of the west coast paleontologists who have been consulted in this connection seems to be in favor of describing new species from wells, for, as Pro-

[1] "Foraminifera from the Deep Wells of Florida," 13th Annual Report, Florida Geological Survey, p. 23, 1921.

[2] Chapman, Frederick, "Foraminifera from the Tertiary of California," Proc. Calif. Acad. Sci., 3d ser. geol., Vol. 8, 1900.

[3] "Description of a New Genus and Species of Freshwater Gastropod Mollusk (*Scalez petrolia*) from the Etchegoin Pliocene of California," Proc. Calif. Acad. Sci., 4th ser. Vol. 13, No. 9, pp. 147–149, March 18, 1924.

[4] Personal communication, January 21, 1926.

[5] In Applin, Ellisor and Kniker, "Subsurface Stratigraphy of the Coastal Plain of Texas and Louisiana." Bull. Amer. Assoc. Pet. Geol., Vol. 9, No. 1, 1925, pp. 79–122.