of "psychologies." Equally must it be pointed out that the forest does not appear very plainly or very attractively among the trees. There is a little too much detail, a little too little contouring of the larger topography. The map is serviceable, but not illuminating. On the third count the writer must frankly express his doubts. The genus student is a difficult guest and his reactions uncertain. Doubtless he likes not that which is good for him, and partakes in large quantities of what is pernicious. Yet, after all, he has a rather versatile appetite which responds to judicious encouragement. Plainly, the diet must be made attractive. Professor Judd's book is not emphatically unattractive from the student's point of view; yet in this respect, it does not compare in success of achievement with several of its rivals for collegiate favor—notably with Professor Angell's text.

Writing texts is like much else, a matter of temperament. The good text-writer is largely born and not made—at least not by the publisher's solicitation. Nor have the best teachers always proved themselves the best writers of texts. The conditions are not unlike those attaching to the construction of ocean steamships, requiring one model for speed and another for cargo. Each result is a compromise; though some are plainly freighters; and others lightly burdened greyhounds. Solidity of content and attractiveness of exposition are not incompatible; but when they are found in marked degree, the possessor thereof should feel within him the call to write a text. In the meantime we shall be content with what there is, and welcome Professor Judd's volumes to a place among their fellows.

Joseph Jastrow

SCIENTIFIC JOURNALS AND ARTICLES

The American Naturalist for February has an article on "The Law of Geminate Species," by David Starr Jordan, geminate species, being two closely related species, found on opposite sides of some natural barrier. Henri Hus discusses "Fasciations of Known Causation," noting that these abnormalities may be transmitted by seeds or cuttings. Charles A. White treats of "The Aggregate Origination of Parasitic Plants" and Charles Depéret of "The Evolution of the Tertiary Mammals and the Importance of their Migrations," considering the changes in the fauna of certain European beds as brought about by local evolution and by immigrations from North America and other regions. G. H. Parker considers "Zoological Progress" or the increase in our knowledge of the animal kingdom. Under "Notes and Literature" variation in *Amblystoma tigrinum* finds itself under *In*vertebrate Morphology.

Bird-Lore for March–April has articles on "The Home Life of the American Egret," by Frank M. Chapman; "The Background of Ornithology," by Spencer Trotter; "The Nest in the Gutter," by Gilbert H. Trafton, and the third paper on "The Migration of Flycatchers," by W. W. Cooke. Under "The Common Names of North American Birds" Edward H. Perkins proposes changes in some inapplicable names. The Audubon leaflet is by Mabel Osgood Wright and is devoted to the song sparrow. A new bird reservation in Florida, known as the Mosquito Inlet Reservation, is announced.

The Zoological Society Bulletin for April is an "Aquarium Number" and deals with all manner of aquatic animals. There are articles on "The Natural Foods of Freshwater Fishes," "Porpoises, Long-lived Fishes"—some of which have lived in the Aquarium for fourteen years—"The Sturgeons, Electrical Fishes and Luminous Fishes." "The Largest Marine Animals" gives much information on the size and weight of many species and "A Large Lobster" records a specimen twenty-three and three quarter inches from tail to rostrum and weighing thirty-four pounds. It is announced that an effort will be made to capture some porpoises by means of a heavy seine and bring them alive to the aquarium.

SOCIETIES AND ACADEMIES

THE BOSTON SOCIETY OF MEDICAL SCIENCES COMPARATIVE ANATOMY AT THE HARVARD MEDICAL SCHOOL

A special meeting of the Boston Society of Medical Sciences, devoted entirely to the cur-

rent work of the Department of Comparative Anatomy, was held at the Harvard Medical School on the evening of April 7. A brief paper was presented by every member of the department, and by Dr. Meigs, who has used the laboratory for the histological portion of his studies concerning the physiology of muscle. After the meeting there was an extensive demonstration of preparations illustrating the papers presented, and the laboratories were open for inspection. Serial sections of the eggs of the Mexican axolotl were exhibited, showing all the important stages of maturation and fertilization; eighty of these series have recently been added to the embryological collection. They were specially prepared by Dr. J. W. Jenkinson. From the following abstracts it will be seen that a considerable variety of scientific topics was discussed, all of which are of medical interest.

Dr. E. B. Meigs described the histological differences between relaxed and contracted smooth muscle fibers.

A number of physiologists have supposed that muscular contraction might be the result of the passage of fluid from one part of the muscular tissue to another, and recent comparisons between histological preparations of relaxed and contracted striated muscle indicate that, during the contraction of this form of muscle, fluid passes from the sarcoplasmic spaces into the fibrillæ or sarcostyles.

The present investigation consists in a comparison between preparations of uncontracted and contracted smooth muscle. The results indicate that in smooth muscle also there is a passage of fluid from one part of the tissue to another during contraction, but that the movement in this case is opposite in direction to that which takes place in the case of striated muscle; the contraction of smooth muscle seems to be accompanied by a passage of fluid from the contractile cells to the intercellular spaces.

The histological results in the case of both striated and smooth muscle are in harmony with the reactions of the two tissues to swelling reagents and their opposites. Striated muscle immersed in distilled water, or in various other reagents which are absorbed by it, slowly goes into contraction; and pieces of muscle which have been caused to contract in this manner may be made to lengthen slowly by immersion in reagents which abstract water from them. Both kinds of reagents have exactly the opposite effects on smooth muscle.

Dr. L. W. Williams discussed the notochordal origin and the histogenesis of the nucleus pulposus. The notochord of the young mammalian embryo is a continuous rod of uniform diameter. It is composed of clearly defined cells surrounded by a thin outer, and a thick mucin-containing inner sheath. The deposition of inter-cellular substance in the embryonic vertebral cartilage squeezes the notochord into the intervertebral discs, where it forms the nuclei pulposi. Within the vertebræ, the notochordal tissue degenerates. The sheaths after becoming calcified are finally destroyed by bone-forming tissue. Within the nucleus pulposus, the loss of cell-walls converts the notochordal tissue into a syncytium with mucin in its meshes. It closely resembles embryonic connective tissue. The notochordal nuclei multiply rapidly by mitotic division. The intercellular substance increases in volume and finally separates the syncytium into small vacuolated masses of protoplasm, similar to fat cells. Each cell is spherical and usually has two nuclei, which lie in a small amount of cytoplasm separating two or more large vacuoles. It was shown that the notochord in man normally has a sinuous course in the base of the skull, and that chordoma usually occurs at the points where the notochord comes nearest to the upper surface of the bone.

Dr. V. E. Emmel presented some results of his studies in regeneration and growth. According to Conklin's hypothesis inverse symmetry in mollusca and perhaps also situs inversus in man are due to an inverse organization of the egg, corresponding with maturation at opposite poles. It does not accord with this theory that until the fourth molt the large crusher claw of the lobster may be made to develop on either the right or the left side. In the larval lobster the first pair

of claws or chelæ are alike and symmetrical, but at about the fifth molt a transition from symmetrical to asymmetrical differentiation of the chelæ normally occurs. The experiments were planned to show to what extent asymmetrical differentiation can be controlled by the amputation of one chela, thus giving the remaining chela the greater advantage in growth. The results show (1) that up to the fourth molt right or left asymmetry of the chelæ may be produced at the will of the experimenter; (2) that during the fifth stage (*i. e.*, between the fourth and fifth molts) experimental control ceases; and (3) that in later stages of development, when the asymmetry of the chelæ has become established, the amputation of one or both chelæ does not reverse the original asymmetry. It appears, therefore, that the factors controlling asymmetry become operative after hatching and are correlated with conditions of growth. The histological changes which occur at these stages of growth and regeneration are being studied.

Mr. R. E. Scammon discussed the accessory chromosome as a determinant of sex. He showed original preparations of the male germ cells of insects, similar to those which led McClung to formulate his theory of the accessory chromosome as a sex-determinant. There were also exhibited several preparations of orthopteran germ cells in which the accessory forms part of a huge multiple chromosome. The behavior of the accessory in these forms was discussed in the light of the recent work of Wilson and others, and the relation between the condition of the accessory chromosome in the Orthoptera and other insect types was shown.

Dr. F. W. Thyng described several models of the pancreas in embryos of the cat, rabbit, pig and man. In the embryos studied no reason was found for subdividing the ventral pancreas into independent right and left parts. Attention was called to the marked differences between the human pancreas and that of the other animals studied. The pancreas of the rabbit and pig usually encircles the portal vein; frequently it does so in the cat, but, apparently, no such occurrence has been recorded in man. The probable manner of development of the rare human anomaly in which the pancreas surrounds the intestine, was explained. In addition to the two human embryos modeled, eighteen others were studied. In all of these the dorsal pancreas joined the intestine nearer the stomach than the common bile duct, but in the other mammals this condition was reversed.

Professor F. T. Lewis, in describing the intestinal diverticula of mammalian embryos, cited Osler's tribute in 1881, to Meckel, who wrote of diverticula in 1812. "In the Handbuch der pathologischen Anatomie the subject is treated at great length and we have an admirable example of the thoroughness with which the older anatomists did their work. No detail has escaped him, and I doubt if any new point in structure or mode of development has since been determined." Until recently, however, the regular occurrence of epithelial diverticula along the small intestine of mammalian embryos has apparently been overlooked. There may be as many as forty-eight of these in a human embryo of 22 mm. Usually they degenerate, but it is possible that they may persist to form anomalous diverticula in the adult. There is reason to believe that elongated forms may become detached, thus giving rise to mesenteric cysts. The embryonic diverticula are discussed at length in the current number of the *American Journal of Anatomy* (Vol. 7, pp. 505–519).

Dr. John L. Bremer described aberrant roots and branches of the abducent and hypoglossal nerves. In the interval along the ventral portion of the medulla between the roots of the abducent and hypoglossal nerves, nerve roots are found in certain human embryos from the fifth to the tenth week. Of these roots there are two classes: one running ventrally, as though to join the hypoglossal or abducent nerves, or to join the glossopharyngeal nerve, to which no ventral branch has been recognized heretofore; and the other class running laterally, to pass just posterior to the accessory nerve, or, if arising further forward, to pass just posterior to the glossopharyngeal nerve. Roots of this latter class, from their

distribution, seem to represent the fibers which, in a spinal nerve, form the ramus dorsalis. The fibers of both sorts which pass anterior to the vagus seem to indicate the remnants of a ventral root to the glossopharyngeal nerve.

Professor Minot in conclusion spoke of the relations of the new department of comparative anatomy to the general work of the school. The department was organized through the interest of President Eliot, with the intention of broadening the scope of the scientific work in the new buildings, and of cooperating with investigators in anatomy, physiology and pathology. It is expected that it will contribute an essential part to the advanced teaching and research for which the new laboratories are specially designed and endowed. The old department of histology and embryology has been merged with comparative anatomy, to the financial advantage of the school. The chief energy of the new department is devoted to the first-year teaching. The instruction is designed, not to produce specialists in anatomy, but to meet the needs of practitioners in medicine, and to prepare students for their later work in the school. In the fourth year there are courses for specialists both in clinical subjects and in anatomy. The papers read at this meeting indicate the scope and variety of the research work going on in the department.

THE AMERICAN MATHEMATICAL SOCIETY

THE one hundred and thirty-eighth regular meeting of the society was held at Columbia University on Saturday, April 25, extending through the usual morning and afternoon sessions. The attendance included thirty-five members. President H. S. White occupied the chair, being relieved at the afternoon session by Professor C. J. Keyser. The following new members were elected: Professor H. E. Buchanan, Lincoln College, Lincoln, Ill.; Mr. E. F. A. Carey, University of California; Professor F. E. Chapman, Southern University, Greensboro, Ala.; Professor R. C. Maclaurin, Columbia University; Mr. E. J. Miles, University of Chicago; Mr. C. A. Stiles, University Preparatory School, Ithaca, N. Y.; Mr. J. S. Thompson, Mutual Life Insurance Company, New York; Mr. O. A. Turney, Phoenix, Ariz.; Mr. C. B. Walsh, Ethical Culture School, New York; Professor R. T. Wilbur, Christian Brothers College, St. Louis; Miss E. R. Worthington, Yale University. Ten applications for membership were received.

Professor E. B. Van Vleck was reelected a member of the editorial committee of the *Transactions,* to serve until 1911. It was decided to hold the summer meeting and colloquium of the society in 1909 at Princeton University, and Professors Fine, Osgood, Holgate and the secretary were appointed a committee to make appropriate arrangements. A committee consisting of Professors P. F. Smith, Keyser and Bliss was appointed to consider the advisability of holding the annual meeting of the society at Baltimore in affiliation with the American Association for the Advancement of Science.

The following papers were read at this meeting:

S. E. SLOCUM: "The collapse of tubes under external pressure."

E. B. WILSON: "On the differential equations of the equilibrium of an inextensible string."

E. B. WILSON: "On the principle of relativity."

E. SWIFT: "Note on the second variation in an isoperimetric problem."

J. I. HUTCHINSON: "The hypergeometric functions of n variables."

E. KASNER: "Note on Meusnier's theorem."

B. F. FINKEL: "Determination of the groups of order 2^m which contain self-conjugate cyclic subgroups of order 2^{m-4} and whose generating operations correspond to the partitions $[m-4, 4]$, $[m-4, 3, 1]$."

J. W. YOUNG: "Two-dimensional chains and the classification of complex collineations in a plane."

C. N. MOORE: "On certain constants analogous to Fourier's constants."

P. SAUREL: "On the distance from a point to a surface."

E. B. LYTLE: "Multiple integrals over iterable fields."

P. A. LAMBERT: "The fundamental theorem of algebra."

E. V. HUNTINGTON: "On the fluctuations in the speed of a flywheel."

E. V. HUNTINGTON: "On the theory of the gyro-

scope, with special reference to the Brennan monorail car."

O. E. Glenn: "Studies in the theory of degenerate algebraic curves."

The Chicago Section of the society met at Chicago on April 17–18. The summer meeting of the society will be held at the University of Illinois on September 10–11.

F. N. Cole,
Secretary

THE TORREY BOTANICAL CLUB

The meeting for March 10, 1908, was called to order at the American Museum of Natural History at 8:30 P.M. by the chairman of the program committee. There were twenty-five persons present. The scientific program consisted of an illustrated lecture entitled "On Horseback through Hayti," by Mr. George V. Nash, and was listened to with great interest by all present.

Tracy E. Hazen,
Secretary pro tem.

The meeting of March 25, 1908, was held at the museum of the New York Botanical Garden, with Dr. John Hendley Barnhart in the chair. The minutes of the meetings of February 26 and March 10 were read and approved. A special committee of the club, appointed on February 11, reported as follows:

"At a regular meeting of the Torrey Botanical Club held at the American Museum of Natural History, February 11, 1908, a committee was appointed to draft resolutions concerning the death of the late Morris K. Jesup.

"Be it therefore *Resolved,* That the secretary be instructed to enter in the proceedings of the Torrey Botanical Club, and transmit to the board of trustees of the American Museum of Natural History, this record of our sincere regret at the loss of one who always manifested such a broad and deep interest in all matters pertaining to natural science."

The report of this special committee was unanimously accepted and adopted. The scientific program was then taken up and two papers were read, of which the following abstracts have been furnished by the authors:

Botanical Experiences in Western South Carolina: Homer D. House.

The richness of the flora of the southern Allegheny Mountains was commented upon, special attention being called to the beauty of the mountains in early June, when several species of *Azalea* and *Rhododendron* are in bloom. Two trips into the mountains were described, one to Jocassee Valley for *Sherwoodia* (commonly known as *Shortia*) and to Tomassee Knob and Tomassee Falls. At the latter place several northern plants were collected, among others *Viola canadensis, Trillium grandiflorum, Filix bulbifera* and *Dryopteris Goldiana.* The second trip was to Rabun Bald in Georgia during early June. The top of this mountain is covered with *Rhododendron catawbiense,* which was at that time in full bloom. In the thickets around the coves on the eastern slope of the mountain a new species of bindweed, *Convolvulus sericatus,* was found. *Viola rotundifolia* also was found here, as well as in adjacent South Carolina, thus considerably extending its known range. The speaker exhibited a large number of specimens, several of them new to South Carolina, and commented upon their distribution.

Observations on the Nutrition of Sarracenia: Winifred J. Robinson.

Plants of *Sarracenia purpurea,* the common northern pitcher-plant, were exhibited and several colored illustrations of the plant in flower were shown.

The present series of experiments was undertaken under the direction of Professor William J. Gies at the New York Botanical Garden in the summer and autumn of 1907 to determine the digestive power of *Sarracenia purpurea* on carbohydrates, fats and proteids. Solutions of great difference in concentration were introduced into the pitchers and it was found that they resisted distilled water and 33⅓ per cent. sugar solution equally well. Acid and alkaline solutions of a very low concentration had no apparent effect upon the pitchers, but a 0.5 per cent. solution of acetic acid and a 1 per cent. solution of potassium nitrate both proved injurious. Sachs's nutrient solution caused the pitchers to decay within a few days. Liebig's meat extract was used as a test of the effect of a stimulant.

Bacteria and infusoria developed in great numbers and decay began in a few days. Solutions of milk in distilled water of different proportions were used, from the results of which it was inferred that the pitcher produced an alkaline substance which reacted with the acid produced in a very dilute solution of milk but was not sufficient to neutralize solutions of greater strength. There was nothing to indicate that the milk fat or protein was digested. Solutions of grape-sugar and cane-sugar of different proportions were placed in the pitchers and there were no indications of a detrimental effect upon them. With Fehling's solution the contents of the pitcher, after the sugar solution had been allowed to remain in them several days, gave a reddish precipitate of copper-oxide, indicating the presence of invert sugar. The reduction was most marked in a 10 per cent. solution of cane-sugar. Starch paste was allowed to remain in the pitchers from three to seven days, when it was removed and tested by boiling with Fehling's solution. The reddish precipitate indicated that a reduction had taken place, though it was not so marked as in the case of the cane-sugar. The addition of an antiseptic did not hinder the reduction of the cane-sugar or starch. Olive-oil and ethyl-butyrate were used to test the fat-digesting power of *Sarracenia,* but the results indicated no digestion. Fibrin was used to determine the digestive power upon protein, but the results were negative. These results as to protein correspond with those obtained by Schimper in 1882 (*Bot. Zeit.* 40: 225) and by Goebel in 1893 (*Pflanz. Biol. Schild.* 2: 186).

MARSHALL A. HOWE,
Secretary pro tem.

DISCUSSION AND CORRESPONDENCE

VERY HIGH CUMULUS CLOUDS

TO THE EDITOR OF SCIENCE: The conflagration in the city of Chelsea on April 12 caused cumulus clouds to form at a great altitude. At Blue Hill Observatory, situated 14 miles south and 630 feet higher, in the afternoon the temperature was 45° and the relative humidity 14 per cent., with a gale from the west-northwest. The sky was cloudless, except for a succession of flat, white cumulus which formed at the top of an immense inclined column of smoke that was highest over Boston harbor and about twelve miles from Chelsea. After drifting further to leeward these clouds slowly dissolved as they sank into a warmer stratum, because no longer supported by the rising smoke. Approximate angular measurements made at Blue Hill by Mr. L. A. Wells and in Boston by the writer, when combined with the direction of the smoke, gave the minimum height of these clouds between four and five miles. Their relative velocity as compared with the surface wind also indicated that they were much higher than the ordinary cumulus clouds which float at the level of about a mile.

Artificial conditions gave rise to these clouds, since the air was too dry for the convectional currents at their normal height to cool to the dew-point, even if they had not been broken up by the strong wind. The air, which was intensely heated by the fire, however, maintained its potential excess of temperature over the surrounding air long enough to ascend to so great a height that its small vapor content was condensed into cloud, when it formed not, as is usual, "the visible capital of an invisible column," but the white crown of a brown mountain.

Mr. S. P. Fergusson described in SCIENCE, Vol. X., p. 86, the formation over a fire of similar clouds whose height was also measured from two stations, but in this case the clouds had only half the altitude of those recently observed. In thunder-storms, however, the cumulo-nimbus rise into the cirrus level and their tops have been measured at Blue Hill above eight miles, or nearly twice as high as the cumulus caused by the Chelsea fire.

A. LAWRENCE ROTCH
BLUE HILL METEOROLOGICAL OBSERVATORY,
April 22, 1908

CLOUDS OVER A FIRE

THE great fire in Chelsea, Mass., on Sunday, April 12, 1908, which burned more than two square miles of city blocks, began under conditions of clear sky and high west to north-