fection, de sa pauvreté, de son échec final et inévitable; s'efforcer de s'ouvrir sur les autres, de partager avec eux ce qu'on possède et d'acquérir en échange ce dont on manque; tendre à réaliser la communion des âmes, l'unité divine, — voilà un plan qui ne manque pas d'attrait, qui répond en tout cas à un instinct réel, profond, souvent exprimé par les poètes, les métaphysiciens, les moralistes, les fondateurs de religions. S'il est vrai qu'il n'y a point de pensée sans action, point d'action sans but; et que, par suite, nous ne pouvons nous soustraire à la question de la finalité, celle-ci me paraît moins fantaisiste que le devoir de penser pour penser; et elle rend mieux compte des faits que le besoin de se défendre contre les accidents de la vie. Elle est fragile sans doute, par son extrême généralité, mais du moins ne prend-elle son point d'appui que sur des données réelles et sur des sentiments observables. Pour le surplus, il serait bien contraire à la liberté de l'esprit de se l'interdire; il suffit seulement qu'on sache ce qu'on fait, et qu'on ne prenne pas une maquette pour un monument.

André Lalande.

"Men of Science in Session."
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MEN OF SCIENCE IN SESSION.

The session of the National Academy of Sciences held in Boston last week was exceptional in several ways. The place of meeting, the new Harvard medical school, was incomparably the most stately and superb that the academy had ever occupied. It is a vast composite building, or series of five buildings, connected by covered ways, all of marble, white, but not pure white. It seems that the builder had the contract for the New York Library; and that in consequence of only perfectly white marble being acceptable for that building, he was able to offer the Boston medical school terms for marble not quite white, and all the more beautiful, perhaps, for that, at a price far below the price of brick. The magnificence of the building is, however, not confined to the exterior. It extends to every detail of the interior and to its furniture; while all is severely simple and conformed to the needs of the work that is to be done there. It is situated in the Fenway, not far from Mrs. Gardner's palace, making two marvels, either well worth a special visit to Boston.

The list of papers was the longest ever presented at any session. Indeed, it was far too long, numbering more than forty; including eighteen by gentlemen not members of the academy. The consequence was that the most important papers by academicians were either withdrawn or very inadequately presented; for the scientific activity of the members does not allow more than eight hours being given to the reading of papers at each of the sessions, of which there are two each year. Another unusual feature of the Boston meeting was that the papers were read in such an order as to bring those of one science together.

The first paper read, perhaps the most important of the whole list, was by Prof. William E. Story of Clark University on a method for the enumeration of algebraic invariants, a memoir finally perfecting the solution of a problem which the greatest English mathematicians of the nineteenth century were unable to compass. There was no other paper upon pure mathematics; but Dr. R. S. Woodward, president of the Carnegie Institution of Washington, gave an account of his solution of a problem in analytical mechanics, which is to be practically applied by the use of a peculiar pendulum for the determination of the acceleration of gravity. The instrument consists of two horizontal iron bars, one of which is fixed,

while the other is suspended from it by two steel tapes and oscillates longitudinally. It is hoped that by this form of instrument the errors of gravity determinations may be greatly reduced.

C. S. Peirce gave a brief account of certain studies of the nature of the fundamentally different forms of relations, signs and simple concepts. Referring to the distinction made by Bentham between idioscopy, or that kind of science which makes special observations, and cœnoscopy, or that kind of science which reasons upon facts known to all mankind, Mr. Peirce pointed out that pure mathematics comes under neither head, since it merely traces out the consequences of pure hypotheses. Cœnoscopy is thus intermediate between mathematics and idioscopy, or special science. It has one division which approaches idioscopy; that is to say, metaphysics. It has a central division, normative science, or the theory of the conditions of excellence and the reverse; and there is left over a study of just what concepts there are, regardless of their excellencies and of whether they are realized or not. This study Mr. Peirce prefers to term phaneroscopy, because its natural title, phenomenology, has been preempted by Hegel for a somewhat different inquiry. Since we cannot examine all possible concepts, we naturally limit our first studies to the simplest of them. Now it is a well recognized principle that the simpler a concept the less positive meaning it has; and therefore we must expect to find that the very simplest have a purely formal, or mathematical, character. It is almost, if not quite, impossible to reach any unquestionable conclusions about any relations until those relations have been diagrammatized, or represented in a form which appeals to the eye. Thus the chief secret of the advantage of algebraic formulæ over verbal statements is that they utilize the power of the most scientific of our bodily senses; and it is usually found that geometrical diagrams composed of lines aid the mind still more than algebraical arrays of letters.

Urged by these considerations, Mr. Peirce had already submitted to the academy a system of diagrammatization of the logical contents of the mind. Upon examining such logical diagrams we find that in one respect they strikingly resemble the structural formulæ of the chemists, since every concept is found to have its own definite valency, that is, to be in all cases connected with others by the same fixed number of attachments; while different concepts have different valencies.

An indecomposable concept, however, can neither have a zero valency, nor a valency exceeding three. We are thus led to predict in advance, with considerable confidence, that we shall find three indecomposable concepts, each at the head of a class of concepts and each marked by little further positive content than that of its special valency. Mr. Peirce went on to describe these three concepts as actually found to occur and gave some account of his observations of the different varieties of each of them.

Charles P. Bowditch of the Peabody Museum, introduced by Dr. F. W. Putnam, gave an interesting account of the chronological system of the Mayas, as made out with considerable probability, amounting in some particulars to practical certainty, by his own industrious comparisons of inscriptions at Palenque. They employed units of 1 day, of 20 days, of 360 days, of 7,200 days, of 144,000 days. There are indications that they knew the length of the tropical year quite closely and could predict the reappearances of Venus.

Prof. Arthur A. Noyes of the Massachusetts Institute of Technology gave an account of researches now in progress by himself and others whom he named into the electrical conductivity, the ionization and the hydrolysis of salts in aqueous solutions, at temperatures running all the way up to 300 degrees C. (=570 degrees F.) The ionization is found to decrease as the temperature rises and to decrease more per degree of such rise the hotter the solution. Different salts of monobasic acids and of univalent bases are ionized to about the same extent at any one temperature; but a corresponding salt of a dibasic acid is ionized less; so that at every temperature the non-ionized part is about twice as great as if the acid were monobasic.

Prof. Theodore W. Richards presented an account of researches by himself, with Messrs. L. J. Henderson and H. L. Fevert as collaborators, upon the heat of combustion of benzol. The greatest difficulty of such determinations arises from the heat flowing out from the calorimeter and getting lost. In order to avoid this Prof. Richards has invented a calorimeter in which the temperature of the water in which the calorimeter is immersed is kept precisely the same as that of the interior of the calorimeter by continual additions of hot water. It is found that the presence of nitrogen prevents the completeness of the combustion.

Prof. Richards also read a paper by himself and George S. Forbes on the atomic weights of nitrogen and silver.

The above were the papers of Tuesday morning, November 20. The afternoon until dark was given up to a conversazione, in imitation of the reunions of the Royal Society in London that are called by that name. It was the first that the Academy has held and was highly successful, because it afforded opportunities for explanations that one cannot well ask for in a public meeting. Most of the exhibits, however, including the best of them, were of apparatus, specimens, &c., that well informed persons had seen before. The best of all, and the most perfectly presented, was the exhibition of stellar photographs from the Harvard College Observatory. But everybody who takes any really deep interest in astronomy has seen all that much more fully and has read the publications of the observatory describing them. An ingenious thing was Prof. Cannon's foëtrope showing the progress of food through the elimentary canal of a fowl, viewed by X-rays, with the movements of the stomach and intestines. There were about fifty exhibits, again an excessive number.

Wednesday morning was devoted to the business meeting of the academy, which is not open to the public. The papers of the afternoon, withthe exception of the first and last, were astronomical. The first, by Gilbert N. Lewis, related to the energy set free in oxidation. W. H. Pickering illustrated with a gyroscope, which he held in his hand, the theory which was advocated, if we remember rightly, by George Darwin in his lectures on tides: that all the planets except Neptune and to some extent Uranus also, have

turned topsy turvy since they first became independent bodies. As long as the parts of a planet were not rigidly connected Kepler's third law would make the side of the planet nearer the sun have a greater velocity than the further side. In other words the rotation on its axis must have taken place in the opposite direction to its revolution around the sun, which agrees with the present mode of rotation of Neptune but is the opposite to the present direction of rotation of the earth, Mars, Jupiter and Saturn and presumably also of Mercury and Venus (the observations of which are open to doubt). Indeed, the original rotation would have been retrograde, or Neptunelike, whatever the law of attraction were, as long as the planets were attracted to the centre of the system; that is, as long as they performed any revolution around the centre. But the tides tend to cause a retardation of the rotation of the planet on its axis, and this, upon the principle of the gyroscope, tends to cause the planet gradually to be upset. In the case of Uranus, this upsetting has been apparently half performed, so that the axis of that planet is nearly in the plane of its orbit. There certainly are tides on that planet, and these must be slowly acting to tip it over into the position of the inner planets.

Mr. Pickering illustrated the matter by a gyroscope upon whose rotation he could bring to bear a greater or less friction at will. The remainder of the paper, which was more original, related to the ninth and tenth satellites of Saturn, both of which were discovered by Mr. Pickering himself by the aid of photography. The ninth, which is the outermost of all and consequently may be presumed to have been separated from the planet at an extremely early date, has a retrograde motion around Saturn, indicating, as it would seem, that the planet had a retrograde rotation on its axis at the time that satellite was separated from it. The tenth satellite (in the order of discovery) lies in the narrow annular space between the orbits of two satellites both much larger than it. The very curious circumstance about it is that when it was first discovered it was moving in a peculiar orbit greatly inclined to the planes of the other satellites. Then Saturn, owing to the earth's annual course, passed too near the direction of the sun to be observed; and when next this satellite could be seen it was moving in an entirely different orbit and was behaving like any common satellite. Mr. Pickering has succeeded in proving that in the interval it was at one time very close to the large satellite Titan, whose orbit lies next within that of the tenth satellite; so that it is probable that it was drawn into its present orbit by the attraction of Titan. One wonders what it will do next.

S. I. Bailey, who is well known to the astronomical world for his skilful use of the Bruce photographing telescope, described the performance of that instrument. The whole heavens, north and south, have already been covered by 1,600 plates, which are estimated to show 8,000,000 stars in all. Another set is now being made with exposures of four hours, showing stars down to the eighteenth magnitude; and this will show some 30,000,000 stars. As one indication of the value of the work of this instrument Mr. Bailey mentioned that when the instrument was first set up the total number of stars known to be variable was about two hundred, but the study of the 1,600 plates, though as yet it is very far from complete, has added more than 2,000 new variables. These large numbers enable astronomers to study the system of the visible heavens statistically; and it is only by statistical studies that its true structure can ever be made out. This was illustrated by the next paper, which was by Prof. George C. Comstock, the director of the Washburn Observatory in Madison, Wis. This observatory, created by Watson and greatly improved by Holden, has a particularly fine meridian circle and a clock perhaps never surpassed.

Prof. Comstock, who has the typical astronomical physiognomy, and especially that sharp eye of the Alvan Clark type, has been redetermining the places of stars of the seventh and eighth magnitudes which were first measured with high accuracy in the first quarter of the nineteenth century by the two Struves at Pulkova. He thus has accumulated a large body of proper motions from which he has made a new determination of the motion of the solar system, based upon data entirely independent of those heretofore used. The result agrees substantially with previous work, though the direction of motion relative to the faint stars differs a little from the motion relative to bright ones. He did not, however, explain the refinements of his procedure, which would have taken too much time. His investigation has not stopped here. He has gone on to use both the new data and the older ones to ascertain, as well as it is yet possible to do so, the constitution of the galactic cluster, which includes, no doubt, substantially all the stars visible to our telescopes or on our photographic plates. His conclusions, which are in some respects quite unexpected, must of course be subjected to careful criticism. Thus he dissents from the opinion that the visible universe shows a definite limit, and he holds that about the two poles of the milky way, and extending nearly or quite to the milky way itself, there is something that obstructs our vision, so that stars not very remote, comparatively speaking, appear fainter than they would if they were in the galaxy. Indeed he goes so far as to say that the eighth magnitude stars are not further from us than those of the sixth magnitude. This must be very seriously examined in every possible way. One conclusion of Prof. Comstock's that will be readily accepted is that there are about a thousand stars, or, say, as many as can be instantly recognized by the naked eye in any one-half of the sphere, which go along with the solar system in its motion through space. He seemed to speak as if this were a pretty sharply definite group or cluster. The whole paper was most excellent and was admirably presented.

Dr. George E. Hale, director of the Carnegie Institution's solar observatory on Mount Wilson and perhaps the most brilliant astronomical investigator now active among a number who command our admiration, gave a paper on sun spot spectra and their bearing on stellar evolution. With his always rapid delivery, accelerated by his evident anxiety not to encroach upon the time of those who were to follow him, he touched upon a great number of points; but if there was any that has not been set forth in the swift succession of recent publications of his wonderfully active observatory

it escaped the reporter's slower moving attention. That the spectra of many stars show peculiarities of the relative intensities of different lines of the same metal, which peculiarities are strongly marked in the sun spots and are in all probability due to cooling or to lower temperature, has recently been shown very clearly by Dr. Hale; and perhaps it will be possible soon to distinguish with certainty between a comparatively cool star which has not yet become hot and one whose heat is becoming exhausted. Sir Norman Lockyer attempted to make this distinction in his book on inorganic evolution, but with very doubtful success. At present the prospect is more hopeful. Dr. Hale mentioned a part of his observatory which embodies a most vital condition of successful research. This is a chamber in which, upon an annular pier, are kept, mounted and ready for instant activity, a variety of instruments for examining terrestrial spectra of all kinds under all sorts of conditions of pressure, temperature, magnetism, &c. Thus when any phenomenon is observed astronomically and the suggestion arises that it might be due to certain conditions the observer can without delay walk into this chamber and make the observation which shall either confirm the suggestion and allow further research to proceed with confidence or shall negative it and show that a different hypothesis is required; or perhaps shall partly confirm it and partly refute it, showing him that he is in the way of the truth but must modify his theory. Rapidity is a more vital factor of success in that mingled process of observation and reflexion that constitutes research than scientific men have usually seen that it is. The closer the union of the observational part and the reasoning part the surer will be the aim, other things being equal; and Dr. Hale, who is a prompt snatcher at time's forelock, has here set an example which will bear good fruit.

Dr. Alexander Graham Bell next read an extended paper upon flying machines. He began with a historical introduction in which he reaffirmed, as an eye witness, the facts of Prof. Langley's experiment of 1896 upon an aerodrome having a wing spread of 14 feet and propelled by steam. "No one," he said, "who had witnessed the extraordinary spectacle of a steam engine flying with wings in the air, like a great soaring bird, could have doubted for a moment the practicability of aerial flight." He maintained that the later disaster proved nothing. He then described the machine of the Wright brothers. They have kept in the air for 38 minutes, and have described figures of eight. The weight carried was nearly two pounds to the square foot of supporting plane. Their velocity has been about thirty-seven miles an hour. Dr. Bell thinks, however, that such high speed is dangerous, at any rate in the infancy of the art, although it is necessary if the weight is to be so great in proportion to the supporting plane. He also showed exactly why planes that are nearly horizontal are necessarily deficient in stability. For that reason he prefers a structure built up of tetrahedral cells. He described a kite made and flown by him. Each cell consists of two horizontal rods each about 10 inches long, one running, say north and south, and the other east and west, each end of each being connected by means of a rod of equal length with each end of the other. The two lower triangles so formed are covered with silk. His kite was built up as follows: The lowest layer consisted of 12 rows of 13 of such cells in each row; the next layer of 11 rows of 14 cells in each row, &c. Each layer had one fewer rows than the layer below it and one more cell in each row. Thus the twelfth layer consisted of a single row of 24 cells. There were 1,300 cells in all. These cells weighed about 40 pounds, and some strengthening material brought the weight up to 61 pounds. In a breeze not sufficient to raise whitecaps on the surface of the sea, this kite carried up, besides its own weight, 62 pounds of manila rope and a man whose weight was 165 pounds, making 238 pounds in all. This was about one-third the weight to the square foot of supporting plane that the Wright machine carries, but the tetrahedral structure is far more stable than Wright's at the same velocity.

Thursday's meeting was opened by Prof. Arthur Q. Webster of Clark University, Worcester, Mass., who described an apparatus for the accurate measurement of the intensity of sound. Prof. Webster seems to have constructed the apparatus long ago, but to have brought it forward only when there appeared to be a real demand for such a thing. There is a pressure gauge consisting of a thin disk of glass which responds perceptibly to a difference of pressure of one hundred millionth of an atmosphere, which is the limit of sensitiveness of an ordinary ear. This is set in vibration by the sound to be measured, which acts on a resonator. The disk receives also a constant vibration in another direction, due to a silent tuning fork. Then a ray of light falls upon a small mirror on the disk, and this, being viewed by a telescope, shows Lissajous figures which alternate between two elliptical forms. By a simple contrivance their positions and dimensions are measured. This is the phonometer. It gives a purely physical measurement which will in many cases not agree with the physiological intensity. It is, therefore, necessary to provide a second instrument which emits a simple harmonic sound of any desired intensity within certain limits.

Dr. George W. Pierce of Harvard University followed with an exhibition of an instrument governed by principles somewhat analogous to those of Prof. Webster's phonometer, but designed to measure the wave lengths of the vibrations of wireless telegraphy. A couple of measurements were actually made before the audience.

A paper by Dr. Otto Folin on the metabolism of creatin and creatinin was read by title.

W. T. Porter of the Harvard Medical School, introduced by Dr. Henry R. Bowditch, read an interesting paper upon vasomotor relations. He began by describing the circumstances in which a great fall of blood pressure may occur and put life into the utmost instant peril. In particular he described in some detail the amputation of an arm, in which after every other connection had been severed there was no symptom of shock until certain nerve fibres were cut, when the shock at once occurred. There were four different mechanisms which might be supposed to cause the phenomenon: cells of the medulla, of the spinal cord, of the sympathetic system and of the blood vessels themselves. He proved that the shock cannot be produced by inhibition or by fatigue, but is probably due to a hypersensitive state of cells in the medulla. No reduction

of blood pressure can be produced by the stimulation of any nerve, but strychnine in doses neither too small nor too great may set up this condition. He thought it likely that drugs would be found that would be capable of overcoming the malady.

Papers by Profs. Edwin H. Hall and Trowbridge were read by title. Dr. Theodore Lyman of Harvard University, introduced by Prof. John Trowbridge, read a paper on the wave lengths of the extreme ultra violet spectrum. This spectrum was discovered a few years ago by Schumann, who used an apparatus of white fluor-spar exhausted to high vacuum, for even a layer of air one millimetre thick will absolutely cut off this light. Schumann had no means of ascertaining the wave lengths of the spectral lines of hydrogen which he detected. But Dr. Lyman, by means of an apparatus consisting of an exhausted tube containing a little hydrogen, with a grating at one end and a photographic plate at the other, succeeded, after eighteen months patient experimentation, in obtaining some photographs of the spectrum of hydrogen, and ultimately succeeded in identifying no fewer than 358 of Schumann's lines with his own. He found that the limit of Schumann's spectrum was at 1,250 of Angström's scale, and that the reason of this limitation had been that fluorite is not transparent for light of shorter wave length. He himself had carried his measures to 1,030 of the same scale. He found there was a great gap in the hydrogen spectrum, the higher limit of this gap being at 1,600. Quartz is considerably more transparent than rock salt. The spectrum of the latter stops at 1,780, while that of the former extends to 1,500.

Prof. Charles S. Minot read a paper on the nature and cause of old age. A guinea pig at birth increases in weight at the rate of 5 per cent. per diem. A month latter its diurnal increase is reduced to 1 per cent. It is thus growing old at a stupendous rate at first, and grows old slower and slower the older it becomes. A rabbit at birth gains 16 or 17 per cent. in weight daily. It is not until the end of a month that the daily increment is reduced to 5 per cent. The rabbit and guinea pig grow old at the same rates at corresponding ages. Dr. Minot insisted that old age is best studied in the embryo. Old age is marked by an increase in the amount of protoplasm relatively to the nuclein. This is an increase of variety; and "cellular differentiation," said Dr. Minot, "is old age." No doubt it was the brief time that prevented him from making clear the advantage of such paradoxical forms of statement. On the other hand, he regarded the process of segmentation of the egg as a process of rejuvenescence.

Dr. Robert T. Jackson of Harvard University, introduced by Dr. E. L. Mark, explained the structure of the animal called richthofenia, and showed that it is neither a coral nor a barnacle, nor belongs to any of the other classes to which it has been referred, but is a brachyopod.

In the afternoon Dr. W. E. Castle of Harvard University, introduced by Dr. E. L. Mark, read a paper on the process of fixing characters in animal breeding. He began by reminding us that not only are some animals normally produced from a single parent, but that parthenogenetic reproduction has been artificially brought about, and further that a spermatozoon penetrating a fragment of an egg containing no nucleus can result in the production of a perfect animal, though a small one. These facts show that the sexual element of either sex contains all that is requisite for determining every essential character of the species, and, consequently, we must suppose that each sex cell contributes to every part of the offspring. He then gave an account, with specimens, of some experiments upon crossing guinea pigs of different colors. If a black and a tawny, or so-called red, guinea pig are mated the offspring will have hair partly black and partly tawny, but it will look black. Now, if this offspring is mated with a black guinea pig, the proportions of black, red and mingled offspring can be determined by a simple rule, and in certain of these the character will be fixed. There is also a brown variety of guinea pig, understood to be the primitive form, and called the agouti. Dr. Castle had found that in breeding from these and the black he obtained in the second generation in every sixteen of the descendants about four red, three black and nine agouti animals. This he accounted for according to the usual principles, and he announced, apparently as a general proposition in breeding, that a character could be fixed in the second generation and that it is quite needless to go further. Prof. Brewer remarked that, although the law of cross-breeding was in some cases such as Dr. Castle had represented it to be, yet there was conclusive evidence to show that in other cases characters are acquired by slow degrees, as speed has gradually been increased in trotting horses.

Bailey Willis of the United States Geological Survey, introduced by Dr. Charles D. Walcott, read a paper on heterogeneous elements of the continent as factors in the history of North America. He showed that there had been five great emergences and between them four great submergences. He adopted Archdeacon Pratt's principle that heavier parts of the earth's crust must sink and lighter parts rise according to hydrostatic pressure. Then, as Major Dutton pointed out, the light material, having been carried to a higher level, will gradually be transferred in part so as to cover the heavier material, while at the lower surface of the earth's crust (supposing there is any such definite surface) the heavy material will be transferred from the heavy columns to the lighter columns. The consequence must be that eventually the heavier columns become lighter than those which had at first been lighter than them. Thus subsidence and emergence naturally aternate.

Dr. Joseph Barrell of Yale University, introduced by Prof. W. M. Davis of Harvard, read a paper upon continental sedimentation, with applications to geological climates and geography. The land deposits are, both climatically and geographically, as important as the marine deposits, and are of four classes, as follows: First, desert deposits; secondly, piedmont deposits, upon the lower slopes of the mountains; thirdly, internal basin deposits, and fourthly, delta deposits.

Prof. Henry Fairfield Osborne of Columbia University was, to the great regret of the audience, forced by the too crowded programme to cut down to little more than a mere list a highly important paper upon the American tertiaries. But the reporter must confess that the extreme fatigue of listening to so many greatly hurried, and one might almost say gabbled, papers upon

branches of science not his own, has prevented his doing the justice to them that he might have been able to do had the programme not been so extremely long. Prof. Osborne allowed 3,000,000 years for the tertiary period in America. The lowest deposits are of volcanic dust and are some 7,000 feet thick. The theory that the bad lands owe their characters to the Great Lakes is now quite exploded. Upon those dust deposits there suddenly appeared a "modern" fauna as if it had dropped from the sky. A third period was occupied by the gradual elimination of the archaic fauna. The middle miocene was marked by the invasion of an African fauna. Unanimity in regard to the great time divisions of the tertiary ages exists among American geologists, but the European geologists, who are confined to the borders of the ocean or of the Mediterranean, hold entirely different opinions, and what is worse they use the same technical terms in senses whose relation to the meanings given to them by our own geologists is doubtful. It is very desirable that some of them should come to see our tertiary, while some of our men explore the European field, in order that an intercontinental agreement may be attained.

Dr. G. H. Parker of Harvard University, introduced by Dr. E. L. Mark, relieved the fatigue of the audience by a decidedly entertaining paper upon the reactions of amphioxus to light. He began by informing those who did not already know it that one of the enigmata of zoology is the origin of the vertebrate eye. The evidence seems to be very strong that some of its usual features have been derived from the transformation of cells deep below the brain proper. Yet it seems incredible, and on received principles impossible, that the organ of sight should have been developed in total darkness. For that reason some have supposed that it took its origin in the skin of the head and then passed through the brain, somewhat as one eye of a flatfish does. This theory is supported by the fact that the skin of the frog and of some fish is sensitive to light. Dr. Parker, having lately found himself in a locality where the amphioxus is very plentiful, thought this a good opportunity for gaining some new facts which might have a bearing upon this difficult puzzle. For the amphioxus, as is generally known, is the very lowest form of vertebrate animal, if indeed it belongs to that type, which some have been unwilling to admit. It is a vertebrate without a vertebra. It is stated in all the books that the skin of amphioxus is excessively sensitive to light. But Dr. Parker found that this is an error due to the fact that when a ray of light strikes one of a shoal of amphioxus, in such a manner as to cause him to move, all the rest move in consequence of the commotion of the water. There has also been some doubt whether amphioxus swims head first or tail first, but Dr. Parker finds that the animal swims either way. The animal being perfectly transparent, there is no reason why the beginnings of an eye should not be developed in its inner parts, and Dr. Parker found that the skin is either not at all, or very little, sensitive to light, but that certain beadlike pigment cells of the spinal cord are decidedly so.

Dr. E. L. Mark of Harvard University gave an account, illustrated by maps and views projected from a lantern, of the marine biological station at Lajolla, Cal., near San Diego.

The well known geologist, Charles S. Van Hise of the University of Wisconsin, gave an account of the cobalt silver district of Ontario, the only region where cobalt is found in important quantities. It occurs as smaltite and as cobaltite.

The session closed with the reading of a suggestive paper by Dr. Ellsworth Huntington of Harvard University, introduced by Prof. W. M. Davis, on the evidence of desiccation during historic times discovered by him in Chinese Turkestan. He set forth evidences upon which he rested with numerous photographic views thrown upon the screen. They seemed to be of a thoroughly trustworthy kind; but it was naturally impossible to subject them to any severe criticism. It may, however, be said that if they do not amount to demonstration of the curve of humidity which he exhibited, at least they are sufficient to call for new explorations. According to his curve, in the earliest times before the Christian era, the country was well watered, but was beginning to dry up. This desiccation went on faster and faster, till about A. D. 100; and the dryness reached its worst about A. D. 500. It then began to be less dry; and about A. D. 1000 reached a maximum of humidity, which, however, was not more than that at the epoch of our calendar. Since that date it has been gradually drying up again and is now nearly as dry as at A. D. 500. The reporter cannot, however, vouch for these statements as a correct report of the minuter details of Dr. Huntington's conclusions, who suggested, however, that the invasion of the Huns might have been due to the drying up of their own land.