

intensities and heat seems to have no effect, except in the absence of light, when they migrate to the colder area. Experiments also show that heat does not act in the same way as light upon the organism.

H. S. Jennings points out that in infusoria and in certain rotifers, besides the radial and bilateral types there is a third type, the spiral or at least one-sided, asymmetrical type of structure with a definite relation to the method of movement and life. In the rotifers this asymmetry affects the internal organs as well as the external features which cause the spiral swimming.

The only cytological paper is by R. Floyd, who describes the nerve cells of the cockroach under various kinds of preservation. He concludes that all nervous studies must be controlled by study of the living tissue. The thoracic ganglion cells have no evident cell walls. The cytoreticulum is studied, but no classification of the cells found was possible.

Last to be mentioned is the paper by W. E. Castle and G. M. Allen on the heredity of albinism and Mendel's law. They have experimented with mice, guinea-pigs and rabbits, and find that complete albinism is always recessive. A suggestion is made to account for the phenomena of mosaics, and it is pointed out that cross-breeding frequently brings out latent characters and that this probably affords the explanation of many cases of reversion.

In closing this synopsis of the volume the reviewer may be allowed to praise the mechanical execution of the work. The plates—produced by lithography, heliotype and other photo processes—illustrate the papers. The proof-reading has been done in a careful manner, and probably the work owes not a little of its many excellencies to its editor, Dr. G. H. Parker.

J. S. KINGSLEY.

SCIENTIFIC JOURNALS AND ARTICLES.

The Bulletin of the American Mathematical Society for February contains the following papers: Report of the Tenth Annual Meeting of the American Mathematical Society, by F. N. Cole; Report of the Cassel meeting of the Deutsche Mathematiker-Vereinigung, by R. E.

Wilson; 'On a Test for Non-uniform Convergence,' by W. H. Young; 'On the Condition that a Point Transformation of the Plane be a Projective Transformation,' by Elijah Swift; 'Note on Cauchy's Integral,' by O. D. Kellogg; Review of Bauer's Algebra, by L. E. Dickson; Shorter Notices of Wölffing's Mathematischer Bücherschatz, Bucherer's Vektor-Analyse, and Ferraris's Grundlagen der Elektrotechnik; Notes; New Publications.

The March number of the *Bulletin* contains: Report of the December Meeting of the San Francisco Section, by G. A. Miller; Report of the Fifty-third Annual Meeting of the American Association for the Advancement of Science, by L. G. Weld; 'On a Gap in the Ordinary Presentation of Weierstrass's Theory of Functions,' by W. F. Osgood; 'On the Theorem of Analysis Situs Relating to the Division of the Plane or of Space by a Closed Curve or Surface,' by L. D. Ames; Review of Hadamard's Propagation des Ondes, by E. B. Wilson; Review of Burkhardt's Theory of Functions, by L. E. Dickson; Notes; New Publications.

SOCIETIES AND ACADEMIES.

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON.

THE 355th meeting was held on February 9. A letter from Miss Fletcher was read in which she stated that, owing to sickness, she would not be able to deliver the presidential address. A letter from Dr. Daniel Folkmar describing the anthropological work he is carrying on in the Philippines was read by the secretary.

Dr. Ales Hrdlicka exhibited cremated human bones from the Choptank River, Md., collected by Dr. Elmer Reynolds, and stated that they are interesting as the first evidence of cremation in the eastern United States except in Florida. Dr. Reynolds, who was present, described the conditions under which the remains were found.

The first paper of the evening, by Mr. W. E. Safford, discussed the question, 'Were the Aborigines of Guam Ignorant of the Use of Fire?' Mr. Safford showed in the clearest manner the origin of the myth that the Chamorros of Guam were fireless at the dis-

covery of the island, finally running it back to the story of a sailor who had accompanied Magellan. At present the inhabitants of Guam make fire by the plow and saw methods, the latter introduced from the Philippines.

The title of Professor L. F. Ward's paper was 'Monogenism or Polygenism.' Professor Ward added much from the biological side that is new and germane to the topic of man's descent, which long agitated anthropologists until the weight of opinion fell to the balance of monogenism. There is no such thing in nature as a first pair; nature is a becoming; there is no abrupt beginning; monogenism, therefore, is the theory that the human races have all descended by various lines from a common ancestry. Biologists are practically at one as to the descent of all living creatures from one primary source. Polygenism is regarded by them as impossible either for the human race or for animals or plants.

The difficulty is to make this clear to non-biologists, and Professor Ward began by explaining that function is simple, while structure is immensely varied. Functions are the ends to which structures are the means.

For example, there is only one kind of life, and only one kind of mind or reason. There are comparatively few vital functions and the same function may be performed by entirely different structures. This is illustrated by what are called analogies in biology. Flight, for example, is a function, but the wings of insects, birds and bats are all different structures. While functions are always the same, there is complete fortuity in structures, and the same structure would never be independently developed twice. Man is a bundle of structures, and the chances are infinity to one that another being could have independently arisen exactly like him. Following out this idea, Professor Ward said that the inhabitants of Mars, should there be such, could not be like any of our types of animals. Fertility *inter se*, which obtains in all the human races, was also urged as an argument against the possibility of polygenism, and as showing that the lines of descent of the human races are very short.

One of the most important corollaries from

the monophyletic origin of man is that all races are of the same age; *i. e.*, all are equally old. There are no 'primitive' races. Man is characterized only by degrees of culture and advancement, but all have taken the same time to reach the point of development in which they are now found.

The paper was discussed by Dr. O. F. Cook, who objected to the use of both monogenism and polygenism and suggested eurygenism as denoting the tendency of all life to ramify.

THE 356th meeting was held February 23. The report of the committee on the preservation of American antiquities was heard and the bill which they have prepared read to the society. The matter was referred to the next meeting for discussion.

Dr. Ales Hrdlicka exhibited and described a true fossil human skeleton from the western coast of Florida. Very few such remains have been found in which the organic matter of the bones has been replaced by mineral. The specimens shown are in the National Museum, one of them a skull converted into limonite, the other a fragmentary skeleton, mineralized in somewhat different manner. The former was described by Professor Leidy in 1879. The bones have been analyzed and are found to contain only eight tenths per cent. of organic matter, but the physical characteristics of the skeleton are Indian-like, and do not point to any great antiquity.

Dr. I. M. Casanowicz read a paper entitled, 'Sacrifice as a Means of Atonement and Communion with the Deity.' The origin of sacrifice was assumed to be a homage actuated by fear and the offerings were naturally of food, and the act was a providing for the wants of the god. In ancient belief the spirits of the gods gathered like flies around the sacrifice. It came to be thought that the gods smelt the sweet savor of the sacrifice and that men depended on the gifts of the gods, and conversely the gods depended on the offerings of men. Later the dependence of the gods on men was eliminated and we have sacrifices of another kind, as the human sacrifice, which may emanate from the belief that the value of the gift is proportioned to the privation of the

giver, and the sacrifice of the first born arises and the self-infliction of pain.

The blood relationships between men and gods arising from the organization of men in kindreds with heads, representatives of gods, was discussed by Dr. Casanowicz and interesting examples of the beliefs and rites given.

Dr. B. Rosalie Slaughter, who has recently returned from the east, gave an illustrated paper, entitled, 'A Journey in Korea and North China.' Attractive views were shown of the scenery, villages, architecture and people, with comments on them that showed the thorough acquaintance of Dr. Slaughter with the subject. At the close of the paper the society passed a vote of thanks to Dr. Slaughter for her interesting address.

WALTER HOUGH,
General Secretary.

THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE.

THE fifth regular meeting of the Society for Experimental Biology and Medicine was held on the evening of February 17, in the rooms of the department of pathology of the Cornell University Medical College. Dr. S. J. Meltzer presided. *Members present:* Adler, Calkins, Crampton, Dunham, Ewing, Gies, Jackson, Levene, Lusk, Meltzer, Murlin, Norris, Richards, Wadsworth, Wallace, Wilson, Woodworth, Yatsu. Abstracts* of the reports of original researches follow:

The Nature and Basis of Sexual Selection in Moths: H. E. CRAMPTON.

The object of the investigation described was to obtain a quantitative expression for the strength of the mating instinct in certain species of large saturnid moths (*Philosamia cynthia* and *Samia cecropia*), and to determine the correlation between the mating instinct and structural characters. The results of earlier statistical studies upon the pupæ of these species were reviewed, dealing with the nature and basis of the process of natural selection during the period before

emergence and at emergence. It was shown that:

1. Those pupæ which die after pupation and prior to metamorphosis are structurally different from and more variable than those individuals which successfully survive the pupal period.

2. Those pupæ which become perfect moths are likewise different from those which can not emerge as perfect moths.

3. The basis for selective elimination is to be sought in correlation between the various structures.

The mating period follows immediately after metamorphosis, when certain individuals with weak mating instinct fail to take part in the production of the next generation, and are thus 'sexually eliminated.' In order to determine the points mentioned above, pupæ of the two species named were isolated as the time for metamorphosis approached, and upon emergence were given one opportunity to mate. It was, therefore, possible to compare the pupæ of the two classes of mating and non-mating individuals. The results, briefly stated, are:

1. That even slightly imperfect moths possess very little mating instinct, or in other words, that with the structural conditions associated with an imperfect power of emergence is correlated a low grade of mating ability.

2. That the mating individuals of the perfect class differ structurally to a certain extent from the non-mating ones, but they are very much less variable than the latter class.

The importance of these results from the standpoint of inheritance and evolution is sufficiently clear to render extended discussion unnecessary.

Observations on a Serous Fluid of Unusually High Molecular Concentration: E. K. DUNHAM.

The fluid was removed from the pleural cavity of a man suffering from lobar pneumonia. The patient was a scene-shifter in a theater and had suffered considerable pain in the chest for four months before his admission to the hospital. His occupation required severe labor for brief periods, during

* The authors of the reports have furnished the abstracts. The secretary has made only a few abbreviations and minor alterations in them.

which he became much heated, with intervals of leisure and exposure to cold drafts of air. The immediate reasons for his admission were a chill and inability to continue work. There was nothing unusual in the clinical course of the pneumonia or peculiar in his treatment. A few days after he entered the hospital 400 c.c. of a clear serous fluid was aspirated from the affected side of the chest and was examined on the same day, with the following results:

Distinctly alkaline, specific gravity, 1021; depression of freezing point, 1.383° C. (mean of three examinations with different portions of the fluid, 1.395 , 1.385 and 1.370° C. respectively); electrical conductivity, 0.009119; chlorine calculated as NaCl, 0.58 per cent.; total nitrogen, 0.84 per cent.; nitrogen from washed tannic acid precipitate expressed in percentage of the fluid, 0.83 per cent.; proteid ($N \times 6.25$), 5.21 per cent. of the fluid; traces of reducing substance (sugar?) after removing proteids with ferric acetate; traces of nitrogen liberated by hypobromite of soda; no extractives of appreciable amount upon shaking with ether, acetic ether, or chloroform.

The matter of chief interest in the results was the considerable depression of the freezing point— 0.81° C. greater than that by the blood, which was found to be 0.57° C. This 0.81° C. represents nearly 0.438 gram-molecule in solution in excess of the molecular concentration of the blood, and appears to be a clear indication that osmotic interchanges between this fluid and the blood did not freely take place, possibly because of a thick layer of fibrin upon the pleural surfaces. Such a deposit would not, however, explain the high molecular concentration of the fluid. It appears most probable that this was produced subsequent to the formation of the fluid, by cleavages in the larger molecules originally present in solution or by the solution of substances not at first dissolved. These substances could not be dissociable, because the electrical conductivity was rather lower than is usual in such fluids. If the substances causing the high molecular concentration were organic compounds they were not extractives soluble in ether, acetic ether or chloroform.

On the assumption that cleavage products of proteid substances, precipitable with tannic acid, might be present and cause the unusual depression of the freezing point, the following experiments were made: Sterile horse serum, which had not been subjected to heat, was divided into portions. Of these some were kept for controls and others were inoculated with pure cultures of *Staphylococcus pyogenes aureus*, or Fraenkel's pneumococcus. Freezing-point determinations were made on certain of these portions and the rest were sealed up in pipettes holding 100 c.c. each. These were incubated at 37° C. for a week, when freezing-point determinations were made on one of the controls and one of the tubes inoculated with each of the bacteria mentioned. Cultures at this time showed the presence of great numbers of the species used, with no admixture of other species. The remaining tubes were left in the incubator for several months, when cultures proved to be sterile. The results of physico-chemical examination of these sera are tabulated below:

HORSE SERUM A.

Sterile Controls.

1903	$^{\circ}$ C.
May 19—	$\Delta = 0.580$; $K = 0.009394$
May 26—	$\Delta = 0.580$; $K = 0.009491$
1904	
Jan. 16—	$\Delta = 0.590$; $K = 0.009684$

Inoculated with Staphylococcus.

1903	$^{\circ}$ C.
May 19—	$\Delta = 0.585$; $K = 0.009370$
May 26—	$\Delta = 0.585$; $K = 0.009674$
1904	
Jan. 16—	$\Delta = 0.640$; $K = 0.010128$

HORSE SERUM B.

Sterile Controls.

1903	$^{\circ}$ C.
May 21—	$\Delta = 0.560$; $K = 0.009516$
May 28—	$\Delta = 0.560$; $K = 0.009516$
1904	
Jan. 15—	$\Delta = 0.600$; $K = 0.009897$

Inoculated with Staphylococcus.

1903	$^{\circ}$ C.
May 28—	$\Delta = 0.580$
1904	
Jan. 15—	$\Delta = 0.640$; $K = 0.010372$

These data show but slight changes in the molecular concentration of the sera, and such changes as have occurred occasion an increase in the electrical conductivity as well as in the depression of the freezing-point, showing that dissociable bodies have been produced. The experiments, therefore, fail to explain the high molecular concentration of the serous fluid from the chest; but it is possible that further experimentation in this direction will be more successful.

An Experimental Study of the Eosinophile Cells during Infection with an Animal Parasite—Trichina spiralis: EUGENE L. OPIE. (Presented by James Ewing.)

The administration of *Trichina spiralis* to the guinea-pig causes an increase of the eosinophile leucocytes in the blood, comparable to that which accompanies human infection. There is no constant alteration of the number of these cells until the end of the second week after infection, when their relative and absolute number rapidly increases and reaches a maximum at the end of the third week. At this time embryonic trichinae are in process of transmission from the intestinal mucosa by way of the lymphatic vessels and the blood through the lungs to the vascular system.

Eosinophile cells accumulate in the mesenteric lymph glands and in the lungs, and form foci which resemble small abscesses in which polynuclear leucocytes are replaced by eosinophile cells. These cells are provided with polymorphous nuclei and do not differ from the eosinophile leucocytes of the circulating blood. Accumulation of the eosinophile cells in the mesenteric lymph glands and in the lungs is explained by the transmission of the embryonic parasites through these organs.

Increase of eosinophile cells in the blood and in other organs is accompanied by characteristic changes in the bone marrow. The fat is diminished in amount and cellular elements replace it. Cells with eosinophile granulation are present in immense number and particularly numerous are the eosinophile myelocytes, cells peculiar to the bone marrow. Eosinophile cells undergoing mitotic division are more numerous than usual.

The number of eosinophile leucocytes in the blood always diminishes before death, so that the proportion is usually less than one per cent. Infection with a very large number of trichinae causes a rapid diminution of the number of eosinophile leucocytes and is quickly fatal. The eosinophile cells of the bone marrow exhibit degenerative changes of which nuclear fragmentation is most characteristic. Similar changes may affect the eosinophile cells of the intestinal mucosa and of the mesenteric lymph glands. Mild infection stimulates the eosinophile cells to multiplication, but severe infection causes their destruction.

Subcortical Expressive Reflexes and their Spinal Pathways: R. S. WOODWORTH.

Dr. Woodworth reported on some experiments done in collaboration with Professor Sherrington in the latter's laboratory. It was shown that in a recently decerebrated cat powerful sensory stimuli evoked reactions such as in a normal animal would be expressive of pain, anger and other similar emotions. Such reactions are, therefore, primarily subcortical reflexes and not dependent on the organ of consciousness. The 'ether cry' also appeared in decerebrate animals. The sensory spinal pathway, by which these signs of pain were aroused, was found by experiments in which partial cross-sections of the cord were made, to run, not in the posterior, but in the lateral columns. The pain pathway from either side of the body runs up both halves of the cord, but more largely up the opposite half.

An Experimental Study of the Cause of Shock: W. H. HOWELL. (Presented by S. J. Meltzer.)

Professor Howell's experiments were made upon dogs anaesthetized with morphia and ether, and brought into a condition of shock by operations of various kinds. Blood-pressure records were obtained in the usual way during the experiment. The following general conclusions were reached:

1. The most important and dangerous feature of severe shock is a long-continued, practically permanent fall in blood pressure to about 20-40 mm. of Hg. This condition is

designated as vascular shock and is due to a long-lasting loss of activity of the vaso-constrictor center.

2. A second important result of shock is a very rapid and feeble heart beat. This condition is designated as cardiac shock; since, although it may result secondarily from the permanent fall in blood pressure, it may also occur quite independently of the vascular shock as a primary result of the operations. Cardiac shock, so far at least as the rate of beat is concerned, is due to a more or less permanent loss of activity of the cardio-inhibitory center.

3. Intravenous infusions of alkaline salt solutions (NaCl , 0.6 per cent.— Na_2CO_3 , 0.5 per cent.) cause a rise of pressure by increasing the force of the heart beat. The effect is more durable than with salt solution alone and may be renewed by repeating the injection.

4. The fundamental cause of vascular and cardiac shock is not exhaustion of the vaso-motor and cardio-inhibitory centers from over-activity, but a more or less permanent inhibition of these centers from excessive stimulation of the inhibitory paths.

New Members.—Drs. Isaac Levin and J. P. Atkinson were elected to membership.

Officers for the ensuing term were elected as follows:

President—S. J. Meltzer.

Vice-President—James Ewing.

Secretary—William J. Gies.

Librarian—Graham Lusk.

Treasurer—Gary N. Calkins.

WILLIAM J. GIES,
Secretary.

THE AMERICAN MATHEMATICAL SOCIETY.

A REGULAR meeting of the American Mathematical Society was held at Columbia University on Saturday, February 27. The American Physical Society met at the same time and place, and an especially interesting feature of the occasion was the presidential address of President A. G. Webster of the Physical Society on 'Some practical aspects of the relations between physics and mathematics,'

which was delivered before a joint session of the two societies.

The attendance at the meeting of the Mathematical Society was about forty-five. President Thomas S. Fiske occupied the chair at the regular sessions and at the joint session with the Physical Society. The following new members were elected: Mr. E. P. R. Duval, Harvard University; Professor G. A. Goodenough, University of Illinois; Mr. H. C. Harvey, State Normal School, Kirksville, Mo.; Dr. J. G. Hun, Princeton University; Dr. T. P. Running, University of Michigan. Nine applications for membership in the society were received.

Professor E. H. Moore, who had served as editor-in-chief of the *Transactions* since its inception in 1900, was reelected to the editorial board for a term of three years.

The following papers were presented at this meeting:

WILLIAM FINDLAY: 'The Sylow subgroups of the symmetric group.'

L. P. EISENHART: 'Three particular systems of lines on a surface.'

JOSEPH BOWDEN: 'The definition of sine and cosine.'

H. E. HAWKES: 'The quaternion number systems.'

L. E. DICKSON: 'On the subgroups of order a power of p in the linear homogeneous and fractional groups in the $GF[p^n]$.'

C. M. MASON: 'On the solutions of $\Delta u + \lambda A(x, y)u = f(x, y)$ which satisfy prescribed boundary conditions.'

F. N. COLE: 'The groups of order p^3q^2 .'

EDWARD KASNER: 'Galileo and the concept of infinity.'

E. W. BROWN: 'On the smaller perturbations of the lunar elements.'

E. B. VAN VLECK: 'On the convergence of algebraic continued fractions whose coefficients have a limiting form.'

HENRY TABER: 'Hypercomplex number systems.'

EDWARD KASNER: 'On the geometry of ordinary differential equations.'

IDA M. SCHOTTENFELS: 'On a theory of functions related to a hypercomplex number system in two units.'

G. D. BIRKHOFF: 'A general remainder theorem.'

The members of the two societies lunched together in the interval between the sessions,

and a representative number were present at an informal dinner arranged for the evening.

The next meeting of the Mathematical Society will be held at Columbia University on April 30. The Chicago Section will meet at Northwestern University, Evanston, Ill., on April 2. The San Francisco Section will meet at Stanford University on April 30.

F. N. COLE,
Secretary.

DISCUSSION AND CORRESPONDENCE.

CONVOCATION WEEK.

THE present multiplicity of scientific societies appears to have its origin in four conditions: (1) in adaptation to the present differentiating or specializing tendency in science; (2) in adaptation to the magnificent distances in this country; (3) in historical peculiarities of origin, notably the former existence of both summer and winter meetings, and (4) in sundry failings of human nature. In so far as this multiplicity is due to the first condition, it is inevitable, if not actually desirable; in so far as it is due to the second, it is necessary; in so far as it is due to the third, it is susceptible to an appeal to reason and public spirit; while as to the fourth, it must be allowed for in any plans for improvement of existing conditions. The other extreme from the present multiplicity, viz., consolidation into a single great many-sectioned society, seems to me, for the above reasons, not only impracticable, but highly undesirable. There is no real analogy between the conditions of scientific progress, which depends much upon individualism and little on organization, and the conditions of a great business where organization is in itself of prime importance; and it is a mistake to suppose that the benefits of consolidation would be as great in the one case as in the other. The real task before us, I believe, is to seek and to achieve that optimum in number and kinds of societies which lies somewhere between the present uneconomical maximum and the unattainable and undesirable minimum of a single society.

Some of the essential conditions of this optimum seem to me these. It must provide for yearly meetings in each of the great

natural divisions of the country, the eastern, central, (and ultimately) western and Pacific sections; for, so great are the distances, and so high the cost in money, time and effort required to cover them at the midwinter season, that a far greater aggregate attendance on scientific meetings, with the resultant benefits, will be secured by this system than can possibly be attained by any single meeting, however central. Furthermore, it is a mistake to suppose that the biggest meetings are, other things being equal, necessarily the best; there is much to be said for the greater profit, as well as pleasure, of smaller meetings. While, of course, a single great society could meet in geographical divisions, it is certainly wiser to utilize for this purpose the existent arrangements, namely, local meetings organized under the auspices of the American Society of Naturalists. There are other reasons, also, why a second group of societies in addition to the American Association is desirable: (1) A vigorous but friendly rivalry will be distinctly advantageous, and much preferable to a society monopoly, and (2) since the American Association is unlimited as to qualifications of membership, and must always have and care for a large semi-scientific or popular element in its activity, there is certainly a need for other societies which will be strictly scientific in their membership and able to conduct their affairs upon a purely scientific basis. I think, therefore, it is very desirable that both the American Association and the American Society of Naturalists should exist, the former meeting in different sections of the country in different years, and devoting itself to the more general aspects of the sciences, and the latter forming a center for the meetings of the more technical scientific societies, and holding a meeting each year in each of the great geographical divisions of the country. The relations between the two should be friendly and cooperative, and that division of the American Society within whose territory the American Association happens to meet should always combine with it in joint meetings, the other divisions meeting in their own territory. It might be advantageous at certain intervals, of not less