SCIENCE

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MSS. intended for publication and books etc., intended for review should be sent to the responsible editor, Prof. J. McKeen Cattell, Garrison-on-Hudson, N. Y.

THE AMERICAN PHYSIOLOGICAL SOCIETY.

THE eighth annual meeting of the American Physiological Society was held in Philadelphia on December 27th and 28th, 1895. The meeting was preceded by the usual smoke talk upon the evening of December 26th. Three of the four formal sessions of the Society were held at the University of Pennsylvania, the fourth in the physiological laboratory of the Jefferson Medical College.

The following communications were presented and discussed:

1. R. H. CHITTENDEN: *The mucin of the white fibrous connective tissue.*

The mucin was prepared from ox-tendons by various methods, more or less analogous to those employed by Loebisch, but the products were all characterized by a comparatively high content of sulphur (2.30 per cent.), whereas tendon-mucin has heretofore been considered as having a low content of this element (0.81 per cent). The various results attained point to the probability that white fibrous tissue contains two or more mucins, closely related in general properties and reactions, but dissimilar in composition, owing possibly to variations in the proportion of proteid and carbohydrate radicles entering into the compound. In the several products analyzed, however, the percentage of sulphur was constant, the variability being confined to the carbon and nitrogen.

Especially important were the results obtained on cleavage of the mucin with boiling dilute acid (HCl). The presence of a true carbohydrate group was plainly shown by obtaining a well defined and crystalline osazone by the phenylhydrazine test. The osazone so obtained crystallizes in fine yellow needles usually arranged in rosettes. When purified as much as possible the osazone is readily soluble in warm water, alcohol, ether, chloroform and benzol. It melts at 158°–160°C., and appears to resemble very closely the pentaglucosazone obtained by Hammarsten from the cleavage product of the peculiar gluconucleoproteid described by him as present in the pancreas.

2. A. R. Cushny: *The distribution of iron in the Invertebrates.*

While the accumulation of iron in the Vertebrates is generally supposed to be a provision for supplying iron to the blood, such an explanation will not hold for the large percentage of iron in the hepato-pancreas of the Invertebrates, since in the latter the blood contains only traces of iron. The hepato-pancreas of the Crustacea and the Echinodermata shows about the same proportion of iron as the Mammalian liver, while the Mollusca have a much larger accumulation than either. Muscle seems to contain about the same percentage of iron throughout the animal kingdom, and in organisms without hepatic tissues, such as the Actinia, the percentage seems to approximate that of muscle.

3. J. J. Abel: *A preliminary account of the chemical properties of the pigment of the negro's skin.* (With W. S. Davis.)

This pigment is of importance, not alone because it is a distinguishing characteristic of the great majority of the human race and because it may be found to serve a physiological purpose, but also because of its very probable relationship to the pigment more sparingly deposited in the skin of the so-called white races and to that found in the hair.

It may also be found related to the pigment of the skin in certain pathological conditions, as in the bronzed skin of Addison's disease, or in the brown or black patches known as *naevi spili.*

The authors have succeeded in isolating the coloring principle of the negro's skin and they hope to apply their method to other instances of skin pigmentation. The isolated pigment has not yet been obtained entirely free of mineral constituents. After incineration the resulting ash consists mainly of silicon dioxide; a very little iron, amounting to 0.1% or less of the original weight of substance, is also present.

At present the authors are attempting to determine the composition of the pigment granules, the minute anatomical elements found in the lower epidermal cells which contain the pigment in union with other substances. While as yet unprepared to give quantitative results, they are convinced that these black granules contain very much inorganic matter, iron being present in considerable amount.

The isolated pigment is found to be very resistant toward destructive chemical agents. Freshly precipitated it is soluble in water, in alcohol (90%) and in mixtures of alcohol and ether. In its behavior toward mineral acids, alkalis and the agents employed to precipitate proteids and also toward oxidizing agents, it agrees with the dark pigments that have been obtained from the hair, from the choroid coat of the eye and from melanotic tumors; in short, it must be grouped with that ill-defined class of compounds known as melanins.

The pigment contained in the hair of the negro was also isolated and was found to respond in a like manner to the many chemical tests to which it was subjected. Ultimate analyses of the skin and the hair pigments also showed a close agreement.

Since the recorded analyses of the pigment of the dark hair of the white races show many points in common with those of the negro's skin and hair, it would seem very probable that the pigment of the negro's skin is closely related to that found in the hair of the white races.

The percentages of carbon, hydrogen, nitrogen, sulphur and oxygen found in the isolated pigment are far from supporting the theory that it is derived from the coloring principle of the blood.

Dry distillation of the pigment carried on at a certain temperature yields much pyrrol, a fact of special interest, since pyrrol has also been obtained from derivatives of chlorophyll and hæmoglobin and from certain melanins and proteids. While we are not justified at present in classifying the various pigments referred to as pyrrol derivatives, the presence of this chemical among their decomposition products would suggest a closer chemical union between chlorophyll and some of the animal pigments named than has hitherto been thought to exist.

4. T. B. ALDRICH: *On the chemical and physiological properties of the fluid secreted by the anal glands of Mephitis mephitica.*

The secretion, at least when examined a few hours after removal from the sacs, has a neutral reaction, a specific gravity, at ordinary temperatures, less than water, a golden yellow color, and a very well-known characteristic and penetrating odor. It burns with a luminous flame, giving off sulphur dioxide fumes, and gives all of the mercaptan and some of the alkylsulphide reactions.

By distillation the secretion is separated into two sharply defined, nearly equal portions: *A*, boiling between 100° and 130° C., and having the odor of the secretion; *B*, boiling over 130° C., and having a less offensive odor than *A*. *A* gives all the mercaptan and some of the alkylsulphide reactions; *B* does not react with either lead acetate or mercuric oxide, but gives some of the alkylsulphide reactions. In *A* we have one or more of the higher mercaptans, in *B* we have probably some alkylsulphides.

The fractional distillation of *A* gave three portions: *C*, B. P. 100–110° C.; *D*, B. P. 110–120° C., and *E*, B. P. over 120° C. *C* constitutes about one-half of *A*; the three fractions gave all the mercaptan reactions.

For the purpose of identifying the mercaptans in fraction *C*, several sulphur determinations were made; the lead and mercury compounds were made and subjected also to analysis. These analyses gave results which point to the presence of one of the butylmercaptans.

It is found that one is able to recognize with the nose $\frac{1}{6\,9\,0\,0\,0\,0\,0\,0\,0}$ mg of *C*; showing that it is this part of the original secretion which gives it its great penetrating and diffusing property.

The secretion is a powerful anæsthetic. There is an instance on record illustrating this property. Some years ago a number of boys caused one of their companions to inhale an unknown quantity of the secretion. The victim lost consciousness, but recovered under the care of a physician and showed no after-effects. The fluid also has the properties of a local irritant, *e. g.*, a drop in the eye setting up a conjunctivitis. Those that have worked with the secretion and have inhaled much of the vapor complain of violent headaches and dysuria. The present writer has not observed these symptoms in himself, although he has worked with comparatively large quantities of the secretion for a long time.

Further chemical and physiological experiments are now in progress.

5. G. LUSK: *Phloridzin diabetes and the maximum of sugar from proteid.*

It was shown that after administration

to fasting rabbits of small doses (1-2 grms.) of phloridzin at frequent intervals (8-12 hours) sugar appeared in large quantity in the urine of the first twenty-four hours, representing a proportion of dextrose to nitrogen in the urine as high as 5.4 is to 1, or D: N:: 5.4:1. In the urine of the second twenty-four hours the relation, however, approximated that found by Minkowski in fasting dogs after extirpation of the pancreas *i. e.*, D:N:: 2.8:1. The action of phloridzin in fasting rabbits is to sweep the organization free from sugar, and thereafter to remove such sugar as may be formed from proteid. Calculation shows that the 45.08 grms. of dextrose produced from the oxidation of 100 grms. of proteid in tissue metabolism contain 44.4% of the available energy in the proteid (using Rübner's estimate that 1 grm. of proteid yields 4000 Cal. in the body.)

6. W. T. Porter: *Further researches on the coronary arteries.*

The frequency with which arrest follows closure of one of the large coronary branches depends on the size of the artery ligated and on the irritability of the heart at the time the ligation is made. The consequences of closing a sufficiently large branch are a fall of the intracardiac pressure during systole, a rise during diastole, a fall in the quantity of blood discharged from the left ventricle, and finally arrest with fibrillary contractions. These consequences are not the result of the mechanical injury done the heart in the operation of ligation. Severe crushing of the cardiac tissue near the coronary arteries rarely produces the phenomena in question. Nor were they once seen in nearly one hundred preparations of the arteries for ligation. Further, the phenomena described can all be produced by closure of the coronary arteries without mechanical injury. This may be accomplished by plugging the mouth of the left coronary artery with a glass rod passed into the aorta through the subclavian or innominate arteries. It can also be done by closing the arch of the aorta for a few seconds, injecting into the aorta at the same time a quantity of lycopodium mixed with defibrinated blood. The lycopodium enters the coronary arteries and closes their smaller branches by embolism. The changes in intracardiac pressure and the arrest with fibrillary contractions are therefore not due to mechanical injury of the heart. They must then be a consequence of the sudden anæmia of the heart muscle caused by closing the arteries that supply it. There is no fundamental difference between the uncoördinated contractions seen in the heart after its arrest from hemmorrhage, as after opening the large arteries, and the fibrillary contractions brought on by closure of a coronary artery.

7. G. N. Stewart: *Note on the quantity of blood in the lesser circulation.*

8. C. F. Hodge: *Histological characters of lymph as distinguished from protoplasm.*

The ordinary histological analysis of an organ includes the cells characteristic of it, the connective tissue supporting structures, its blood vessels and lymphatics, and its nervous supply. In addition to the above, lymph is continually streaming through the cells and between them. We know that this lymph contains large quantities of proteid matter in solution which is precipitated by the ordinary reagents used in hardening tissues for microscopical purposes. If this precipitate is wholly inert toward staining reagents, we are not even then justified in leaving it out of our histological analysis, since many structures of the greatest importance are 'achromatic.' If lymph precipitate or coagulum does stain, it is clearly of importance to determine what form it takes in the section, granular, reticular or alveolar.

The first method employed consisted in smearing frog's lymph on a slide, plunging it into mercuric solution and passing it through different stains. Such films gave a granulo-reticular appearance strongly stained and quite similar to many ordinary cell protoplasms. The absence of any control as to thickness of film, however, makes this method inapplicable to rigid comparison with appearances of protoplasm in sections of known thickness. In order to meet this difficulty, although possibly introducing others, the author inserted small bits of dry pith into the lymph sac of a frog, and after these had become saturated with lymph they were removed and with similar sized bits of other tissues were passed through various histological processes and sectioned in paraffin. Thus sections of tissue and of lymph coagulum, filtered through the walls of pith cells, were obtained, of equal thickness and comparable in every way.

Compared thus with cells of nerve, muscle and gland the chief result is that lymph furnishes to empty pith cells a histological content strikingly similar to certain structures usually ascribed to protoplasm. Recently Fischer, by injecting pith with chemically prepared solutions of proteids, peptones, *et al.*, proved that a number of reagents precipitated these proteids in the form of granules not to be distinguished from Altman's 'Elementarorganismen.' It thus becomes manifest that the granular factor in cell protoplasm may be readily accounted for as a simple artefact formed from solutions and not necessarily as preformed in the cell. In the author's experiments on lymph in which osmic acid, Flemming's solution, mercuric chloride, gold chloride and alcohol were used for hardening, the character of the precipitate was chiefly reticular or alveolar. In alcohol and mercuric chloride this is fine and appears under ordinary powers as vacuolated granular protoplasm. In osmic solutions it is coarsely alveolar with dense accretions of stained matter at the angles of the alveoli. Gold chloride gives a striking fibrillar reticulum with frequent sharply defined granules, resembling the varicosities and end balls often described in connection with nerve fibrils.

A number of stains have been tried. The carmines and hæmatoxylins are strongly retained, as are most of the anilins, eosin, fuchsin and nigrosin, and even methyl blue and safranin are retained quite strongly. Comparison with cells of different tissues prepared side by side with the lymph from the same frog would thus indicate that a considerable proportion of the substance stained in the cell protoplasm can not be differentiated from lymph by the stains thus far employed. It is true that identity of staining cannot be taken to prove identity of substance; but until other methods of analysis prove either identity or difference, we must admit the possibility that a large factor in what is ordinarily described as the granulation or reticulation of cell protoplasm may be simply precipitate in the cell of lymph common to the whole body. Until such analysis is made, further work upon the finer 'structure' or even on the 'content' of the so-called 'protoplasm' can have little permanent value. A point of special importance is that the nucleus stains by almost all methods in a way to differentiate it sharply from lymph precipitate. These reactions would disprove all ideas tending to make the nucleus a lymph space in the cell.

9. C. F. HODGE (for J. R. Slonaker): *Demonstration of the comparative anatomy of the area and fovea centralis.*

Methods for preserving the eye and for the demonstration of the retina in the eye as a whole and in microscopical sections were briefly discussed and a large number

of specimens were exhibited. The general summary of the forms thus far studied may be made as follows:

Mammals possess an area as a rule; in some, however, notably the dog, no area can be distinguished. The primates are the only class in which a fovea is present.

All birds examined, except the chicken, have one or two well-defined foveas with areas of various forms. In the domestic chicken no trace of fovea or area has been observed. Both the quail and partridge have well-developed foveas. Among the birds studied, the following have a central fovea with circular area: turkey, duck, partridge, quail, pigeon, song and English sparrow, kinglet, robin, bluebird, and crow. The goose and ring-neck plover possess a central fovea and a band-like area. In the tern we find two foveas and a band-like area extending horizontally across the retina. One of the foveas, corresponding in position to the human fovea (nasal) is situated near the optical axis and within the area. The other fovea (temoral) is located above the band-like area and close to the *ora serrata*. Its position would indicate that it serves for binocular vision. Both the sparrow hawk and the red-tailed buzzard hawk possess two foveas, each one surrounded by a well-defined circular area and connected by a slightly developed band-like area. The foveæ in the hawks are much closer together than in the tern and are both comparatively near the optical axis, the temporal fovea apparently moving towards the center of the eye as the position of the eye in the socket changes from the lateral to the frontal type. The kingfisher resembles the hawks in the above particulars.

As to the reptiles, amphibia and fishes, the turtle and frog have band-like areas extending across the eye horizontally just above the nerve. These are not marked by any thickening of the retina, but by a closer packing together of the cells, especially well seen in the ganglion cell layer. In none of the fishes examined has either area or fovea been found. The retina is, however, much thickened over the superior half.

10. G. C. Huber: *The ending of the chorda tympani in the sublingual and the submaxillary glands (with demonstrations).*

The observations reported were made on preparations obtained from young dogs and puppies; the tissues were stained with the double Golgi-Cajal method and the Ehrlich-Bethe methylene blue method. The following conclusions were reached:

1. The cells of the sublingual and the submaxillary ganglia are multipolar in type; they belong to the sympathetic system; this is shown in preparations impregnated with chrome silver.

2. The axis cylinders of the sympathetic cells follow the larger and smaller gland ducts and form a plexus about the intralobular ducts. From this plexus fibres are given off that form a second plexus about the alveoli outside of the *membrana propria*. From this second plexus ultimate fibrillæ pass off, penetrate the *membrana propria* and end on the gland cells.

3. The chorda tympani consists of fibres, some of which end in the form of a pericellular end-basket around the cells of the sublingual ganglion, while others have no connection with this ganglion, but end in a similar manner in the submaxillary ganglion. No fibers of the chorda tympani end on the gland cells.

4. The sympathetic fibres following the branches of the submaxillary artery are axis cylinder branches of the sympathetic cells in the superior cervical ganglion. As far as has been determined, they end on the blood vessels.

11. G. W. Fitz: *A working model of the eye.*

Dr. Fitz showed a working model of the eye consisting of a skeleton eye set in gym-

bals to allow for free motion in vertical and horizontal planes. The front of the eye carries an elastic lens, made by fastening a sheet of gelatine over a water chamber with a glass back. The gelatine is bulged more or less, as the water pressure in the chamber is increased or diminished by raising or lowering the reservoir connected with it by rubber tubing. A portion of the retina is represented, including the yellow and blind spots and serves the purpose of a screen for receiving the images of candles used with the model for studying the optics of vision.

The optical conditions involved in normal vision, accommodation to near and far objects, the use of the iris, near and far sight and correction by lenses, the blind spot, corresponding points of retinæ (two models), binocular vision and convergence, estimation of distance, Scheiner's experiment, etc., may be experimentally studied with the model.

12. J. G. CURTIS: *A method of recording muscle curves.*

Dr. Curtis briefly referred to a method of recording muscle curves so that they shall be visible to a large lecture class, such as commonly calls for the use of the duBois 'muscle telegraph.'

The shaft of a muscle lever of Tigerstedt's form is replaced by a stout and very long straw which shall magnify the contractions as much as possible. In a cleft in the free end of this straw is stuck a piece of leather, which is to 'write' upon a drum turned simply by hand. The leather should be about 2½ centimetres long, and 8 to 10 millimetres wide, the length of the leather lying in the length of the straw. The leather should be flexible, but thick enough to be moderately elastic; its rough side should be turned toward the drum, and longitudinal cuts, each about 6 to 8 millimetres deep, should be made with scissors in its free end, so as to divide what is to answer to a 'writing point' into five or six fingers.

The straw lever should be placed normal to the drum and pushed directly toward the latter until the cloven end of the leather not only touches the drum, but is deflected rather sharply in the direction toward which the latter is to revolve.

If now the drum be made to revolve by hand, there may be recorded very sufficient muscle curves, each made up of several neighboring parallel lines, which lines are visible together at a distance as a white band from 4 to 10 millimetres wide.

13. G. N. STEWART: *Measurements of the circulation time of the retina.*

Dr. Stewart demonstrated for the particular case of the retina a method of measuring the circulation time employed by him for various vascular tracts. A solution of methylene blue in normal saline was injected into the central end of one jugular vein of a rabbit. The retina on the other side was observed with the ophthalmoscope, and the interval between the appearance of the blue in the central artery and in the central vein measured with the stop-watch. The following is a specimen experiment:

Rabbit, 1360 grms, in weight.

Circulation time from central artery to central vein of retina, 1.75, 1.8, 1.7, 1.95 seconds. Last seen to be rather too long.

Circulation time from jugular vein to retinal artery, 4.05 seconds.

Circulation time from jugular vein to carotid artery, 2.8 seconds.

Circulation time from jugular vein to retinal artery, 3.8 seconds.

Circulation time from retinal artery to retinal vein, 1.8 seconds.

Circulation time from retinal artery to retinal vein, 1.85 seconds.

Circulation time from jugular vein to retinal artery, 4.0 seconds.

Circulation time from jugular vein to carotid artery, 2.25 seconds.

Circulation time from jugular vein to carotid artery, 2.5 seconds.

14. T. W. Mills: *Cortical cerebral localization in certain animals.*

The paper was a report on the above subject confined chiefly to birds and one rodent, the rabbit. The work will be extended to other rodents.

Birds: The author finds that stimulation of the cortex will not produce movements of the head in birds, as stated; that the effect on the pupil is not constant but variable; that it is not always confined to the opposite side, though it is usually most pronounced on that side; that there is one invariable effect of stimulating the cortex of birds, viz: drawing of the nictitating membrane over the eye ball to a greater or less extent, dependent upon the strength of the stimulus. This result is not mentioned by other investigators, and the author cannot confirm most of Ferrier's statements regarding the results of stimulating the cerebrum of the pigeon. His own experiments were made on fowls and pigeons, chiefly the latter, and on both pure-bred and common specimens.

Rabbit: As regards the rabbit, the author had been unable to find a cortical centre for the hind leg, though such a centre is clearly mapped out by Ferrier. He had no difficulty in all cases in getting cortical localization of movements of the head, mouth parts, fore limbs, etc., in the rabbits. He had used a great variety of animals of different ages, and both pure-bred and cross-bred animals.

In the dog, cat and all the animals the writer had examined, he was convinced that the definiteness of the limits of centres had been exaggerated and that probably new explanations of 'motor centres' would require to be constructed. Definiteness of localization is unquestionably found to increase, however, as one ascends the animal scale.

15. W. T. Porter: *A new method for the study of the intracardiac pressure curve.*

Two methods are now used to record the changes of pressure in the heart. In one the manometer and the tube connecting it with the heart are filled with liquid, to the exclusion of air; in the other the distal portion of the tube contains air. In the former method the advantage gained by employing an incompressible fluid is diminished by the inertia introduced by the weight of the liquid column. In the latter the lessening of inertia by substituting air for water in a part of the tube is more than offset by the loss of time unavoidable in the registration of very rapid changes of pressure by a compressible medium. The errors inherent in these two methods explain the many opposing opinions regarding the form of the intracardiac pressure curve and the filling and emptying of the heart. A theoretically perfect method requires the use of an incompressible fluid and an absence of inertia. In the new method offered by Dr. Porter these conditions are both fulfilled.

A stopcock worked by an electro-magnet is placed in the tube connecting the ventricle with the manometer that is to write the pressure curve. The current which opens the stopcock is made by a second manometer, also connected with the ventricle, driving a wire, fastened on its lever, into two mercury cups, as the pressure in the ventricle rises. By adjusting the wire the circuit can be made at any point in systole. If made near the summit of contraction the stopcock will be opened only during the maximum of ventricular contraction, and the manometer will write only the top of the intraventricular curve, for example, the last twentieth of the rise in pressure. The inertia error caused by the liquid in the manometer and the connecting tube passing through one-twentieth its usual rise is so slight as practically to disappear. The true summit of the intraventricular curve is thus secured, free of inertia error. This summit is seen

to be a straight line, parallel or nearly parallel with the atmospheric abscissa.

16. S. J. MELTZER: *On the mode of absorption from the peritoneal cavity in rabbits.* (With I. Adler.)

In the recent literature on the physiology of absorption a number of writers have expressed the surprising opinion that the lymphatics assist but little in the absorption from the serous cavities. With regard to this question Meltzer and Adler made two sets of experiments on rabbits. In the first set 100 cc. of a saline solution were introduced into the peritoneal cavity (the animals were always well narcotized), and removed again after 40 minutes. In order to exclude the lymphatics, in some rabbits the innominate veins were ligated. While in a large number of normal rabbits the quantity absorbed in 40 minutes was about 35 cc.; in those with ligated lymphatic ducts it was about 18 to 12 cc. The authors, however, avoid drawing the conclusion from these experiments that the lymphatics are of great importance to the absorption, since some normal rabbits showed poor absorption, and, in fact, in two cases more fluid was taken out than was put in. In the other set of experiments for each rabbit with ligated innominate veins a control rabbit was taken, whose external jugular veins were ligated. Both animals were alike in regard to the venous stasis of their brains, but differed as to their lymphatics; in one they were excluded, and in the other they were not. The same dose of strychnine was injected into the abdominal cavity of each; the one with the lymphatics open had a tetanic attack, the other was attacked either not at all or much later. The same was seen when about 1.5 cc. of 5 % potassium ferrocyanide was injected, and the urine was tested. The Prussian blue reaction appeared in the rabbit with ligated lymphatics, an hour or an hour and a half later than in the rabbit with open lymphatics. This shows distinctly what importance the lymphatics have for the absorption from the peritoneal cavity.

17. S. J. MELTZER: *On the incorrectness of the often quoted experiments of Starling and Tubby with reference to the mode of absorption from the peritoneal cavity in dogs.*

As an important argument for the theory that the fluid from the peritoneal cavity enters the circulation directly through the walls of the blood vessels and not by the long way of the lymphatics, the experiments of Starling and Tubby are often quoted. Starling and Tubby have made only three experiments, and have published one protocol only, which is in the main as follows: 40 cc. of indigo carmine were introduced into the abdominal cavity; 2 minutes after the injection the urine was dark blue, while a half hour later the lymph showed a bluish tinge. Meltzer has repeated these experiments and found quite a different result. Potassium ferrocyanide or indigo carmine appeared in the lymph from the thoracic duct about 14 minutes after their introduction into the peritoneal cavity, but in the urine only after an hour or more. Moreover, even after the injection of indigo carmine directly into the circulation, 23 minutes elapsed before the urine became blue.

18. F. S. LOCKE: *On the action of ether on contracture and on positive kathodic polarization of voluntary muscle.*

Mr. Locke described experiments, the graphic records of which were shown, in which the action of ether on striated muscle under the influence of various contracture-conditioning agents was investigated. Under etherization the normal twitch of short duration reappears. The relation of this result to Biedermann's positive kathodic polarization of striated muscle was

pointed out, reasons for considering which undemonstrated were given.

19. H. G. Beyer: *On the influence of exercise on growth.*

Dr. Beyer spoke of the necessity of applying more exact methods of investigation to the study of this very important physiological subject than had been done hitherto. While acknowledging that some of the more general good effects of all forms of exercise were within the easy reach and the experience of all, the more remote and permanent ones must be made the subject of more serious study and investigation.

He described one of the methods by means of which the influence of systematic gymnastic or of other forms of exercise might be ascertained, and presented the results of some investigations in this direction. For example, as to height, his figures presented strong evidence that height is decidedly increased by exercise taken within physiological limits and during the period of growth.

20. W. H. Howell (for Messrs. Conant and Clark): *The existence of a separate inhibitory and accelerator nerve to the crab's heart.*

The work was done upon the common edible crab, *Callinectes hastatus*. The authors have been able to show that two separate nerves pass from the thoracic ganglion to end in a plexus in the wall of the pericardium and that one of these nerves, when stimulated, inhibits the heart beat, while the other causes marked acceleration. The inhibiting nerve was traced anatomically to the ganglion, which it joins in company with the large mandibular nerve. The junction of the accelerator nerve with the ganglion has not so far been demonstrated anatomically, but the physiological evidence indicates that it leaves the ganglion in company with the nerve to the first pereiopod. If this latter nerve is severed from the ganglion, stimulation of the ganglion no longer gives acceleration. If the peripheral end of the severed nerve, however, is stimulated, marked acceleration is obtained. If, moreover, the severed nerve is again cut a little farther to the periphery, stimulation of the new peripheral end no longer affects the heart, while stimulation of the small isolated piece thus obtained gives acceleration. This evidence indicates that the accelerator nerve leaves the nerve of the first pereiopod a short distance, about 1 centimetre, beyond the thoracic ganglion. As stated above, in the neighborhood of the pericardial plexus it is easily found as a separate nerve lying close to the inhibitory nerve. The authors were not able to obtain any evidence of a tonic activity of either of these nerves. Stimulation of the cerebral ganglion with strong currents gave inhibition of the heart, which disappeared, however, when the commissures connecting this ganglion with the thoracic ganglion were cut.

21. Fr. Pfaff: *On toxicodendrol and on the so-called toxicodendric acid.*

'Toxicodendric acid' has been regarded heretofore as the active principle of poison ivy, *Rhus toxicodendron*. Dr. Pfaff isolated this acid and analyzed its barium and sodium salts. Quantitative and qualitative tests show that it is really nothing but acetic acid. The true active principle of poison ivy is an oil named by Dr. Pfaff *Toxicodendrol*. The purity of the oil obtained was proved by quantitative analyses of the lead compounds with different preparations of the oil.

22. H. C. Chapman: *Methods of teaching physiology.*

Professor Chapman gave a demonstrative talk upon methods employed in his own teaching, illustrating his remarks largely by apparatus devised by himself. He urged the value of the comparative method and

showed a valuable series of Mammalian brains, together with other comparative anatomical preparations.

The following new members were elected:

J. G. Adami, M. A., M. D., M. R. C. S., Professor of Pathology, McGill University.

T. B. Aldrich, M. D., Instructor in Physiological Chemistry, Johns Hopkins University.

J. McK. Cattell, Ph. D., Professor of Experimental Psychology, Columbia College.

G. P. Clark, M. D., Professor of Physiology, Syracuse University.

R. H. Cunningham, M. D., Assistant Demonstrator of Physiology, College of Physicians and Surgeons, Columbia College.

G. W. Fitz, M. D., Assistant Professor of Physiology and Hygiene, Harvard University.

T. Hough, Ph. D., Assistant Professor of Physiology, Massachusetts Institute of Technology.

R. Hunt, A. B., Fellow in Physiology, Johns Hopkins University.

F. S. Locke, M. A., M. B., Instructor in Physiology, Harvard Medical School.

Professors C. S. Minot and C. F. Hodge were appointed to express to Prof. Langley the opinion of the Society that it is highly desirable that the table of the Smithsonian Institution at the Naples Zoölogical Station be continued. Mr. W. B. Saunders entertained the members of the Society at luncheon at the Art Club. The Society enjoyed also the courtesies that were extended to the affiliated societies by the University of Pennsylvania and the Philadelphia Local Committee.

Officers for the coming year were elected as follows: Members of the Council, H. P. Bowditch, R. H. Chittenden, W. H. Howell, F. S. Lee, J. W. Warren; President, R. H. Chittenden; Secretary and Treasurer, F. S. Lee.

The President and the Secretary were appointed respectively Delegate and Alternate to the Congress of American Physicians and Surgeons of 1897.

FREDERIC S. LEE,
Secretary.

THE PHILADELPHIA MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION.

AT the Princeton meeting of the Association a year ago overtures of affiliation were received from the American Society of Naturalists, and in response to these the meeting of 1895 was held at the same time and place as those of the affiliated societies. The opportunities thus afforded of seeing and hearing distinguished representatives of kindred lines of investigation added much to the interest of the psychological program, while the abundant hospitality of the local committee provided for the social contact, which is rightly an important feature of all such gatherings.

On opening the first session of the Association, the President, Prof. Cattell, of Columbia, introduced Prof. Fullerton, Dean of the University of Pennsylvania, who first welcomed the Association to the University and then read a paper on *Psychology and Physiology*. In it he drew the boundary between the two sciences sharp, not with any view to warning off mutual trespass, but to having the writers of text-books keep clear for their readers the essential limits of both sciences. With Foster's Physiology as a text Prof. Fullerton showed what lavish use is made in the chapters on the functions of the sense organs and the nervous system of material that is patently psychological, *i. e.*, secured by the distinctly psychological method of introspection. This paper appears in full in the current number of the *Psychological Review*.

Prof. Fullerton was followed by Dr. Farrand, of Columbia, who described a *Series of Physical and Mental Tests on the Students of Columbia College*. The tests described are made on the undergraduates of the College