made on the pupil's own body. It is interesting to see how much pure physiology, as distinct from anatomy, can be learned in this way, without the aid of complex apparatus, dissection or vivisection. Vivisection is neither employed nor referred to in any way in the book, and dissection only as it pertains to bones, muscles, the heart and the kidney. Anatomy is treated not as a finality, but as a basis for the study of function. The directions for the study of bacteria are excellent, and the practical applications of bacteriology include, among other things, the canning of fruits, the use of the tooth-brush, the cleaning of the streets, and the cleansing of wounds.

In the opinion of the reviewer physiology is usually taught in high-school courses too much as a human, and too little as a broadly biological, science. Hence some regret is unavoidable that in the present book more attention is not given to the comparative aspect. Notwithstanding this lack, the book is thorough, is calculated to arouse the interest and even the enthusiasm of the pupil, and is to be heartily recommended for use in schools.

Frederic S. Lee.
Columbia University.

BOOKS RECEIVED.

A Text-book of General Physics. Charles S. Hastings and Frederick E. Beach. Boston, Ginn & Co. 1899. Pp. viii + 768. $2.95.

The Development of English Thought. Simon N. Patton. New York and London, The Macmillan Company. 1899. Pp. xxvii + 415.

The Shifting and Incidence of Taxation. Edwin R. A. Seligman. New York and London, The Macmillan Company. 1899. Pp. xii + 337. $3.00.

The Cambridge Natural History. Volume IX., Birds. A. H. Evans. London and New York, The Macmillan Company. 1899. Pp. xvi + 635. $3.50.

The Elements of Physical Chemistry. J. Livingston R. Morgan. New York, John Wiley & Sons; London, Chapman & Hall, Ltd. 1899. Pp. xiii + 299.

Examination of Water. William P. Mason. New York, John Wiley & Sons; London, Chapman & Hall. 1899. Pp. 135.

De la méthode dans la psychologie des sentiments. F. Rauh. Paris, Alcan. 1899. Pp. 305.

SOCIETIES AND ACADEMIES.

THE BIOLOGICAL SOCIETY OF WASHINGTON.

The 19th anniversary meeting was held January 17th, under the auspices of the Washington Academy of Sciences, in the hall of the Columbian University, the occasion being the address of the retiring President, Dr. L. O. Howard, entitled 'Are Insects as a Class Injurious or Beneficial in their Relations with Man?' The paper was published in full in Science for February 17th.

The 301st regular meeting was held January 28th and was devoted to a consideration of the 'Great Dismal Swamp.' Dr. David White traced the geologic history of the swamp and surrounding regions, showing how successive periods of elevation and depression had resulted in the formation of a considerable area so slightly elevated above sea-level that the natural drainage is insufficient to remove the rainfall. It was stated that the present period is considered to be one of subsidence, and it was noted by later speakers that Lake Drummond is evidently increasing in size.

Mr. F. D. Gardner described the soils from a practical standpoint, with special regard to the agricultural possibilities of the land extensively reclaimed by drainage. Large deposits of peat exist, which it has not been found possible to utilize on a commercial scale. The water of the streams and drainage ditches is very strongly impregnated with the soluble products of the enormous quantities of decomposing vegetable matter, and, like the soil, has a distinctly acid reaction. This acidity of the soil may be so excessive as to interfere with its fertility, although inexhaustible quantities of plant foods are present.

Mr. Thomas H. Kearney exhibited a large series of photographs illustrating the characteristics of the flora of the swamp. The various plant-associations were enumerated and described at length, and their relative importance in the formation of humus was noted. Reference was also made to the possible effects of the acidity and generally low temperature of the water as agents likely to retard growth and to require adaptations against excessive transpiration. The woody type of vegetation predominates, there being very few herbaceous species

and these invariably perennials. Bulbs and creeping rootstocks occur, but the cespitose habit so common among dry-land plants is entirely absent. Notwithstanding the abundance of climbing woody vines and bamboo-like Arundinarias which give an aspect of tropical luxuriance, the flora is predominantly boreal in origin. Many northern plants have their southern limit of distribution here, and, on the other hand, several southern types have never been found farther north.

Mr. William Palmer continued Dr. White's discussion of the physiography, with particular reference to the changes due to human agencies. The vegetation becomes very dense along canals and ditches where formerly the swamp was comparatively open, as far as undergrowth was concerned. These ditching operations have been carried on since the days of George Washington, who spent considerable time in the Dismal Swamp in surveying and managing the work, and who died possessed of $2,000 in stock in the enterprise.

It was stated that the drainage of the swamp is very intricate, the direction of the current being not infrequently reversed in the same channel. Miocene bivalve shells are found in great abundance near the northern end of the Jericho Ditch. Of existing animals there are thirty mammals, the more prominent of which are deer, opossums and wild cattle. Forty-one species of birds are regular summer residents, with many more transient visitors. The most characteristic bird of the swamp is perhaps the Prothonotary Warbler, a rare bird everywhere else, but not uncommon in the swamp. The resident birds and mammals in some instances show distinct characters, by which they may be readily separated from those of the neighboring drier regions, and have consequently been described as distinct species or subspecies. Fourteen species of fish are known from the waters of the swamp, although it is believed that none existed in Lake Drummond until admitted through the canals. Snakes may be said to be abundant, as Mr. Palmer has counted 153 while passing along one of the canals on a warm day. The King Snake is very tame and sometimes climbs into boats, but with no malicious intentions. Four frogs and six turtles were also enumerated.

In conclusion, Mr. Palmer stated his regret that the opportunity of holding the vicinity of Lake Drummond as a National Park had not been improved before its great natural beauties were so largely destroyed.

The 302d regular meeting was held February 11th, but, owing to the unusually severe and inclement weather, the attendance was small, and several members who had arranged to continue the discussion of the Great Dismal Swamp were absent. After electing to active membership Dr. Oscar Loew, of Washington, and Lieutenant Wirt Robinson, of New York, the Society voted to postpone the discussion and adjourn.

O. F. COOK,
Corresponding Secretary.

CHEMICAL SOCIETY OF WASHINGTON.

THE regular meeting was held on January 12, 1899.

The first paper of the evening was read by Dr. E. A. de Schweinitz, and was entitled 'The Serum Treatment of Some Animal Diseases.'

In this paper the author gave a general review of the work begun in 1890 in the study of the substances secreted by the hog cholera and the swine plague germ in relation to immunity. He further pointed out the production of an enzyme by the hog cholera and other allied germs, and their importance in producing in animals immunity from disease. From this point the work was extended to a study of the serum obtained from animals that had been immunized to disease, and this was found to contain an immunizing principle and exerted curative properties upon experimental animals affected with hog cholera and swine plague respectively. Following these experiments, practical work has been carried out in the field for several years, with very satisfactory results. The treatment with serum was found to save about 80 per cent. of infected herds, while in those herds not treated which served as checks the loss from disease was over 80 per cent.

In practical work in the field it is difficult to decide often whether the animals are suffering from either hog cholera or swine plague alone or both of these diseases. To overcome this difficulty it has appeared advisable to use a

curative serum for one of these diseases mixed with a curative serum for the other. For protective vaccination it appears advisable to use, in addition to the serum, the products of the bacteria as well as their cell contents, including the products of the secretion or excretion.

The second paper of the evening was read by Dr. F. K. Cameron, and was entitled 'On the Estimation of Nicotine,' by E. A. de Schweinitz, J. A. Emory and F. K. Cameron.

This paper described a critical examination of the analytical methods so far proposed, and with special reference to the so-called 'Kissling Method.' Attempts to devise a satisfactory method were made by formation of double salts with metallic compounds, precipitation of an addition compound with bromine or iodine, precipitation with picric acid, precipitation with phosphomolybdic or phosphotungstic acid, decomposition of accompanying amines with nitrous acid, decomposition of these compounds with hypochlorous or hypobromous acid, separation of the ammonia as oxalate by the addition of alcohol. The results were summed up as follows:

I. The so-called Kissling method was to be regarded as the best so far proposed. For the estimation of nicotine in tobacco leaves or powders it may be regarded as satisfactory, but its application to tobacco extracts yields very unreliable results.

II. A complete extraction of nicotine by ether and some other solvents is readily accomplished.

III. An evaporation of an ether extract will afford a practicable separation from ammonia alone, but not from other organic bases.

IV. A complete separation by distillation with steam is much more difficult than is usually supposed. Certain deviations from the usual practice were suggested.

V. No method involving the precipitation of the nicotine as an insoluble compound has been found practicable.

VI. No method involving the decomposition of accompanying compounds has been found practicable.

VII. The presence of tertiary amines, and probably some pyridin derivatives in tobacco extracts, is as yet an insurmountable obstacle in the separation or estimation of nicotine.

Finally, it is to be observed that nicotine comports itself as a tertiary amine. It does not yield a nitroso compound. Its separation from ammonia, primary and secondary amines, can be more or less readily accomplished by the adaptation of well-known general methods. Its separation from tertiary bases must be dependent on the discovery of some accidental physical or chemical property of the substance involved which cannot be predicated from known general principles. It would seem that a satisfactory solution of the problem is dependent upon some empirical relation, and it is in this direction that further investigation is indicated. But it is to be hoped that a more profound study of nicotine itself will yield satisfactory evidence as to its true nature, and from the knowledge thus gained the problem before the analyst may not be so aimless or complicated as it now seems.

William H. Krug.
Secretary.

Meeting of the New York Section of the American Chemical Society.

The February meeting of the New York Section of the American Chemical Society was held on the 10th inst., in the Assembly Room of the Chemists' Club, at 108 West 55th street, Dr. Wm. McMurtrie presiding. In accordance with a resolution adopted by the Washington Section, it was resolved "that it be recommended to the Council that the Society confer, through appropriate channels, with the Chemical Society of London, as to the feasibility of the separate publication of their abstracts after the manner of the *Chemische Centralblatt*, the preparation of these abstracts to be undertaken by both Societies conjointly."

A report from the Committee on Patent Legislation was read, recommending that the present Committee be continued, with five additional members to be appointed by the chair.

The duty of the Committee will be to prepare such alterations and amendments as may seem advisable and submit them to the different members of the Committee as well as to the Sections of the Society before the first spring meetings. From the reports of the Sections in different parts of the country a general report will be

prepared for the next session of Congress in December.

The following papers were read:

'Recent Extension of Our Knowledge Regarding Nitrates as Plant Food,' Dr. J. A. Myers.

'A Method for the Analysis of Canned Condensed Milk,' F. S. Hyde.

'Manufacture of Ether,' Alfred Roos.

'Manufacture of a New Guaicol Compound,' L. H. Reuter.

'Explosibility of Nitrogen Iodide and Acetylene Copper Compounds and Use of the Latter in Manufacture of Alcohol and Ether,' L. H. Reuter.

'Chemistry of the Dynamite Process of Weighting Silk,' Rafael Granja.

'Chemistry of the Velocitan Process—Quick Tanning,' Rafael Granja.

'Melting Point as a Cyclic Function,' Thos. Bayley, England. Read by title.

DURAND WOODMAN,
Secretary.

GEOLOGICAL CONFERENCE AND STUDENTS' CLUB OF HARVARD UNIVERSITY.

Geological Conference, January 10, 1899.—Dr. T. A. Jaggar, Jr. gave a communication on 'The Geology of the Northern Black Hills,' and illustrated it with many lantern views, photographs and specimens. He dwelt especially on certain facts, discovered by him during the past summer, which throw new light on the general problem of intrusives. These will be published in full later.

Students' Geological Club, January 17, 1899.—In a paper entitled 'Our Present Knowledge of the Geology of the Boston Basin,' Mr. R. E. Burke briefly summarized the literature on the geology of that area.

Geological Conference, January 24, 1899.—Mr. H. T. Burr presented some results obtained in mapping the conglomerates of the Boston Area with a view to determining their relative age. The Commonwealth Avenue cut in the Roxbury conglomerate shows a series which strikes transversely (E–W) to similar, adjoining conglomerates to the north and south. Evidence was offered to show that this structure is due to overthrusting from the north followed by normal faulting.

The Brighton amygdaloids have generally been considered as flows. The speaker held, after a detailed study of their contacts, that these rocks are intrusive. Further, their injection was probably preceded by faulting.

In discussing this paper, Professor Shaler favored the division of the Roxbury conglomerates into formations, on the basis of recognized periods of denudation that alternated with periods of deposition.

Mr. Robert DeC. Ward spoke on 'Acclimatization of the White Man in the Tropics.' By acclimatization is meant adaptation to a new climate. This problem, although an old one for Europeans, has confronted us for only a few months. It arises as a result of physiological changes that take place in the body, and may be best studied from two points of view, (1) a consideration of these physiological changes, and (2) a study of the diseases most prevalent in the tropics which a resident there is most likely to contract.

In connection with the former part of the problem the chief factors are heat and humidity. Heat, in itself, is not dangerous; but it becomes so when significant humidity is added. Heat induces evaporation and thus greater desire for drink. Accordingly, considering a certain increase in drink necessary, those nations which drink hard liquor will suffer more than those which use wine. Cereals afford safer food than meats. In regard, then, to both liquid and solid food the southern Europeans have advantages over the English. Too much or too little exercise is extremely dangerous; a certain amount is absolutely necessary. The most healthy tropical districts are high and dry.

In connection with the latter part of the problem, three diseases are especially prevalent, namely, sunstroke, yellow fever and malaria. Sunstroke is chiefly influenced by the rains. Malaria, the greatest obstacle in acclimatization, comes with the rains, but is also closely related to soil conditions. Yellow fever, although varying with the rainy season, finds its check in elevation. Thus, in the respective countries, the following altitudes have been found to be about the upper limit of that disease: in the United States, 800 feet; in Mexico, 2,300 feet; in Brazil, 2,700 feet; and in Jamaica, 4,000 feet.

The chief physiological changes resulting from life in the tropics are increased respiration and

perspiration, a more rapid pulse, enlargement of the liver, anæmia, and perhaps a rise of body temperature. Hygiene, as is shown by statistics, is effective in reducing the death rate, and thus in making life possible for white men in the tropics. While a strong person may, with proper care, live nearly anywhere in the tropics, he does not become independent of the tropical climate. Accordingly, authorities agree, with only a very few exceptions, that true acclimatization of the white man in the tropics is impossible.

J. M. Boutwell,
Recording Secretary.

ACADEMY OF NATURAL SCIENCES, OF PHILADELPHIA.

January 24, 1899. Mr. Witmer Stone made a communication on the Academy's collection of birds and its history. He quoted from Sclater to the effect that in 1852 the collection was the largest in existence. The work of American ornithologists from Alexander Wilson to those of our own time, most of whom had been more or less intimately associated with the Academy, was commented on and two of Wilson's types were exhibited. They were the only ones known to the speaker to be in existence, all the others having apparently been lost on the breaking up of Peale's Museum, of which they formed part. After commenting on the growth of the collection, Mr. Stone spoke of the modes of preservation and exhibition, dwelling on the advantage of keeping the bulk of the specimens as flattened skins in air-tight drawers. Fine specimens of recent taxidermic work were exhibited and contrasted with the 'stuffed' birds of half a century ago. The communication formed a most interesting contribution to the history of the Academy and will make part of the first number of the *Proceedings* for 1899.

A paper entitled 'Contributions to the Life-History of Plants, No. XIII.,' by Thomas Meehan, was presented for publication.

January 31. Professor Henry A. Pilsbry called attention to a small collection of shells from New Mexico and Arizona, received from Mr. Ashmun, whose zeal as a collector had increased the number of species of the region from about a dozen to over one hundred. The snails are almost entirely confined to the mountains and they exhibit the characters of forms from archipelagoes, only one species of a genus being found on one mountain range. Six species of *Pupa* were from six distinct localities.

Dr. P. P. Calvert commented on the influence of the heat of the room in hastening the development of dragon-flies from nymphæ.

A paper entitled 'A List of Fishes collected at Port Antonio, Jamaica,' by Henry M. Fowler, was presented for publication.

February 7. Messrs. George and William S. Vaux, Jr., made a communication on the Illecellewaet and Asulkan Glaciers of British Columbia. After Mr. George Vaux, Jr., had exhibited a large number of beautiful lantern views of the region, illustrating the distribution of peaks, glaciers and ranges, Mr. William S. Vaux, Jr., read a paper, which was afterwards presented for publication, describing in detail their investigations undertaken to determine the rate of recession of the two glaciers specially under consideration. The paper was also satisfactorily illustrated.

A paper entitled 'A New American Land-Shell,' by Edward G. Vanatta, was presented for publication.

February 14. Dr. P. P. Calvert called attention to the new catalogue of the dragon-flies of New Jersey, the section of the general catalogue of insects of that State confided to him by Professor J. B. Smith. The number of species of these insects has increased since the issue of the first catalogue in 1890 from 39 to 85. Middle-southern New Jersey has been touched but slightly and there is no doubt that other species will be added to the list.

Edw. J. Nolan,
Recording Secretary.

NOTES ON PHYSICS.

THE MEASUREMENT OF INDUCTANCE.

Of the various electrical measurements which serve in the electrical testing laboratory, the measurement of the inductance (the exact electrical analogue of the moment of inertia of a rotating wheel) of a coil of wire is perhaps the most unsatisfactory. Mr. H. Martienssen (*Wiedemann's Annalen*, 1899, No. 1) has im-