Chairman, George B. Pegram; *Vice-chairman,* W. S. Gorton; *Secretary-Treasurer,* Henry A. Barton; *Members of the Executive Committee,* I. I. Rabi and G. Breit. Membership in the section is restricted to members of the American Physical Society, but its meetings will be open to all interested persons.

THE scientific library of the late Professor U. S. Grant, containing fifteen hundred bound and four thousand unbound volumes, was formally presented by Mrs. Grant on February 14 to the Department of Geology and Geography of Northwestern University. President Scott accepted the library on behalf of the university. Dr. Grant was head of the department for the thirty-three years preceding his death in September, 1932.

DISCUSSION

THE BIOCHEMISTRY OF ANESTHESIA

DUE to travel and other external circumstances, the publications of W. D. Bancroft, *et al.,* printed in the *Journal of Physical Chemistry* (35: 215, 1931, and 36: 273, 1932) were unfortunately traced only during the course of the autumn of this year by means of the *Chemisches Zentralblatt.* The reprints of those papers sent to me upon request reached me at the beginning of October, 1933, and so I may be permitted to refer to them briefly after an undue delay.

(1) The assumption referred to on page 216—that "it is known that during narcosis the permeability is first lowered and then increased"—has been abandoned by Hoefler and Weber in 1926,[1] and Nord and Franke expressed their position concerning this point as well as concerning the alleged "stimulation" or "activation" by means of ethylene in their extensive experiments with zymase solutions and yeast cells[2] as follows: "The hitherto unexplained effect of minute quantities of ethylene and related substances on cell systems appears to be due to an *initial* increased cell permeability, allowing an intensified interaction between reactants and enzymes, followed by the formation of a (reversible) adsorption film, which simultaneously acts as a protector against damaging transformation products."

(2) Nitrous oxide and acetylene does not belong to the same group of narcotizing agents, since, according to another series of investigations,[3] the former decreases the surface tension, whereas the latter (as well as ethylene) increases the surface tension of solutions of biocolloids. The "Erstickungstheorie" of Herm. Wieland can not be, therefore, valid, and on account of the opposed working mechanism of the two gases the adsorption theory can also not be regarded as satisfactory. Besides this, we could show by nephelometric measurements that solutions of biocolloids are not coagulated, either by nitrous oxide or by unsaturated hydrocarbons, and so we could not confirm any connection between narcosis and coagulation, all the less, since the activity of zymase solutions could be practically inhibited by the latter[4] without a noticeable coagulation of the carriers.

Besides many other statements in the papers of Bancroft *et al.,* which stimulate the reader to constant mental discussion, I wanted to refer especially to the above proven contradictions.[5]

F. F. NORD

PHYSIOLOGICAL INSTITUTE
TIERÄRZTLICHE HOCHSCHULE
BERLIN, NOVEMBER 25, 1933

[1] *Jahrbuch f. wiss. Botanik,* 65: 643–737.

[2] *Protoplasma,* 4: 595, 1928; *Jour. of Biolog. Chemistry,* 79: 50, 1928; *Z. f. angewandte Chemie,* 42: 1025, 1929. "Mechanism of Enzyme Action and Associated Cell Phenomena," Baltimore, Md., 1929.

[3] *Trans. Faraday Society,* 26: 760; *Z. f. Physikal. Ch.* (A) 150: 1, 1930, and 166: 1, 1933, and the monograph, "Zum Mechanismus der Enzymwirkung unter besonderer Berücksichtigung der Kryolyse," Stuttgart, 1933.

[4] *Z. f. Physiolog. Ch.,* 183: 217, 1929.

[5] Compare for further literature: "Ergebnisse der Enzymforschung," Vols. 1 and 2, Leipzig, 1932, 1933.

NAMING HYDROGEN ISOTOPES

THE wide-spread interest in heavy hydrogen and its compounds has been reflected in the discussion of suitable names and symbols for both H^1 and H^2. Of the letters in SCIENCE one of the most interesting is that of Professor Urey and others in the number dated December 29.

The awkwardness of the names protium and deuterium, however suitable they may be scientifically, appears to be commonly recognized. Various alternatives have been offered, but I have failed to see that any suggestion has been made of the following rather simple method of meeting the requirements for both names and symbols for these isotopes.

Our minds, as well as our literature, are so filled with the specific significance of the name hydrogen that to discard it would be certain to entail endless confusion. Both simplicity and understanding would be served by calling protium "hydrogen-p" and deuterium, "hydrogen-d," and the connection with the familiar hydrogen thus be maintained. Similarly, the symbols Hp and Hd would be specific, exact and almost self-explanatory.

The formulas H^1H^2, $NH^1H^2_2$, $NH^1_2H^2$ and $C_6H^1_2H^2_4$, cited by Professor Urey and others, would then be written HpHd, $NHpHd_2$, NHp_2Hd and $C_6Hp_2Hd_4$, thus reducing the symbols to a form

analogous to those in common usage. The names would be, most simply, hydrogen-pd; ammonia-pd_2, ammonia-p_2d and benzene-p_2d_4. Professor Whitmore's deuteroneopentane would become neopentane-d.

It is unlikely that this nomenclature will meet all complications, but for the simpler compounds it appears to have advantages and may indeed suggest to others a more perfect solution of the problem.

WILLIS A. BOUGHTON

CHEMICAL LABORATORIES,
HARVARD UNIVERSITY

THE NEUTRON

THE experiments of Lawrence, Livingston and Henderson on the artificial disintegration of the deuton by the proton show that the mass of the neutron as calculated from these experiments is much smaller than the value assigned to it by Chadwick. If we express this mass difference in energy units, by means of the Einstein relation, then this difference is equivalent to 6 million volts. This difference is much greater than the mean error involved in the two sets of experiments. This indicates either that the relationships used in the calculation of the mass are not valid or that the neutron may have a different mass, depending on the conditions where it exists.

In the light of these experiments on the mass of the neutron and others on the constituents of the beryllium nucleus, our ideas of the stability of the nucleus must be revised. We meet here a similar situation to that which arose in classical electrodynamics when it attempted to account for the stability of the atom. The stability arises not from the binding energy of the particles for one another but from the existence of quantum laws governing the system. If we suppose that the neutrons are held in the nucleus by a type of quantum law and that the binding, if any, plays no rôle, then we can apply Dirac's theory of radiation to the behavior of the neutron, substituting in that theory for the energy and momentum of the photon the appropriate quantities for the neutron. Instead of the atom in various quantum states of excitation we have the nucleus in its various quantum states forming stable configurations—the positron plus the neutron, the proton; the positron plus two neutrons, the deutron and other combinations of positrons and neutrons. The interaction between the positron and the neutron which takes the place in the neutron theory of the interaction between the light wave and the electron is not known as yet. However, experiments on the scattering of neutrons should give us some insight into the type of interaction.

The experiments on the production of neutrons by alpha particles gives neutrons, in many cases, of widely different energies. These sets of neutrons of different energies have been assumed generally to be made possible by the emission of gamma rays from the nucleus, but in the case of beryllium it is difficult to see how any nucleus could emit rays of such great energy. Perhaps, the difference may arise from the production of the neutron occurring by different reactions. For example, in the case of beryllium, we might have as the final products of the disintegration either a neutron and a carbon nucleus or a neutron and three alpha particles.

ARTHUR BRAMLEY

BARTOL RESEARCH FOUNDATION
OF THE FRANKLIN INSTITUTE

OXYGEN AS AN ACCELERATOR IN THE GROWTH OF EMPUSA ON FLIES

WHILE occupied with certain physiological experiments with house flies some time ago the writer accidentally left several flies in an atmosphere of O_2 for a period of several weeks. It was observed at the end of this time that the flies were densely covered with *Empusa*. The growth of the fungus was much more luxuriant than the writer had ever observed before. It seemed probable that the O_2 atmosphere had stimulated the development of the *Empusa*. Consequently, experiments were conducted with more flies to investigate the problem further.

In almost every trial, in which freshly killed or live flies were placed in glass jars with glass stopcocks and the air replaced with O_2, the fungus developed. Some of the flies were so covered with the growth that scarcely any body parts were visible. They gave the appearance of cottony balls.

House flies captured in the spring and placed in O_2 atmospheres did not develop *Empusa*. The experiments were again repeated the following fall with success. It was noted, however, that jars containing the proper moisture developed the best *Empusa* growths. No attempts were made to determine the correct humidity, as the writer was interested only in the O_2 effects. However, it is safe to conclude that O_2 atmospheres greatly accelerate the development of *Empusa* on flies.

Ordinarily a period of one to two weeks is necessary for the *Empusa* to develop in jars of O_2. Calcium chloride tubes can be used in place of jars with glass stop-cocks; in fact any sort of glass container that can be hermetically sealed should be satisfactory.

WM. A. HIESTAND

PURDUE UNIVERSITY

THE STIMULATIVE ACTION OF YEAST EXTRACT IN THE RESPIRATION OF RHIZOBIUM

DURING the past two years respiration experiments with the legume bacteria have been conducted in this laboratory with the Warburg technique, special con-