Cushman Murphy for his volumes on "Oceanic Birds of South America." Two fellows, Dr. Ernst Mayr, New York City, and Mrs. M. M. Nice, Chicago, and one corresponding fellow, R. C. Falla, Christchurch, New Zealand, were elected.

In addition to 234 new associate members, six new members were named: W. P. Brodkarb, Ann Arbor; James Moffitt, San Francisco; M. D. Pirnie, Augusta, Mich.; O. S. Pettingill, Jr., Northfield; W. P. Smith, Wells River, Vt.; F. M. Uhler, Washington, D. C.

Delegates to the International Ornithological Congress, 1938, are Alexander Wetmore, J. P. Chapin, J. H. Fleming and J. C. Greenway. The 1938 meeting will be held in Washington, D. C., and the 1939 meeting in California.

LAWRENCE E. HICKS,
Secretary

THE NORTHWEST SCIENTIFIC ASSOCIATION

THE fourteenth annual meeting of the Northwest Scientific Association was held on December 28 and 29 at the Davenport Hotel, Spokane, Wash. The organization's membership is drawn largely from members of the science staffs of the institutions of higher learning in Montana, Idaho, Washington and Oregon, augmented by scientists and engineers in applied fields throughout the Pacific Northwest. Official registration was 148, although visitors and guests swelled the attendance to more than 200 at the section meetings.

The speaker at the opening general session was Dr. E. C. Johnson, dean of the College of Agriculture, State College of Washington, Pullman, who related some of his summer's observations on the collective farms of the U.S.S.R. at the annual dinner. Dr. H. K. Benson, head of the department of chemistry and chemical engineering, University of Washington, Seattle, gave the principal address, speaking on "The Application of Chemistry to Industry." At the joint luncheon with the Associated Engineers of Spokane on the second day, Dr. Benson also spoke, taking as his subject "A Chemurgic Program for the Northwest."

The annual Sigma Xi breakfast was followed by an illustrated lecture on the origin of Crater Lake, entitled, "Mt. Mazama—Explosion *vs.* Collapse," presented by Dr. Warren D. Smith, head of the geology-geography department at the University of Oregon, Eugene.

Aside from the general sessions, special section meetings were held for the following groups: (a) Bacteriology and Public Health, (b) Botany-Zoology, (c) Chemistry-Physics-Mathematics, (d) Education-Psychology, (e) Engineering, (f) Forestry, (g) Geology-Geography, (h) Social Science and (i) Soil Conservation. A total of 89 papers were presented.

Officers elected for 1938 include: Dr. J. H. Ramskill, Montana State University, Missoula (forestry), *president;* Dr. E. F. Gaines, State College of Washington, Pullman (agronomy), *vice-president;* W. B. Merriam, Eastern Washington College of Education, Cheney (geography), *secretary-treasurer,* with Dr. C. C. Todd, Pullman, retiring president, and Dr. E. C. Jahn, University of Idaho, Moscow, *councilors.*

Trustees elected were: E. M. Keyser, Spokane, and Dr. William H. Cone, Moscow, Idaho, for the three-year term, and Thomas Large, Spokane; C. C. Johnson, Pullman, and Gerhard Kempf, Priest River, Idaho, for the one-year term. Dr. O. W. Freeman, Cheney, was elected editor of *Northwest Science,* the official publication of the association.

W. B. MERRIAM,
Secretary

SPECIAL ARTICLES

THE ULTRACENTRIFUGAL CONCENTRATION OF THE IMMUNIZING PRINCIPLE FROM TISSUES DISEASED WITH EQUINE ENCEPHALOMYELITIS[1]

IT has recently been shown that the virus of equine encephalomyelitis (Eastern strain) can be sedimented and separated from accompanying non-infectious tissue elements by quantity ultra-centrifugation; especially active preparations made in this way contained large amounts of a homogeneous heavy substance that may well be the infectious agent.[2] Several years ago it was found[3,4] that injection of non-infectious formalin-treated brains of guinea pigs dying of this disease would protect healthy guinea pigs against later injections of active virus suspensions. We have used the ultracentrifuge to concentrate and purify the immunizing principle from formalin-inactivated diseased tissues.

Our formalinized tissue suspensions were completely inactive as judged by their ability to initiate disease in either mice or guinea pigs; when injected in suffi-

[1] The part of this investigation carried out at Duke University School of Medicine and Duke Hospital was made possible through the interest and aid of the Lederle Laboratories, Pearl River, N. Y. We acknowledge with appreciation the technical aid of Mary Shipp, Department of Anatomy, Duke University School of Medicine.

[2] R. W. G. Wyckoff, *Proc. Soc. Exp. Biol. and Med.,* 36: 771, 1937.

[3] M. S. Shahan and L. T. Giltner, *Jour. Am. Vet. Med. Asn.,* 84: 928, 1934.

[4] P. K. Olitsky and H. R. Cox, *Jour. Exp. Med.,* 63: 745, 1936.

cient amounts they were capable of immunizing guinea pigs. For experiments in concentration such suspensions were cleared of gross material by low-speed centrifugation and then run one and a half hours in a quantity ultracentrifuge[5] using a field of ca 60,000 g. Samples of the supernatant liquids, which were of high protein content, were reserved for tests of immunizing power; the rest was discarded. The large pellets found after ultracentrifugation were resuspended, and their solutions further purified by repetition of the cycle of low-speed centrifugation and ultracentrifugation.

Ultracentrifugal analytical examination of the final solutions has shown the sharply sedimenting boundaries of a molecular species with a sedimentation constant of the order of 60×10^{-13} cm sec.$^{-1}$ dynes^{-1}. In no instance was there to be seen any trace of the more rapidly sedimenting material that may be the infectious substance.[2]

The immunizing capacities of the supernatant fluids and of the final solutions have been tested by subcutaneous injection into 400-gram guinea pigs of two equal doses at an interval of one week, and by intracerebral injection of 100 to 500 minimal lethal doses of active virus two weeks after the second immunizing injection. Complete immunity has been conferred by small amounts of the final product, whereas the supernatant fluids have been devoid of immunizing capacity. In one experiment, for example, there was survival of three out of four guinea pigs receiving solutions containing a total of 0.2 mg. of protein. Two of these animals gave no reaction to 200 lethal doses of virus, the third became ill but promptly recovered. In another experiment in which the protein content of the protective injections was 0.25 mg each, three out of four animals survived 500 minimal lethal doses of active virus without rise in temperature or clinical manifestations of the disease. All guinea pigs injected with the corresponding supernatant fluids died in less than 72 hours. The results of other experiments have been similar. This work is being continued.

J. W. BEARD
HAROLD FINKELSTEIN
W. C. SEALY
DEPARTMENT OF SURGERY,
DUKE UNIVERSITY SCHOOL OF MEDICINE
RALPH W. G. WYCKOFF
ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, PRINCETON, N. J.

VITAMIN B_1 REQUIREMENTS OF DIFFERENT STRAINS OF WHITE RATS

FROM the time the International Standard of vitamin B_1 was first adopted and made available, the conversion of Sherman Chase units of B_1 to International units has been a point of difference between laboratories. Conversion factors varying from two up to four or five have been reported. These variations have been tentatively explained on the basis of strain differences with the suspicion frequently that diet and technique might contribute largely to the results.

We have had the opportunity in the past two years of using three different strains of white rats in vitamin B_1 work, and have fed a number of groups on different levels of synthetic crystalline B_1. The results obtained with the three strains on a 2 gamma B_1 per day level, with two strains on a 4 gamma level, and one strain on an 8 gamma level, illustrate differences in three strains in their growth response to the feeding of vitamin B_1:

Strain	2 gamma fed daily Ave. gain in 5 weeks Gms.	4 gamma fed daily Ave. gain in 5 weeks Gms.	8 gamma fed daily Ave. gain in 5 weeks Gms.
A ...	33.3 ±1.9	52.8 ±2.3	....
B ...	14 ±1.64	27.6 ±1.04	52.9 ±2.8
C ...	29.8 ±3.38	....	....

These strain differences are inherent, as the young of the breeding stock of these three strains fed on the same stock ration give the characteristic response to B_1 supplements indicated in the table.

Variations in the factor for the conversion of Sherman Chase units to International units can be adequately explained by strain differences in the requirements of the test animals. It is obvious that each laboratory must determine its conversion factor for its particular strain of animals. It is suggested that the development of strains having uniform B_1 requirements is necessary if accurate results are to be obtained.

R. F. LIGHT
L. J. CRACAS
THE FLEISCHMANN LABORATORIES,
NEW YORK, N. Y.

THE EFFECT OF HUMIDITY ON THE DEVELOPMENTAL RATE OF CHICK EMBRYOS INCUBATED UNDER INCREASED ATMOSPHERIC PRESSURE

USING a slightly modified pressure incubator, originally described in SCIENCE,[1] a study was made of the effect of humidity on developmental rate of chick embryos during the first eleven days of incubation. Previous studies[2] had shown an acceleration of growth

[5] R. W. G. Wyckoff and J. B. Lagsdin, *Rev. Sci. Instruments*, 8: 74, 427, 1937.

[1] SCIENCE, 80: 99–100, 1934.
[2] *Jour. Elisha Mitchell Sci. Soc.*, 52: 269–273, 1936.