These results, while confirming Fischer's observations that heparin produces a combination in serum that is precipitated at approximately pH 5.0, does not substantiate his tentative conclusion that this combination is euglobulin or pseudoglobulin. Fischer's proofs of euglobulin have chiefly concerned procedures which depend upon precipitation at the isoelectric point; a sodium acetate buffer mixture, CO_2, dialysis. Precipitation near its isoelectric point is a characteristic of euglobulin; on the other hand, euglobulin, as it is ordinarily recognized, may be salted out with neutral salts. If the heparin-protein complex of new-born serum is euglobulin, it should have been precipitated at 1.00 molar sodium sulfate, or if only a partial combination the salting out might possibly have appeared at 1.50 volume-molar sodium sulfate. We realize that salting out is not an entire proof of a globulin. Salting out does, however, comprise one of the procedures used in differentiating and preparing euglobulin. Fischer's suggestion is exceedingly interesting, but its verification requires more evidence than isoelectric precipitation. It seems to us that this phenomenon observed by Fischer can be explained without assuming the actual formation of globulin.

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THE RELATION OF THE HYPOPHYSIS TO EXPERIMENTAL DIABETES

IT has been known since 1889 that removal of the pancreas leads to an increase in the blood sugar and appearance of sugar in the urine. Insulin, prepared from the pancreas, is effective in controlling the metabolism of sugar but does not cure the condition. Recently Houssay reported that extirpation of the hypophysis prior to removal of the pancreas was effective in preventing severe diabetes. It appears that we have confirmed this work. Two dogs did not survive long after the second operation, but in them the typical hyperglycemia did not develop. A third animal has survived over three weeks, during which time he has remained in good health. The tolerance for glucose is normal and the fasting blood sugar is within the normal range. No spontaneous glycosuria has occurred.

The animal shows certain symptoms which indicate complete removal of the hypophysis. Autopsy will show whether or not the hypophysectomy was complete and if there is accessory pancreatic tissue. This work is being continued at the University of Chicago.

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CANCER RESEARCH

IN the January, 1933, number of *The American Journal of Cancer* is an editorial on cancer research. In this the editor states that the prime needs of cancer research are first, *brains;* second, *time;* and third, *money.*

I should like to point out the obvious fallacy of any generalization of this type, even though it be made by one who for years has been connected with an institution utilizing each of the three components mentioned. In a field as complex as that of cancer research one institution may need primarily brains, another time for investigation and a third money. Furthermore, the primary need of any one institution engaged in cancer research may change from month to month or from year to year. It is also obviously true that no one component alone will result in progress. Brains without time or money result merely in theories. Time alone is obviously sterile. Money without brains or time is a material and impersonal factor. If each scientific man would avoid the field of generalization about the work of all others and would apply himself to his own problems in the way that he believes best, utilizing, in the proportions which he is able to find them and is able to develop them, the three elements of brains, time and money, more progress will result.

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ROSCOE B. JACKSON MEMORIAL LABORATORY
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REPORTS

APPROPRIATIONS FOR GRANTS IN AID BY THE NATIONAL RESEARCH COUNCIL

THE National Research Council wishes to announce that the research aid fund of which it has had charge for the past three years is to be continued during the present calendar year, 1933. The fund is administered by a special committee on grants in aid of research, which is composed of the chairman and treasurer of the council and of the chairmen of the council's seven divisions of science and technology. This committee will be ready to consider requests for grants of moderate amount from this fund for the support of the individual research work of qualified investigators in the fields of the natural sciences, who are citizens of the United States or of Canada.

Requests for grants from this fund will be acted

upon by the committee at two meetings during the year, in May and in December. It is requested that applications for grants to be considered at the meeting in May be filed with the council before March 15 and that applications to be considered at the December meeting of the committee be forwarded to reach the council before October 15, 1933.

The council has adopted the following policy for the administration of this research aid fund:

(1) Grants will be made in order to cover such expenses as the following: apparatus, materials and supplies, technical assistance, and field expenses.

(2) In general, grants will not be given for personal salaries or fellowship stipends, for expenses of publication, for the purchase of books, for travel to attend scientific meetings, or for research work of students under instruction.

(3) Preference will ordinarily be given to the support of investigations—(a) in which the problem and methods to be used are clearly stated, and in which definite results can be expected with the aid of the grant; (b) toward which the university or other institution to which the applicant is attached also contributes financially or through special support; (c) for which a grant of not more than $1,000 is requested.

(4) A report of progress should be made by the grantee to the Secretary of the Committee within a year after beginning the use of the grant.

(5) Periodical reports of expenditures from grants are expected, ordinarily, at the close of each quarter.

(6) The title to property purchased from grants will remain with the National Research Council until ultimate disposition of the property is made by the Council.

Correspondence in regard to applications for grants should be addressed to the Secretary, Committee on Grants in Aid, National Research Council, 2101 Constitution Avenue, Washington, D. C.

At its meeting in December, 1932, the committee on grants in aid made thirty-four grants for the support of individual research, as follows:

George E. Davis, Department of Physics, Iowa State College, development of improved methods of determining absorption spectra; Jacob Kunz, professor of theoretical physics, and J. T. Tykociner, research professor of electrical engineering, University of Illinois, determination of the magnetic moment of hydrogen; P. A. Ross, professor of physics, Stanford University, x-ray analysis and the Compton effect.

Charles B. Breed, professor of railway and highway transportation, Massachusetts Institute of Technology, cost of highway transportation; Wilber E. Harvey, assistant professor of metallurgical engineering, Lehigh University, combined effects of corrosion and fatigue upon welds; C. F. Hirshfeld, chief, research department, The Detroit Edison Company, in cooperation with H. Diederichs, professor of experimental engineering, Cornell University, determination of the temperature of the metal of a tube wall separating bodies of steam and water.

H. K. Benson, professor of chemical engineering, University of Washington, biochemical decomposition of sulfite waste; Cecil E. Boord, professor of organic chemistry, Ohio State University, synthesis of olefines; George A. Hulett, professor of physical chemistry, Princeton University, electrical conductivity of pure water; Wesley G. Leighton, assistant professor of chemistry, Pomona College, activation of surface phenomena in quartz by ultra-violet light; A. L. Robinson, assistant professor of chemistry, University of Pittsburgh, thermochemistry of dilute solutions; O. F. Stafford, professor of chemistry, University of Oregon, concentration of the H^2 isotope of hydrogen by the electrolysis of water.

Paul H. Dunn, fellow in geology, University of Chicago, correlation of Silurian strata in the Mississippi Basin; Ross L. Heaton, consulting geologist, Denver, Colorado, stratigraphy of the central and southern Rocky Mountain region.

Reginald D. Manwell, assistant professor of zoology, Syracuse University, effect of atebrine and rauwolfine on avian malaria; Eric Ponder, professor of general physiology, New York University, effects of intravascular lysins on red blood cells; Bret Ratner, clinical professor of pediatrics and lecturer on immunology, New York University and Bellevue Medical College, proteins and amino acids of milk; B. T. Simms, professor of veterinary medicine, Oregon State Agricultural College, salmon poisoning in dogs; Carl C. Speidel, professor of anatomy, University of Virginia, fundamental activities of nerves in the living animal; Maurice B. Visscher, professor of physiology, College of Medicine, University of Illinois, mechanical efficiency of heart muscle; Herbert U. Williams, professor of pathology, University of Buffalo School of Medicine, evidence of syphilis in mummified bodies from Peru.

William A. Cannon, lecturer in botany, Stanford University, derivation of oxygen by the roots of land plants; Henry J. Fry, professor of biology, New York University, mitosis in *Chaetopterus;* Ernst Gellhorn, professor of physiology, College of Medicine, University of Illinois, influence of metabolites and internal secretions on fatigue; Madeleine P. Grant, assistant professor of zoology, Smith College, thyroid secretion in amphibians and mammals; E. Raymond Hall, assistant professor of vertebrate zoology and curator of mammals, University of California, monographic study of the American weasels; Hans Jenny, assistant professor of soils, University of Missouri, ionic exchange of potassium on soil colloids; Harold Kirby, Jr., associate professor of zoology, University of California, flagellates in termites; C. R. Orton, professor of plant pathology, West Virginia University, natural dissociation of *Fusaria* in the soil.

C. W. Brown, professor of psychology, University of California, central nervous mechanism of emotional responses; Clarence H. Graham, assistant professor of psychology, Clark University, analysis of visual response by means of an electrical recording method; Harry F. Harlow, assistant professor of psychology, University of Wis-

consin, effect of complete striate muscle paralysis upon learning and thinking; Truman Michelson, ethnologist, Bureau of American Ethnology, Smithsonian Institution, study of special data upon the ethnology of the Fox and Ojibwa Indians; William S. Webb, professor of anthropology and archeology, University of Kentucky, archeological survey of Kentucky.

W. H. HOWELL,
Chairman, National Research Council

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A METHOD OF OUTLINING CUTANEOUS NERVE AREAS

IN 1928 we discovered that the cutaneous area supplied by a nerve may be rendered insensible to light touch by subjecting the nerve trunk to the influence of an alternating current; the area may be outlined by the procedure employed in cases of peripheral nerve lesions. Though we have not explored the literature to its depths, our efforts in this direction have failed to reveal a previous record of such a finding.

This indicated a new experimental approach to some of the problems of cutaneous innervation and sensation; such work has been pursued in this laboratory since 1928, and preliminary reports have appeared.[1] We did not intend to publish the technique apart from the results, but requests for an account of the method indicate that a brief note would place it at the service of others who might find it useful. We shall describe the apparatus used by us, suggesting some desirable modifications; others will occur to those who use the method.

The current from the 110 volt D. C. main was converted into an alternating current by a small Alexanderson alternator (Fig. 1); because of its noise this should be in another room than that wherein the observations are being made. The alternator may be driven by A. C. or by D. C.; Fig. 1 shows the latter arrangement. The frequency was controlled by a variable resistance in the circuit driving the alternator; it was estimated from the number of teeth and the r. p. m. of the alternator, this being ascertained by a Starrett speed indicator. The current strength was controlled by a system of variable resistances in the primary or input circuit (Fig. 1); our method of measuring it was unsatisfactory and need not be described; that this is unimportant is indicated below.

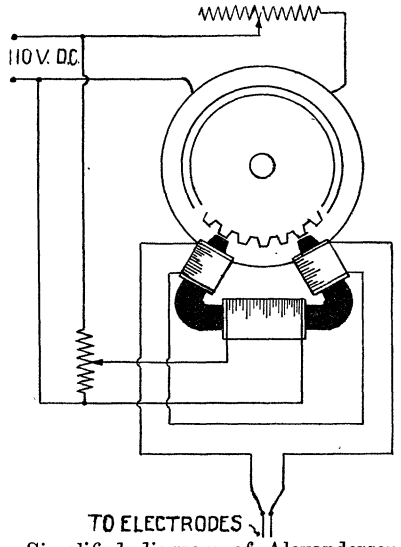

FIG. 1. Simplified diagram of Alexanderson alternator, with driving circuit (above), input circuit (left), and output or stimulating circuit (below).

We have applied the method systematically only to the nerves of the forearm and hand, to which the following account refers. Each nerve to be investigated was subjected to unipolar stimulation through the intact skin. We used metallic electrodes, padded with gauze soaked in a saturated solution of NaCl; subsequently we have found a 4 per cent. solution equally satisfactory. The large inactive electrode was applied to the opposite arm. The stimulating electrode (diameter about 1 cm) being placed on the skin over an appropriate part of the nerve trunk, somewhat as indicated by Hughson,[2] the current was *gradually* turned on by withdrawing resistance from the input circuit. With practice the nerve was soon "picked up"; this was evidenced by the sensation of flutter projected into its cutaneous area, as described by Hughson.[2] As the current was increased, testing with a von Frey hair revealed that at a certain level of current strength tactile sensibility disappeared in the area supplied by the nerve under stimulation, though remaining unaltered elsewhere; to this loss of sensation we apply the provisional term "masking" in preference to anesthesia. Manipulation of the electrode and of the current extended the masked area to a limit beyond which no further manipulation could extend it; it was then outlined on the skin as in the case of a peripheral nerve lesion, every precaution being taken to ensure that the subject received only tactile stimuli.

Fig. 1 shows no apparatus for measuring the frequency and strength of the current, that being unnecessary if one is merely outlining nerve areas: it is sufficient to manipulate the current (and the electrode) until the area is masked. If he so desire, the

[1] I. M. Thompson, V. T. Inman and B. Brownfield, *Anat. Rec.*, 45: 245, 1930; I. M. Thompson and A. Barron, *ibid.*, 48: 35 (Suppl.), 1931; I. M. Thompson, *Jour. Anat.*, 66: 148, 1931.

[2] W. Hughson, *Anat. Rec.*, 23: 371, 1922; *Johns Hopkins Hosp. Bull.*, 33: 338, 1922.