action current as well). It has been found by Field and Brücke, which accords with this hypothesis, that the refractory period steadily increases with continued stimulation for at least 10 minutes and recovers during rest. After equilibrium is established, in several minutes, no further change takes place as long as the same stimulation is continued, until in many hours fatigue, possibly due to exhaustion of C, sets in.

Absence of oxygen interferes with reaction 3. In nitrogen the oxidizing reserve permits it to continue for some time, but more and more slowly as the reserve is used up, and finally it ceases entirely. The amount of E will correspondingly slowly fall and, exactly as above, reaction 2 and then 1 be interfered with and weaker and less frequent impulses be conducted; the system eventually tending, however, not to equilibrium but to completion with failure of conduction. The fall in heat, prolongation of refractory period reported by Fröhlich and by Kato, spreading out of action current, etc., that accompany the course of asphyxia all find their explanation on this basis.

Other phenomena of nervous activity are in conformity with this scheme, but it is not wise to press it further till more definite knowledge of the actual changes postulated is available. At present there is evidence that other changes than the direct energy yielding ones are indeed present, but what rôle they play, if any, remains to be determined. The formation of ammonia has been mentioned and there are also changes in phosphates (unpublished observations). In fresh nerve there is about 60 mgm. per cent. of "soluble" phosphate (expressed as P_2O_5), of which less than half is free inorganic and the remainder partly in an acid labile combination (phosphagen?) partly in an acid stabile one (lactacidogen?). Long standing in oxygen has little effect on the distribution, but standing in nitrogen sends all or nearly all of the phosphate into the inorganic form.

It remains to correlate this material with some actual mechanism of conduction. The current view that activity of one portion of a nerve fiber is the stimulus to the adjacent portion and so along the entire fiber has much to support it, especially in the form developed by Lillie. Recent evidence indicates that conduction itself may be analyzed into two phases occurring repeatedly in succession. The first is an explosive type of chemical change in a portion of the membrane surrounding the nerve fiber, and it leads, probably by local potentials, to ion movements within the fiber, which constitute the second phase. Local concentration of ions against an adjacent portion of membrane initiates here the explosive change, and so on. Probably the ion movements are associated with only a small fraction of the energy changes, and all the material presented above concerns itself mainly with the behavior of the membrane during and after conduction. Reaction 1 would thus be the one directly entering into conduction, the explosive change determining by its intensity the amount of potential developed, the distance ahead that adequate ion movements take place, and so the intensity and speed of the nervous impulse. Most factors affecting conduction act primarily through the membrane reactions, but some, as for example diameter of the nerve fiber, may act through the ion changes. It seems not impossible to account for the phenomena associated with the activity of nerve along the lines here sketched; and, recalling that the metabolism of central nervous tissue is several hundred times as intense as that of peripheral nerve, there appear to be available many new data to help account for such reflex phenomena as summation and fatigue.

R. W. GERARD

UNIVERSITY OF CHICAGO

HAWAII'S TRIBUTE TO DR. NEWCOMBE

DR. FREDERICK CHARLES NEWCOMBE, professor emeritus of botany and retired head of the department of botany at the University of Michigan, died in Honolulu, T. H., October 1, 1927, aged sixty-nine years.

On account of failing health, Dr. and Mrs. Newcombe had made their home in Honolulu since October, 1923, soon after Dr. Newcombe's retirement from the university. Mrs. Newcombe died July 10, 1927.

Although never of robust physique, Dr. Newcombe was an indefatigable worker. Even after coming to Hawaii, he continued his researches on the sensitive reactions of plants at the Hawaiian Sugar Planters' Association with which he was associated.

The rare opportunity was afforded Dr. Newcombe, after retirement from a long, active career of teacher, research worker, executive of his department, editor and counselor to many, to carry his endeavors into a new and different environment. Here he not only continued research in his chosen field, but became a leader in the scientific thought and life of the territory. Few indeed, even if they had not been burdened as he was by failing health and the strain of the long, fatal illness of a loved one, could have grasped such an opportunity. It is a tribute to the man's undying loyalty to the work he loved, to his keen mind, tactful optimistic personality, indomitable will power and sound judgment, which never permitted him to do anything hastily, that he was able, in spite of anxiety, physical and mental suffering, to gather together and unify into two working organizations the many diverse scientific interests of the

territory. Where others had failed Dr. Newcombe succeeded. In a quiet unassuming manner, he led in the gathering together of a small group of botanists and the organization of the Hawaiian Botanical Society, April 7, 1924. He became the first president of the new organization and by the end of his presidential year its success was assured. Its growth and development have been steady.

In the same manner, through his influence, a larger group with more diversified scientific interests gathered at the University of Hawaii and there under his leadership the Hawaiian Academy of Science was organized July 23, 1925. Again he served in the capacity of first president during the first critical year of its existence, giving freely of his time, energy and the wisdom of his deep rich life. The successful year closed with a four-day session devoted to the reading of papers bearing on various scientific subjects of interest. The Hawaiian Academy of Science has continued its active growth.

Dr. Newcombe's helpfulness to the cause he loved did not end with the organization of these two societies. The latchstring of his study was always out. Never was he too busy, too tired or too engrossed with his own affairs to pause and help with advice, suggestion or criticism a fellow worker. In fact it seemed as if he could not do or give freely enough from his rich life. Age, sickness and sorrow did not dim the brightness of his great mind. He remained, as he would have wished, in full possession of his mental faculties until a few hours before his death. As he approached the sunset of his life, those who knew him best felt a softening and a mellowing of his natural austereness. Many an eye was moist at the close of the simple service held in his home, where alumni of the University of Michigan, friends and scientists had gathered in the hush and quiet of the late Sabbath afternoon, to pay tribute by word and profusion of flowers to the memory of a great teacher, scientist and friend. His passing means much to the community at large, to the scientific world and to his friends here and on the mainland.

As student and author of many articles on original research, as teacher, counselor and inspiration to his students and fellow workers, Dr. Newcombe has exercised a dominating influence in the advancement of scientific thought in America.

ELIZABETH DOROTHY WUIST BROWN
BERNICE P. BISHOP MUSEUM,
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SCIENTIFIC EVENTS

THE AUSTRALIAN NATIONAL RESEARCH COUNCIL

THE annual general meeting of the Australian National Research Council was held in Melbourne on August 25 and 26. According to a report printed in *Nature*, particular attention was given to the financial position of the council in relation to present and future work. The offer of the Carnegie Corporation to provide a sum of £5,000 as the nucleus of a research fund was accepted with most cordial thanks, and with this sum and more than £1,000 available from other sources, such a fund was formally instituted. A strong committee was appointed to take action for securing additional contributions from Australian sources, and it is hoped that before long the council will be in a position to give considerable aid to Australian workers in pure science. Amongst several satisfactory reports on the year's work was one from the anthropology committee outlining the progress made since the initiation of the department of anthropology in the University of Sydney. This step followed upon a resolution by the second Pan-Pacific Science Congress of 1923 and was made possible by contributions from the commonwealth and state governments and the Rockefeller Foundation. The new department is now in full swing and is taking active steps to organize investigations both on the mainland and on the neighboring Pacific islands. The following new members were elected to the Australian National Research Council, the total membership of which may not at any time exceed 100: Mr. C. R. P. Andrews (director of education, Western Australia); Professor A. R. Radcliffe Brown (anthropology, University of Sydney); Professor A. N. S. H. Burkitt (anatomy, Sydney); Professor A. J. Ewart (botany, Melbourne); Dr. W. A. Hargreaves (government chemist, South Australia); Professor J. W. Paterson (agriculture, Perth), and Dr. H. R. Seddon (Veterinary Research Station, New South Wales).

The trustees of the Commonwealth Science and Industry Endowment Fund in Australia are this year making £1,250 available in small grants for the assistance of scientific workers in Australia. The lines which will be followed in making the grants will be similar to those which have been proved to be satisfactory by the Department of Scientific and Industrial Research in Great Britain. The Commonwealth Fund has an invested capital of £100,000, and it is provided by act of parliament that the interest from it shall be employed for the dual purposes of training students in the methods of scientific research and in providing assistance to persons engaged in research, irrespective of whether their work has an obvious practical application or not. At present, the income is being devoted mainly to the first object, but as time goes on it is expected that an increasing sum will be available annually for distribution in grants.

LECTURES BY INDUSTRIAL FELLOWS AT THE MELLON INSTITUTE

THE following course of lectures on technologic subjects, by specialists engaged in scientific investigation