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BY LORD ADRIAN, O.M., F.R.S.

In November 1975 Dr Detlev Wulf Bronk, Foreign Member of the Royal Society, was planning a journey from New York to London to attend the Anniversary Meeting of the Society and to visit his many friends. But a fortnight before the meeting he developed a cerebral hemiplegia and died after a few days' illness. He was then 78: there had been no signs of the return of the vascular trouble which had kept him in hospital in 1970, and he had lost none of his interest in science and scientists or of his remarkable gifts for inspiring productive research. Since that illness, in fact, although he made fewer long journeys by air, he was still busy for most of the week and still followed the New York pattern of leaving the city by road on the Saturday and returning on Sunday evening.

On these weekly occasions he and Helen, his wife, would spend the night at one of the several houses, away from the city, which they had leased or built for themselves when the family was growing up. There was the farmhouse near Media which they had built during the depression in the thirties when 'Det' was head of the Johnson Foundation in Philadelphia; later on there were the houses at Woods Hole and Seal Harbor where he kept his boat, and the latest of all was a more lonely retreat in the Adirondaks, where he was constantly enlarging a very small hut on the side of a mountain.

For Det Bronk had many of the qualities of a pioneer as well as of a scientist on orthodox lines. He was the son of a Baptist minister in New York and was proud of his descent from William Brewster, the Mayflower pilgrim in 1621, and Governor of New Plymouth, and he was proud of the name which he inherited from Jonas Bronck, a member of the Dutch Reformed Church and a citizen of New York, whose name survives in the district known as the Bronx.

Bronk's own scientific work had been most productive when he was the young Director of the Johnson Foundation in Philadelphia from 1929–1949; but his faith in the value of science for the improvement of human affairs and his work for that improvement had lasted the whole of his life. His final appointment, as President of the Rockefeller University, had ended in 1968 but had left him with friends and admirers throughout the civilized world.
His career as a scientist began when he had gone as a student to Swarthmore before the United States had entered the war against Germany in 1917. After war was declared he had been in the U.S. Naval Aviation Corps and had finished, when peace returned, as an Ensign with a pilot's qualification.

He came back to civilian life to study physics at the University of Pennsylvania in 1920 and at Michigan in 1921–24, and then, perhaps because of his interest in aviation, he turned over to physiology—first as Instructor and then as Assistant Professor of Physiology and Biophysics at Swarthmore College.

Swarthmore is proud of its Quaker connections: Bronk was not a Quaker himself, but he was there at a formative period in his career and was grateful for what Swarthmore had taught him. Much later, when he was at Johns Hopkins, he told us that sometimes on a weekend visit to the farmhouse near Media he would find his way to the Friends' Meeting House across the valley and would go in to sit quietly, with nothing to say, but feeling it good to be there.

He was ‘Dean of Men’ at Swarthmore College in 1927–29 as well as Professor of Physiology. There was not much time for research and, much as he liked the students, he was glad to be offered the chance of a journey to Europe to visit the laboratories and to meet the physiologists there. He had been happily married to Helen Ramsey in 1921, and so in 1928 they were able to sail to England together and to spend some months in London and Cambridge before returning to his Swarthmore appointments. They arrived in Cambridge early in 1928 and stayed in one of the small but picturesque houses in Little St Mary's Lane. The Physiological Laboratory was within walking distance: the building was relatively new, for it had been opened in 1914 and had been planned with some reference to electro-physiological work. This was due to Keith Lucas, F.R.S., the physiologist who had helped to design the building and had arranged that in certain rooms the electric supply could be taken entirely from a storage battery with no external connections which might bring in unwanted signals. Keith Lucas was already a leader in what was known as ‘Muscle and nerve physiology’, but he was killed in a flying accident during the war of 1914–18.

When the Bronks arrived it was ten years since the fighting in Europe had ended; but it had left its marks on the progress of science and one of its consequences had been the rapid development of radio communication with the aid of the triode valve. This made it possible to magnify very small electrical events, to display them as audible signals or as photographs on moving film.

As early as 1921 the physiologists Gasser and Newcomer of St Louis, U.S.A., had published records obtained with triode-valve amplification to give magnified pictures of the ‘action potential’ in nerve fibres, and a year later Erlanger and Gasser had added a cathode ray oscillograph to give more accurate records of the rapid potential changes.

It was clear that a great deal of fresh information about the nervous system would be gained by this new technique, but it was not until 1925–26 that the
Cambridge Laboratory had suitable apparatus. In 1926, however, encouraged by Gasser’s advice, we had reassembled the apparatus which Keith Lucas had used and had added a three-stage amplifier which followed Gasser’s design. So, in 1926, when Yngve Zotterman and Brita, his wife, had come from Stockholm on a visit to Cambridge it was possible to record the signals in individual sensory nerve fibres from endings in the skin or the subcutaneous tissues. It seemed that the impulses composing the message in a single fibre were alike in size but varied in frequency according to the pressure applied to the end-organ. With the motor nerve fibres it had at first been more difficult to restrict the number in action, but after the Bronks’ arrival in 1928 it was done by destroying all but a few of the fibres in small branches close to the muscle. It then appeared that the frequency range of the impulses was much the same in the motor fibres as in the sensory. They were in a regular sequence at frequencies between about 5 and 150 a second and were irregular below that range.

Finally, these results for the motor nerve fibres could be checked by records from the muscles of human subjects, with no anaesthetics which might affect the frequency range of the impulses. For Bronk had produced the ideal electrode for recording the activity of human or animal muscles without interference from electrical forces of different origin. It was simply made from a hypodermic needle to be thrust into the muscle, with its outside connected to earth and a central insulated wire inside it leading to the input of the amplifier, so that it would record electric events at the tip of the needle but not elsewhere. With the Bronk electrode it was no longer necessary to work in a shielded room—and it was in great demand for lecture-room demonstrations of the nervous control of the voluntary muscles, in the lecturer (or in his assistants).

Bronk’s visit to Cambridge was followed by one to London to work in A. V. Hill’s laboratory at University College, on the temperature changes occurring in muscle activity. Here too he was soon at home. His visit to Hill was the start of a life-long friendship and it led to two papers which show his ability to use exact methods in physiology for new problems then within range of solution.

The Bronks went back in 1930 to a country which was soon to face a financial crisis: but in spite of the difficult years of the U.S.A. recession his work was not greatly affected. For in 1930, Bronk, who was then 33, was offered and had accepted the post of Director of the Johnson Foundation, a research establishment attached to the University of Pennsylvania, but with adequate funds of its own. He was also Director of the Institute of Neurology and Professor of Biophysics at the University. He had little teaching to do and the laboratory of the Johnson Foundation was well equipped, though some of the work there was done near midnight to avoid electrical interference—but Bronk himself was accustomed to very late hours and could work all night if necessary, and most of his team were young.

Bronk’s earlier years as the Director of the Johnson Foundation (particularly from 1931 to 1941) were the time when he gained his spurs as a scientist by
his own research in a special field of the vertebrate nervous system. In fact by 1941 Bronk and his team had published more than twenty papers in the *American Journal of Physiology*, and both Gasser and Bronk had been valuable members of the Physiological Congress at Leningrad in 1935 and at Zurich in 1938.

Until 1941 his chief concern had been the ‘autonomic nervous system’ which regulates the internal activities of the body by a special arrangement of nerves and peripheral ganglia. There were various possibilities then to explain the transmission of signals from pre- to post-ganglionic pathways, and the work of the Johnson Foundation before the war had done much to reduce the problem.

But after the attack on Pearl Harbour in 1941 Bronk, as the once young flyer in the U.S. Navy in 1918 as well as the older physiologist, could give valuable help to the Air Force of 1941–45, though they were flying at twice or three times the ceiling of 1918. He was made ‘Coordinator of Research for the Air-Surgeon’s Office of the U.S. Army Air Forces’ (and received an award for exceptional civilian service). And he was also in constant demand to advise on problems concerned with the universities, in the war and the peace which would follow.

The peace had followed in 1945 and the Johnson Foundation was soon busy again with new evidence about ganglionic transmission. But Bronk who was then 48 was moving away from the specialist’s path. His chief concern was no longer the research on the nervous control of the visceral organs. In fact he emerged from his share in the war with honours and responsibilities which would scarcely have allowed him to return whole-heartedly to the problems of nervous conduction.

He was elected a Foreign Member of the Royal Society in 1948 and delivered the Croonian Lecture in 1949 on ‘The rhythmic action and respiration of nerve cells’. But after the war he began to aim at a different target—the organization of scientific research as a major concern of civilized life.

He was rightly proud of the Johnson Foundation, and in 1946 he, as its Director, had been invited to join the ‘Board of Scientific Directors of the Rockefeller Institute for Medical Research’ and he was already active in international councils and aware of the need for a general advance in the teaching and research in science of every kind.

It was therefore no great surprise when in 1949 he accepted the invitation of the (medical) Johns Hopkins University at Baltimore to become its President—and so to begin the career as a ‘statesman of science’ which he followed for the rest of his life.

He was now concerned with the teaching at hospitals and medical schools which should lead to a medical degree—and he wanted more liberal training, with fewer barriers between teacher and pupils and between faculties, old and young. His own success as a teacher may have been due in part to his personal approach, but at least it helped to establish the claims of science in medicine at every turn, and his ‘Hopkins Plan’ took account of the needs of the student.
who distrusted his powers and wanted a longer time to prepare for his final profession.

In the four years which he spent at Johns Hopkins Bronk added new buildings and did his best to increase the morale of the non-medical faculties in a famous medical university; and he developed his own ideas for removing the barrier between teacher and taught.

But there were soon still greater responsibilities to be faced, at his final appointment as President of what was then the ‘Rockefeller Institute for Medical Research’ but was soon to become the ‘Rockefeller University’.

For fifty years the Rockefeller Institute in its New York buildings had played an essential rôle in medical progress. It had gained the esteem of the world; but its aim was research, not teaching, and it had made no attempt to cover the whole of the medical field. Gasser, who was then its Director, could point to distinguished professors who owed much of their training to contacts made at the Institute, but Bronk, then on its Committee, wanted much more. He wanted to see the Institute changed to a new University, where teaching as well as research would cover the medical field and would attract the most intelligent students as well as the distinguished professors.

Such a change would involve new buildings in the heart of New York, a much greater budget and an exceptional Director with the good will of the medical profession. But Bronk had served on Gasser’s Committee since 1946, and already in 1950 he had been elected President of the National Academy of Sciences of the U.S.A. No one could doubt his ability. It was known that he favoured the change to a new University with a yearly input of students and the power to award degrees. So now, on Gasser’s retirement in 1953, Bronk was the obvious choice as President of the new Rockefeller University. He was then 56 years old. He was duly appointed President in 1953 and held office until 1968, and for most of those years he held other important positions as well—he had been President of the National Academy of Sciences for an exceptional period, from 1950 to 1962, and Chairman of the National Science Board from 1950 to 1964. He had visited many countries, sometimes with an eye for new members of the staff of the Rockefeller University, or for occasional students to come for their medical training, sometimes for attending an international meeting and sometimes to receive yet another honorary degree (he had 55 at least) and so to raise the morale of the new or the old university which had made him a member.

Meanwhile the Rockefeller University continued to prosper. New subjects were added—mathematics, psychology, physics—and there were new and impressive buildings in pleasant gardens, the Caspary Auditorium, the Abby Aldrich Rockefeller Hall and the Graduate Students Residence: and Det and Helen were housed in the newly-built President’s Lodging overlooking the East River but invisible from the East River Drive. It was the focus of hospitality to guests from the University and from every part of the world—and so it continued until 1968 when he had finished his third five-year term as President.
In fact for the 18 years, from 1950, when he became President of the National Academy of Sciences, until 1968 when he retired from his official position at the Rockefeller University, Detlev Bronk played a leading rôle in the organization of scientific research in the U.S.A. By his work as Chairman of the National Research Council and of the Natural Sciences Board from 1956–1964 he had become the accepted leader in the campaign for expanding the influence of scientists on the federal policy of the government. He could plead for support for more basic research in universities as well as in Government laboratories; and his influence had always been strengthened by personal contacts and friendly discussion—and in the end his advice was often accepted.

His service to the development of science as a major concern of the State was recognized by the award of the National Medal of Science and the Presidential Medal of Freedom (as well as by the photograph of Mount Bronk—so named in his honour by the National Science Foundation’s Office of Antarctic Programs, in 1963).

After Bronk had finished his term of office as President of the Rockefeller University he went with Helen to live in a pleasant apartment not far down the river: but he kept his office at the University, and his secretary, Mrs Bright, as well as the many friends he had made at the University and on his travels. He continued to give great service to the whole community as an elder statesman, skilled in the ways of scientists and doctors and universities in many countries.

He was proud of the many new buildings for which he had once been responsible, in Philadelphia, Baltimore, New York and Washington, particularly those of the new Rockefeller University and those of the National Academy of Sciences at Washington, which had been greatly enlarged since his time as its President, when he had urged the need for expansion.

He had always been interested in building—as a builder himself as well as a client. He had helped to design the farmhouse at Sycamore Mills near Media, which was built in the nineteen thirties with large rooms and a great open hearth at the end of the parlour, and a meadow sloping down to the creek in the valley. There in the thirties you might meet with some of his team from the Johnson Foundation at Philadelphia, and in the fifties and sixties with some of the guests which he and Helen had brought from the President’s house at the Rockefeller University. And he was usually ready to carry out extensive repairs himself on his houses in the country, for he was an accomplished carpenter and could enlist the help of his friends. He was a sailor as well as a builder: in summer he would usually manage a cruise in his yacht with the family, and a skiing excursion in winter.

In 1949 at the University of Pennsylvania, he gave one of the Benjamin Franklin lectures which concerns his devotion to science, and another at Auburn University in 1970 where he ends ‘After fifty years as an engineer, biologist and servant of universities and government, I still have faith in science and reason as sure means for creating an even better quality of life’.
The photograph is by R. Carter, Illustration Service, the Rockefeller University.

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