inferior. This is not done, however, because the choice between the 800 meter and one hour would be arbitrary; and because any new record above the line would require a recalculation with distortion of the whole plot. It is believed that the plot as shown gives a fair comparison between the records. Tentatively a smooth S curve is drawn through the four records mentioned, and is considered to represent the present limit of human speed.

The plot shows that four of Haegg's seven records, the 1,500 and 2,000 meters, his one mile and the two mile, are practically equivalent. The 3,000 meters and three mile are much better, but inferior to his 5,000-meter record. The new mile record by Arne Andersson in Sweden of 4: 02.6 is closer to the curve; but even the hypothetical "four minute mile" falls short, and is therefore an imminent possibility.

A straight line is drawn between the 400-meter point and that for 220 yards, showing that those for 300 yards and 300 meters are inferior. The break at 400 meters is of course too sharp, but the abrupt drop is due to the fact that races shorter than 400 meters are not completely exhausting.

The records used in the calculations are those given in the New York World Almanac for 1943, whether officially accepted as world's records or not. Two other records are included, the new mile record made on July 1, 1943, and the 500-yard record of 54.4s. by Borican on June 13, 1940. Table I gives the records for the more usual distances with the products plotted in Fig. 2, and the calculated records corresponding to the curve of Fig. 2. Calculated times for other distances can be found readily by interpolation. Any actual time for a race can be compared with the calculated world's record on a percentage basis, either time for the same distance or, what is more sound theoretically but less convenient, relative distance in the same time; since that represents the relative accomplishment of an inferior runner as compared with that of a "perfect" runner in the same time.

TABLE I

WORLD'S BEST RUNNING RECORDS

Distance	Product*	Time computed	Time actual	Per cent.
100 yd	....	....	9.4s	
100 m	....	....	10.2s	
200 m	5.33	20.16s	20.3s	99.3
220 yd	5.39	20.3s	20.3s	100.0
400 m	6.057	46.0s	46.0s	100.0
440 yd	6.043	46.34s	46.4s	99.87
800 m	6.041	1m 46.6s	1m 46.6s	100.0
880 yd	5.860	1m 47.33s	1m 49.2s	98.26
1,000 yd	5.697	2m 4.7s	2m 8.8s	96.82
1,500 m	5.771	3m 40.4s	3m 45.8s‡	97.61
1 mile	5.860	3m 58.7s	4m 2.6s	98.19
2,000 m	5.788	5m 4.8s	5m 11.8s	97.66
3,000 m	6.000	7m 58.6s	8m 1.2s	99.46
2 miles	5.815	8m 37.2s	8m 47.8s	98.00
3 miles	5.993	13m 26.6s	13m 32.2s	99.31
5,000 m	6.081	13m 58.2s	13m 58.2s	100.0
5 miles	5.687	23m 26.5s	24m 6.2s	97.25
10,000 m	5.950	29m 39.8s	29m 52.3s	99.30
10 miles	5.784	49m 35.0s	50m 15.0s	98.67
19,210 m	5.946	One hour	One hour	100.0

* $(\log D - 1.5)(V - 3.2)$ D in meters, V in meters/sec.
‡ Since this paper was written, Andersson has run 1,500m in 3m 45s.

OBITUARY

LEWELLYS F. BARKER

DR. LEWELLYS F. BARKER, emeritus professor of medicine of the Johns Hopkins University and visiting physician to the Johns Hopkins Hospital, died on July 13 at the age of 75 in his home at 208 Stratford Road, Baltimore. His death brought to a close a long and active career in which he had attained great eminence as a physician and teacher.

Dr. Barker was born in Norwich, Ontario, Canada, on September 16, 1867. His father, James F. Barker, and his mother, Sarah Jane Taylor Barker, were members of the Society of Friends and thus Dr. Barker was brought up as a Quaker. He attended Pickering College from 1881 to 1884 and in 1890 received the degree of bachelor of medicine from the University of Toronto. After graduation he served as an interne in the Toronto General Hospital, and having determined that the Johns Hopkins Hospital was the institution in which he wished to continue his medical studies, he came to Baltimore, and was appointed assistant resident physician by Dr. Osler. This marked the beginning of Dr. Barker's distinguished services to the Johns Hopkins University and Hospital.

During these early and busy years he worked in close association with Osler, Welch and Mall, and it was not long before it was realized that this young assistant possessed a mind of unusual quality and capacity. Dr. Franklin P. Mall, the professor of anatomy, was one of the first to give expression to this feeling and in 1894 selected Dr. Barker to fill the position of associate in his department; and in 1897, at the age of 30, Dr. Barker was made associate professor of anatomy. Under Mall's influence, Dr. Barker became absorbed in a study of the nervous system. This resulted in his first important and extensive contribution to medicine which took the form of a book entitled "The Nervous System and its Constituent Neurones."

A trip abroad to work in Germany with von Fry, Flechsig and His was soon followed by a noteworthy distinction, for in 1900 he was invited to take the chair of anatomy at the University of Chicago. Pre-

vious to his departure from Baltimore, however, there had been an opportunity to work in the pathological department at the Johns Hopkins University, and to make two important expeditions, in company with Dr. Simon Flexner; one to the Philippines on the Johns Hopkins Medical Commission, and the second to San Francisco on a commission sent by the Government to determine the existence or non-existence of bubonic plague in that city.

In 1903 Dr. Barker married Miss Lillian Haines Halsey, and later when they made their home in Baltimore, their house became a center to which innumerable friends from home and abroad were welcomed with the greatest hospitality.

While Dr. Barker was professor of anatomy at the University of Chicago, he published an article on the whole-time teaching of clinical subjects. This paper attracted some attention and when Dr. Osler resigned the chair of medicine at the Johns Hopkins University in 1905 to go to Oxford, Dr. Barker was selected to fill this post. It was not, however, possible at that time, to place the department on a full-time basis.

The appointment was a somewhat unconventional one, for Dr. Barker had had little practical experience in clinical medicine. Nevertheless, he returned to Baltimore equipped in other respects in an unusual manner to develop along progressive lines the excellent medical clinic which already existed, for he not only had experience and training in one of the preclinical sciences, but had spent a year working with Friedrick Müller in Munich and with Abderhalden in Emil Fischer's laboratory in Berlin. Endowed with remarkable intellectual qualities, a gift for teaching and unusual executive ability, Dr. Barker enlarged the facilities for investigation, and with much foresight developed the first medical clinic in the country in which well-equipped laboratories for research in chemistry, in physiology and in infectious diseases and immunity formed an integral part of the department. This elaborate extension of the arrangement which then existed was an innovation and an important contribution.

In his practice, he soon came to appreciate the need of emphasizing special examinations, which were rapidly being made available through new techniques, for obtaining information concerning the diseased state of his patients. In the course of these intensive studies, attention was directed not only to the various physical abnormalities, but to the hereditary traits, the emotional reactions and the mental characteristics of the individual; and in order to accomplish this successfully, it was desirable that a small group of physicians, surgeons and specialists should work in close cooperation. Only when the data, obtained in this manner, were analyzed, correlated and coordinated, could a comprehensive diagnosis be arrived at, and what Dr. Barker termed a correspondingly "multidimensional" therapy instituted. It is not surprising that he should have been particularly attracted to a study of the anatomical and functional disturbances of the nervous system, and that first, having laid stress upon the personality of the patient, he should later lay emphasis upon the individual as a complicated and indivisible whole. These were principles which dominated his practise, and which brought him phenomenal success. His knowledge led many groups to seek his advice, not only concerning matters of physical well-being, but involving problems of social welfare.

His interests grew in number and widened in scope and when it became financially possible through the generosity of the Rockefeller Foundation for the Johns Hopkins University to place some of the clinical departments on a full-time basis, Dr. Barker found it impossible, on many accounts, to accept the headship of the department of medicine on this basis. He remained, however, an active and brilliant member of the staff for the remainder of his life, acting as a member of the medical board of the hospital, of which he was chairman for many years, and conducting clinics, the last series of which he completed only a few weeks before his death.

His quick and retentive mind, his wide and remarkably varied interests, his systematic methods of intensive study and concentrated reading, resulted inevitably in an accumulation of knowledge which was almost encyclopedic. This was reflected in his brilliant clinics and lectures, in his addresses and in his numerous articles and treatises which touched almost every phase of medicine. His last book, published scarcely a year before his death, was an autobiography entitled, "Time and the Physician."

He was a member of a great number of medical and scientific societies, and acted as president of many, including The National Committee for Mental Hygiene (1909–1918), the Association of American Physicians (1913), the American Neurological Association (1916), the Southern Medical Association (1919), the Association for the Study of Internal Secretions (1919) and the Medical and Chirurgical Faculty of Maryland (1923). He received the honorary degree of doctor of laws from Queens University, Canada, in 1908; from McGill University in 1911 and from the University of Glasgow in 1930.

Dr. Barker was a conspicuous figure in American medicine. His somewhat stately gracious manner, his height, his white hair and, above all, his long delicately formed hands impressed every one who came in contact with him. There have been few physicians in this country who were more learned in the various

branches of medical knowledge, more widely versed in the affairs of man or more interested in the human being than Dr. Barker.

WARFIELD T. LONGCOPE
THE JOHNS HOPKINS HOSPITAL

RECENT DEATHS

DR. ROSCOE RAYMOND HYDE, professor of immunology and director of the laboratories of immunology and filterable viruses of the School of Hygiene and Public Health of the Johns Hopkins University, died on September 15 at the age of fifty-nine years.

DR. BERT CUNNINGHAM, professor of biology at Duke University, died on September 27 at the age of sixty years.

DR. J. WILLARD HERSHEY, head of the department of chemistry of McPherson College, Kansas, known for his work on rare gases, died on September 27 at the age of sixty-seven years.

STEWART H. BURNHAM, who retired recently after serving for more than twenty years as assistant curator of the herbarium of the department of botany of Cornell University, died on September 25. He was seventy-two years old.

DR. ARTHUR A. TICKNOR, divisional chemist for the Calco Chemical Company of Bound Brook, N. J., a subsidiary of the American Cyanamid Company, died by suicide on September 26. He was fifty years old.

DR. GEORGE BACHARACH, assistant professor of chemistry at Brooklyn College, died on September 20, at the age of fifty-five years.

SCIENTIFIC EVENTS

AIRCRAFT PRODUCTION IN GREAT BRITAIN

THE Select Committee on British National Expenditure, in a report on Aircraft Production issued recently, states, according to *The Times*, London, that the aeronautical industry in Britain is suffering from an acute shortage of scientific and technical men. It is stated that there are not enough adequately qualified men available to maintain the industry at the proper level of efficiency. This shortage applies also in the whole field of aeronautical research, including the official establishments, and it is said to have been clear for some time that there is more work than can be done by the existing personnel. The report continues:

> Special measures are therefore necessary. Men of high academic, scientific or technical attainments should not be allowed to be absorbed in the fighting services, where, even when they are employed in technical jobs, their qualifications are often much higher than is needed. More pre- and post-graduate courses in aeronautics are needed at the universities, especially in view of the fact that facilities for training which were available in the industry in peace-time are now used for training R.A.F. personnel. The committee recommends that the appropriate departments should investigate the facilities available for training research workers, aeronautical engineers and other technicians in order to determine what action is necessary to meet requirements.
>
> There is a similar shortage of adequately qualified staffs in all grades of management. The enormous expansion of the industry has entailed the up-grading of large numbers of men with relatively little experience, and it is freely admitted by managements that they have had to promote many men whom they would not normally so promote. Little appears to have been done to remedy the deficiency. In the case of foremen the situation has been worsened by the fact that there is frequently reluctance to accept promotion. In a few cases, the existence of high piece-rate earnings may partly explain this reluctance, but the more general reason is undoubtedly simple unwillingness to accept responsibility. This is not unnatural when it is remembered that relatively few workmen are of long standing in this industry. To remedy these deficiencies the committee recommends that courses should be provided to train foremen for higher grades, and that more use should be made in the Ministry of Labor's courses in foremanship.

The report points out that one of the most disturbing features in regard to the supply of labor for the industry is the high rate of wastage. In the present general shortage of labor it is necessary for firms to engage persons who for one reason or another are not ideally suited for the work. The committee considers that the rate of wastage disclosed is greater than it should be, and that action should be taken by the Ministries of Labor and Aircraft Production to reduce it.

OPHTHALMOLOGICAL RESEARCH AT THE UNIVERSITY OF OXFORD

THE University of Oxford is planning the establishment of a department for ophthalmological research, the activities of which would include research, teaching and the treatment of patients. The Ophthalmological Research Endowment Committee is asking for help in raising £250,000 to build, equip and endow the research laboratories of a department of ophthalmology at the university. Contributions received during the war will be invested in Government securities. The treasurer of the Ophthalmological Research Endowment Fund, Old Clarendon Building, Oxford, will receive contributions. Expenses of the appeal