

GEORGE HENRY FALKINER NUTTALL

(5 JULY 1862—16 DECEMBER 1937)

NUTTALL was born in San Francisco, California, on 5 July 1862; the second son of Robert Kennedy Nuttall, M.D. (Aberdeen) and his wife, Magdalena, daughter of John Parrott of San Francisco. The Nuttalls were descended from an old Lancashire family, which settled in Ireland in 1707, many of its members serving as officers in the British Army. His father went to Australia, but migrated to San Francisco in 1850 and practised there till 1865. In that year the family came to Europe and remained there till 1876, the children being educated in England, France, Germany and Switzerland. Consequently, Nuttall spoke several languages, a fact which assisted him enormously in his future work and travels.

Most of the family returned to San Francisco in 1876, where his father died in 1881. Nuttall returned in 1878, obtained the M.D. degree of the University of California in 1884, and then with some members of the family travelled in Mexico for a year. His sister, Zeila (1857–1933), devoted her life to Mexican archaeology.

In 1885–6 Nuttall worked in the newly founded Johns Hopkins University, Baltimore, at biology under H. Newell Martin, formerly Huxley's demonstrator at the Royal College of Science, London, and at psychology under Hall.

In 1886 he spent a few months at Breslau and then went to Göttingen where he remained for four years, working under Flügge and others. Most of his time was devoted to the study of botany and zoology, which exerted a predominating influence on his career, for the greater part of his life was devoted to the study of parasitology.

At this time the question of humoral versus cellular immunity, lately formulated by Metchnikoff, was being hotly debated, and Nuttall turned his attention to this subject also. Though Fodor and Wyssokowitsch had shown that bacteria injected into the blood stream disappeared therefrom, Nuttall (1888), working in Flügge's Institute, was the first to demonstrate that defibrinated blood possessed a considerable bactericidal power against anthrax bacilli, and that this power was destroyed by heating to 55° C., and also disappeared in time. This work formed the basis of an essay, "A contribution to the study of immunity", for which Nuttall received the triennial Boylston Prize from Harvard University, open to competitors of all nations. The essential facts disclosed by Nuttall were confirmed by many workers, who showed further that the power varied with the bacteria employed. Nuttall's work stimulated investigation on the nature of humoral immunity, and within two years Behring and Kitasato (1890) had demonstrated antitoxic immunity. He graduated Ph.D. of Göttingen University in 1890.

After travelling for a year Nuttall returned to Baltimore in 1891 as assistant to W. H. Welch, the Professor of Pathology, and in 1892 was made Associate in Hygiene.

In 1891 he published a method for estimating the actual number of tubercle bacilli in the sputum, and for some weeks calculated the numbers present daily in the sputa of three patients. The maximum number found was 4,312,581,280 and the minimum 265,980. A method for inoculating media and animals with known numbers of bacteria was also described. This was the first work published on this subject.

In 1892 he published in conjunction with Welch a very full account of *B. aerogenes capsulatus*, now known as *B. welchii*, but the importance of this organism as a pathogenic agent was not fully appreciated until the Great War.

In 1892 he visited Havana and noticed that at the Royal and Pontifical University dissections were made in the open air. At that time 25% of all the troops sent out from Spain died of yellow fever, and the physician in charge of the yellow fever ward in the hospital was nick-named the "undertaker". The great mortality amongst newcomers and the relative immunity of the native population greatly impressed him.

In March 1893 he went to Europe to prepare himself for the Professorship of Hygiene in Baltimore, but altered his plans after meeting his future wife in Dresden, and remained in Germany till 1899. He worked at Göttingen for about a year and then went to Berlin where he worked as a voluntary assistant at the Hygienic Institute under Wolffhügel and Max Rubner. In 1895 he married Paula, daughter of Kammerherr von Oertzen-Kittendorf of Mecklenburg.

The most important research which he carried out during this period was that undertaken with Thierfelder (1895-7), on whether the presence of bacteria in the gut, etc., was necessary for normal animal life. After overcoming many technical difficulties they showed that it was possible to rear guinea-pigs, delivered by Caesarian section, in a specially devised chamber under aseptic conditions. The animals remained healthy for two weeks, and, had it been worth while continuing these very laborious experiments, would probably have lived as long as animals living under normal conditions. In the course of these experiments it was demonstrated that some substances secreted in the urine arise from bacterial activity in the intestinal tract.

In 1895 he designed a thermostat to contain a microscope for the study of living bacteria, etc., at known temperatures, which was used extensively for many years.

In 1897 he first turned his attention to the part played by insects, ticks, etc., in the spread of disease, a subject to which he devoted most of the rest of his life, and in 1899 published his well-known paper, "On the rôle of Insects, Arachnids and Myriapods as carriers in the spread of bacterial and parasitic diseases of man and animals", a critical and historical review of the whole subject. At that time, though the relation of mosquitoes to filaria and of ticks



Fig. 1.

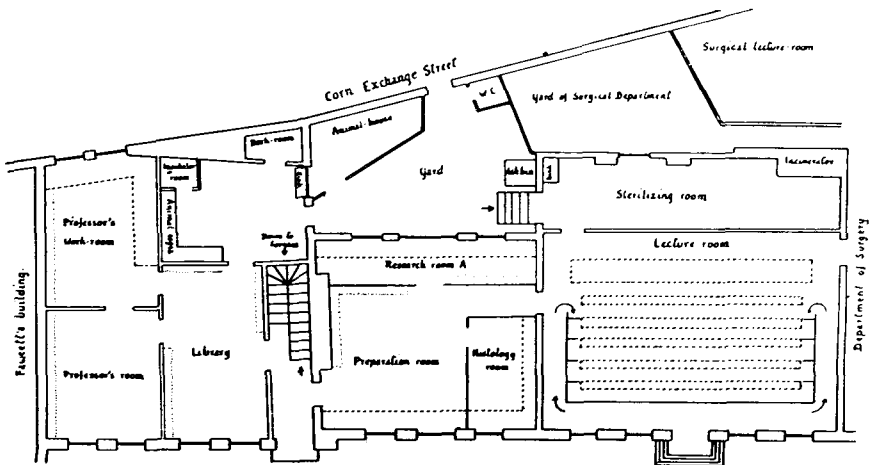


Fig. 2.

to Texas fever in cattle was known, and of mosquitoes to malaria very strongly suspected, if not actually proved, the insect transmission of plague and yellow fever was not suspected, and very few of the works on hygiene even mentioned the possible role of insects as carriers of infection. Nuttall's review, which was the first attempt to bring together all the scattered references to the subject and to quote native surmises in various parts of the world, stimulated research, though the widespread importance of the subject was not fully appreciated for some years.

In May 1898, Nuttall was invited to Cambridge by A. A. Kanthack, Professor of Pathology, who died in December before any definite arrangements had been made. In May 1899, Sir Clifford Allbutt, Regius Professor of Physic, renewed the invitation, suggesting that a teaching post might be created for him, and Nuttall came to Cambridge in the Long Vacation and gave a course of lectures on bacteriology, residing for six weeks in Gonville and Caius College. At that time the Department of Pathology occupied the oldest scientific building in the University, completed in 1784, which for many years (1784–1865) had housed nearly all the scientific professors in the University, namely the Jacksonian Professor, and the professors of botany, chemistry, mineralogy and mechanism. It consisted of a large lecture room, a demonstration room and five other rooms, two of which were subdivided by matchboard partitions into small research rooms or compartments. The teaching staff consisted of the professor, G. Sims Woodhead, and the demonstrator, T. Strangeways Pigg, who soon afterwards changed his name to T. S. P. Strangeways. Nuttall, who wished to teach hygiene, undertook to give courses in bacteriology, and in 1900 was appointed University Lecturer in Bacteriology and Preventive Medicine for a period of five years at a stipend of £50 a year, the usual stipend in those days of a University Lecturer. At the same time he received the honorary M.A. degree. In the same year he founded the *Journal of Hygiene*, the first number appearing in January 1901, which he edited till his death; in fact, he had decided to break his connexion with the *Journal* at the end of last year. Throughout this long period he spared no trouble in editing, going over almost every paper word by word, making emendations and suggestions, and insisting on due credit being given to previous workers. Nuttall was very proud of the *Journal* and of its offspring *Parasitology* (p. 135) and set a high standard. "Not only did he require honesty, he required intelligibility... and did much to raise the standard of literary workmanship in medical and biological circles." For some years Nuttall made himself personally responsible for both *Journals*, neither of which at first met the heavy expenses of production. Afterwards, however, each began to pay and was taken over by the Cambridge University Press, and Nuttall received a small stipend as editor.

Nuttall worked in a small, but well-lighted, compartment (about 14 × 7 ft.) in one of the ground-floor rooms, Strangeways, Cobbett and Durham occupying the other compartments. In this room he carried out his well-known researches on the formation of precipitins, on the precipitin test in relation to zoological

relationship and to legal medicine, and on the structure and biology of mosquitoes, and their geographical distribution in England.

Previous to 1900, instruction had been given in this laboratory to a small number of third year medical students and to a few students preparing for the D.P.H. examination, but in that year a course, which was given by Woodhead, Strangeways, Nuttall and Shipley and became very popular, was introduced in the Long Vacation for students preparing for the final M.B. examination. Nuttall lectured at 2.30 p.m. and superintended practical work from 3.30 to 6.30 on three days in the week. His teaching was extraordinarily interesting and stimulating, for he not only spoke with a great personal knowledge of his subject but he knew nearly all the leading bacteriologists in America and Europe (see p. 138), told how their discoveries were made, and described their successes and disappointments, methods, idiosyncrasies and disputes. At tea under the large Sophora tree, familiar to all medical students until 1934 and the last relic of the Old Botanic Garden (1762–1852), on the site of which many of the laboratories stand, he was on the friendliest terms with all, eagerly discussing any subject which arose and occasionally describing in glowing words accompanied by apt gestures some of his remarkable experiences in California or Mexico, or in the numerous laboratories he had visited or worked in. On fine evenings Nuttall or Strangeways met the class under the tree and discoursed on the relation of pathology and bacteriology to practical medicine and public health, often citing their own experiences. Each year fifty or more students attended, the heat in the demonstration room was often terrific, the laboratory stock of microscopes was very limited, many had to be borrowed from other laboratories, most of them without rack-work coarse adjustment, mechanical stages were non-existent and oil-immersion lenses rare and often of poor quality; in fact, other laboratories did not possess them. In spite of many difficulties they were very happy days for all, and Nuttall often referred to them with enthusiasm in after years. This course continued to be given until the introduction of a new examination in elementary general pathology and pharmacology (2nd M.B., Part II), commonly known as “Bugs and Drugs”, in 1910.

In 1900 Nuttall became interested in the history of malaria in England. Though few, if any, indigenous cases existed, many medical men in Essex, Cambridgeshire, etc., remembered severe outbreaks in the early days of their practice. Nuttall with Cobbett, Strangeways (1901) and others undertook a survey of the distribution of *Anopheles* in England, and showed that three species were to be found in all districts which were formerly malarious, being especially numerous in lowlying lands, but that they occurred also, though in smaller numbers, in many places where the disease had never been recorded. The disappearance of the malaria in England was therefore not due to the extinction of *Anopheles*. This paper included the first accurate maps on the distribution of disease-bearing insects, a system which has since been followed in many parts of the world. With Shipley (1901) he carried out important

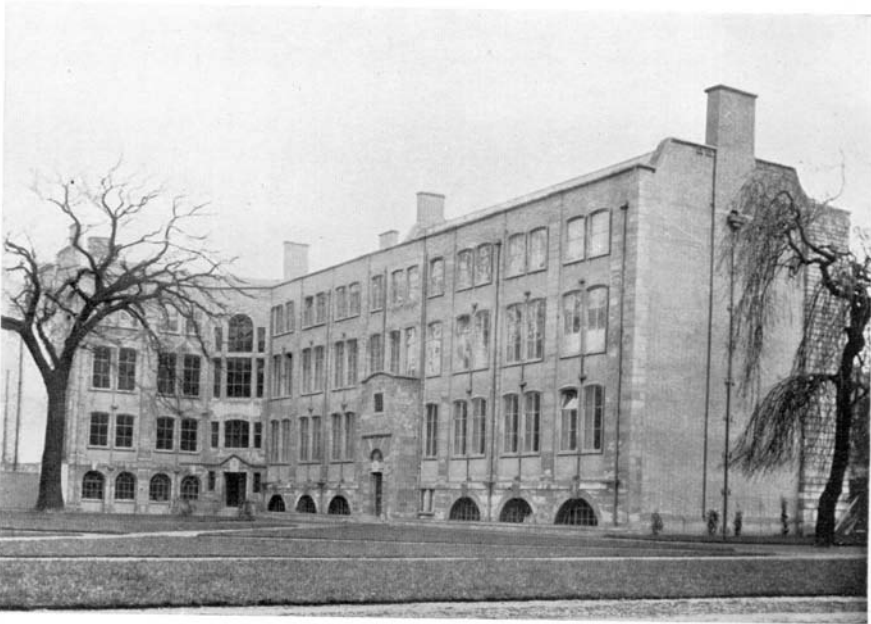


Fig. 3.

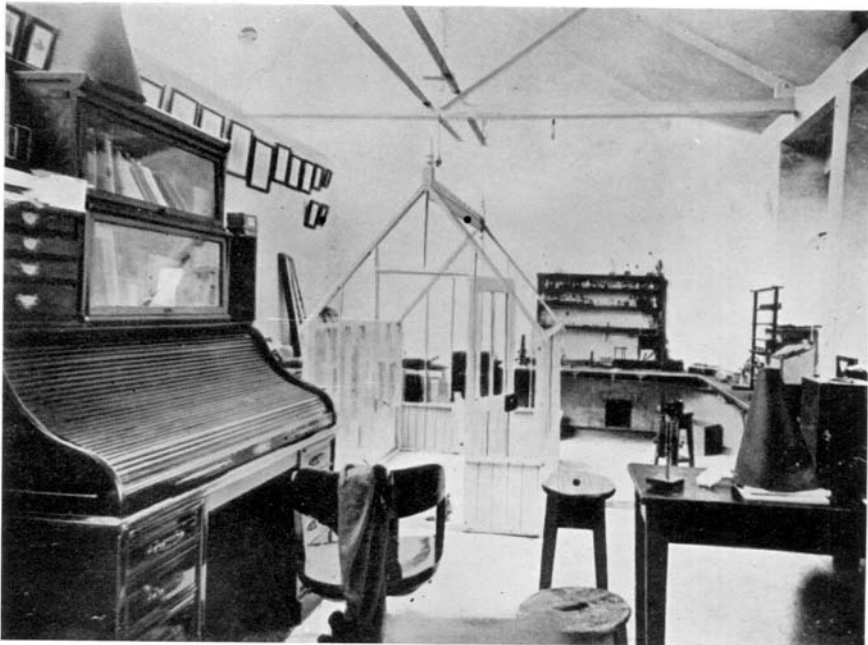


Fig. 4.

researches on the structure and biology of *Anopheles*. This was the most detailed study of its kind which had been published, and revealed many new facts.

Kraus (1897) was the first to demonstrate the production of precipitins in sera by inoculating clear filtrates of bacteria, and soon afterwards Tchistovitch (1899), Bordet (1899), Uhlenhuth (1900) and others observed the formation of specific precipitins after the inoculation of various bloods and sera. Nuttall (1901) soon confirmed and extended these observations, noticed slight reactions with the sera of allied animals and suggested the forensic use of precipitating antisera. During the next three years he worked with great diligence on the application of the precipitin test to the relationships among the vertebrates, and in 1904 brought out his classical monograph on *Blood Immunity and Blood Relationship*. In this work he clearly demonstrated group reactions in the Mammalia and a bond between Aves and Reptilia. For the further elucidation of this subject accurate quantitative tests are necessary. Nuttall realized this and devised quantitative methods, but up to the present no sufficiently accurate quantitative method has been devised. At the same time, with his aid, the first investigations were carried out in his laboratory on the use of the precipitin test for medico-legal purposes (F. Sanger, 1902).

In 1904 Nuttall was chairman of a committee appointed by the British Association on *Ankylostoma* in British coal mines.

In this year he was elected F.R.S., at the same time as his friend Shipley.

In spite of considerable opposition, Nuttall by his enthusiasm and persistency, with the co-operation of his intimate friend, Sir Patrick Manson, persuaded the University to establish in 1904 the first Diploma in Tropical Medicine and Hygiene. This diploma, which played a very great part in raising the standard of research in tropical medicine and in parasitology amongst medical officers in the tropics, was continued until 1933, when the establishment of a diploma in connexion with the London School of Hygiene and Tropical Medicine rendered its continuance unnecessary. During the whole of this period he took a very active interest in this diploma, for many years acted as an internal examiner, and for the last few gave lectures on those subjects in which he was especially interested.

On 1 March 1904 the building in Downing Street known as the Medical School was opened by King Edward VII, and Nuttall moved into a moderate-sized room on the top floor, which soon became remarkable for a greenhouse, used for the rearing of ticks, etc., erected in the middle. In this room he worked till 1907. The old laboratory remained derelict for a few years and was then pulled down. In 1934 a portion of the new Zoological Laboratory was built on its site.

In May 1906, in consideration of "his services to the University and his distinction as a man of science" he was appointed Reader in Hygiene as from Michaelmas with a stipend of £250 a year; the General Board being unable "in view of other claims on the funds of the University . . . to propose a larger sum".

In this year he obtained the degree of Sc.D. and was elected a Fellow of Christ's College.

Nuttall held the office of Reader for a few days only, for on 16 October 1906 he was elected the first Quick Professor of Biology. Previous to the election Allbutt, Manson, Osler and Ross addressed a letter to some of the most eminent bacteriologists and protozoologists in Europe and America asking for their opinions on Nuttall's qualifications. This letter produced remarkable results, for fifty-seven replied that in their opinion he was eminently fitted to promote the study of protozoology, in its relation especially to the causation of disease, and thirty added special appreciations of his work. The regulations laid down that the professorship should be "not tenable for more than three years without a fresh election, open to all candidates, including the prior holder thereof"; that the stipend should be nine-tenths of the income of the Fund, but should not exceed £1000 a year; that until otherwise determined the Professor should devote himself to the "study of Protozoa, especially such as cause disease"; that he should lecture only in one term on the results of researches carried out in his laboratory or elsewhere and that he should receive not more than £300 a year from the Quick Fund for "providing assistance and for the general maintenance of his laboratory". (Up till 1918, about £200 was received.) The regulation restricting his lectures brought his active teaching career to an end, and the last regulation hampered throughout his tenure of the professorship both his research and the expansion of his department by imposing the necessity for continually begging for funds outside the University, in order to meet the expenses incurred in maintaining and developing his laboratory.

In 1907 the Quick department moved into a large room (63 × 37 ft.) on the ground floor of the east wing of the Medical School, originally intended for a teaching museum. A wooden floor, which owing to its light substructure soon became resonant and creaky, had to be laid down in order to bring the work benches near to the window level, and the room was divided into alcoves by suitably placed cupboards, bookcases and screens. In this uncomfortable and unsuitable room, which was never free from dust owing to busy roadways on three sides, without privacy, subject to continual interruptions and apprehensive of fire (owing to the large quantity of wood employed), Nuttall worked with great energy and enthusiasm till 1921, and published a long series of important papers on "red-water" in dogs, horses and cattle, and on the classification, structure, biology and disease-transmitting capacities of ticks and lice. With the aid of grants and benefactions and contributions out of his own stipend he established during this period an Assistantship in Protozoology to the Quick Professor (H. B. Fantham, C. Strickland, E. Hindle, D. Keilin), a Demonstratorship (C. Warburton), and a Research Studentship in Medical Entomology (E. P. Jepson, G. Merriman, D. Keilin), and the post of Helminthologist (A. Porter). All the available places in the laboratory were generally occupied by research workers, amongst whom may be mentioned P. A. Buxton, S. R. Christophers, J. W. Cornwall, S. Hadwen, L. Harrison, F. N. Howlett,

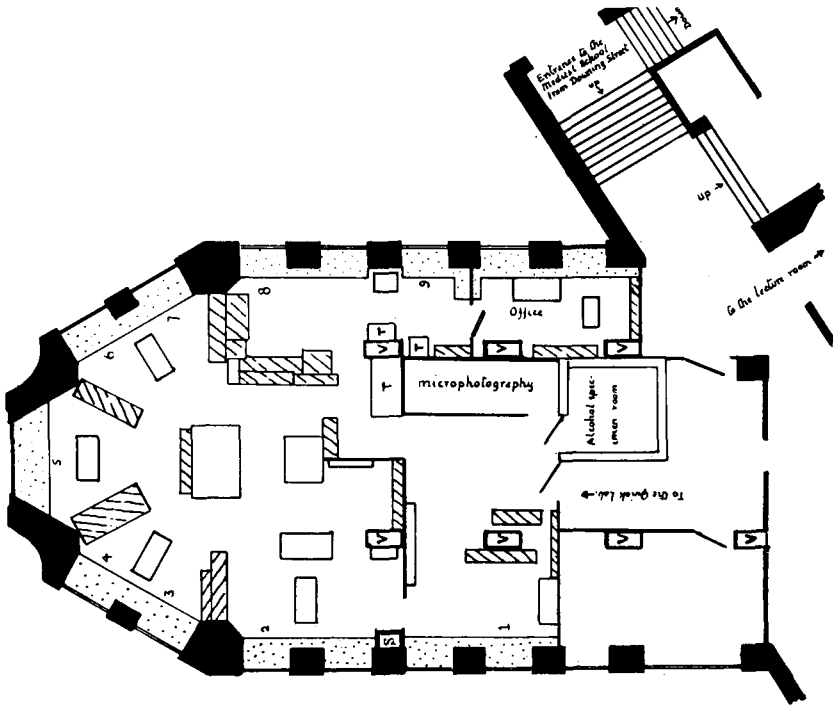


Fig. 6.



Fig. 5.

J. C. Johnson, J. W. Munro, W. S. Patton, I. M. Puri, L. E. Robinson, P. H. Ross, N. H. Swellengrebel, Miss W. M. Vincent and W. Lien-Teh. During this period 216 papers were published from the laboratory.

He was elected to a professorial fellowship at Magdalene College in 1908.

Owing to the increasing number of papers on parasitological subjects, which he received for publication in the *Journal of Hygiene*, Nuttall founded *Parasitology* in 1908 and was its chief editor till 1933, when Keilin, who had helped him for some years, took over the editorship. In this year he was also chiefly responsible for the editing of a large book on *The Bacteriology of Diphtheria*, and translated the contribution by F. Loeffler.

In 1909 accommodation for experiments on large animals became necessary, and Nuttall in conjunction with the Professors of Pathology and Agriculture purchased about 25 acres of land on the Milton Road, and erected a number of buildings, including a laboratory for the Quick department, a post-mortem room, stables, piggeries and small animal houses. In 1913 the land and buildings, known as the Field Laboratories, were conveyed to the University. Since 1880 Allbutt had continually urged the importance of comparative medicine and pathology, and Nuttall and his colleagues, who had in mind the possibility of the foundation of a department of animal pathology at some future date, hoped that their purchase of the land would help the project. In 1923 the Department of Animal Pathology was established and in 1927 the administration of the Field Laboratories was entrusted to the Professor of Animal Pathology.

In May 1919 "the highly unsatisfactory conditions prevailing in the Quick laboratory" led Nuttall to issue an appeal for funds with which to erect an Institute for Parasitological Research in Cambridge, and in October 1919, Mr and Mrs Percy Molteno very generously intimated their willingness to present a sum of £30,000 for this purpose on the understanding that the University provided a suitable site. The benefaction was gratefully accepted by the University on 8 November, and Nuttall devoted great attention to the planning of the new Institute.

In 1920 the "study of Parasitology" was substituted for the "study of Protozoa" in the regulation concerning the duty of the Quick Professor.

The Molteno Institute for Research in Parasitology was formally opened by Earl Buxton on 28 November 1921. Unfortunately, Nuttall, to whom the ceremony represented "the consummation toward which he had striven for many years", could not be present, having five days previously had a severe haemorrhage from a duodenal ulcer.

Nuttall commenced his studies on tick-transmitted diseases, which were chiefly to occupy his attention for several years, in 1904. By means of infected adult ticks (*Haemophysalis leachi*) sent by Lounsbury from South Africa he infected dogs with piroplasmiasis (*Piroplasma canis*), a disease which is unknown in England. This was the first case of investigation of a disease imported by means of an infected vector. He worked out the mode of multiplication of

the parasite in the blood of dogs (1906–7), compared it with the mode of multiplication of *P. bovis* and *P. pitheci*, and attempted, but without success, to ascertain its life cycle in the tick and to grow it in culture. Then followed a long series of experiments on the drug treatment of the disease, resulting in the discovery (1909) that trypan-blue is a remedy for the deadly piroplasmoses in dogs, cattle, sheep and horses. This was a discovery of great economic importance, for this drug has since been used throughout the world both to prevent and to cure these diseases. He also carried out a series of investigations (1909–10) on *Theileria parva*, the parasite of east-coast fever in horses, and researches on spirochaetoses.

In 1908 he published with L. E. Robinson an elaborate paper on the structure of the tick, *Haemophysalis punctata*, and shortly afterwards the first fasciculus, on the Argasidae, of his monograph on *Ticks*, in conjunction with C. Warburton, L. E. Robinson and F. W. Cooper, appeared. During the next three years several papers on the habits and adaptations of ticks and on new species were published, and in 1911 the second fasciculus of the monograph, on the Ixodidae, appeared, in conjunction with C. Warburton, as well as a *Bibliography of the Ixodoidea* containing 2004 titles of publications dealing with ticks and their relation to disease. Several more papers relating to ticks followed and in 1915 the third fasciculus, on the genus *Haemophysalis*, in conjunction with C. Warburton, as well as a continuation of the *Bibliography*. He published several other papers on ticks, including observations on “tick-paralysis”, the regeneration of lost parts and the behaviour of the sexes, up till 1921. In the exhaustive monograph Nuttall and his collaborators dealt with the structure, biology, classification and relation to disease of ticks belonging to certain families. They published many new facts, described many new species from all parts of the world, and showed that ticks may undergo considerable variations in structure depending upon nutrition and exhibit special adaptations according to the hosts they attack. Materials for fasciculi on other families were collected and will be dealt with by two other workers. Nuttall formed a very large collection of ticks from all parts of the world, probably the largest in existence, containing many type specimens.

In the Great War the discomfort amongst the troops caused by lice and the spread of disease, especially typhus and trench fever, by their agency seriously troubled all the belligerents, and in 1917 Nuttall began to investigate the “louse problem”. As in dealing with other problems he first looked up all that was known on the subject, though the recent literature of enemy countries was difficult to obtain, and published a bibliography of *Pediculus* and *Phthirus*, the first of its kind, which included publications dealing with human lice, their anatomy, biology, relation to disease and prophylactic measures (1917). In the same year he published an account of the part played by lice in the causation of disease and a paper on the biology of *Pediculus humanus*, and in 1918 other papers on the pathological effects and biology of *Phthirus pubis*, all containing much original work. These were followed by a long and exhaustive



Fig. 7.

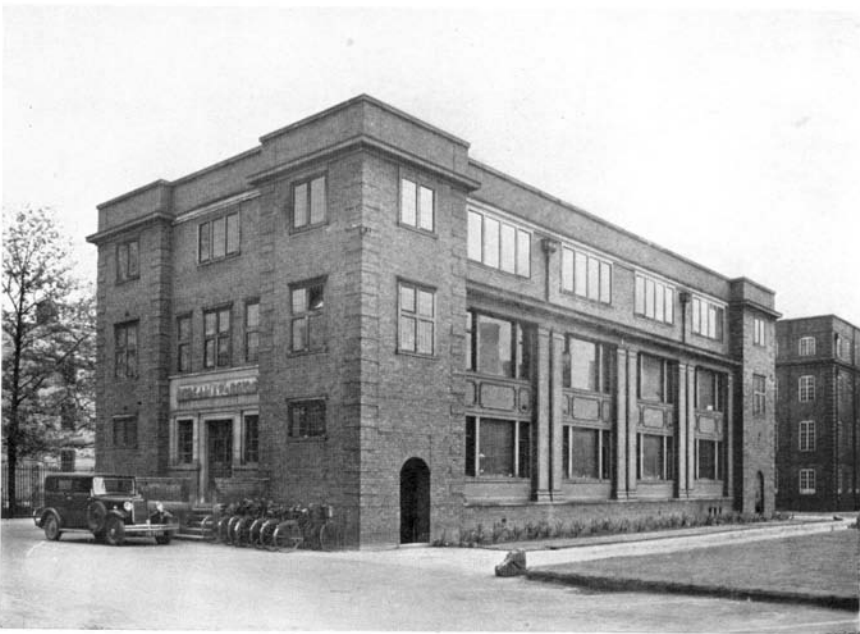


Fig. 8.

paper (1918) on the means available for combating lousiness in soldiers and civilians. He also wrote the *Army Council Instruction* (1918) on "Lice, their relation to disease, biology and means of combating lousiness among soldiers", and was consulted in regard to the *Army Council Instruction* (1918) on "Scabies" (itch). Other papers relating to lice appeared in 1919–21.

After the transference of the Quick Department to the Molteno Institute Nuttall continued his work on ticks and lice, but at first he was in poor health, and the sudden death of his wife in 1922 depressed him. Afterwards the supervision of the Institute, the direction of research and the necessity for raising funds to meet the increasing expenses limited his personal researches. He published few papers, but he ordered his collections, which received constant additions, and accumulated valuable material for the further fasciculi he had planned of his monograph on ticks. In 1924 the regulations for the Diplomas in Public Health and Tropical Medicine and Hygiene were altered, all candidates being required to attend the courses for Part I of each diploma in Cambridge, and parasitology was made a separate subject in connexion with which lectures and demonstrations were given during two terms each year at the Institute. In the same year parasitology was included as a subject in the Natural Sciences Tripos, Part II (Pathology). D. Keilin was appointed University Lecturer in Parasitology in 1925.

Between 1921 and 1931 the following amongst others worked in the Institute: H. P. Bayon, Miss A. Bishop, R. Hill, S. Madwar, J. M. Purie, A. W. R. Roberts, L. E. Robinson, L. G. Saunders, P. Tate, Miss W. M. Vincent and C. Warburton.

Up to 1921 the Quick Department had been housed in the same building as the Departments of Pathology and Pharmacology, and the members of their staffs met daily in the common tea-room. This happy contact was then broken. In 1934 the greater part of the Medical School was pulled down and on its site the south and east wings of the Zoological Laboratory were erected, but the Humphry Museum, now the Balfour Library, with the old Quick laboratory below it was left standing.

Nuttall resigned the Quick Professorship in 1931 and became Emeritus Professor of Biology. D. Keilin, F.R.S., who had joined the laboratory in 1915, and had held the posts of Research Student in Entomology (1915–17), Assistant to the Quick Professor (1917–24) and University Lecturer in Parasitology (1925–31), was elected to the Chair, and required by the Quick Managers to study "The Biology of the Cell".

During his tenure of the Professorship, Nuttall had raised £60,000 which were expended on building and endowment and on research, and had received grants, expended on research workers, totalling nearly £12,000. Four workers had held Beit Memorial Fellowships. After 1924 the endowment of the Institute in terms of annual income was about £1000. 314 papers had emanated from the laboratory. Nuttall's own researches (throughout his career), which were incorporated in about 200 publications, covered several branches of

biology, including hygiene, bacteriology, immunology, protozoology and parasitology. Of these a complete list will be published in *Parasitology*. Besides these he wrote, before his election to the professorship, numerous reviews in German, which helped to make British and American investigations better known in Germany. He had formed a large and valuable library of journals, books, reports and reprints and presented the majority to the library of the Institute, which will be known hereafter as the Nuttall Library, but those dealing with pathology and medicine he gave to the Department of Pathology. He presented his large collections, of which his tick collection was the richest in the world, to the Institute.

In his honour two genera, *Nuttallia* (França, 1909) and *Nuttalliella* (Bedford, 1931) and eight species, including ticks, mites, fleas and Protozoa, were named after him.

In 1932 he was presented by his colleagues and pupils with his portrait in oils by de Lazló.

Nuttall from time to time held several well-known lectureships at home and abroad, was a member of four important Government committees, and represented the University at many congresses (1903–36). These he enjoyed greatly, for he spoke several languages and had a multitude of friends.

Nuttall received honorary degrees from the Universities of California (LL.D., 1924), Strassburg (1927), Egypt (M.D. 1928), South Africa (D.Sc. 1929), and Liège (M.D. 1930) and was elected corresponding member of many scientific societies. He received also the Belgian Order of Leopold II (1919) and the French Order of Commandeur de la Légion d'Honneur (1934).

When "The Biology of the Cell" became the subject of study of the Quick Professor and the diplomas were disestablished, Nuttall feared that his work would be undone and that teaching and research in medical parasitology would be discontinued at Cambridge. His fears, however, were allayed when the University Lectureship in Parasitology, disestablished after the election of Keilin to the Quick Professorship, was re-established, research work encouraged and further developed and the teaching of the subject in the Natural Sciences Tripos (Part II, Pathology) augmented.

In his early life Nuttall had travelled in Mexico, Cuba and North America, and was fond of telling glowing stories, full of incident and detail, of his adventures and hunting trips and of the scenes after the San Francisco earthquake. When he went to work in Germany he became well acquainted with almost all the great investigators in pathology of that time, Blanchard, Bordet, Calmette, Ehrlich, Fraenkel, Grassi, Koch, Laveran, Metchnikoff, Manson, Novy, Osler, Ostertag, Pfeiffer, Roux, Rubner, Sternberg, Welch and others, and delighted to recount anecdotes illustrating their characters, habits and researches. Later he travelled in Europe and Africa, making before starting each trip the most careful inquiries into all that was likely to interest him.

He was a most enthusiastic, conscientious and industrious worker, and his intimate knowledge of several languages made his exhaustive investigations into



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the literature comparatively easy for him. His gift of recognizing the potentialities of discoveries of apparently little importance made him, as has been shown, a pioneer in several lines of work. While at Cambridge his only relaxations were occasional days' shooting or, rarely, short fishing trips in Ireland.

After his election to the Quick professorship he ceaselessly advocated the importance of parasitology, but he had a hard struggle to establish the Molteno Institute for Research in Parasitology, for diseases due to parasites are few and unimportant in England and the subject forms no part of the British medical curriculum. He had seen the effects of such diseases in America, Cuba and elsewhere and was well acquainted with their predominating importance in other parts of the world, but locally little interest was taken in them, and Nuttall, exasperated by the indifference and prejudice often shown, occasionally made injudicious retorts, and sometimes obstinately maintained them, which aroused misunderstanding and further opposition to his views, but without impairing his friendships. He had, however, the pleasure of seeing parasitology recognized and properly taught as an important part of the public health and tropical medicine diplomas and of knowing the high repute in which the Quick Laboratory and afterwards the Institute were held at home and abroad.

Nuttall was alert in his movements, riding his bicycle to and from the laboratory to the end, eager and vivacious in his talk, and kind, courteous and considerate to all. He had a charming manner and winning smile, was most loyal to his friends and took endless trouble in supplying information for which he had been asked. In the tea-room of the laboratory, the combination room of the College and the unofficial meeting place of the Congress these qualities were invaluable. He was not exactly ambitious, but took great pleasure in the many marks of distinction conferred upon him, regarding them as recognitions of his subject rather than recognitions of himself. He had a wide and curious knowledge of natural history, heraldry, wine and gardening, and latterly devoted considerable energy to research into his family history. He was also an excellent draughtsman with a great interest in art. He designed and built in the Madingley Road a house to which he was much attached, and here he showed abundant hospitality, especially to foreign colleagues visiting this country.

He died suddenly, as he hoped to die, with his enthusiasm and energy little impaired, on the eve of a dinner to be given by sixty colleagues in his honour on his retirement from his long and successful editorship of the *Journal of Hygiene*. He is survived by two sons and a daughter.

We are indebted to Dr L. Cobbett for the photograph of Nuttall taken in 1901, in the middle of his most productive period, to Messrs Ramsey and Muspratt for his photograph taken in 1936, and for the other photographs to Mr W. A. Mitchell, who joined the Pathological Laboratory in 1897, and has in his timely and excellent photographs preserved numerous interesting features of the laboratories, many of which have disappeared.

G. S. GRAHAM-SMITH.

EXPLANATION OF PLATES II—VII

PLATE II

G. H. F. Nuttall in his room in the Old Laboratory in 1901.

PLATE III

Fig. 1. The Old Pathological Laboratory in 1901. On the left is Fawcett's building (1879). The main door of the Pathological Laboratory is in the centre. The two windows on the ground floor nearest to Fawcett's building are those of the professor's private room, the two next the door those of the library. Above these are the large windows of the demonstration room. The lower storey of this part was built in 1833, and the upper in 1872. To the right of the door are the windows of the preparation and histology rooms, and above them the windows of the research room. The lower storey of this part was built in 1784 and the upper in 1872. The lecture room, built in 1784, is to the right of the tree. The small portion erected in 1784 housed five scientific professors till 1866. Chemistry occupied the building from 1866 to 1888, when pathology moved into it. The building was demolished in 1907. The figure on the extreme left of the group is Nuttall having tea with some members of the D.P.H. class.

Fig. 2. Plan of the ground floor of the Old Pathological Laboratory in 1901. Nuttall occupied the research room labelled *A*, with large windows looking out on to a small courtyard, Strangeways the histology room, and Durham and Cobbett compartments in the room above. Upstairs the whole area to the left of the staircase formed the demonstration room. There was no floor above the lecture and sterilizing rooms.

PLATE IV

Fig. 3. The Medical School from the south court of the museums in 1904. The relation of this building to the Old Laboratory is indicated by the tree. Nuttall occupied the top room, with its windows partly hidden by the branches of the tree, from 1904, when the building was opened, till 1907. The rest of the left wing and the whole of the top floor of the right wing were devoted to pathology. Pharmacology and surgery occupied the other floors of the right wing. An extension of the Chemical Laboratory was built against the blank wall on the right in 1909. In 1932 the whole of the building, except the wall facing Downing Street, was demolished and the south and part of the east wing of the new Zoological Laboratory built on its site.

Fig. 4. Nuttall's room (1904–7) in the Medical School. In 1906 the room became the first Quick Laboratory. Note the greenhouse for rearing ticks, etc.

PLATE V

Fig. 5. View of the south end of Corn Exchange Street in 1937. On the right, where the pavement is very narrow, is a portion of Fawcett's building, erected in 1879. Next to it is a portion of the new Zoological Laboratory completed in 1934, which occupies the sites of the Old Pathological Laboratory and of the east wing of the Medical School (rounded portion). Beyond this is a portion of the Medical School which was not pulled down. The top floor with small windows was a demonstration room, the middle floor was the Humphry Museum, now a part of the Balfour Library, and the ground floor was the Quick Laboratory from 1907 to 1921. The building beyond the tree is the Geological Laboratory on the far side of Downing Street.

Fig. 6. Plan of the second Quick Laboratory (1907–21). This room (63 × 37 ft.), the windows of which are shown in Fig. 5, was divided into alcoves by partitions and suitably placed screens, cupboards and bookcases. The Alcohol room was built of brick. The benches are stippled and the work places indicated by the numbers 1–9. Nuttall occupied No. 5 (1907–21) and Keilin No. 9 (1915–21). The bookcases and cupboards are hatched and the tables left blank; thermostats (*T*); ventilating shafts (*V*).

PLATE VI

Fig. 7. An alcove and work bench in the second Quick Laboratory (1913).

Fig. 8. The Molteno Institute in 1937. The Institute was opened in 1921. Nuttall occupied the room on the first floor above the stone at the junction of the two paths. On the right is a portion of the New Pathological Laboratory, opened in 1928.

PLATE VII

G. H. F. Nuttall in 1936.