By the death of Hofrat Professor Ernst Fuchs from angina pectoris on November 19, 1930, in his 80th year, ophthalmology has lost its most lucid and able exponent, and ophthalmologists the world over, a most charming and loveable companion.

Fuchs was a pupil of the famous surgeon Billroth, and studied ophthalmology in Vienna under Professor Ferdinand Arlt, whose assistant he became and to whose chair at the University he subsequently succeeded.

The Vienna school of ophthalmology was the first to be formed in Europe on the renaissance of ophthalmology towards the close of the 18th century. Only last year, at the opening of the Wilmer Institute, Fuchs gave the following interesting account of its origin.

An itinerant coucher of cataracts, named Wenzel of Paris, "a completely ignorant fellow," obtained skill and reputation in his method of operating by practice on the highways of France, where he collected blind beggars and vagrants and relieved them of their cataracts. His fame spread so that the Austrian Empress Maria Theresa sent for him in 1775 to operate on one of the ladies of her court. Before leaving Vienna he was paid to impart the details of his technique to three young physicians there. One of them, a teacher of anatomy named Barth, was then commissioned to teach ophthalmology also. It was Barth's pupil Beer, who in 1812, became the first professor of ophthalmology in the University of Vienna and was given an independent clinic with two wards containing twelve beds each. Ferdinand Arlt, Fuchs's teacher, who succeeded Beer in the post was a self-made man of humble
The following is a description given of him by Hasket Derby who became one of his pupils in 1859.

"He was an insignificant looking man rather below medium height, somewhat shabbily dressed in black, with sharp cut features, a large and suspiciously red nose; he was wearing a high stock of black satin and showed no collar. The latter in fact he never donned except on state occasions. His general appearance was so insignificant and ordinary that one of the class observed, on seeing him riding in his carriage, sitting up straight and perched on the extreme front edge of the seat, 'he looks as if he had been sent for a carriage by someone else and were bringing it home to him.' How his appearance belied him! He was the first of living operators, the most thorough and able of teachers, and a man of world-wide fame. Patients came to him from all over Europe. His 'Klinik' was thronged by patients of every clime." Such was the environment in which Fuchs commenced his training in ophthalmology and he always spoke with reverence and gratitude of what he had learnt from Arlt.

Arlt had a theory that acquired myopia was due to passive hyperaemia of the uveal tract from pressure of the external rectus and inferior oblique muscles upon the venae vorticosae during prolonged convergence. To test the truth of this theory, Fuchs undertook an investigation into the topography of the insertions of the extraocular muscles, of the vortex veins, and of their relation to one another. After careful measurements in a large number of eyes having different refractive conditions he arrived at the conclusion that the recti muscles could exert no pressure on the blood in the veins, but that the oblique muscles might do so. The worst of all positions in this respect being that in which both eyes are turned downwards and inwards. A position which might lead to obstruction of the venous outflow from the two outer venae vorticosae which take the blood from the posterior pole of the globe.

One of Fuchs's earliest contributions to the pathology of the eye, for which in subsequent years he did so much, was published in 1881, and consisted of an extensive and useful analysis of sarcoma of the uveal tract based on 259 cases collected from different sources. In the same year the University of Liège founded a Chair of Ophthalmology to which Fuchs, who was then thirty years of age, was appointed.

At the fourth International Congress of Hygiene, held at Geneva in 1882, the English Society for the Prevention of Blindness announced its intention of offering a prize of 2,000 francs for the best essay on the causes and prevention of blindness; the essay to be written in German, English, French, or Italian, and not previously published. In furtherance of the same object the International Society for the improvement of the condition of the Blind
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Considering all he calling blindness, following figures of committee work wrote: "the Local consulted by Welfare of blindness is that reads, It of how closely and therapeutics, which jury is eyesight a well-considered while of the definition a appointed Medicine of the prize was first received, not second and second prize was awarded to Professor E. Fuchs, of Liege; the first to Dr. Wilbrand, of Hamburg; and the third to Dr. P. H. Mules, of Manchester.

Of Fuchs's essay the jury spoke as follows:— "It is an original work of great merit answering more completely than any of the others to the requirements laid down in the programme. Combining clinical experience with a complete knowledge of the literature of the subject, the author has considered all sides of the question with a thoroughness, exactness, and breadth of view which have struck all the members of the jury. Keeping constantly in mind the practical and philanthropic aim of the competition, and starting with a definition of blindness based on the social and economic position of the blind, the author succeeds in being complete and scientific, while he avoids superfluous statistics and considerations of pathology and therapeutics, which are outside his subject. His work presents a well-considered whole, of which each chapter may be profitably consulted by itself. The chief place is given throughout to the study of those preventive measures by which the number of incurably blind persons may be diminished. The jury feel it their duty to express the hope that this excellent work may soon be published, and if possible, translated into other languages, through the means of the English Society for Prevention of Blindness, or in some other way."

An English translation of this essay, made by Dr. Dudgeon, was published in 1886. The definition of blindness Fuchs gave, of which the jury so highly approved, was as follows: "Speaking scientifically blindness is that condition in which objective sensations of light are not received, but from the practical standpoint a man is blind if his eyesight is so far incurably impaired that he is unable to follow any calling which requires the use of the eyes." It is interesting to note how closely this corresponds to that arrived at for adults by a committee of the section of ophthalmology of the Royal Society of Medicine appointed in 1915 to consider the matter at the request of the Local Government Board's Departmental Committee on the Welfare of the Blind, and which has now been generally adopted. It reads, "the expression 'Blind' means too blind to perform work for which eyesight is essential."

It must have been a considerable source of satisfaction to Fuchs, considering all he had done to promote prophylactic measures against blindness, to be able, a year before his death, to quote the following figures showing a marked decrease in its amount. He wrote: "In 1899, there were on an average 8·7 blind in each
10,000 of population in the central and western European states; in Russia approximately 20, and in Egypt as many as 132. Just before the world war, figures for the central and western European states were about two-thirds of those in 1899—5.2 as against 8.7. The difference between then and now struck me forcibly in regard to Egypt. When I first visited there thirty-six years ago it was a common experience to see blind beggars asking for alms, one holding the other's hand, a chain of five of them led by one who still possessed some sight. And now one sees this no more. When I first visited the Arabic University of Al Azahr, in 1893, there were about 600 blind among the 4,000 students; at my last visit in 1926, I was told there were not more than 80."

The occurrence of crescents, due to choroidal atrophy at the outer margin of the optic disc in association with myopia, was recognised in the early days of ophthalmoscopic research. It was Fuchs, in 1882, who pointed out the necessity of differentiating between these acquired atrophic crescents, and congenital crescents due to a defect in the development of the choroid, occurring usually at the lower margin of the optic disc, which is small and oval horizontally. A condition commonly spoken of as Fuchs's coloboma.

In 1885 Fuchs returned to Vienna as successor to Professor Jaeger and in the same year published his classical article on the anatomy of the iris. Owing to the method of bleaching sections not having then been introduced, he was not able to give a full and accurate description of its posterior pigment epithelial layers and of its dilatator muscle fibres. In a later edition of his Textbook, however, he not only described the appearances shown in a bleached section, but also introduced a drawing depicting them.

The first edition of Fuchs's "Lehrbuch der Augenheilkunde" appeared in 1889. The purpose for which he originally wrote it was to supply those attending his lectures with the substance of his teaching in a permanent form, and thus relieve them of taking copious notes and waste of time and energy in copying them out afterwards. Fuchs considered that the taking of notes distracted a student's attention from the object before him, more especially in clinical lectures. The book not only admirably fulfilled this, its original object, but as it passed through some twelve German editions and was translated into all the important European languages as well as Japanese and Chinese, it served to disseminate the author's thorough, clear and concise teaching throughout the ophthalmic world.

It was a happy idea to employ two different sized types in its construction, the essential portions of a subject being printed in large type, and the less important in small. By this means the book was adapted for the use of students studying for a pass degree, who subsequently intended to engage in general practice, and found
all that they would require in the matter in large type. Whilst those who studied ophthalmology, with the intention of devoting themselves specially to its practice, had matters of much additional interest placed before them in the small type.

The first English translation was ably carried out by Dr. Duane, of New York, from the second German Edition in 1892. A second English edition was published seven years later; and a third, likewise by Dr. Duane in 1908, from the eleventh, greatly revised and enlarged, German edition, containing 441 illustrations. These illustrations, both those of clinical and pathological conditions, most clearly indicate what they are intended to depict, being of considerable help in enabling the reader to follow the descriptions given in the text. Fuchs had but a poor opinion of photo-micrographs as a form of illustration and never employed them.

As already stated Arlt had made Vienna a great centre of ophthalmic teaching and treatment, and Fuchs not only maintained but still further enhanced its repute in both these directions. Patients who were dissatisfied with the treatment they were receiving or in whose case there was some difficulty in the diagnosis, journeyed to Vienna from all parts of the world to seek Fuchs's advice, which was always honest, straightforward and to the point; he never tried to magnify his capacities unduly. For there was never anything of the charlatan about Fuchs.

Shah Nasr-ed-din of Persia sent his favourite wife, who had become blind, to Vienna to consult Fuchs. It had been diagnosed that she had cataract and several other women suffering from cataract were allowed to accompany her. When Fuchs examined her he found she had absolute glaucoma and that nothing could be done for her. He was, however, able to restore the sight of the women who came with her. The Shah could never understand why it was that Fuchs could do so much for these women of low degree and yet nothing for his favourite consort.

The amount of clinical work which Fuchs's appointment as Professor of ophthalmology at Vienna involved is shown by a statement he made in 1897 in an article on "Retinitis Circinata." He there said that amongst 70,000 patients seen during seven and a half years in his clinic he had only observed eleven cases of this rare disease; one which he was first to differentiate from other forms of retinitis, and of which he gave such a full description of the clinical characteristics that little, if anything, has been added since.

Fuchs was a frequent visitor to England and seems to have enjoyed association with his British colleagues. When in London he stayed with his friend Dr. W. A. Brailey in Old Burlington Street, visited the operating theatre at Moorfields and gave encouragement and assistance to the younger men in their research work in its pathological laboratory.
He attended the meeting of the British Medical Association held in London in 1895, and read a paper at its Ophthalmic Section on "Erythropsia." His attention became attracted to the affection by having himself experienced it after wandering over the snowfields for some hours the previous year. He then proceeded to investigate it in himself and others in his usual systematic manner; climbing for the purpose to the top of a mountain 600 feet high near Vienna with a chess board, having black and white squares, and a campimeter. He came to the conclusion that erythropsia was a special phenomenon always presenting itself in the same way, and independent of the colour of the reacting light, provided that it be strong enough to produce dazzling. To explain it he inclined to the hypothesis that the visual purple having become completely bleached by exposure to light becomes visible as it regenerated in the dark.

Fuchs was a great walker and loved to spend his vacations in the mountains of the Tyrol or elsewhere, often accompanied by his friend and colleague, Professor Sattler, of Leipzig. On one occasion, when wandering in a wild part of Sicily, he was held up by brigands and had to part with his purse and watch.

Affections of the cornea was a subject in which throughout his life Fuchs took the keenest interest. In 1881 he wrote his description of the changes in opacity of the cornea in glaucoma, and one of his last publications was an article "On the Localization of Pathological Changes in the Cornea." A form of keratitis which will always be associated with his name is that which he termed "Keratitis Punctata Superficialis" of which he first gave a detailed account with drawings in 1889.

In 1902 Fuchs was invited to deliver the Bowman Lecture at the Ophthalmological Society of the United Kingdom and he chose for his subject, "Keratitis." In it he made a comparison of the corneal changes observed clinically with those found microscopically. He described the tendency which the epithelium has to level up all the inequalities of the corneal surface and keep it smooth; penetrating into clefts, and even sometimes, after extraction of cataract, extending down the wound into the anterior chamber, lining it, and causing glaucoma. He discussed desquamation and excitation of the epithelium, stated that he had no doubt as to the existence of neuropathic keratitis, and gave an account of the sequence of changes which occurred in what Arlt had termed "atheromatous ulceration," i.e., ulceration in connection with old leucoma. Fuchs further briefly referred to the pathology of such rare conditions as Groenouw's nodular corneal opacity, ring abscess of the cornea, dystrophia epithelialis corneae, with all of which he dealt more fully in articles published in subsequent years.

Fuchs was an accomplished linguist speaking several different languages. His English delivery was so good that when he lectured...
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in that language it was a treat to listen to him. After the delivery of his Bowman lecture he was elected as one of the select list of Honorary Members of the Society.

Fuchs's love of travel led him to Ireland in 1909, and he attended the British Medical Association's meeting held that year in Belfast; accompanied by his wife he stayed whilst there with his old friend Dr. Nelson, who had been in his youth one of Garibaldi's red-shirt heroes. To the proceedings of the Ophthalmic Section he contributed a paper on "Malformations of the Cornea in cases of Inherited Syphilis," in which he pointed out the frequent coincidence of interstitial keratitis and vertical oval cornea. Out of 22 cases with vertically oval corneae which he collected in the course of a year, in 8 there was good evidence of inherited syphilis, in 8 others some indication of it, and 6 cases which exhibited no evidence of syphilis. This unusual form of the cornea he found influenced its curvature, inverse astigmatism being present in most of the cases to between 3 and 4 dioptres.

Fifty years ago it was the custom for a patient after an operation for extraction of cataract to be put to bed with both eyes tied up in a darkened room, and kept there for a week, the dressings being changed only by the light of a candle kept shaded at the foot of the bed. It was feared that the admission of light too soon to the eye would cause inflammation. The upgrowth of the science of bacteriology has changed all this, and in 1900 Fuchs did not hesitate to make an ophthalmoscopic examination of eyes within three days of a cataract or glaucoma operation, and found no evil results to arise therefrom. He further considered that the usual restriction as to moving about after cataract operations was unnecessary, and allowed his patients up out of bed the day following. As the result of his early ophthalmoscopic examination in these cases he found that detachment of the choroid was far from being an exceptional condition, as had generally been supposed, and instead of being difficult to diagnose could sometimes be seen by means of focal illumination. In the paper which he wrote on the subject in 1901, he estimated the relative frequency of its occurrence after different operations, the conditions which predispose to it, the time after an operation at which it most frequently occurs, and discussed its pathology.

Fuchs's keen capacity of observation and accurate methods of investigation are well shown in two papers which he published in 1904 and 1905, which form important contributions to our knowledge of inflammations of the uveal tract which follow perforating injuries of the eyeball. He pointed out the difference between exudative uveitis, which he called "Endophthalmitis," and the granulomatous infiltration of the tissue which is associated with sympathetic inflammation.
In endophthalmitis the exudate consists of lymphocytes and polymorphonuclear leucocytes, the inner layers of the ciliary body and the retina becoming involved, and the choroid only later when the retina is so disorganised as to cease to shield it. In sympathetic ophthalmitis on the other hand the proliferation consists of a diffuse infiltration with round cells, accompanied by proliferation of endothelial cells and giant cells; the stroma of the uveal tract being first involved, either uniformly throughout or in the form of nodes. With these essential differences in view, Fuchs proceeded to examine sections of 181 eyes removed after injuries for the fear of sympathetic disease during a period of twenty years. Of these he selected by microscopical study, and without knowing the clinical histories the sections of 24 eyes showing the granulomatous proliferative form of uveitis; subsequent reference to his notes showed that the fellow eye in all these cases except one became sympathetically inflamed. In the one exception there was a history of sympathetic irritation, but in 16 other cases of sympathetic irritation there were no signs whatever of proliferative uveitis in the enucleated eyes. Though exudative endophthalmitis may be present together with proliferative granulomatous uveitis, it is only in the presence of the latter that the fellow eye is likely to become involved.

At the International Medical Congress held in London in 1913 Fuchs was invited to be one of the openers in the Ophthalmic Section of the discussion on "The Pathogenesis of Chronic Uveitis, excluding Syphilitic, Tuberculous and Sympathetic Cases." He dealt mainly with the pathology of the condition, describing the characteristics of the cells in the exudate and the different forms of deposit on the posterior surface of the cornea. He classified cases clinically into five groups according to their degrees of severity.

In 1908 Fuchs undertook a detailed investigation of cases of tumours of the ciliary epithelium; not only of those which he had had under his own observation, but also of cases published by other observers to whom in many cases he applied for and obtained sections which enabled him to inspect them personally. As the outcome of this work he suggested the provisional classification of such tumours as follows:

I. Innocent tumours (so-called adenomata).

II. Malignant tumours.
   1. Having the structure of the embryonic retina (Diktyoma).
   2. Whose structure does not represent the whole retina but at most the simple ciliary epithelium. These consist of
      a. Cellular membranes with a single layer of nuclei, combined with cellular tubes.
      b. Cellular tubes alone, or
      c. Cells grouped in an irregular fashion with only a few tubular formations in the youngest parts.
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Usually when a man reaches the age of 60, his capacity and energy for conducting original investigations commences to wane. It was not so with Professor Fuchs. The compulsory age for retirement from ophthalmic hospital appointments in this country is usually 60. Fortunately for ophthalmology the legal age for retirement from the chair of ophthalmology in Vienna is not until 70. Up to that age Fuchs remained full of vigour, not only carrying on his routine duties, but also attending and taking part in discussions at the annual meetings of the Heidelberg Ophthalmological Congress, which he always preferred to the larger International Congresses, and continuing his output of valuable clinical and pathological researches until the outbreak of the great war.

In 1911, he visited the United States of America and at its Ophthalmological Society delighted his audience with a paper on "The field of vision in Tabetic Atrophy of the Optic Nerve." In it he maintained that the proportion of cases in which a central scotoma was present had been considerably underestimated, and that it was one of the results of the tabes and not, as had been suggested, a complication due to a simultaneous syphilitic retrolublar neuritis. It was, however, he said, still uncertain whether tabetic changes in the nerve were purely degenerative from the beginning or whether a slight form of inflammation preceded the atrophy.

Most of Fuchs's papers were published in von Graefe's Archiv fur Ophthalmologie; in 1913 he published one in French in the Annales d'Oculistique on "Opacity of the Lens after Corneal Suppuration," in which he suggested an explanation of the pathogenesis of anterior polar cataracts, some of which occur in connection with perforating ulcers of the cornea; some with ulcers which do not perforate; and some, which are congenital, without any sign of corneal inflammation. He discounted the hypothesis of a previous writer, that the primary change was a shrinkage of the lens fibres at the seat of the opacity, by attributing such shrinkage to the hardening reagent. He described the first change as a rarefaction and destruction of some of the epithelial cells of the anterior capsule, followed by proliferation of neighbouring cells. The primary destruction, in cases of corneal suppuration, he attributed to toxins in the aqueous humour; but did not explain why such toxins should affect the cells lining the lens capsule and leave unaffected those lining Descemet's membrane. Where capsular cataracts developed as the result of an anterior synechia of the membrane, he attributed the proliferation of its lining cells to a negative pressure produced beneath the capsule, apart from any toxic influence.

Some difference of opinion existing as to whether a rupture of the sclerotic proceeded from without inwards or from within outwards; Fuchs, in two articles published in 1911 and 1913, brought to bear
the wealth of his clinical and pathological material in elucidating the point. In the first paper he clearly showed that ruptures began at the ligamentum, passing to Schlemm’s canal and then outwards towards the surface. In the second paper he described a special variety of rupture of a smaller type, confined to the limbus, beginning at Schlemm’s canal and extending straight forwards instead of diagonally outwards; in which the conjunctiva was always torn and where generally there was a prolapse of iris. He also referred to another class of incomplete rupture in which the conjunctiva and outer layers of the sclera remained intact; the area involved, later becoming ectatic, and the pupil displaced upwards.

As the outcome of his many years of hard work Fuchs was before the out-break of the great war in affluent circumstances, and delighted in hospitality, gathering around him at his dinner table visitors to Vienna from all parts of the world. At the conclusion of the war, due to the rapid depreciation in the value of the krone, he became considerably impoverished. At the commencement of his eighth decade he met his altered circumstances in the most courageous fashion, and accepted an offer gracefully and opportunely made in 1921, by his friends and admirers in America to conduct a lecturing tour in the United States on the pathology of the eye. His love of travel subsequently led him to visit Spain, Egypt and Asia Minor.

In 1929 he motored across Europe, with his old friend Dr. Barkan, some five years his senior, to attend the International Ophthalmo-
logical Congress in Amsterdam. Here a great welcome awaited him. To a group of American ophthalmologists attending the congress had occurred the idea of organising a luncheon in honour of this Grand Old Man of Ophthalmology. A large gathering of his friends, pupils and admirers from all countries assembled, with Dr. Suker in the Chair, and when Hofrat Professor Fuchs’s health was proposed the toast was received with resounding applause. The opportunity was also taken of presenting to him the Leslie Dana Medal, instituted as an award for work conducive to the prevention of blindness. Fuchs’s reply to this enthusiastic reception was characterised by his usual tact and modesty.

From Holland he proceeded again to America to attend and take part in the dedication ceremony of the Wilmer Institute of Ophthalmology in Baltimore. Afterwards, before returning home, he extended his travels to Mexico. Most truly may it be said that Fuchs never allowed grass to grow under his feet.

As a man, Fuchs possessed a striking appearance; well above the average height, he had the slight stoop of a student. A flowing beard made his naturally large head appear even more massive, but his most conspicuous features were his observant, watchful grey eyes. The expression of his face was always calm and unruffled;
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indeed it would be difficult to have imagined him as angry or impatient.

Fuchs leaves behind him not only a store of most valuable scientific work, but also the example of a fine character and of one who hungered and thirsted after truth.

E.T.C.

RETINITIS NEPHRITICA OR ALBUMINURICA

BY

N. PINES

LONDON

"Ceterum censeo ophthalmoscopum quotidie usendum esse."

This paper is the third and last part of one chain of clinical investigation. All the work is the outcome of general practice where the ophthalmoscope was used merely as a means of thorough clinical examination, limited by the comparatively simple resources of routine surgery-work and by the necessity of regarding my retinal findings as a part of the clinical whole. This work is, therefore, as much an essay in general medicine as in ophthalmology and its chief value, if any, lies in demonstrating the importance of an early ophthalmoscopic examination. As an instance it is sufficient to point out the books of Fisher on oedema and McDonagh on the nature of the disease where the ophthalmoscopic examination is wholly omitted. The same applies to many of the cases quoted in D. Russell's remarkable book on Classification of Bright's Disease.

In the special ophthalmological literature up to the present day there still exists a very wide divergence of views on retinitis albuminurica. Putting aside purely pathological or anatomical treatises it will be sufficient to quote the opinions of only a few recognized authorities. In Fuchs' well-known text-book there is no difference between the eleventh and seventeenth editions; in both of them this learned writer considers that "the severity of retinitis albuminurica bears no fixed proportion to the intensity of the kidney disease nor to the amount of albumin in the urine ....... The like is true of the subsequent course; the retinitis may improve, while the kidney lesion grows worse and vice versa ......." Fuchs believes that every form of nephritis, which is accompanied by albuminuria, may be complicated by retinitis albuminurica. Fox, in his text-book, expresses a similar view. Leber, in the Graefe-Saemisch handbook, holds a different view. On page 817, Vol. VII,