

# THE ANATOMY OF THE CELL.

## LECTURE BY PROFESSOR WOOLLARD.

The concluding lecture of a series of three by Professor H. H. Woollard, on "The Science of Dissection," was delivered at the lecture theatre of the Prince of Wales building at the University on Tuesday evening, the subject being "The Anatomy of the Cell." There was a large attendance and the lecture was illustrated by lantern slides showing the various stages in the evolution of a cell, and the methods of micro-dissection.

After describing the anatomy of the structure of the cell, the lecturer touched on the technique of micro-dissection by means of which the cell itself and the structures it contained could be dissected. Of recent years a machine had been invented which had greatly facilitated such investigation, for elements of the size of one-tenth-thousandth of an inch could be dealt with by means of it. Further knowledge had been obtained as to how the kidneys performed their functions, and also on the formation of such organs as the eye. Those results were of great importance in medicine, since the individual became what he was by a series of orderly and progressive changes starting in a single cell mechanism. Inheritance had been traced to the cell, such as the mechanism of the chromosomes. Chromosomes preserved their shape and form throughout life. In man there were 48 chromosomes arranged as 24 pairs, and one number of each pair was derived from each parent. The germ cells—the egg and the sperm before they were ready for active fertilisation—went through a complicated series of changes, the meaning of which had only recently been made clear. The essential point in those changes was the reduction of the chromosomal number by one half. When fertilisation occurred only one sperm penetrated the egg. That penetration of the egg by the sperm caused a number of changes to ensue. The egg so fertilised proceeded to divide and multiply at an amazing rate, the symmetry of the right and left halves of the body was determined, and there was caused a special arrangement of the developmental factors. Those changes were not due to any peculiar property of the sperm, for the same result could be caused in the egg by a mechanical or chemical stimulus, or pricking it with a needle. The essential contribution of the sperm was to add the paternal chromosomes so that the body number (48) was restored. The sperm and the egg thus each furnished half the chromosomes. The meaning of those changes was only recently discovered. At the same time that those results were worked out, the work of Mendel, a priest in Silesia, had been re-discovered.

### Mendel's Laws of Heredity.

Mendel had formulated certain laws of heredity, which were now called by his name. The first proposition was that human beings inherited all their qualities as units. It was a startling idea that a quality like longevity should be inherited as a unit factor. It seemed to be so, and all sorts of things, like fertility, color, size, resistance to disease, abnormalities, and diseases, seemed to behave as Mendelian units. Each of those factors was represented in the body by two units, or genes, one coming from each parent. The two genes might be the same in kind, or they might be opposite—as one for tallness and one for shortness, or both for the same thing. The expression of the factor might represent only one gene, and that one was then said to be dominant and the other recessive. Recent work had shown that the character expressed might be neither dominant nor recessive, but a compromise between the two, or even something different from either. The essential point, however, was that when the germ cells were formed only one gene, and never two, entered the cell. That was known as Mendel's first law of the segregation of the genes. The second law stated that when the genes entered the germ cells each did so independently. That also had been modified by recent work, so that it was now known that genes assorted themselves in groups. The group unit was a chromosome, but some became assorted independently. That independent assortment made the offspring a mosaic of the characters of both parents. Numerous examples of those laws were given by the lecturer, and illustrated by diagrams.

### The Determination of Sex.

Speculations about the causes of sex had been many. Sex had been supposed to be due to diet, the relative ages of parents, and the vigor of the parents. They now knew that sex depended on a chromosomal difference between males and females. In the male there was a peculiar chromosome, which was called the Y chromosome. In some animals the Y chromosome was ab-

sent, and in any case even when present, was quite inert and exerted no hereditary factors. The mate of the Y chromosome was a normal one called the X chromosome. When the segregation of chromosomes occurred in the formation of germ cells the male cell formed two kinds of sperm, one containing X and one Y chromosomes. When fertilisation occurred, if the eggs received the X bearing sperm the female was produced, and if it received Y the male resulted. Thus a daughter received the X chromosome from the father, and the son received the X from the mother. Since the Y chromosome from the father was inert, the son had on the balance one more chromosome from the mother than from the father. To that extent the son tended to resemble his mother more than his father. Several diseases, such as color blindness, night blindness, and a tendency to bleed, when they occurred, were carried by the X chromosome of the Y pair. In general it might be said that those so-called sex-linked diseases were transmitted by the mother and that sons suffered from them. This mode of sex determination should on a basis of chance give a 50-50 ratio of sons and daughters. That was not realised in practice, for about 130 sons to 100 daughters occurred at conception, but the higher mortality of sons caused the sexes to be about equal in the fifth year of life.

### Heredity or Environment.

Professor Morgan had carried out a tremendous amount of work on the fruit fly, which lived for about 14 days. About 20 million of them had been observed, and as many generations as would correspond to those of man since the dawn of history. That study had made it clear that the heredity units formed linked groups, and that there were as many groups as there were chromosomes. Thus there would be 24 groups in man. In each group the heredity factor was represented by a minute particle of the chromosome called a gene, which was about one three-hundred-thousandth part of an inch in size. Those genes were strung along the chromosomes in a linear series like beads on a string. The question whether the changes occurring in an individual in his lifetime became inherited by his offspring had been hotly debated. Numerous experiments bearing on that question were discussed, and the lecturer said the answer could be confidently given that acquired characteristics were not inherited. Maternal impressions could not be transmitted to the offspring. One of the great difficulties in human inheritance was to know how much could be ascribed to Nature or inherited, and how much to nurture or environment. Karl Pearson, in his eugenics laboratory in London, had invented a mathematical method to calculate the mental and physical characteristics of offspring and parents. The net result of that work was to diminish the part played by environment, and to exalt that of inheritance. They, however, only knew one way by which the individual or the species could be changed, and that was by variation in the chromosomes.

### Sterilisation of the Feeble-minded.

The practical enforcement of selective breeding in the human race was being forcibly argued. There was nothing to be said against persuasive eugenics. The statutory enforcement of eugenic ideas was more dangerous, and many of those enthusiasts appeared to have little regard for human liberty. Compulsory sterilisation of the feeble-minded had also been advocated. Despite horrible records like that of the celebrated Jukes family, the majority of the feeble-minded turned up sporadically in good families. That was because feeble-mindedness was a recessive characteristic, and both parents had to carry the gene, though they themselves appeared to be normal. If they assumed that such a gene was uniformly distributed through the population, and that marriage was a random choice, calculation showed that it would take 60 generations to reduce the rate of feeble-mindedness from one in a thousand to one in ten thousand by sterilisation. Another instance was the Nordic cult. Anatomists were agreed that there was a distinct variety of man called the Nordic race in north-western Europe. The best argument that it was a distinct variety was that it was the only fair race that had ever existed. Exponents of the Nordic cult asserted that the race possessed all the excellences, that no other race had any good qualities, and that all great men had been Nordics. They even went so far as to assert that Jesus Christ must have been a Nordic. It was true that, pictorially, Christ was always represented as being fair, but it was difficult to believe that He was not a Jew, and according to Rendell Harris He was short in stature. The evidence so far advanced by the disciples of the Nordic cult was not good enough to compel all men to march to the tune of "gentlemen prefer blondes." (Applause.)

### Rising Lawyer

One of the most brilliant of the younger generation of lawyers is Mr. Martin Chemnitz Kriewaldt, who is a member of the legal firm of Johnstone, Olsson, and Kriewaldt.

He is also an accomplished speaker, and has distinguished himself in international as well as inter-university debates.

A son of Mrs. and the late Rev. E. P. Kriewaldt, he was born at Tweedvale in 1900, 15 years after his parents arrived



MR. M. C. KRIEWALDT

from America. He was educated at Concordia College, and then went to America. There he studied at Shawano High School, Wisconsin, whence he proceeded to California University, Wisconsin University, and Missouri University.

Mr. Kriewaldt graduated Bachelor of Arts at Wisconsin University, in which he had figured prominently as a member of the debating team. He also took part in university wrestling matches.

The following year he returned to Adelaide and entered the University of Adelaide, which granted him an "ad eundem" degree of Bachelor of Arts, in recognition of his graduation at Wisconsin. He enrolled in the Faculty of Law, and soon distinguished himself. His experience in debating in America stood him in good stead at the University of Adelaide. He was a member of the successful Adelaide team which defeated both Queensland and New South Wales Universities in inter-university contests.

In 1925 he took part in the debates against the team from Oxford University, which resulted in a win for both sides. Those verbal contests provided what were probably the finest debates held in Adelaide for some years.

Mr. Kriewaldt graduated Bachelor of Laws in November, 1925, and was articled to Mr. R. F. Newman, of the firm of Newman & Harris. In the following July he was admitted to the Bar, and soon afterward joined Messrs. Johnstone and Olsson.

Modern poetry has been for several years the principal pastime of Mr. Kriewaldt. He is a keen tennis player, and a baseball enthusiast.

# The Register.

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## THE FIGHT AGAINST CANCER.

Modern society, which owes an inestimable debt to the medical fraternity generally, on the score of its increasing scientific skill, has reason, also, to be deeply grateful for the public spirit so conspicuously exhibited by many of the leaders of the profession of healing. These gentlemen see their responsibility to the community from the standpoint of the rarest and most exalted altruism, and are far more concerned for the public health than the public itself seems to be. Every successful campaign against disease owes its origin and its vigorous conduct to a doctor, and to a doctor, moreover, who would probably be fully employed—as the term is understood among laymen—if he were content to confine himself to the routine of medical practice, and leave public questions to public men. Society would be ill served, if all members of the medical profession took this limited view of their functions. In countries which do not possess our climatic advantages, plumbers are said to pray for a hard frost and a sudden thaw, in the hope that trade will be stimulated by a consequent epidemic of burst water pipes. The imagination is staggered by the thought of the epidemics which might devastate mankind, if physicians were as mercenary and unfeeling as this. We owe preventive medicine, especially, to a more sensitive professional conscience. Nor is it too much to say that in preventive medicine, more perhaps than in anything else, lie the hopes of the human family for a happier future. With the advance of the movement for public hygiene, the medical faculty is becoming less and less a purely remedial agency. Epidemic and endemic diseases, with which doctors once concerned themselves only when perhaps fatal symptoms were manifested in the individual patient, have been recognised as social, rather than strictly medical, problems; and, attacked from a new angle, some of them are being so notably reduced in their incidence, that their disappearance from the list of human ills is obviously no distant possibility. Other prime causes of mortality have been diminished in a most encouraging degree, steadily and consistently, year by year. These facts, gratifying though they are, serve to emphasize the deplorable nature of a not unrelated circumstance.

As Dr. F. S. Hone pointed out, in his recent timely letter to the Dean of the Faculty of Medicine at the Adelaide University, the rapidly rising cancer death rate in this country, is in marked contrast to the fall that has taken place, in the last thirty years, in infantile mortality, and in the death rate from pulmonary tuberculosis. The alarming character of the relevant statistics, cannot be too often, or too strongly, urged upon the Australian public. The national death rate from tuberculosis declined, from 61 per 100,000 of the population in 1922, to 59 in 1926; while, in the same period, the cancer death rate was mounting, in spite of the utmost efforts of science to check it, from 91 to 94. In the final year of the quinquennium which supplies these figures, and thus shows the persistence of a tendency which has been increasingly manifest for a generation, nearly six thousand people were killed by cancer in this country—almost twice as many as died from pulmonary tuberculosis. Relatively, "the white plague" is beginning to lose its terrors; but a worse evil has usurped its place, as the most dreaded and destructive of all diseases. Seventeen countries for which statistics

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### PERTH UNIVERSITY.

### Larger Grant Requested.

PERTH, Tuesday. The senate of the University of Western Australia has decided to ask the Government to increase the annual grant by £2,000, making the total £31,000, to enable it to provide a diploma of education, a chair of mathematics, chair of geology, half-time lecturer in psychology, diploma of commerce, and to equip the faculty of law. The diploma of commerce is proposed, provided commercial interests make an endowment of £4,000. It is estimated that there will be an overdraft of £5,000 at the end of this year.