THE HUMAN BODY.

Some of Its Marvels Described.

Address by Professor Wood Jones.

In the Commemoration address at the University on Wednesday, Professor Wood Jones delivered an address in which he brought a highly scientific subject to the understanding of the ordinary man, and told of some of the wonders of the human body. With the aid of Professor Darnley Naylor, he has coined a new scientific term, which will probably have world-wide employment.

Professor F. Wood Jones (Professor of Anatomy at the University of Adelaide) held the rapt attention of the assemblage when he delivered the Commemoration address at the University of Adelaide yesterday. He is remarkably fluent and lucid, has a subtle touch of humor, and he spoke for over an hour without notes, giving names and dates by the score. His subject was "The Position of Anatomy in the Modern Medical Curriculum, and the Conception of Cytoclesis."

He said in the little world of a University there must be scholars, thinkers, workers, and leaders of every kind. Of some such erudition was expected, of some such profundity, of some such ingenuity; but the Professor of Human Anatomy was not expected to be a scholar, he neednot be a philosopher, or one erudite, or deeply versed in any branch of abstract lerning. (Laughter.) Nevertheless, the teaching of anatomy was essential in the curriculum of the medical student who was to become the healer of sick and suffering humanity. The precise gross details of the structure of the human body were determined and standardised in description in the year 1543. When Andreas Vesalius, the Belgian genius with the English mother, gave his "De humani corporis fabrica" to the world, he was no more than twenty-eight years of age. Vesalius described the structure of the human body with wonderful accuracy, and he had taken his place for all time as the founder of the science of descriptive anatomy. Surely it was a somewhat dispiriting thought that the description of the details of the gross structure of the human body was standardised in 1543. What sort of enterprise was left for the succeeding generations of human anatomists during the long span of almost four centuries that separated Vesalius's day from the present? Yet, though a superficial glance at 1543 and 1923 might lead one to endorse a pessimistic view, the truth was very different, and it would be more correct to say that the early standardisation of his subject was the anatomist's greatest asset. The anatomist was the father of the physiologist, of the embryologist, the histologist, and the anthropologist, among others. Even in recent times the occupant of the anatomical chair had been the teacher of physiology. The human anatomist took into his especial charge the practical application of the science of human anatomy to the art of the surgeon, and an ample harvest came to him from the work of the old masters of surgery. The occupant of the chair of human anatomy also eagerly annexed the discoveries of all those men who sought to enquire into the functions of the various parts of the body.

The Bewildering Archaetype.

In 1658 the priest Athanasius Kircher (1602-1680) examined blood of plague-stricken patients with a microscope; Jan Swammerdam (1637-1680), the naturalist, Antony van Leeuwenhoek (1632-1723), the man of leisure and possessor of some two hundred and fifty microscopes, carried on the work, and the professor of anatomy, Marcello Malpigi (1628-1694), blossomed forth as the histologist. Nor was the human anatomist content with that. Men were at work who were laying the foundations of the study of the anatomy of diseased conditions. In 1761 Giovanni Battesta Morgagni (1682-1771), professor of anatomy at Padua, published his life's work as the "De sedibus et causis morborum," and the science of morbid anatomy was born. Morbid anatomy, as well as normal anatomy, then became the legacy of the professor of human anatomy. And were he asked to give a modern instance of a professor of human anatomy who was a master of morbid anatomy he would single out Archibald Watson, Emeritus Professor of Human Anatomy in the University of Adelaide. (Cheers.)

Then came the bewildering archaetype. The almost intangible creed of the school of the transcendentalists. It was this that flashed across the horizon of the human anatomist and bade all men follow. For the archaetype, for transcendental anatomy, the will-o'-the-wisp, the occupant of the chair of anatomy bartered his painfully acquired possessions one by one. (Laughter) The anatomist, intent upon following the chimera of the archaetype, gave up the study of morbid anatomy, and the professed pathologist had birth. He passed over the study of surgical anatomy to the surgeon. He gladly gave away functional anatomy, and the physiologist came into being. The study of embryology, in so far as it did not affect the archaetype, he gladly disposed of, and the embryologist became specialised, and, alas! too frequently deserted the anatomical department for that in which biology was taught. Last of all, he relinquished microscopic anatomy, and the professed histologist came on the scene, and altogether inappropriately emerged in the department of physiology. Truly the archaetype and all the concepts of transcendental anatomy were enough to engage the attention of any man, and it was well to let such trivialities as physiology, pathology, embryology, and histology pass to anyone who was sufficiently interested to teach them. (Laughter.) The anatomist could well afford to shed these impediments if only he were left in peace to develop the concept of the archaetype and to study the homologies of animal structure.

Morphology.

But it was a sorry bargain. For twenty years and more the archaetype was worshipped; for twenty years it grew, until it attained gigantic proportions. In 1859 it received its death blow. It crashed and fell when Darwin's explanation of evolution became an accepted creed. (Laughtr.) There was no archaetype. The anatomist had given away everything, everything but his descriptive anatomy, for a mere shadow. He was left with no more than Vesalius had handed to his forebears in 1543. (Laughter.) There was little that the anatomist could snatch from such ruins of the archaetype as the evolutionary conception had left. But with what remained he did his best and sought to add fictitious attractiveness to his subject by a new-begot enthusiasm for a so-called science of morphology. Perhaps no more forlorn hope was ever embraced by a worthy set of men. It would be unfitting to make light of the possibilities of morphology as a properly conducted line of study; but it must be owned that much morphological research undertaken during the first fifty years after the publication of the "Origin" stood sorely in need of revision. (Hear, hear.) Many anatomists resisted the appeal of the post-Darwinian study of morphology, or abandoned it disgusted, since there was in them that which forbade the belief that a tendon in a bird, a muscle in a horse, or a fascia in a sloth could throw very much direct light upon human origins. To these came a smaller but a surer blessing in the homely introduction of formaldehyde as a preservative agent for anatomical material. Here was a stupid story of how the introduction of a preservative, which especially hardened tissues, led to a wider and more artificial scope for the descriptive anatomist pure and simple. The formalin-hardened cadaver was dissected with fresh zeal, and a new descriptive anatomy, in many ways the worst yet accomplished, was promulgated. (Laughter.) It was no exaggeration to say that most of the difficulties of the modern student of anatomy were due to the bewildering complexities of the descriptive anatomy of the formalin period. Surely there was the low-water mark of anatomy as a science.

The Ductless Glands.

During the period of transcendentalism all was well lost that the ideal might be preserved. When the archaetype dazzled him the anatomist had gladly relegated to others almost all of the more progressive offspring of his subject. The study of morphology, the consolation prize, failed him before long, and he was left once more with descriptive anatomy, a study which he proceeded to elaborate into a terrible complexity of bewildering detail, made possible by the hardening reaction of formalin. (Laughter.) It might be said, 'What, then, for the future of anatomy?' They had gone too far in giving away. They could not recall, or wish to recall, pathology or the more chemical side of physiology, but should recall histology to the anatomy department, and with all other of the living branches of the medical curriculum they should be in far closer harmony. In looking round for an element of mystery wherewith to make his dry bones live, the human anatomist had manifested his ancient weakness for worshipping the gods of other men. The teaching of the action of the hormones, enunciated by Bayliss and Starling in 1902, had made a strong appeal to many anatomists. That human bodies were the structural complexes resulting from the action of the secretions of certain ductless or endocrine glands was a comparatively simple concept, and it required but little imagination to picture an alteration in the quantity or quality of the secretions exerting a potent influence for change upon the form and structure of the body. Maybe it was not taxing the possibilities of the hormones too much to imagine that a little more or a little less of the secretion of that gland or this might determine some of the structural differences between the various races of mankind, or even between a man and, say, a chimpanzi.

The Forming of the Eye.

Even if they might not annex the hormones with any success we need not want for mystery, for anatomists, though they had not all realised it, had within their keeping a sprite so potent, so elusive, that compared to it the genie of the hormone was as a mere village boggart. (Laughter.) It was in 1913, at the International Congress of Medicine held in London, that Ariens Kappers, of Amsterdam, first succeeded in making the bulk of British anatomists appreciate his conception of "Neurobiotaxis." That an animal reacted to a sensory stimulus by an appropriate motor response was a phenomenon familiar to everyone. That a newborn animal would do that was common knowledge. Directly the nipple of the mother was near to the newborn pup's nose the sightless, senseless creature grasped it with his lips, and the whole complex mechanism of suckling was initiated. That was not chance. The whole wonderful contrivance by which the sensory stimulus of the contact with the nipple produced the appropriate motor response of the movements of the lips and tongue in suckling was laid down in the central nervous system of the pup long before it was born. Here was something more subtle even than a hormone: a call of cell to cell, a hold of cell on cell; a call exerted long before function would demand the harmonious outcome of the call; a call of predestiny; a call of ancestral memory—it mattered not what it was termed. In the arrangement of the embryonic sensory and motor ganglia in the brain stem they were dealing with well ascertained facts; and it might be said with truth that no work previous to that of Ariens Kappers and Davidson Black afforded any sort of solution to the problem of the varied arrangement of those ganglia in the different types of animals. Neurobiotaxis had made the arrangement of the nuclei of origin of the cranial nerves in the human brain stem easily grasped by the medical student; it had opened a new vista for the human anatomist. And yet, though neurobiotaxis had seemed to some to be too fanciful a concept to take its place in the ordinary routine of teaching, what a parochial manifestation it was of a much wider phenomenon which was displayed everywhere, in every system, in every tissue of the animal body. Neurobiotaxis was a term applied to the peculiar "call" as it was evinced among the myriad cells which constituted the central nervous system; but the call was not limited to the central nervous system. There is a general phenomenon of cell call, a wonderful influence which living cells exerted, and that strange force he would name Cytoclesis. For this term he was indebted to Professor Darnley Naylor, whose instant appreciation of the phenomenon and whose classical feeling dictated a nomenclature which aptly described the condition. Cytoclesis was a general phenomenon in the animal body. Take, for example, the eye and its appendages. It must have struck every student of anatomy as a wonderful thing that as the rudiment of the developing eye grows towards the skin there came into being, at the site of its coming, the rudiments of the superficial parts of the organ of vision. From first to last the story of the developing eye moved in a fairyland of insoluble mysteries. First tucked away (and, one would hazard, folded in by an ill-chance) within the dark neural orb, the eye struggled to regain the surface of the head, which one day would be exposed to the rays of light. After its probation period as part of the infolded neural tube, after its painful struggles to be free and to grow towards the surface where in the distant future it would meet those rays which alone could set its cells vibrating, it still had its trump card to play: it still had its call. Something called it to the surface, and as it approaches the surface its own call went forth, and the cells of the embryonic skin of the surface of the face responded to the call. The optic cup, growing outwards from the brain, would form the light-sensitive parts of the eye hidden in the layers of the retina; but those parts were useless if the optic cup remained covered by the ordinary opaque skin. It therefore called to the ectoderm cells of the area towards which it was growing, and behold there was initiated the marvellous change by which a transparent lens and cornea were called into being from cells which elsewhere formed the ordinary opaque skin. (Cheers.) That the changes which resulted in the formation of the lens were due to cytoclesis exerted by the optic cup seemed beyond question. Should the optic cup fail to develope, or should it fail to grow towards the surface, then the call did not reach the ectoderm of that portion of the face where the transparent media of the eye should be developed, and lens formation did not take place. Moreover, if the developing optic cup of a tadpole were removed from its original site and transplanted beneath the embryonic skin of some other part of the body, it could still exert its cytoclesis and produce a lens in an altogether abnormal situation. That the embryonic skin of the abdomen should be able to form a lens for a transplanted portion of an eye was a marvel, and only one force, the cytoclesis of the optic cup, could produce the marvel.

As with the organ of sight, so with the organ of smell, and in the developing alimentary system the influence of cytoclesis was seen everywhere.

When a Nerve is Cut.

Professor Jones said in the kidney thousands of tubules met end to end, as the cut ends of thread in two tangled skeins might find each other and join. Again, cytoclesis might fail, and then there arose the curious pathological manifestation known as congenital cystic kidney. Of a certainty cytoclesis was everywhere displayed in the tissues of the animal body. Surely it was not too imaginative a thesis to maintain that that ordered call of cell to cell, that prompting as to station, was in reality the force which determined that a definite ordered system of organs was created out of a cellular mass. The whole completed perfection of the animal body was in itself evidence of the action of cytoclesis A community of cells in some way conducted its own destiny, so that by the cytocletic word of command some cells took their station here and some there. Order was preserved, definite arrangement was produced by the call of cell to cell, by the influence of cell on cell, and an embryo might be said to be a cell community governed and directed by cytoclesis. So much modern work had progressed upon purely physical or chemical lines of research that they were, maybe, in some danger of regarding the body as a test tube in which chemical reactions occurred, or as a thing of which the whole ordered building was a mere matter of simple physical laws. They seemed to stand in some need of a reminder that the living cell community of the microcosmos must not be overlooked. There were, indeed, some signs and portents that certain of the more subtle chemical explanations of vital phenomena needed further examination. Cramer seemed to indicate that the most elusive of chemical agencies, that of the vitamines, resolved itself into the familiar old story of structure and function, rather than one of undefinable chemical action. Deprivation of a vitamine appeared to damage a cell complex, and owing to the damage of a series of cells the whole tissues suffered. The ailing of the body in consequence of the damage of a tissue or cell community was a concept altogether different from that of a body suffering from the deprivation of an obscure chemical factor. Moreover, it was a concept that was altogether in harmony with the picture of the cellular microcosmos ordered by cytocletic action. In many ways the formation of parts in the developing embryo was singularly like the process which accompanied the repair of damage inflicted in adult life. The further they went back along the animal