

animal, he was fond of saying, is the rock on which morphology is built. From such observations he was later led to the study of the body-cavities of animals, and finally established that, while the body-cavity of annelids and vertebrates is the coelom, in molluscs and arthropods it is of a different nature and filled with blood. This and other contributions made by Lankester have helped greatly in the clearing up of obscurities and the elucidation of many important points in the general morphology of various groups of Invertebrata, thereby laying bare their true phylogenetic relationships.

The masterly memoir entitled "Limulus, an Arachnid" (*Quar. Jour. Mic. Sci.*, 1881) is a triumph of Lankester's method, whereby he first proved the close affinity of this remarkable creature, known as the King crab, to the scorpion and not to the Crustacea as hitherto supposed. Another important line of research dealt with the development of molluscs; the memoir which followed (on "The Embryology and Classification of the Animal Kingdom", *Quar. Jour. Mic. Sci.*, 1877) contained many new and fruitful conclusions, and had a great and lasting influence on the science of embryology. His work on *Amphioxus*, and especially on its development, in collaboration with his pupil, A. Willey, also deserves special mention. On quite other lines were his pioneer researches on the pigments of animals, and his later work on flint implements. These are but a few of the subjects he studied.

In addition to these special papers Lankester wrote many works of a more general character. The articles he contributed to the "Encyclopædia Britannica", on Protozoa, Hydrozoa, Mollusca, Arachnida, Polyzoa, and general zoology, are masterpieces of scientific exposition; also his introductions to some of the volumes of the well-known "Treatise on Zoology", of which he was editor. Among his more popular, but not less excellent books, may be mentioned "Comparative Longevity" (1871), "Degeneration" (1880), "The Advancement of Science" (1889), "The Kingdom of Man" (1907), "Science from an Easy Chair" (1910), and "Great Things and Small" (1923).

It was in 1869 that Lankester, who had just graduated at Oxford, became co-editor with his father of the *Quarterly Journal of Microscopical Science*. Under his able sole editorship from 1878 until 1920 it became the leading British journal of scientific zoology.

The lasting value of Lankester's work depended, perhaps, most on the soundness of his judgment. In matters of morphology especially, a sound judgment, based on a broad foundation of accurate knowledge, a wide outlook combined with a well-trained and alert imagination, are necessary for success, and these are just the qualifications Lankester possessed. Eager as he was to hear of new discoveries, he was not easily led astray by the extravagant praise of some new theory. He delighted to share his knowledge with others, and to rouse in them the interest he so deeply felt. Hence he was a great teacher. In the simplest

language he could give vivid descriptions or lucid explanations; with impressive mastery he could marshal the evidence and develop his argument. But perhaps his most precious gift was his power of selecting the essential, of picking out the important and discarding the unimportant. Neither in conversation nor in lecture were his statements obscured by irrelevant detail. He delivered inspiring lectures spontaneously, often without notes of any kind, trusting to his memory, to the specimens on the table, and the diagrams on the wall. He would illustrate them by skilfully executed drawings in coloured chalks on the blackboard.

Always ready to help and advise colleagues or pupils, Lankester took the keenest interest in their work. When consulted he never seemed at a loss for a helpful suggestion or an appropriate comparison drawn from his vast store of well-ordered knowledge. To any sincere inquirer he gave unselfishly of his best; those who worked with him owed much to his inspiration, for which he claimed no credit. But he never forced his opinions on them, and allowed them free choice to pursue their own lines of research.

Lankester's services to the cause of protozoology and medicine have already been mentioned. Even more has zoological science in Great Britain benefited by his help in the foundation of the Marine Biological Association and the erection of its Laboratory at Plymouth. For long he took an active interest in its welfare, and the proud position this laboratory now holds as a centre of biological research is largely due to him.

The reputation of Ray Lankester at home and abroad was great. Elected a fellow of the Royal Society so early as 1875, he was awarded the Royal Medal ten years later and the Copley Medal in 1913. From the Linnean Society he received the Darwin-Wallace Medal and the Gold Medal. A knighthood was conferred on him on his retirement from the British Museum. He received many honours from universities at home, and from numerous learned societies on the Continent and in America.

Lankester was a man of strong feelings, which he did not hesitate to express. Any form of sham, fraud, or injustice roused his anger, and his impetuous temperament sometimes led him into difficulties, even injured his worldly prospects. But he had high ideals and a kind heart. His many interests, artistic and literary as well as scientific, his great personal charm, won him many friendships. During his frequent visits to the Continent he made friends with most of the eminent zoologists of his day.

His friends will mourn his loss, but his work will remain and bear fruit, the best memorial to a life devoted to the advancement of science.

E. S. GOODRICH.

ZOOLOGICAL teaching in the broadest sense, including animal physiology, was given a new impetus in Oxford by the completion of the University Museum about 1860, in Cambridge by the inspiring personality and administrative power of Michael

Foster. The Oxford Museum, owing its existence to the prophetic vision and untiring efforts of Henry Acland, in alliance with the genius of Ruskin, began its work with George Rolleston as the forceful and arresting head of the "Linacre Department of Human and Comparative Anatomy and Physiology", the parent of four separate Departments—Zoology and Comparative Anatomy, Human Anatomy, Animal Physiology, and Anthropology.

Three great names—Balfour, Lankester, and Moseley—will always be associated with the revival of zoological learning in our two ancient universities; for it was in this period that their student years were passed, and each of them rendered invaluable service to his Alma Mater as a teacher, and, above all, as an inspirer of research.

Lankester was fortunate in his boyhood, living in a home which enjoyed the friendship of such leaders of scientific thought as Huxley, Edward Forbes, Hooker, Henfrey, Tyndall, and Darwin—to mention the names which arose in his mind in association with the centenary of Huxley's birth. After gaining a scholarship at Downing College, Cambridge, in 1864, Lankester paid a vacation visit to Oxford, and, as he has told me, was at once attracted by Rolleston's enthusiasm and all the interesting and stimulating excitement of the Linacre Department making its fresh start in the New Museum. He resigned the scholarship at Downing and in 1866 gained a Junior Studentship at Christ Church.

Lankester had taken his degree five years before I first went to Oxford in 1873. He had lectured in the Museum under Rolleston until the inevitable had happened and the two men separated—Lankester to teach in a laboratory fitted up for him at Exeter College, of which he had become a fellow and lecturer in 1872. Memories of that fellowship examination, with Huxley and Rolleston as examiners, reached me in the following year, and from them I learned that there were only two candidates—Lankester and Sharkey (now Sir Seymour Sharkey). The latter devoted his whole time to a single question—the functions of the spleen; Lankester to zoology in the strict sense. The work of both candidates was so admirable and so incommensurable that no award was possible on the examination, and Lankester was elected as the senior, and probably also because his subject was thought to be more useful for the students of that day.

Of the three Oxford Colleges with which Lankester was associated—Christ Church, Exeter, and Merton—Exeter was always nearest to his heart. Here were his dearest friends—Bywater, Pelham, and Jackson, and later on Moseley—and it is in the Hall of Exeter that his gift, the admirable portrait by John Collier, has hung for many years.

To one bound as I was to the Museum as an undergraduate and later as a demonstrator, Lankester and the Exeter laboratory were something of a mystery; but some of the students attended both institutions, and I remember D'Arcy Power (now Sir D'Arcy Power) telling me of the excellence of the zoological teaching in "the other place". There also remained on the hidden side of a black-

board a beautiful drawing in coloured chalks of a sea-urchin—a lingering memory of the time when Lankester lectured in the Museum; and, after many years, I was told that Rolleston had so far forgotten the old bitterness as to turn the picture round and explain it to the students.

Our long friendship, begun in 1883, when I went to see him in London about some papers for the *Quarterly Journal of Microscopical Science*, became close and intimate when he became deputy Linacre Professor during Moseley's illness and succeeded to the chair in 1891. Our gardens were only separated by a low wall, and some of the steps by which an easy passage was effected are still in existence. In 1893 we became colleagues, and I can never forget the warmth of his welcome to me as a brother professor.

Lankester's scientific career will be described by others who were more closely associated with his teaching and researches. I propose to speak of other sides of his personality as they were revealed in a friendship of more than forty-five years.

Only those who knew Lankester well can realise the warmth of his affection for his family and his friends, and the depth of his sympathy with them when in trouble. He was devoted to children and loved to amuse them. He had a most understanding feeling for living animals—for Sally the chimpanzee, and in more recent years for a young gorilla then living in London and taken from time to time for exhibition in the Zoological Gardens. In these Anthropoid apes and in his dog he was quick to recognise the terror aroused by the unexpected and oftentimes by the near presence of man. I especially recall his feeling for the gorilla looking out with a terrified apprehension upon the torrent of humanity in a London street. When it has been doubted whether animals possess reason as apart from intelligence, whether any animal can ever in thought ask 'why', he has spoken of the wonder "What is the meaning of all this?" which he felt might be recognised in the pensive expression of Sally.

A side of Lankester's character, sometimes insufficiently appreciated, was his essential and abiding boyishness. "I hear you're a very quarrelsome man"—the words with which he was received by Archbishop Temple when he called as a candidate for the directorship of the Natural History Museum—gave him just the opening he could make the most of, the one he would have chosen for himself. Like a boy he loved fun, and he loved fighting, but was always ready to make friends when the fight was over, a readiness not always exhibited by the other side. Lankester, if shewn to be wrong by a foe worthy of his steel, would express regret and apologise in the midst of the encounter. Once, when we were playing on the long since abandoned Hinecksey golf-links and had reached one of the greens below the oak, far-famed as the "signal-elm" of Matthew Arnold's lovely poem, a ball, struck by a player far behind us, came bounding down the hill. Lankester watched its approach with rising wrath, and when it crossed our green and finally came to rest on the opposite

side, he stamped it into the ground. The player, after inspecting his buried ball, followed us to the next tee, and first explaining that he had struck from an impossible position and had shouted his apologies, proceeded to attack Lankester in the most violent terms of which he was capable, and his capacity was of a high order. Lankester at once said "I was wrong: I apologise". "I was wrong too: I ought not to have used such language", the other replied, and they shook hands. Lankester had mistakenly assumed that we had been followed by a heedless player who knew nothing and cared nothing for the rules of the game. The incident brings to light a weakness which increased with increasing age—a tendency to attach too much importance to small things, and especially to technical details of procedure or terminology which seemed to exercise an irresistible attraction for him. But this is a small failing in a very great man who has left a deep and enduring mark upon zoological science and upon the intellectual life of the Darwinian epoch.

EDWARD B. POULTON.

The strong personality and penetrating mind of Ray Lankester must have exercised a strong influence on the lives of many of his old pupils, and the news of his death will be received by them with feelings of deep regret and grateful remembrance. As a student who attended the first course of lectures he gave at University College, London, I can well recall the impression he made upon me then. His personal appearance was not what I expected. It seemed to me almost incredible that a man who had gained such a great reputation should be so young, strong, healthy, and well dressed, and when he began to speak, his resonant voice and his clear and decisive sentences seemed to penetrate into my mind as no other teacher's had ever done before. In those days the students were more rowdy in class than they are now, and as a rule a great deal of time was wasted in partially successful attempts to maintain order. It struck me therefore as strange that in Lankester's classes there was never any disturbance: the men felt his power, they became interested in what he had to say, and they were satisfied to remain quiet. We all felt that the lectures given by him were not of the ordinary text-book stuff; their substance seemed to come direct from the zoological workshops of the world, and was illuminated by many brilliant generalisations and pungent criticisms.

Practical work in zoology in those days was almost a new thing: there were no books to help us, and the appliances provided were for the most part inadequate; but, as it was impossible at first to get demonstrators, we had the great advantage of the personal guidance and supervision of the professor himself, and it was in the practical class that some of us formed that deep reverence and affection for our master which has lasted throughout our lives. He hated carelessness or sloth, and at times his anger was terrible, but he freely gave his great skill in manipulation, his sympathy, and his wise advice to the earnest student.

When, in later years, we came into closer touch

with Lankester as advanced students or as demonstrators, we marvelled at the rapidity with which he wrote and illustrated his original contributions to zoological science in several of its branches, and at his wide and accurate knowledge of the literature of the subject. It is true that there was far more untrodden ground and a great deal less literature to read in the late 'seventies than there is now; but, looking again at some of the papers written by him at that period, I still wonder at the originality and accuracy of his work.

For the first few years, I cannot remember how many, Lankester used to live in Oxford and come to London two or three days a week to give his lectures; but when the Jodrell endowment of his chair was made, he moved into lodgings in London, and I well remember the keen pleasure it gave me when I was invited to spend an evening with him. On those occasions I often met distinguished men of science of the day, and I never left without feeling that I had gained inspiration and instruction.

Lankester's conversation was not only interesting when it turned on scientific subjects. He had wide and liberal sympathies with all the important events of the day, and always spoke with original and decisive views. He was perhaps at his best when engaged in a campaign against some form of humbug or imposture. I can well remember his account one evening of the séance in which he and Dr. Donkin exposed the trickery of the medium Slade, who was afterwards and in consequence convicted at a police court and sent to prison. Lankester's hatred of imposture seemed to be a kind of religious fervour, and he would act without regard to or fear of the consequences. His public-spirited zeal in these matters naturally led to rancour and abuse from the friends and supporters of those whom he exposed; but if he made some enemies as a consequence, those who knew him best never wavered in the belief that in everything he did he was absolutely sincere.

He had a wide knowledge of the drama and a personal acquaintance with many of the leading actors of the day, and in art he had a cultured taste and an interesting critical faculty. On both these matters he spoke with interest and with authority. At the time when he was at University College he was not apparently specially interested in any kind of outdoor games; his passion for golf developed later. But I was present on one occasion when he and Francis Balfour were engaged in an amusing controversy on the respective merits of rowing and lawn tennis, Lankester, who had rowed in the Downing College boat, supporting rowing and Balfour lawn tennis.

The influence that Lankester had on the development of research in zoology during his tenure of the Jodrell professorship at University College, London, was widespread. As editor of the *Quarterly Journal of Microscopical Science* he was able to encourage good work, but it was principally on account of his wide and liberal sympathies with workers in various fields of research that his advice and help were so eagerly sought. At that time the study of embryology seemed to predominate over any other