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EDWARD TYSON'S *ORANG-OUTANG**

AN ESSAY REVIEW BY K. F. RUSSELL

So far as the study of human and comparative anatomy is concerned the seventeenth century exhibited to a high degree what Cole has so felicitously called the development of craftsmanship. During this century anatomists in many parts of Europe searched for the smallest details of the anatomy of man and of animals. In this century, too, was developed the comparative approach to anatomy.

The solid foundation of the macroscopic anatomy of the bodies of most animals was laid early in the century by the excellent work of Volcher Coiter, Hieronymus Fabricius, Giulio Casserio and Carlo Ruini, to be followed later by Marco Aurelio Severino, Gerard Blaes, Marcello Malpighi, Jan Swammerdam, Martin Lister, Thomas Willis, Nehemiah Grew, Frederik Ruysch and many others. The insatiable curiosity of Antony van Leeuwenhoek commenced our knowledge of the wonders to be seen by magnifying glasses and microscopes and the lively descriptions he gave in his famous series of letters to the Royal Society incited the interest of members of that already distinguished body.

Quite apart from the individual endeavour of many biologists the seventeenth century saw the establishment of collective research with the formation of groups of workers banded together in the common search for knowledge. From these initially small gatherings emerged the Royal Society, the Private College of Amsterdam, the *Academia Naturae Curiosorum*, the Copenhagen group under Thomas Bartholin and the *Académie Royale des Sciences*.

The publication of this collective research in the *Philosophical Transactions*, the *Acta Medica & Philosophia Hafniensia*, Claude Perrault's *Mémoires pour servir à l'histoire naturelle des animaux* and elsewhere, greatly added to biological knowledge.

By 1700 it is true to say that there was available to the scientist with an inquiring mind a vast quantity of detailed information on the structure of animals and of man. Much of this was scattered and such was the condition of many libraries that there would have been very few places where a significant percentage of the information would be easily available to the worker.

One of those who had contributed much of the detail and who today is not so well known as he should be, but who was certainly the most outstanding comparative anatomist in Britain in his day was Edward Tyson. Born in Bristol on 20 January 1650/51, he was the son of a mercer. Schooled in Bristol, he matriculated at Magdalen Hall, Oxford, in 1667, obtained his arts degrees (B.A., 1670; M.A., 1673) and studied medicine, graduating in 1677. While a student Tyson came under the guiding influence of Robert Plot and when he came to London in 1677 obtained the friendship of Robert Hooke. These two men undoubtedly influenced Tyson's researches. Elected a Fellow of the Royal Society in 1679, he was incorporated Doctor of Physick at Bennet College, Cambridge, in 1680 and the same year admitted a Candidate of the Royal

* EDWARD TYSON: *Orang-Outang, sive Homo Sylvestris: or, the Anatomy of a Pygmie compared with that of a Monkey, an Ape, and a Man*. London, 1699. A facsimile with an introduction by Ashley Montagu. London, Dawsons of Pall Mall, 1966. Price: £22 10s. 0d.

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College of Physicians; the College has recently obtained the diploma presented to him on this occasion. He was elected a Fellow of the Royal College of Physicians in 1683, became physician to Bethlem and Bridewell Hospitals in 1684 and in the same year was chosen one of the Readers in Anatomy at Surgeons' Hall, a position which he held until 1699. Elected to the Council of the Royal Society in 1688 he became Censor to the Royal College of Physicians in 1694. He died on 1 August 1708.

This bald account of his life although it indicates his varied interests gives no idea of his researches. Tyson is remembered today by the preputial and coronal glands of the glans penis in man of which, such are the vagaries of eponymous nomenclature, he did not leave an account. Their discovery is, however, ascribed to Tyson by his friend William Cowper in the latter's *Myotomia Reformata*, 1694. Tyson also mentions them in a manuscript copy of his syllabus of lectures, now in the British Museum (MS Sloane 2770). It is to be regretted that his name is attached to his least important discovery.

Tyson's principal contribution to human anatomy was his Readership at Surgeons' Hall where he was responsible for the visceral lectures for over fifteen years. For these he prepared a syllabus of which a number of copies have survived in manuscript. Although it cannot be proved, it is probable that these formed the basis for the long series of printed syllabi issued by Surgeons' Hall during the first thirty or more years of the eighteenth century. Few of his papers deal with human anatomy, although he reported a case of horseshoe kidney in an adult and bilateral double ureters in an infant in the *Philosophical Transactions*. In the latter case he made the observation that the suprarenal glands in the foetus and infant were proportionately larger than in the adult. He also described 'stones' in the pineal gland.

The influence of his teaching and his readiness to allow others to use his discoveries is seen in the works of his contemporaries. Humphry Ridley in his *Anatomy of the Brain*, 1695, quotes a case of anencephaly reported to him by 'that curious anatomist and learned person Dr. Tyson'. As we have seen William Cowper in the appendix to *Myotomia Reformata*, 1694, gives an account of the preputial glands described by 'my very good friend that judicious anatomist Dr. Tyson'. James Keill after dedicating his *Anatomy of the Humane Body Abridged* (first edition, 1698) to Tyson, says in the 1703 edition when discussing the thymus:

The learned Dr. Tyson supposes the Use of this Gland to be for a Diverticulum to the Chyle in the Thoracick-Duct of the Foetus, whose Stomach being always full of Liquor in which it swims, must keep the Thoracick-Duct distended with Chyle; because the Blood which the Foetus receives from the Mother fills its Veins, and hinders the free entrance of the Chyle into the Subclavian Vein. Nor can any Argument be drawn from the Valves in the Lympheducts of the Thymus, against this Opinion; for I have more than once Injected them with wax up to the Thymus, by the Thoracick Duct, as Mr. Cowper likewise observes.

It is interesting to note that Thomas Gibson in the 1703 edition of his *Anatomy of Humane Bodies Epitomized* says that it was Philip Verheyen who described the thymus as a diverticulum.

As Cole says 'he abandoned human for comparative anatomy, and was the first Englishman to investigate animal structure on an extensive scale'.

Tyson by his breadth of vision, enquiring mind, detailed knowledge of the literature,

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unbounded curiosity and the necessary skill in dissection made himself the master of comparative anatomy. The lines written by Mark Akenside in his poem *The Virtuoso*,

He many a creature did anatomize,
Almost unpeopling water, air, and land;
Beasts, fishes, birds, snails, caterpillars, flies,
Were laid full low by his relentless hand,

could well apply to Tyson, although written long after his death.

The Royal College of Physicians possesses a folio album containing some 200 drawings which belonged to Tyson with many notes in his hand which, more than any of his published writings, gives an insight into the breadth of his researches. Here, drawn in the finest detail either by Tyson or possibly by Richard Waller or Henry Hunt is the anatomy of creatures ranging from the horse bot-fly, through the tape worm and round worm, lizard, dogfish, opossum, gazelle, peccary, ostrich, the tortoise (or was it a turtle?) dissected by Tyson and Hooke in the Lord Mayor's kitchen, the mantegar (*Papio maimon*) and others. It is only when this record of his work is examined in detail that one gets a clear picture of the pre-eminent position in the history of comparative anatomy occupied by Edward Tyson.

Most of his papers were published in the *Philosophical Transactions* of the Royal Society, a few in the *Acta Medica & Philosophica Hafniensia* edited by Thomas Bartholin; some were hidden in the works of his contemporaries such as the description of the 'Scent-Bags in Poll-Cats' contained in Robert Plot's *Natural History of Oxford-Shire*, 1676; and in Francis Willughby's *De Historia Piscium*, 1686, are two descriptions by Tyson. It is certain, too, that Tyson played a considerable part in the compilation of Samuel Collins's *Systeme of Anatomy*, 1685, a series of original drawings for which are in the British Museum (MS Sloane 5260). Tyson himself says this in a letter to Robert Plot dated 24 March 1680/81 which is quoted in Ashley Montagu's excellent biography; Haller is also careful to point this out. Collins's *Systeme* was a vast collection of dubious value; Cole calls it 'the only work of its justly neglected author', and a 'grandiloquent but meretricious compilation'.

Tyson's first book appeared in 1680 and dealt in detail with the porpoise (*Phocaena or the Anatomy of the Porpess, dissected at Gresham Colledge*). This was an important work for a number of reasons. It not only gave a particularly good account of the structure of the porpoise but described for the first time the retia mirabilia of Cetacea (Cole). In addition Tyson lays down the importance of a comparative approach to anatomy and attempts to develop a plan for a natural history of animals.

In 1698 Tyson gave the first account of the anatomy of a marsupial in *Carigueya, seu Marsupiale Americanum: or the Anatomy of an Opossum*: this was a female, although later he and William Cowper were able to dissect a male specimen. As Cole says, 'The greatest success achieved by Tyson in his dissection of the opossum is his admirable description of the puzzling female genitalia'. His description of the opossum first appeared in the *Philosophical Transactions* and later in the year was issued as a separate volume printed from the same formes with alteration of the page numbers.

By almost universal consent Tyson's greatest and most important work was published in 1699 with the title *Orang-Outang, sive Homo Sylvestris: or, the Anatomy of*

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a Pygmie Compared with that of a Monkey, an Ape, and a Man. Tyson did not use the term *Orang-Outang* in its modern sense as applied to a member of the *Pongo* family, but literally in the sense of 'man of the woods', for it was a chimpanzee that he described. He was copying Nicholas Tulp who used the same words to describe the chimpanzee which he illustrated in his *Observationum Medicarum*, 1641.

The first description of an orang-utan was given by Pieter Camper in 1779 in his *De l'Orang-Outang, et des quelques autres espèces de singes*. The term chimpanzee was not introduced into England until 1738 (Ashley Montagu).

In this description of a young male chimpanzee, Tyson was at pains to point out that his 'pygmie' was not a monkey but was in fact a creature very near to man in many details of his anatomy. It was Tyson with this book who 'initiated the anatomical study of the man-like apes, and who was virtually responsible for instituting a new family of hominoid apes intermediate between man and monkeys' (Cole).

Tyson added to the purely anatomical description of his chimpanzee a philological essay in which he pointed out that the 'Pygmies, the Cynocephali, the Satyrs, and Sphinges of the Ancients' were in fact apes or monkeys and not men.

The book was well received by his contemporaries but, as we shall see, a most important point raised by Tyson was not appreciated; it was, in fact, made too far in advance of its time.

The *Philosophical Transactions* published a review which cleverly abstracted the main feature of the book, which said

The Ingenious Author of this Treatise, having often obliged the World with his Anatomical Discoveries and Observations on several curious Subjects, of which there is a Catalogue at the end of this Tract, has here given us a very Ample, as well as Accurate Account of this strange, and indeed surprising Animal, a creature rarely, if ever seen by our World.

The review ends by calling the book 'this Learned and Ingenious Treatise'. It stresses the various anatomical features by which the chimpanzee most closely resembles man.

The account of the muscles was written by William Cowper who also drew the illustrations which were engraved by Michael van der Gucht.

. . . I am obliged to my good Friend Mr. Cowper, not only for designing all my figures; but obtained of him likewise to draw up this ensuing account of the Muscles; whose great Skill and Knowledge herein, is sufficiently made evident by his *Myotomia Reformata*, or, *New Administration of all the Muscles in Humane Bodies*, published sometime since: To which I refer my Reader, for a fuller account of them, whenever 'tis said, that such and such Muscles in the Pygmie resembled those in Humane Bodies.

One of the people who had a high opinion of Tyson and his *Orang-Outang* was Alexander Monro (Primus) who always prefaced his course of anatomy by a series of lectures on the history of the subject. These were never published by Monro although they were pirated by William Northcote and printed as *A Concise History of Anatomy*, 1772, (Russell). Monro's lectures exist in several manuscript transcripts, including his own holograph copy now in Otago. All these transcripts vary slightly, for Monro lectured extemporaneously, but in the Edinburgh University transcript Monro says:

The last of the British I'm to mention at this time is a man of very great Reputation. Viz. Dr. Edward Tyson Author of several pretty papers both in the *Philosophical Transactions* and

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Acta Haffniensia. He writes nothing on the human Anatomy, but is exceeding industrious in furthering that of Brutes, particularly he writes a very exact Treatise on the great Monkey called Ourang Outang, and another on the Rattle Snake etc.

However by far the greatest tribute came from Albrecht von Haller in his *Bibliotheca Anatomica*, 1774–77, when he said ‘Nihil habemus in comparata anatome huic operi comparabile’. This is praise indeed.

A modern appraisal of Tyson’s works has been given by Ashley Montagu and very little can be added to his account, for it will always remain the definitive biography. Nevertheless in order to view Tyson’s *Orang-Outang* in its true perspective it is important that we should compare his descriptive anatomy with that presented in books of human anatomy written in the same period. We should, in fact, adopt the same comparative approach with regard to the work as a whole that Tyson adopted with the anatomical features of his pygmie. This becomes necessary because it was most unusual at this time for a monograph to be devoted to the discussion of a single animal; Tyson’s books are almost unique in this regard. It must be remembered, too, that in his day the higher anthropoids were virtually seen only by travellers and their anatomy quite unknown. The chimpanzee was seen and illustrated in Europe only once before, the orang-utan was not to be described until 1779 and the gorilla was not discovered until 1847.

Seen in this light Tyson’s descriptive anatomy of the chimpanzee, here dissected for the first time, is a remarkable achievement. He sets about his description in a thoroughly modern, workmanlike fashion with a complete grasp of the literature which is freely quoted. When he wants to compare his anatomical findings with those of man he marshals his facts methodically, with clarity, economy of words and with complete confidence.

So far as British authors are concerned the books on human anatomy which can be set against Tyson’s work for their originality and breadth of vision are those of his friends and contemporaries James Keill, William Cowper, Humphry Ridley, Richard Lower and Tyson’s more senior colleague Thomas Willis.

Read today, with the knowledge of all that has been discovered since Tyson’s death, his *Orang-Outang* is still a great book.

As an example of his astute observation the following extract may be quoted:

The Hair of our Pygmie or Wild Man was of a coal-black colour, and strait; and much more resembling the Hair of Men than the Furr of Brutes: . . . The tendency of the Hair of all the Body was downwards; but only from the Wrists to the Elbow ‘twas upwards; so that at the Elbow the Hair of the Shoulder and the Arm ran contrary to one another.

This is the first recorded observation of the reversal of hair tracts on the arms of the higher apes and man, an observation later to be made by Charles Darwin in *The Descent of Man*.

To his descriptive anatomy Tyson adds careful measurements of all parts of the body of his chimpanzee, probably the first use of the modern science of anthropometry. The skeleton of his pygmie is still extant in the British Museum and Ashley Montagu has checked Tyson’s measurements of this with complete agreement.

One feature of his book remained hidden to his contemporaries but its importance

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was not lost to his successors. This was Tyson's repeated assertions of the place occupied by his 'pygmie' in the scale of nature, for although he said it was not a man he placed it in an intermediate position between the monkeys and man.

Sir Thomas Browne in *Religio Medici* declared that there was 'in this Universe a Stair, or manifest Scale of creatures, rising not disorderly, or in confusion, but with a comely method and proportion'; Tyson, who obviously studied Browne, says the same thing in the dedication of his book to Lord Evesham:

Tis a true Remark, which we cannot make without Admiration; That from Minerals to Plants; from Plants, to Animals; and from Animals, to Men; the Transition is so gradual, that there appears a very great Similitude, as well between the meanest Plant, and some Minerals; as between the lowest Rank of Men, and the highest kind of Animals.

But he goes on to make a more significant remark:

The Animal of which I have given the Anatomy, coming nearest to Mankind; seems the Nexus of the Animal and Rational, as your Lordship, and those of your High Rank and Order for Knowledge and Wisdom, approaching nearest to that kind of Beings which is next above us; Connect and Visible and Invisible World.

With complete clarity of argument Tyson says:

What I shall most of all aim at in the following Discourse, will be to give as particular an Account as I can, of the formation and structure of all the Parts of this wonderful Animal and to make a Comparative Survey of Men, with the same Parts in a Humane Body, as likewise in the Ape and Monkey-kind. For tho' I own it to be of the Ape kind, yet, as we shall observe, in the Organization of abundance of its Parts, it more approached to the Structure of the same in Men: But where it differs from a Man, there it resembles plainly the Common Ape, more than any other Animal.

Later he concludes:

But at the same time I take him to be wholly a Brute, tho' in the formation of the Body, and in the Sensitive or Brutal Soul, it may be, more resembling a Man, than any other Animal; so that in this Chain of the Creation, as an intermediate Link between an Ape and a Man, I would place our Pygmie.

No statement could be more clear than this and with it Tyson laid the basis for the scientific thought which culminated in Thomas Henry Huxley's *Evidence as to Man's Place in Nature* (1863) and Charles Darwin's *The Descent of Man* (1871). It is strange that while Huxley mentions Tyson and praises his work, Darwin does not.

The second portion of Tyson's book in which he shows by skilful argument that the pygmies and satyrs of the ancients were not men but were either apes or monkeys does not, in modern eyes, have the same importance as that on the *Orang-Outang*. Much of his treatise would seem to be influenced by the chapter on 'pigmy' by Sir Thomas Browne in his *Pseudodoxia Epidemica*, 1646.

A second edition of *Orang-Outang* was published in 1751 and to this was added Tyson's work on the rattlesnake, itself an important piece of research first presented to the Royal Society in 1682/83, and his papers on the peccary, the tape worm and the round worm. This was the last appearance of Tyson's most important work until last year when a splendid facsimile of the 1699 edition was produced by Dawsons of Pall Mall.

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This long overdue reprint has been issued with an introduction by Ashley Montagu which gives a brief but satisfactory account of Edward Tyson. It is a matter of congratulation to all concerned that Tyson's work should be available again, and in facsimile. The reproduction of the text and the plates is all that could be desired. The book is cased in quarter morocco. Great care has been taken to ensure that the facsimile is worthy of the original, but it is a pity that Tyson's portrait has reproduced so badly. It is also a matter of regret that the cost of the facsimile puts it out of the reach of those who would gain the greatest enjoyment and profit from having it on their shelves.

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