

The Making of Evolutionary Anatomy in the Twentieth Century; or, the Evolution of Anatomy.

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Note on Names

Much of the fossil material that has been discovered is recognized by several names. Some names are local and geographical, others zoologically formal and refer to the genus and species to which the finder assigned the fossil. In either case names of places have often changed, or spellings revised, and, in the case of zoological terminology, adapted to an author's peculiar classification of a fossil. The reader should consult Michael Day's *A Guide to Fossil Man* (4th edition, London, 1986) for resolution of onomastic problems.

Four of the anatomists mentioned in this dissertation have names which are apt to cause confusion; Sir Grafton Elliot Smith, Sir Wilfrid Edward LeGros Clark, Sir Arthur Smith Woodward and Frederic Wood Jones. They are occasionally known by the last of the surnames only, and this seems to be the case more often than not in recent secondary literature. I retain the unhyphenated double barrelled names; these are the ones they used themselves, and by these were they known to their contemporaries. Bibliographic sources admit either and are by no means consistent.

Introduction

Before the separation of what we today recognize as the distinctive disciplines of anatomy and physiology, form and function were studied united; the intimate dialectical relationship between structure and the use of the parts of the body being illustrative of the divine Creator's skill. Yet anatomy, divested of any physiological implication of function, was able to show still more clearly grand design, in this case nature was the agent. Comparative studies of 'perfect' adult morphology and embryological growth, within a secular paradigm of natural history, were able to show the mechanisms of intricate life and reveal the turning cogs and pumping pistons of a late Victorian view of Nature with *Deus extra machinam*. Nature was to be her own creatrix; man his own creator, Selfmade. For workers concerned with evolution of man in the early decades of this century, a purpose was still evident in nature, if this was not explicitly admitted then it was abundantly clear in their work.

It is not my intention to catalogue particular views of evolution and relate these to the kind of anatomy or anatomical methods that were being used by various workers this century but to follow Grafton Elliot Smith and some of his anatomical and institutional concerns. He had found that the practice of anatomy in this country was not as useful as it could be in resolving problems of the nature of man and he set about rectifying the deficiencies of a narrowly conceived anatomy in the departments of which he

was professor. This meant an integration of other academic and department concerns and it gives something of the modern idea of a programme of human biology with anatomy at its core.

The State of Evolution

The emergence of ‘philosophical’ anatomy,¹ a knitting together of comparative anatomy and embryology in the early 1800s, and the discovery of exotic (extinct) animals led to the search for anatomical homologues amongst extant species. Animals classified by their similarity of structure revealed, in the works of Georges Cuvier, and the researchers following him, a ‘unity of plan’,² or divine order. The ‘British Cuvier’ himself, Richard Owen writing on the taxonomic classification of mammals,³ had found a similar unity, ‘I cannot shut my eyes to the significance of that all-pervading similitude of structure— every tooth, every bone, strictly homologous— which makes the determination of the difference between *Homo* and *Pithecus* the anatomist’s difficulty’. The significance was not evolutionary, it was theological and it proved the existence of God. Owen had created from his comparative anatomy of living and fossil animals a ‘vertebrate archetype...a transcendental

¹Or ‘transcendental’ anatomy, the terms are synonymous. The anatomy is very much concerned with a romantic idea of the unity and coherence of nature. Vide Rehbock, 1990.

²For the establishment of Philosophical anatomy in England and the importance of the work of many of its originators and followers vide Desmond, 1959.

³Owen, 1857 p. 20.

vision of the unity of type'.⁴

With same anatomical facts— the hard evidential reality of bones and fossils— available to him as were available to Owen, Thomas Henry Huxley found a different story to tell. Within a Darwinistic framework of evolution, one unguided by divine hand and dependent upon contingency⁵ he could place man squarely *in* nature. Man he considered materialistically contiguous with the rest of the animal kingdom; man was not created separately from it as if according to some general divine *bauplan* of life. As may be attested from the title of Huxley's best known work *Man's Place in Nature*⁶ and the often quoted 'alpine metaphor' within (p. 111–2) his intent was not to detail the hows and the whys— the mechanism— of human evolution that had (perhaps wisely) only been alluded to in the *On the Origin of Species*,⁷ but to establish the credibility of Darwinian evolutionary theory. Huxley, in using comparative anatomy (he made relatively little mention of the then known fossil human material), to throw much light on man's relations with

⁴Bowler, 1976 p. 99.

⁵Evolution is not random, the form of a structure is dependant on those that preceded it, this contingency 'is a thing unto itself not the titration of determinism by randomness' (Gould, 1989 p. 51). This is apt to be forgotten in the all too frequent denunciation of early workers in the twentieth century for their adoption of 'orthogenism', what is classically seen as a halfway house between the special creation of the Bridgewater Treatises and 'proper' Darwinism.

⁶Huxley, T. H., 1863.

⁷Darwin, 1859 (repr. 1984, p. 458) 'light will be thrown on the origin of man and his history'. In subsequent English editions: 'much light will be thrown etc.'. This line was omitted in the first German translation by Heinrich Broon, the edition that most influenced Ernst Haeckel (Trinkhaus & Shipman, 1993 p. 78).

the animals had turned anatomy into a heretical science. The bitter pill of the materialism that proposed that ‘thought and emotion are the consequence of physical antecedents’⁸ he sweetened with a rhetorical allusion to Matthew 5:5;⁹ that despite such humble origins man was transcendent:

Our reverence for the nobility of man will not be lessened by the knowledge, that man, in substance and in structure, is one with the brute; for he alone posses the marvellous endowment of intelligible and rational speech, whereby, in the secular period of his existence, he has slowly accumulated and organized the experience which is almost wholly lost with the cessation of every individual life in other animals; so that now he stands raised upon it as on a mountain top, for above the level of his humble fellows, and transfigured from his grosser nature by reflection, here and there, a ray from the infinite source of truth.¹⁰

The heresiarch’s implication is that through evolution man can raise himself still higher; evolutionary theory does not debase man by eliminating the Cartesian duality of earthly body and heavenly mind, it exalts him in a classic Victorian tale of success through strife. It is clearly optimistic; it is progressive and it suggests man has the capacity for potentially limitless advance, something he does not have if he were simply created by God, always having had and always having only those attributes first bestowed upon him.

⁸Huxley, T. H., 1893–4 vol. 1, p. 206.

⁹Revised Version: ‘Blessed are the meek: for they shall inherit the earth’.

¹⁰Huxley, T. H., 1863 p. 112.

The theme of the humble origin is common in later writings in anthropogeny but it represents more than a literary metaphor for the evolutionary origin of man from ignorant apes. It is supported by such embryological observations that the anatomy of man is consistent with that of juvenile apes.¹¹ Man is neotonous, has retained the infant morphology that other apes have lost through morphological specialization, and he is the more plastic and adaptable because of it. He is not only physically juvenile but psychologically so in that his curiosity, playfulness, and innocence (and even goodness) are considered as much the causes of the development of the intellect as they are characteristics of children.¹² This position of the innate goodness of man and of the invocation of childlike qualities in him is one drawn from anatomical studies of the neuroanatomy of modern and fossil man and extant non-human primates; it provides one scientificized explanation of human nature.

¹¹E.g. Bolk, 1921. Also Keith, 1923 p. 268, ‘...a true interpretation to such human features as are represented by man’s small face and jaws; his forehead tending to be devoid of supra-orbital ridges, his [relatively] large head poised on a long and relatively slender neck: they are features first produced in the foetal stages of higher primates and now retained by man in his adult stage’.

¹²A teacher of mine in the Department of Anatomy and Cell Biology in the University of Liverpool had facetiously suggested that Jesus be considered the first neotonist for the comment reported by Matthew (18.3), ‘...except ye turn, and become a little children, ye shall in no wise enter into the kingdom of heaven’.

Evolution Misunderstood?

Take this very Darwinian theory about which they¹³ are so suddenly angry. The majority of scientists have long abandoned the rigid gospel of Natural Selection in favour of Creative Evolution. There are too many contradictions involved in Darwin's first formulation. It is obvious, for example, that while development from a reptile into a bird was proceeding, the stages between winglessness and wings, considered in themselves, without allowing and end in view, were positive disadvantages in the 'struggle for existence'; half a wing is certainly no improvement upon no wing.¹⁴

Today the reconciliation of Science and the Faith is complete, and theologians find no difficulty in believing that man has attained his present position in the cosmos by his own labours and long sustained efforts. Man, then, has a history of endeavour, extending far into the backward abysm of Time, of which he has no call to be ashamed. Immersed as he is in this prison house of matter,... he may yet grow upward... and must climb as far above our present position as we are now above that of the pathetic 'missing link' dug up in S. Africa.¹⁵

The quotations are from non-scientific publications, and the later patently from a theologian but the message is the same in the literature submitted to *Nature*, and to other scientific journals— evolution is progressive, life is purposeful, and natural selection means that strife and industry actively

¹³The 'Holy Rollers' at the trial of J. T. Scopes were those who considered Scopes' teaching sinful. Scopes was indicted in Dayton, Tennessee for teaching Darwinian evolutionary theory.

¹⁴*The Spectator*, July 18th, 1925 p. 94

¹⁵1925a: *The Morning Post*, February 2nd, 1925. The missing link is Raymond 's Taungs cranium (infra III. i).

pursued lead to survival.¹⁶ Thus the simian or brutal features in the morphology of a fossil inevitably meant that it was of an intrinsically lower level of evolution (the concept of levels of evolution is itself inconsistent with how we view evolution today). It was inconceivable that the distinctive morphology of, for example, the Mauer mandible could actually have represented a positive evolutionary advance on the Neanderthal condition.¹⁷ Further, extant representatives of a taxon that were believed to be more morphologically ‘primitive’ than other members of it (in the case of human evolution this invariably meant the Australian aboriginal, or the African Negro) were considered ‘less evolved’. They were therefore less perfect; again it was inconceivable that the form that changes least is that which is most in harmony with its environment.

I have taken two examples, of a very great many, to show that the view of evolution in the early years of this century is non-evolutionary as we know it. Adaptionism, population biology and genetics have all been added since the 1940 to create the presently accepted paradigm of evolution. The ‘modern synthesis’ or ‘neo-Darwinism’¹⁸ of the 1940s and 1950s is emphatic

¹⁶E.g. Sir Arthur Keith, ‘the greatest living anthropologist’ (*The Sunday Times*, February 8th, 1925, p10 col. 4) and Conservator of the Hunterian Museum of the Royal College of Surgeons, London, had always maintained that evolution was progressive and purposeful (Keith, 1946 pp. 215–8). Vide also Wood Jones, 1942 (E.g. pp. 55–56).

¹⁷E.g. Sollas, 1910 p. lxxxv, ‘thus even at this comparatively late stage [of evolution], the brutal characters inherited from the ape, though waning, have not wholly disappeared’. Vide also Keith, 1915 pp. 242–4.

¹⁸The ‘Modern Synthesis’ has become the orthodox interpretation of evolution by means of natural selections, and is ruthlessly non-progressive. It is a diffuse theory which as its

on the issue of evolutionary destiny and progress: they do not exist. The evolution of species is aimless, though not random. Whether Darwin had included purposiveness in his formulation of evolution by means of natural selection is difficult to tell, to that end I cannot resolve whether evolutionary theory as it is used in the anatomy of anthropology and the reconstruction of the genealogy of man in the early years of this century is a reflection of Darwinism or a peculiar version of it. We call such views non-evolutionary, would Darwin?

Peter Bowler would argue that Darwin would not recognize the evolutionary theory used by anatomists in studying human origins in the early years of this century as consistent with his own: ‘As late as the 1930s, theories of human evolution still took for granted an element of progressionism that was becoming increasingly out of touch with the cultural values of the time. The destruction of the last vestige of Victorian optimism was catalyzed, if not caused, by the application of the *renewed* Darwinism of the ‘Modern Synthesis’¹⁹ (emphasis mine). For Bowler, Darwin was a revolutionary but whereas he attributes non-evolutionary views to social phenomena Davydd Greenwood attributes them to something more fundamental: to the legacy of the ancient humoral theory of nature. He argues that the conceptual frame-

name suggests draws together evidence from many scientific fields (Olson, 1959 p. 529); this provides strength in that it rests on no central tenet that may be disproved, and its weakness as an experimentally testable scientific hypothesis. Vide Huxley J., 1942; Jepsen, Mayr & Simpson, 1949; and Mayr & Provine, 1980.

¹⁹Bowler, 1987, p. 248. Vide also Bowler, 1976.

work of pre-evolutionary thought remains, and points to non-evolutionary views in some of the most eminent biologists after the impact of the ‘Modern Synthesis’.²⁰ A more cautious view, and the one to which I am inclined, is taken by Robert Richards who reminds us that ‘Darwin was not of a late twentieth-century mind. Progress was the intended consequence of the model that he had originally adopted for species evolution, namely, that of individual evolution...Darwin worked a compromise in his conception of species transformation by making progress non-necessary, though general and by placing the guide for advance in the external environment’.²¹ In several interpretations of Darwin’s work as progressive critics have often believed that the author has fallen foul of the rhetorical devices used by Darwin to soften the blow that his uncompromising scientific work would deliver.²²

Nevertheless, evolutionary theory was universally framed in progress; some anatomists’ work even went so far as to obscure even a progressive human evolution as much as was possible. Arthur Keith,²³ for example, had formulated a theory of the extreme antiquity of man, the origin of whom he had extended further into the past than any other palæoanthropologist. He had interpreted all the fossil material then known in such a manner that suggested modern man had remained essentially unchanged in his anatomy

²⁰Greenwood, 1984.

²¹Richards, 1992 p. 90.

²²On this vide Campbell, 1987.

²³As conservator of the Hunterian Museum of the Royal College of Surgeons of England Keith held probably the highest, most respected position in British anatomy.

for hundreds of thousands of years.²⁴ In asserting the permanence of modern human anatomy he implied two important points: firstly, that the human structure is so perfectly construed as not to change further; and secondly that the differences between races were long established.²⁵ Whilst he did not directly disavow the evolution of man in the first instance, in displacing the origin further into the past he had threatened the possibility of palæo-anthropologists ever being able to find enough material to view the course of development. This of course was the principal aim of palæoanthropology—to discover the succession of anatomical structures that had lead to the form of modern man. With a lengthened period of evolution one was less likely observe such succession. It was the form, and more specifically, the size of the cranium that for Keith was the determining anatomical characteristic of mankind,²⁶ and by finding evidence of large brained ‘men’ in the abysm of time²⁷ he was implying either that evolution had to work extremely quickly to account for man, or than it did not in fact occur. Of course, this was

²⁴*The Antiquity of Man* (Keith, 1915. His earlier book, *Ancient Types of Man* (Keith, 1911a) is a more equivocal. Illustration, 1911a & Illustration, 1911b show reconstructions of the ‘La Chappelle-aux-Saints’ skeleton based on Keith’s data (Keith, 1911a & 1911b respectively). In comparison to Illustration, 1909, and the accompanying text (Anon, 1909) based on the researches of the French palæoanthropologist, Marcellin Boule, Keith’s reconstructions posses a nobility, an aspect of sapience, and a modern skeleton.

²⁵Keith, 1913a, ‘I still maintain, as I did before the Piltdown skull was made, that the Pliocene ancestor of modern man was one probably as highly evolved as the aboriginal man of Australia’.

²⁶In his reconstruction of the size of the Piltdown skull Keith increased the cranial capacity by 200cc over that of the original reconstruction by Arthur Smith Woodward (Keith, 1913b pp. 197–9).

²⁷Though the believed geological age of the earth was considerably greater than Archbishop James Usher’s 6000 years (an age that was still seriously contended in 1859) it was a lot less younger than it is held to be today.

never directly stated; he was, publicly, a committed ‘Darwinian’.

But Wynfrid Duckworth²⁸ had found that the high degree of encephalization amongst the then known fossil crania was not itself consistent with known post-cranial morphology. Furthermore, a particular ‘fossil’,²⁹ that from Galley Hill, was frequently used by Keith to make his position firm was positively disruptive to the concept of evolution:

Up to a certain point, the evidence is strikingly favourable to the hypothesis of human evolution. By this is meant the gradual development of the modern type of skeleton found in association with a large and active brain, capable of manifesting its activity in a great variety of ways... Most of the oldest human skeletons... differ from this type [i.e. the modern]... although a difference cannot be demonstrated in cranial capacity.³⁰

The Galley Hill find is of such antiquity yet so modern looking that it is a blow to modern evolutionary theory, indeed many have refused to accept the skull and its evidence.³¹

A further suggestion of Keith’s, that the anatomy of the Neanderthal type could be recreated in man if the pituitary gland were hyperactive,³² threw another spanner in the works of evolution. Until then all structures

²⁸Duckworth was University Lecturer in Anthropology in the department of anatomy in Cambridge; Elliot Smith had worked with him when junior demonstrator in the department.

²⁹This was later shown to be the skull of a modern human recently interred.

³⁰Duckworth, 1912a p. 127.

³¹Duckworth, 1912a p. 132.

³²Keith, 1911 p. 120. He drew parallels between the morphology of the Neanderthal and the acromelagic pathology of humans.

could be assumed to be the result of sequential evolution excepting, of course, the odd pathological specimen.

As a rule, this flattening [of the Neanderthal cranial vault] has been regarded as representative of a stage in the evolution of a highly developed human skull [the high, domed cranium of modern man] from a more lowly, in fact more simian one.³³

But if the newly discovered hormones could have such a profound on structural anatomy the ‘stages’ would be further obscured; they would not necessarily be representative of evolution, but unpredictable occurrences of glandular pathology.

It is, I think, significant that the concerns for the origin of man held by anatomists were directed to the search for and the interpretation of material that was after the ape–human division. In *The Morphology of the Apes and Man*, a typical production from Elliot Smith’s department at University College, London, C. F. Sonntag remarks that palæoanthropologists of his time have no idea of what the common ancestor of man and the apes looked like or how it might have behaved.³⁴ The reason is simple; no one was searching for the common ancestor, all were trying to trace the path of a glorious ascent. The methodological act in this is the application of the ‘evolutionary’ principles of progress (in Elliot Smith’s case internally driven

³³Duckworth, 1912a p. 142.

³⁴Sonntag, 1924 p. 333.

by the brain) to anatomy: the result an understandable derivation of modern structure. It must also be understood that all palæoanthropological anatomy is comparative anatomy.

Grafton Elliot Smith and the Expansion of Anatomy

Stereotyped Anatomy

By 1913 the state of British anatomy and its heavy reliance on stereotyped detail was being debated in the literature. The amount of information that the medical student had to digest, along with a profusion of differing terminologies was considered by Sir William Osler to be detrimental to medical students, and to the goals of their schools.³⁵ Grafton Elliot Smith had in 1910 associated the present preoccupation with descriptive minutiae with anatomists of the previous century, who ‘...began to devote themselves exclusively to the study of evolution of the mere form and structure of animals, to the neglect of their functional attributes and the immense role which function

³⁵Osler had identified that the percentage failure figures reported by three General Medical Council had risen from 12.4% (1861) to 41.9% (1895). Further the failure rate was higher at Edinburgh, and amongst surgeons (Osler, 1913 p. 1048).

plays in moulding the form of the body'.³⁶

In 1913, following Osler's lecture on *Examinations, Examiners and Examinees*,³⁷ Elliot Smith wrote in *The Lancet* of the poor foresight of the Council of the Royal College of Surgeons. The Council had appointed as examiners for the Primary Fellowship Examination in anatomy fellows whose chief interest was other than anatomy; he exclaimed that

...the College is driving students to the crammer and to the text-book monger, and paralysing the work of those teachers who are endeavouring to instruct their advanced students in a knowledge of the whole structure of the human body and its real significance.³⁸ (emphasis mine).

What is it that Elliot Smith meant by the 'real significance' of the human body? Firstly, Elliot Smith's conceptions of the activities with which anatomists should concern themselves is an indication of that significance—otherwise they would not be pursuing such a line of research methodology. And his call was for an anatomy, which once again communicated with other disciplines, particularly physiology. As once anatomy was inseparable from physiology, and arguably, other 'medical sciences' that we would today recognize as distinct, so it should be again. Physiology ought to be fused to anatomy to produce an experimental rather than a descriptive discipline. In

³⁶Elliot Smith, 1910 p. 1.

³⁷Published in *The Lancet*, Osler, 1913 p. 1047–50.

³⁸Smith, 1913a p. 1227.

his vision of a future anatomist he shows us his opposite number, the anatomist who does not understand or fully appreciate the broader implications of Darwin's theory: he is an anatomist who concentrates upon 'pure morphology' who 'spurn[s] the utilitarian aspect of his subject' and has 'edged himself around with a barrier' lest other specialists 'corrupt the good manners of his new path of life'.³⁹ The real significance, then, is to be understood only if pure morphological research, i.e. the search for structural homologies, is rejected and the morphologist becomes again a student of the functional attributes of structure, and the development of form. Anatomical structures do not by themselves mediate with the environment unless they react to it and adapt with it, that is function and, broadly speaking, evolution.

In the following twelve years, in some university departments at least, the standard of anatomical teaching and research had improved. Abraham Flexner, writing in 1925 on the general state of medical education, commented that in recent years there had been, in England, 'notable progress in the Departments of Anatomy at Cambridge and Manchester, and above all at University College, London'.⁴⁰ What he meant by 'progress' is not altogether clear, however a shift from the 'sterile Edinburgh tradition', with *Cunningham's Anatomy*⁴¹ as its representative was to be aimed at. Elliot Smith had

³⁹Smith, 1910 p. 1.

⁴⁰Flexner, 1925 p. 165.

⁴¹By 1913 the text was into its fourth edition. It was still dedicated to William Turner, but now edited by Arthur Robinson who held the Chair of Anatomy at Edinburgh. It was renowned as a ponderous and bulky tome. The fourth edition is reviewed in *The Lancet*

at some time inhabited all of these departments.⁴²

Flexner also reported that the increased number of vacancies in anatomical Chairs at the English universities meant that they were not being immediately filled by surgeons.⁴³ This was undoubtedly considered a positive development since the ‘advanced students’ of anatomy (as highlighted in the quotation from Elliot Smith, *supra*) were clearly not being represented by surgeons’ narrow and particular interests in anatomy. This was brought more clearly into relief by a letter written to *The Lancet* from ‘A London Teacher of Anatomy’; as was alluded to in Elliot Smith’s statement (*supra*, n. 38), the letter read ‘...it is absurd that candidates and teachers should submit to surgeons being the judges of knowledge in a subject which has long outgrown their grasp’.⁴⁴ The students of professed anatomists were more knowledgeable than their surgical masters on the real significance of structure.

In 1913, then, the ‘anatomist’ was becoming distinguishable from the surgeon (by whom anatomical knowledge had traditionally been safe-

1913(2): 933–934.

⁴²Cambridge from 1896 (matriculation at St. John’s College, fellowship 1899), as Junior Demonstrator in Anatomy, until appointment to the Chair of Anatomy in the Government School of Medicine, Cairo in 1900; Manchester from 1909 until 1919; then he was asked to accept the Chair at the new Institute of Anatomy in University College, London (1919 until death in 1937).

⁴³Flexner, 1925 p. 166.

⁴⁴The *Lancet*. 1913(2) p. 1288. It is perhaps not too much to suppose that the letter was in fact written by Elliot Smith himself, despite the declaration of the author’s being a London based teacher.

guarded), certainly his knowledge was beyond that required by surgery; and surgeons had developments in the immediate area of their particular practice to cope with. The anatomist was becoming a scientist and a professional in his own right, and anatomy a science rather than a pre-medical chore to be completed before something more worthy could be embarked upon. What is distinctive about this is that anatomy, as with many of the ‘pre-medical sciences’ of the previous century, could now be pursued as a scientific enterprise and as such was responsible for its own organization as a discipline. Moreover, at least at more the more advanced level, anatomy was no longer ‘the hand maiden of surgery’. Thus a student could justifiably complain about the confusing morass of anatomical names facing him; he was only ‘...aiming to equip himself for the practice of medicine or surgery, and not for the specialized career of a pure anatomist’.⁴⁵

But surgeons, as represented by the Royal College of Surgeons, not so much scientists but practitioners, were still the protectors of the arcane knowledge of anatomical description. This they were to cling to with fervour. The reply of Rickman J. Godlee⁴⁶ to Sir William Osler’s exhortation to ‘Burn the anatomical fetish’⁴⁷ is indicative of a trenchant position with regard to existing anatomical questioning in the FRCS examinations. For

⁴⁵ *The Lancet*. (1913)2 p. 1199.

⁴⁶ Godlee was president of the Royal College of Surgeons and Surgeon Ordinary to H. M. King George V.

⁴⁷ Osler, 1913 p. 1048. He considers the anatomy textbook Cunningham’s *Anatomy* to be a prime example of the medical profession’s excessive reliance on dry anatomical detail.

Godlee the failing of students to handle the anatomy that they are asked to know is a result not of any excessive reliance on description— and, anyway, the FRCS anatomy examination is the gold standard of anatomical knowledge, so it must not be a prize easily won— but of the medical schools in not applying more stringent measures to ensure that only the better candidates reach their final examinations.⁴⁸ While the professionalization of anatomy is obviously an issue with wider implications in the medical profession and has to be accounted for by more than a call from Osler to simplify medical examinations,⁴⁹ it may suffice for me to say that it did allow an expansive development of anatomy away from surgical utility and from its existence in dry and descriptive detail as a hurdle to surmount for the possession of the suffix FRCS Eng.

The Anatomy

...In the first place we have been endeavouring to rescue physical anthropology from the thralldom of the anthropometrists, to integrate the subject with biological work in close co-operation with work in general biology and embryology, physiology and psy-

⁴⁸Godlee, 1913 p. 1153.

⁴⁹Osler found the rigid examination structure of recent years in the medical profession as constraining. He considered it ‘Chinese’ in comparison to a ‘Greek’ education and held that ‘...nothing is more fatal to a true intellectual training than a constant preoccupation with its practical results’. To which end he had suggested a type of continuous examination, or assessment. (Osler, 1913 pp. 1047–1050).

chology.⁵⁰

The study of neuroanatomy in which Elliot Smith had made his reputation as an anatomist was more given to experimental, i.e. physiological, work than any other branch of anatomy. It is also that which is the most likely to be considered consistent with mental life and psychology; certainly Elliot Smith considered the functional anatomy of the brain of prime importance to psychiatry though this was not thoroughly appreciated by his colleagues.⁵¹ The brain, its morphology and actions, and its growth and development formed Elliot Smith's main interests. And it was around the anatomy of the brain that other aspects of a unified anthropology, a revived anatomy (and an evolutionary anatomy) would crystalize. This new system of anatomy 'Contains the germ of a new method of approach to the problems of psychiatry, and a means whereby in time the unification of anthropology will be effected and a real science of man created',⁵² the aim '...to build a rational and serious interpretation of the nature of man and the fundamental principles of human behaviour'.⁵³

⁵⁰Letter from Elliot Smith to C. M. Hincks, 1926, reproduced in Dawson, 1938 pp. 89–95.

⁵¹'...before coming to London it was customary to give students working for the diploma in psychiatry [at Manchester] yet another type of neurology which aimed at the elucidation of the functions of the brain as an ideal introductory to the study of the morbid anatomy of the central nervous system'. This suggests that at other institutions teaching in morbid neuroanatomy was not preceded by a grounding in the physiological, or functional, relations of brain structures.

⁵²Elliot Smith, 1923 p. 441.

⁵³Letter from Elliot Smith to C. M. Hincks, 1926, reproduced in Dawson, 1938 pp.

From the *function* of the living brain it was possible to understand the mind, psychology, and ultimately society. From the *structure* of the brain as it was represented in past ancestors of man by the markings on the interior of the cranium⁵⁴ something could be understood of their degree of humanization. Moreover, since it was the large intellectual capability of man that most clearly distinguished him from his anthropoid relatives⁵⁵ it is also the brain to which one must turn in order to determine the ancestral relations of man. All other considerations of anatomical variation in and between fossils were secondary to this overriding preoccupation. The proposal that the evolution of the brain was pre-eminent in the evolution of man Elliot Smith delivered in his presidential address to the anthropological section of the British Association in 1912.⁵⁶ The proposal was widely accepted, and was particularly welcomed by Arthur Keith⁵⁷ (it supported the authenticity of the large brained Galley Hill that had been found in particularly ancient strata, supra):

He [Elliot Smith] rightly foresaw that before the anthropoid characters would disappear from the body of primal man the

89–95.

⁵⁴Elliot Smith, 1924a.

⁵⁵Elliot Smith, 1910.

⁵⁶Elliot Smith, 1912. Vide also Elliot Smith, 1924b pp. 20–22.

⁵⁷Though Keith, of course, could not admit that the evolution of the brain was observable in the known fossil material; for him the brain had achieved its present size long ago, the rest of the body was catching up. Thus Keith, 1911 p. 125, ‘... the size of the brain has not shown a progressive increase with evolution’. Even if a reputed ancestor were a brutal savage, if he possessed a large brain and an was bipedal, he was a man (Keith, 1911 p. 93).

brain, the master organ of the human body, must first come into its estate. Under its dominion the parts of the body such as the mouth and hands, the particular servants of the brain, became adapted for higher uses.⁵⁸

Psychology, as the resolution of brain function, Elliot Smith understood to be ‘the bond of union’ between physical anthropology and cultural anthropologies. Hitherto ‘the two branches have been cultivated in water-tight compartments, and the fact that the results achieved in each of them have far reaching significance in the interpretation of the problems of the other is a rule totally ignored’.⁵⁹ He had, for example discovered that ‘...it was hopeless to solve any of the more difficult problems of physical anthropology unless one took into consideration factors which led to the movements of people about the earth’.⁶⁰ Physical anthropology meant the application of the techniques of structural anatomy to the study of the ‘relations of man to the lower animals and all aspects of the structures of human races, particularly the measurements of skulls’,⁶¹ i.e. that the evolution of man could be understood in terms of structural anatomy. Elliot Smith had found the position of physical anthropology as applied structural anatomy unworkable, and introduced into the study of the evolution of man more of a reliance on the workings of the body.

⁵⁸Keith, 1915 p. 434

⁵⁹Elliot Smith, 1923a p. 441.

⁶⁰Letter from Elliot Smith to C. M. Hincks, 1926, reproduced in Dawson, 1938 pp. 89–95.

⁶¹Sonntag, 1924 p. 1.

Elliot Smith's synthetic anthropology gave more meaning to the previously facile lining up of fossil cranial material such that they showed the 'genealogical tree' of man. In such a scheme the reconstructed genealogy is often an end in itself. Anatomical measurements (and non metric, qualitative evaluations) were made of bones and fossils and the results then arranged from the lowest to the highest. The 'highest' and the 'lowest' usually taken as being man and a chimpanzee-gorilla mix.⁶² The skulls thus arranged presented the evolutionary development of man. Elliot Smith's anthropology extended this evolutionary development beyond osteological form by concentrating on the brain, thus could evolution of man be traced further back in time—the neo-pallium which finds its fullest development in man had begun to evolve with the origin of mammals.⁶³ The organic evolution of

⁶²That the human lineage was considered to lie close to that of the African, great, apes (gorilla and the chimp) may be attributed to Darwin and Huxley's contention, but it is by no means the only one. Haeckel had suggested an origin from the gibbon (a lesser ape), and Frederic Wood Jones, Co-worker with Elliot Smith on Egyptian material in Cairo, took Elliot Smith's view on the importance of the brain to its logical conclusion in his suggestion that man had arisen from the tarsier. In this he bypassed all morphological similarities that connected the apes and man, and relied on evidence of encephalization, the importance of vision and the upright posture. (Wood Jones, 1916 & , Smith Woodward et al., 1919 p. 494) Elliot Smith repudiated Wood Jones' evidence (Smith Woodward et al., 1919, p. 475).

⁶³Elliot Smith, 1912. Vide also 1924b figs. 1 & 2 (pp. 2–3); European man (especially the Nordic race) is placed at the upper centre of the 'scheme of relations' and a direct lineage is drawn down through the Insectivora. The Neanderthal, Mongoloid, Negro etc. are represented as side-branches, and are therefore deviants, of the ideal central lineage. Sollas, 1910 pp. lxxx–lxxxi had commented on the tendency to extend ancestral lineages and, without directly mentioning Elliot Smith, criticized it as teleological: 'Thus on a mere article of faith, the ancestral series of the primates is carried through the lower mammals into the reptile phylum; nor does there appear to be any reason why we should stop at this point. The same logical process consistently carried out will lead in the need to an ancestral protist, and thus speculative biology provides us with a new form of the doctrine of predestination'.

the brain was contiguous with the mind and the evolution of culture of modern man; The present idea of history would, for example have to be expanded into the biological past. Beyond written documents and archaeological relics history needed to be extended— at least so far as the origin of *Homo sapiens*, but perhaps further.⁶⁴ Human nature had ever been the same, lying outside of any particular culture (it is the result of our biological inheritance). It is from this work that he gives the idea of existing theories of cultural development a subtle twist. It was not by analogy with biological evolution that cultures arose from those similar to the savages' and progressed in parallel toward a common goal. Culture had evolved only once and the observable differences in cultures are merely variations on a universal theme.⁶⁵ This is particularly significant in the understanding of the morphological variability of the modern races of man for it assumed that *Homo sapiens* had evolved only once, the races developing afterwards. This placed a greater emphasis on the need to study the most primitive of the human races, the native Australian (II.v, *infra*), than if races had developed separately and locally— the European from the Neanderthal, the Mongoloid from Peking man etc..

Many of Elliot Smith's publications⁶⁶ from his time at Cairo suggest the development of this 'heresy', which he was later to expand and include

⁶⁴Elliot Smith, 1924b, '...the word "Prehistory should be eliminated from the vocabulary of all who value clearness of thought and precision of statement' (p. 134).

⁶⁵Elliot Smith, 1924b p. 134.

⁶⁶A list of his publications is to be found in Dawson, 1938 pp. 219–253.

in a united physical–cultural anthropology. Anatomy was the basis of this expanded concept of anthropology,⁶⁷ one with universal aims to understand what he called ‘Greater Humanity’ Perhaps the fullest expression of his views on the importance of this synthesis of the biological and social sciences of man is to be found in *Human History*.⁶⁸ In his neuroanatomy he had included physiological experimentation, in his anthropology he proposed to use an evolutionary approach to a conjoint anatomy–physiology to properly understand his subject:

The structure of the human body only becomes really intelligible when one investigates not merely the functional significance of the various structural arrangements, but also the history of the processes whereby they attained their present structure and proportions. The study of biology is in this sense essentially a discipline of history— what our predecessors called Natural History, as we in our generation call it Evolution. But if the true Study of Mankind is Man, it involves a good deal more than the mere examination of the dead corpse or the study of the actions of the heart, lungs, brain, or any other individual system or part of the living body. Its chief aim should be the study of the actions of the whole organism, the behaviour in the sense of such actions as can be observed and recorded.⁶⁹

It was in connexion with an anatomy that united the physical and social elements of man’s structure that ‘human biology’ came into use. In

⁶⁷Morphology was considered the foundation of all sciences, physical as well as biological. Physiologists and others in medicine had forgotten this (Elliot Smith, 1926).

⁶⁸Elliot Smith, 1930.

⁶⁹Elliot Smith, 1930 p. 11.

Elliot Smith's concern for the institution of anthropological research in Australia he had acted as intermediary between the Rockefeller Foundation, with whom he had links from the establishment of the Institute of Anatomy at University College, London, and the inchoate department of anthropology in Sydney. The secretary of the Rockefeller Foundation had agreed a grant for the study of a human biology that included anthropology.⁷⁰

The Department

In 1919 Elliot Smith resigned as professor of anatomy in the University of Manchester, and asked to accept the offer of the Chair at University College, London. Here he was also to be head of the newly Institute of Anatomy and Embryology, and dean of University College's medical school. The institute was funded by the Rockefeller Foundation⁷¹ and provided Elliot Smith the opportunity '...to fashion the newly established Institute of Anatomy into the fountain-head of information about human structure, prehistory, and an understanding of human bodily and mental activity, such as a properly rounded anatomy department in a modern medical school and a university should

⁷⁰Elkin, 1970 p. 252. A. P. Elkin was a contemporary of Elliot Smith's and Professor of Anthropology in the University of Sydney.

⁷¹Vide Elliot Smith 1923a, 1923b & the *London University Gazette*, July 4th 1923 (pp. 151–3). The Rockefeller Foundation had supplied £370 000 specifically for the new anatomy buildings and a further £835 000 for University College Hospital and Medical School in recognition of British medical science in the Great War '...the largest single benefaction to any educational institution in Great Britain' (Harris, 1938 p.173).

be'.⁷² Obviously Dart's opinions are likely to be a little biased towards the type of anatomy department that Elliot Smith had created in University College; he had himself found in that department the inspiration for his own career in palæoanthropology and the confidence to establish a similar department in the University of the Witwatersrand in Johannesburg.⁷³

In a reflection on his student days in University College under Elliot Smith, Solly Zuckerman wrote: 'Whatever the research interests of some of the professors of anatomy who were then in chairs, the teaching of the subject was very much a routine and dreary affair when Elliot Smith took charge of the new Institute of Anatomy and Embryology at University College, London. But it did not take him long to revivify the Department and expand its intellectual horizon'.⁷⁴ Elliot Smith's research interests in cultural anthropology (particularly Egyptian)—developed when at Cairo—were expanded at University College such that the Reader in Cultural Anthropology, W. J. Perry,⁷⁵ was a member of the department of anatomy. Furthermore, Charles

⁷²Elkin, 1974 p. 36. Raymond worked under Elliot Smith at University College after graduating in medicine in 1917 from the University of Sydney. As an undergraduate he had assisted S. Arthur Smith, Elliot Smith's brother and lecturer in anatomy at Sydney. All three were students of James Wilson Professor of Anatomy at Sydney and later at Cambridge.

⁷³Goldman, 1959 pp. 31–34.

⁷⁴Zuckermann, 1973 p. 16. By his account it was a diverse department. Certainly the work in Gower Street was exciting enough to distract Zuckermann from his clinical studies, and towards anthropology (p. 15).

⁷⁵Elliot Smith and Perry had worked together in Manchester and Perry was 'imported' to University College to fill the Readership (the Readership was created under Elliot Smith). It was with Perry that many of Elliot Smith's views on cultural anthropology and the diffusion of culture were developed. Compare, for example, Elliot Smith, 1930

Singer, appointed as Lecturer in the History of Medicine, and later Professor in that newly created position, and Bernard Spilsbury through his application of morbid anatomy to forensic cases, were to add to further breadth to Elliot Smith's department.

The department included research from many academic disciplines that would hardly seem to have any bearing on the structure of the body and its role in medical practice. Their immediate practical relevance must have been appeared remote indeed. But it seems that his intention was not to effect a reform of medicine but with the establishment of a new unified discipline, as distinct from medicine. His programme was new: 'It may sound strange to make the statement in so many words, but so far as I can discover a scheme of this sort has never been attempted anywhere else'⁷⁶ On his intentions for his programme at University College, Elliot Smith had further written:

In this department [of anatomy] in addition to the teaching of anatomy to medical students it has been the tradition to teach anthropology to such other students as needed the subject...

An ideal Institute of Anthropology should be associated with a school of anatomy where particular attention is paid to neurology...[indeed] such an Institute would represent the germ of a post-graduate university, whose centres of interest would definitely be the study of Man, his history behaviour and beliefs. It

pp. 180–267, and Perry, 1935 pp. 93–123 on the natural pacificity of man, and that of civilization as the problems of mankind.

⁷⁶Letter from Elliot Smith to C. M. Hincks, 1926, reproduced in Dawson, 1938 pp. 89–95.

would eventually involve the studies of the humanities in a much more rational and fruitful way than is done at present.⁷⁷

The custom built institute in Gower Street was equipped with apparatus that had until then been considered necessary only in physiological work;⁷⁸ there was provision for anatomical experimentation on live (rather than cadaverous) animals and humans— the X-ray room being incorporated for the study of the structure of the body with life. Rooms were set aside for the analysis of gait and locomotion. Whereas previously anatomists had been able to infer the degree of bipedalism of a fossil once it were alive by the position of the exit of the spinal cord (if it were anteriorly placed at the base of the skull the human upright posture and bipedal locomotion had been ‘achieved’) they could now study human movements and differing degrees of bipedalism in the extant apes. By gaining a fuller appreciation of human movement and the action of muscles during locomotion, from the post-cranial fossil evidence of muscle attachment and development it would be possible for anatomists to study the gradual evolution of modern locomotion. That is to study the evolution of a function rather than a structure.

For the medical student he insisted that the reliance on lecture be decreased and the minutiae of structural fact be replaced by broader patterns

⁷⁷Letter from Elliot Smith to C. M. Hincks, 1926, reproduced In Dawson, 1938 pp. 89–95.

⁷⁸Elliot Smith 1920a. Vide also Elliot Smith 1923b for the plan diagrams of the Institute, and its connexion with the physiological laboratories.

of growth— on the larger scale through evolution and on the smaller through embryology.⁷⁹ For anatomical research physiology was to be reintroduced so that an experimental anatomy could be developed along the line of recent physiological work.⁸⁰ Anthropological research— and this to Elliot Smith included physical anthropology and the evolution of the human form— was to be supported by physiology in a similar manner to anatomy, it was not enough merely to measure and record osteological metrical variation but to understand the processes of such variation. He called for further Breadth in the teaching curriculum for advanced students by insisting that they spent sabbatical years at other universities, particularly those at which some measure of first-hand field work might be attempted.⁸¹

Elliot Smith had considered that a major failing in the teaching of science was the rote learning by students of the results of others, this he altered by increasing the amount and volume of practical classes.⁸² Again the emphasis, as in anatomy generally, is experimental rather than descriptive. The integration of research and teaching, of the arts and the sciences, the ‘Unit System’, was a major consideration by the Rockefeller Foundation representatives in their donation to the College.⁸³

⁷⁹Elliot Smith, 1917, 1920b & 1926c.

⁸⁰The work of E. H. Starling and William Bayliss (professors of physiology at University College) on the endocrine system was of importance in the gaining of the Rockefeller Foundation’s grant (Elliot Smith, 1923b p.67–68).

⁸¹Elliot Smith, 1925. *The Times* February 4th, 1925 p. 10 col. 1.

⁸²Elliot Smith, 1920 p. 68. Vide also Elliot Smith 1917.

⁸³*London University Gazette*, July 4th, 1923 p. 152.

University College was well adapted to the needs of its anatomy students and I presume that young doctors graduating from there had a wider appreciation of anatomy than their contemporaries, certainly a seemingly disproportionate amount were to hold high anatomical office later on. That University College was successful in its anatomical instruction may also be gleaned from the performance of its internal students in the B.Sc. (Honours) degree in anatomy and human morphology that was offered by the University of London. From 1918 until 1925 all but one of the successful candidates had studied in University College.⁸⁴ The degree of B.Sc. in anatomy and human morphology was the first such established in Britain; the value of an advanced course in anatomy certified separately from the first M. B., was recognized in 1913 when a writer to *The Lancet* had called for a programme to be initiated. A model programme already existed in ophthalmology in the University of Oxford, where medical students could be certified separately in this subject.⁸⁵ However this is of course a subject of tangible practicality; anatomy is a degree more academic.

⁸⁴External students were not permitted to take the honours B.Sc., and it seems that no one took a B.Sc. by research in that subject between the dates given. The degree was either not particularly popular or was particularly difficult for only seven students graduated (two in class I) during this period. This may be compared, for example, with the honours B.Sc. in which thirty-three student graduated. Data from the University of London calendars.

⁸⁵Letter from Percy Dunn. *The Lancet* 1913(2): 1286–7.

Departmental Integration

Following his protégé from Sydney, James T. Wilson, Professor of Anatomy in that University came to St. John's College, Cambridge. Wilson was installed as Professor of Anatomy for the academic year beginning 1920, and with Elliot Smith working at University College, London, the two were in close contact for an attempted shake-up of British anatomy, and the establishment of new anatomy departments. Elliot Smith had written of his impatience to Wilson, '...anxious as I am to get to London, I am even more so to see you in this country where things anatomical badly need stirring up...'.⁸⁶

At University College, London it was Elliot Smith's intention to teach a 'living anatomy'; not only was physiological work to be readmitted to anatomy, but histology and radiography were to be added.⁸⁷ When working as Junior Demonstrator in Anatomy at Cambridge under Alexander Macalister⁸⁸ Elliot Smith was forced to continue his enlightened experimental

⁸⁶From Elliot Smith to Wilson. Manchester, January 25th, 1919, reproduced in Dawson, 1938 p. 74.

⁸⁷Elliot Smith, 1920b p. 606.

⁸⁸Alexander Macalister, Wilson's predecessor in the Chair (1883–1919), held an interest in anthropology (but of a less 'living' kind), 'He seems, however, to be intensely devoted to anthropology of, I am sorry to say, the bone measuring variety'. (Letter From Elliot Smith to Wilson. London, September 7th, 1896, reproduced in Dawson, 1938 p. 20); '...his chief anatomical interest is anthropological. If anything delights him more than inventing some new craniometric index it is the manufacture of some cacophonous name to brand it'. (Letter From Elliot Smith to Wilson. Cambridge, November 18th, 1896, reproduced in Dawson, 1938 p. 20).

anatomy (anatomy with the physiology put back in) in the physiological laboratory.⁸⁹ The state of British anatomy he considered grim indeed, but things were to change:

At a time when this serious attempt is being made to provide facilities for carrying on research in anatomy [at University College, London], it is particularly gratifying to know that the University of Cambridge has appointed to its Chair of Anatomy the most learned British exponent of the techniques of anatomy and embryology... J. T. Wilson will exert a great influence in the encouragement of anatomical research in this country. His appointment to Cambridge inspires the confidence that the dark days of British anatomy are numbered.⁹⁰

In the Department of Anatomy at Cambridge things were being prepared for Wilson: by Graces of April 12th, 1920 the subjects under direct consideration of the professor of anatomy were broadened and included some previously that fell under the remit of the professor of zoology; vertebrate anatomy and embryology. Histology,⁹¹ however, was still being taught in connection with physiology.⁹² Moreover, the University Lectureship in Human Anatomy⁹³ was, by a Grace of November 26th, 1920, expanded into

⁸⁹Letter from Elliot Smith to Wilson. Cambridge November 18th, 1896, reproduced in Dawson, 1938 p. 127–8.

⁹⁰Elliot Smith, 1920b p. 607.

⁹¹At University College, London one of the Physiology professors, E. H. Starling had ceded to Elliot Smith the teaching of, and research in, microscopic anatomy and histology (Elliot Smith, 1920a p. 68).

⁹²*The Historical Register of the University of Cambridge: Being a Supplement to the Calendar, with a Record of University Offices, Honours, and Distinctions to the Year 1920.*, 1922 p. 3.

⁹³Created by a Grace of November 8th, 1884 (Tanner, 1917 p. 119).

a Readership⁹⁴ — the Lectureship remaining vacant— and incorporated the Lectureship in Physical Anthropology,⁹⁵ which was formally dissolved. Physical anthropology had formally passed under the control of the Special Board of Medicine and the professor of anatomy and was, under Wilson, to be of more central importance. The chair was further removed from the medical faculty by a Grace of April 22nd, 1927 and assigned to the Faculty of Biology ‘A’, the Readership followed on March 8th, 1930.⁹⁶ It was generally supposed that Wynfrid L. H. Duckworth would succeed Macalister to the Chair, he was the most senior member of the department as Senior Demonstrator of Anatomy and Lecturer in Physical Anthropology. He was, however, somewhat representative of the ‘old school’, his interest in physical anthropology deriving from the amateur tradition⁹⁷ of human evolutionists and fossil hunters. Arthur Keith, risking his friendship with Duckworth for the benefit of science, voted, with the majority of Cambridge anatomists, with his head, ‘at the last moment my heart gave way’, for the vibrant anatomy that Wilson’s appointment portended.⁹⁸

⁹⁴*The Historical Register of the University of Cambridge: Being a Supplement to the Calendar, with a record of University Offices, Honours, and Distinctions to the Year 1920.* pp. 9 & 15

⁹⁵Created by a Grace of July 8th, 1899 (Tanner, 1917 p. 119).

⁹⁶*The Historical Register of the University of Cambridge: Being a Supplement to the Calendar, with a Record of University Offices, Honours, and Distinctions, 1921–30*, pp. 16 & 27 respectively.

⁹⁷Anatomy at the International Medical Congress’, *The Lancet* 1913(2): 874–5.

⁹⁸Keith, 1950 p. 391.

Anthropology For Empire

Grottoes above the river Düssel in the Neanderthal⁹⁹ had revealed in 1856 fossil material of human similitude that was only haphazardly included in later constructions of human origins. The material was initially considered to be the representative of a primitive human race,¹⁰⁰ comparative with those known in other parts of the world, viz. Africa and Australia, and was certainly not considered ancestral to modern man. This may have been owing to the reluctance of many to accept that human forms evolved so soon after Darwin's formulation, but within the Darwinian paradigm it is likely to have been the result of a long-standing emphasis on racial rather than human origins.¹⁰¹ A link was established between fossils and the so-called savage races which was further reinforced by the state of their cultures, barbaric in comparison to that of their European investigators. These 'savages' were

⁹⁹This was the first recognized human-like fossil. Since the discovery of the fossil German spelling has been revised and 'valley' is now spelt 'tal'. In some authors, the spelling Neandertal is to be found. I consistently use Neanderthal because the rules of zoological nomenclature do not admit of any change of spelling after a name has been decided upon (the zoological classification is *Homo neanderthalensis*) and I consider two spellings, one for the zoologically formal Latinized and one for the trivial Anglicized version, confusing.

¹⁰⁰Erickson, 1974 p. 181.

¹⁰¹That is ethnogeny rather than anthropogeny. As John Greene has pointed out ethnogeny was of extreme importance for Imperial nations, he refers specifically to the eighteenth century, though what he says is equally valid for the early twentieth: 'To the eighteenth century mind the basic issue concerning human races was whether they were to be regarded as separate species or as varieties of a single species. The issue was a vital one. Theologically it bore upon the Christian doctrine of the spiritual unity of men in their common decent from Adam. Politically it influenced the white man's conception of his rights and duties with respect to colonial peoples' (Greene, 1959 p. 221).

recognized as a living examples of a past, prehistoric existence,¹⁰² something similar to which Europeans had passed through long before. As (progressive) evolution was characteristic of human physical development and so it was of human mental and cultural development. Edward B. Tylor— with whom Elliot Smith had locked horns over the nature of evolution with regard to culture— had applied evolutionary theory to culture *by analogy* (II. ii, supra), and recognized amongst the world’s a ladder-like progress from lower to higher forms; that one culture evolved into another.¹⁰³ Elliot Smith hotly contested this. Culture had evolved once, and once only— in Egypt. He used several examples to explain his meaning but I think the best known is that concerning megaliths; the rougher versions of which, which were to be found in certain places of the world, were merely imperfect copies of the original (subconsciously remembered) Egyptian type.¹⁰⁴ The original culture had diffused to other parts of the world. This is quite clearly the opposite of any idea of a ladder-like theory of the succession of cultures by ever more superior forms, and Elliot Smith’s idea of the abilities and the facilities of colonially subjugated peoples was more considerate because of it. Furthermore, with the native Australians at the base of the human racial stock the study of them became imperative before their populations were further decreased by the encroachment of the ‘new Australians’ into native tribal habitat.

¹⁰²Tylor, 1898.

¹⁰³Tylor, 1903 E.g. pp. 26–29. Europeans were only generally more culturally advanced than other races; there are some areas in which he is less advanced, the Englishman for example does not climb trees as well as the wild Australian (p. 28).

¹⁰⁴E.g. Elliot Smith, 1930 p. 367.

A spate of letters written to the editor of *The Times* in the early months of 1925 followed Elliot Smith's request for the full importance of colonial, and especially Australian, anthropology to be recognized.¹⁰⁵ He wrote of the need for a co-ordinated approach to anthropology, both physical and cultural, for the benefit of the Empire. This came in three ways. Firstly, he suggested political necessity; the new and stringent immigration laws that had been passed in the United States that previous summer showed that an appreciation of ethnology was required to rationally evaluate the evidence for that policy. By understanding the intricacies of ethnology and anthropology Britain might become better acquainted with the foreign policy of other powerful nations. Anthropology was of as much importance in foreign relations as in colonial administration.¹⁰⁶ Of course anthropology was also an interesting and valuable academically, and it is in this regard that he makes his second and third requests; that of an expansion of anthropological resources in the Dominions, and the establishment of an interconnected network of anthropological institutes linked through visiting scholars and students.¹⁰⁷

¹⁰⁵ *The Times*, January 17th, 1925 p. 6 cols. 1–3.

¹⁰⁶ A fuller understanding of anthropology would facilitate administration of Empire: '...an Anthropology Department will then become an Intelligence Department to the Local Administration' (Letter from Captain C. S. Rattray to *The Times*, January 20th, 1925 p. 13 col. 5. Rattray had himself 'thrown light upon the mind of the Ashanti and greatly facilitated administration in that area' [Leader, *The Times*, January 17th p. 11 cols. 3–4]). Further, it was recognized that anthropology represented a kind of 'insurance against future native troubles', these could prove very costly (Letter from V. C. C. Collum to *The Times*, February 6th, 1925 p. 8 col. 6).

¹⁰⁷ Letter from Elliot Smith to the editor. *The Times*, February 4th, 1925 p. 10 col. 1.

That his first written point in his letter is the importance of anthropology in political expediency, and colonial administration is not surprising. He is unlikely to obtain financial support from the British government if the study of native Australians were only of esoteric, or academic, value—the colonial coffers were already stretched from the cost of the Great War. The same is true in his relations with the federal government of Australia, theirs was a developing nation and some immediate practical benefit had to be obvious in any anthropological policy. In this regard R. J. Berry, an Edinburgh trained anatomist who held the Chair of Anatomy in Melbourne, had made his case for an expansion of anthropological research in the University of Melbourne couched in terms of social efficiency, his programme of research had definite practical social benefit.¹⁰⁸

The last two considerations of his letter are of particular importance for his synthetic anthropology. The Australian aboriginal, for example, can only be studied in his natural habitat in Australia. No matter how much theorizing and integration of disciplines and approaches goes on in a university department in England the native Australian can not be properly understood there. Anthropological research must be completed where the material is, whether these are fossils or ‘living fossil’ races.

Australia is the home of the most primitive race of men that still survives on this earth; and her scientific men [i.e. Australia's]

¹⁰⁸Cawte, 1986.

and the Commonwealth Government not only realize their duty towards these aborigines, but also their *responsibility* and opportunity for making as complete a *study* as possible of these *interesting survivors* and their customs and beliefs.¹⁰⁹ (My emphasis).

It was once the ‘white man’s burden’ to ameliorate the poor conditions of the natives’ lives, this was the practical use of anthropology: ‘The Negro’s true place cannot be ascertained by the mere exhibition of philanthropy toward him, laudable as is the motive; a careful study of him as a human being physically and mentally can alone render it possible for Europeans to practically and permanently benefit him’.¹¹⁰ For Elliot Smith, however, the responsibility was greater, it was not directed to the benefit of one race but to mankind.¹¹¹ To the ends of such a study Elliot Smith was involved in the establishment of the department of anthropology in the University of Sydney,¹¹² and he strongly encouraged his ablest students to positions in which they would contribute first-hand to anatomical problems in physical anthropology.

¹⁰⁹Letter from Elliot Smith to the editor. *The Times*, January 17th, 1925 p. 6 cols. 1–3.

¹¹⁰Anon., 1866 p. 6.

¹¹¹His synthesis receives its fullest and clearest expression in *Human History*, 1930. The preface (pp. 9–15) spells out that he finds his work of the very highest importance for the understanding of mankind.

¹¹²Elkin, 1970 pp. 252 & 263.

The Net...

Many students of Elliot Smith, or the junior demonstrators of anatomy in his departments, were to prosper in palæoanthropological research, and all were primarily concerned with the structure and function of the brain. Six in particular held positions of extreme influence in the anatomical world. Davidson Black, Raymond Dart, Wilfrid LeGros Clark, Joseph Shellshear, H. H. Woollard and Solly Zuckerman. Dart and Black as Professors of Anatomy in Johannesburg and Peking respectively, were to recover and interpret new fossil material of an unknown kind; Shellshear and Woollard held the Chairs of Anatomy in Hong Kong and Sydney, and Adelaide, St. Bartholomew's Hospital and University College, London, respectively; and LeGros Clark and Zuckerman were the professors of anatomy at Oxford and Birmingham (respectively) who were influential in a revision of anatomy in the 1950s. Alexander Cave a contemporary of Elliot Smith has remarked that he had a 'missionary zeal'¹¹³ with which infected his students; the metaphor of Elliot Smith as a missionary is particularly apt. He had established his Church at University College, London and his workers were dispersed amongst the eastern colonies and other anatomical departments; his idea on the pre-eminent role of the brain in human evolution in the centre of the synthetic anthropology was the Message.

¹¹³Cave, 1938 p. 177.

Palæoanthropogy

Here I shall specifically mention Davidson Black and Raymond Dart because they are the more conspicuous of Elliot Smith's students in that they both discovered previously unknown fossil material whilst working in colonial universities, and fame, and fortune, ultimately lies with the bones.¹¹⁴ Black is perhaps the lesser-known and least influential in academic progeny of the two. His Chinese *Sinanthropus* material was considerably less contentious than Dart's *Australopithecus*, and much of it was unfortunately lost in World War II.

Davidson Black, a medical graduate of the University of Toronto, had spent a sabbatical year (1914) away from the Western Rivers University in Cleveland, Ohio with Elliot Smith at Manchester.¹¹⁵ Whilst at Manchester Black was diverted from his researches in neuroanatomy and erred toward palæoanthropology; Elliot Smith was in this year preparing his own reconstruction of *Eoanthropus dawsoni* (the infamous Piltdown Skull).¹¹⁶ Black was later to become heavily involved in palæontological research when he

¹¹⁴'Nine-tenths of your importance in this field comes from your finds. People remember. They remember Johanson. They remember the Leakeys. But LeGros Clark, who was an intellectual in the discipline, his name will fade.... And certainly so will mine because I m not a finder. There is a tremendous bias towards finders. And with this goes an unwarranted weight on their opinions'. Day, 1981.

¹¹⁵Dictionary of Scientific Biography. (vol. 2). New York, 1970 p. 171–2.

¹¹⁶Cave, 1938 p. 199.

became Professor of Anatomy at the newly founded Peking Union Medical College. His interest in physical anthropology was certainly worrying to his paymasters, the Rockefeller Foundation, for in China it was thought that Black's attention would become directed more toward his palæoanthropological interests than to the comparative anatomy and medicine for which he was principally employed.¹¹⁷ It would seem that little attention was paid to the requests for an abandonment of anthropological studies as Black later found fossil human material that he named *Sinanthropus pekinensis*¹¹⁸ at Chou Kou Tien,¹¹⁹ near Peking. Black's paper on the formation of the brain, and its development in *Sinanthropus*¹²⁰ is conspicuously similar to the hypothesis of the pre-eminence of the brain in hominid evolution that Elliot Smith had formulated, and he placed his newly christened genus in a position consistent with ancestry of man whilst acknowledging the similarity of structure to *Pithecanthropus*. Though the cranial capacity was no greater than *Pithecanthropus*, the type of brain was evidently human, it was not so much the size of the brain a fossil had that counted but its conformation. Elliot Smith saw it as '...an ideal link between the two irreconcilable forms found in Java [*Pithecanthropus*]¹²¹ and Piltdown [*Eoanthropus*] respectively',

¹¹⁷ Letter from R. M. Pearce, an assessor of Black's department of anatomy at Peking, written upon his return to the United States to Black. In Trinkhaus & Shipman, 1993 p. 223.

¹¹⁸Black, 1927.

¹¹⁹Later known as Choukoutien, and now as Zhoukoudian.

¹²⁰Black, 1931.

¹²¹The sinanthropines were later included, with the pithecanthropines, in the newly created *Homo erectus*.

Moreover ‘It is not so much that he has interpreted the remains of another early Pleistocene genus, so much as the fact that this genus can be linked with the two earlier genera, and so provide a solid foundation for the interpretation of the characters of the earliest members of the Human Family and their wanderings throughout the World’.¹²²

Black was perhaps luckier than Raymond Dart in that he was an anatomist in Asia, a part of the world that had stronger claims to be the ‘cradle of mankind’ than Africa, despite Darwin’s tentative suggestion that man was likely to have evolved there.¹²³ Dart’s original fossil was the ‘Taungs skull’ from Taungs in the Bechuanaland Protectorate of South Africa.¹²⁴ It was found by a student of his at the university when, in need of material for the beginnings of a departmental museum, he offered a prize of £5 for the best fossil material found by a student during the long vacation.¹²⁵ That one of Dart’s first acts in the University of the Witwatersrand was the collection of fossil material (and other osteological material for comparative study)

¹²²Elliot Smith, 1931. In Elliot Smith et al., 1931 p. 20.

¹²³ Darwin, 1879 p. 155. The oldest fossil material then known came from Java (the *Pithecanthropus* fossils from the Solo River valley). Comparative philological work of the eighteenth century had established the origin from Sanskrit of the Indo-European languages. This pre-Babel, Aryan language represented to some the common language of the original rootstock of man. Friedrich Schlegel, a German comparative philologist saw parallels with his subject and comparative anatomy: ‘Comparative grammar will give us entirely new information on the genealogy of language, in exactly the same way in which comparative anatomy has thrown light upon the natural history.’ (Schlegel, 1808, transl. by Bodmer, 1943 pp. 180–181). Vide also Osborn, 1926.

¹²⁴Dart, 1925a & 1925b.

¹²⁵Dart, 1959 p. 1.

when the departmental buildings were in such a state of dishabille and the university had no library¹²⁶ is an indication of what the nature of his anatomy programme was to be.¹²⁷

The conclusion that Dart had drawn in his first paper was that the specimen (which he had assigned *Australopithecus africanus* which coinage offended the Classical sensibilities of readers of *The Times*¹²⁸) was that the specimen represented a humanoid ape, rather than merely a primitive looking, savage featured, but basically modern man. All fossil material found until Dart's discovery had been of this nature; the Neanderthal may have been a brute but the size of his cranial vault was so close to modern man's as— as brain size was the characteristic of man— to admit consideration of his role in human evolution. Dart's material presented a wilder hypothesis and brought to light the potential of origin from truly (mentally) humble roots. The favourable reaction to the Piltdown material is an indication of the degree to which the general morphological features of a potential ancestor could be degraded so long as there was adequate material to suggest that he had been sapient.¹²⁹ Thus could the mandible of an orang-utan be associated

¹²⁶Dart, 1959 p. 8 (no library); p. 32–33 (poor state of the buildings and the facilities in the dissecting rooms).

¹²⁷Dart, 1959 p. 34 'The abysmal lack of equipment and literature forced me to develop an interest in other subjects [than anatomy], particularly anthropology, the one for which Elliot Smith had fired my enthusiasm'.

¹²⁸Letters from Captain Douglas English, *The Times* February 8, 1925 p. 8 col. 5., and 'A. Mere Systematist', *The Times* February 12th, 1925 p. 8 col. 1. Vide also , 1925d & Bather, 1925.

¹²⁹On the theoretical framework that supported the Piltdown forgery, Elliot Smith's

with a fully modern cranium, and with relatively little discrepancy.¹³⁰

Dart was intensely proud of his material, the fossil was of greater value than the gold which had led to Johannesburg's prosperity.¹³¹ Furthermore, until Dart's conclusions were lambasted by the most eminent British based anatomists¹³² and then by the popular press,¹³³ his hypothesis and his fossil was warmly received. It was the 'Missing Link'.¹³⁴ The former Prime Minister of South Africa, Jan Christiaan Smuts¹³⁵ wrote to Dart on his discovery:

Your keenness and zealous interest in anthropology have led you to what may well prove an epoch making discovery, not only far-reaching from an anthropological point of view, but also calculated to concentrate attention on South Africa as the great

pre-eminence of the brain, and Arthur Keith's extreme antiquity of man vide Hammond, 1988, Spencer, 1988 and Stocking, 1988.

¹³⁰Elliot Smith in Dawson, Woodward & Elliot Smith, 1913 p. 147; & Elliot Smith 1913b.

¹³¹Dart, 1959: 'I doubt if there was any parent prouder of his offspring than I was of my "Taungs baby" on that Christmas of 1924.' (p. 9); 'The earth was to yield something more precious than gold.' (p. 26).

¹³²Viz. Sir Arthur Keith, Professor G. Elliot Smith, Sir Arthur Smith Woodward and Dr. W. L. H. Duckworth. *Nature*. 115: 234–236, 1925. Duckworth was perhaps the most sympathetic, Keith the most scathing. Vide also the stern rebuttal of 's claims by Keith (*Nature*. 116: 11, 1925), Dart's reply (*Nature*. 116: 462), and Keith again (*Nature*. 116: 462–3).

¹³³*The Sunday Times*, February 8, 1925 has 'the greatest living anthropologist, Sir Arthur Keith... [setting] one unfounded rumour to rest'. *The Spectator*, February 14, 1925 (p. 227); vide also pp. 328, 366 & 407–8 in 1925(1). , 1959 p. 41 recalls 'Taungs' being a byword in 20s argot for 'ugly'.

¹³⁴Keith, 1913 p. 325 'It is not only a missing link but a very complete and important one, but it lies altogether in the anthropoid chain which culminates in man'. *The Observer*, February 8, 1925 (p. 7 cols. 1–2) 'The Taungs Skull: New Light on Human Development' by E. N. Fallaize (Honorary Secretary of the Royal Anthropological Institute).

¹³⁵ (1919–1924). Smuts was again Prime Minister from 1939–1948 succeeding the nationalist James Barry Munnick Hertzog.

field for scientific discovery for scientific discovery which it undoubtedly is... I congratulate you on the reward of your labours which reflects lustre on all South Africa.¹³⁶

Clearly the material was of some national pride, as all such material is and brought fame (and money) to the Witwatersrand University. As Elliot Smith had asserted physical anthropology carries political weight. But shortly after Dart's theories were derided; and leaving to Robert Broom¹³⁷ the Taungs skull for further work, and further fossil finds,¹³⁸ he seemingly withdrew from the physical anthropological world. That is until Philip V. Tobias, a student of his and later successor to the Chair of Anatomy at the Witwatersrand University, unearthed at Makapansgat fossil material that would launch Dart on an expanded theory of tool use by australopithecines, their osteodontokeratic¹³⁹ culture, and 'the antiquity of murder'.¹⁴⁰

Dart's expansion from physical anthropology, and evolution, into cultural evolution is not surprising given the four years he spent under the influ-

¹³⁶Dart, 1959 p. 36–37.

¹³⁷Broom was sole early supporter of 's conclusions (E.g. *Nature*. 115: 569–571, 1925b, and *Nature*. 116: 462, 1925c). This provided his introduction to human fossil hunting. Though a doctor by training he was renowned for his work on reptile palæontology.

¹³⁸Many more fossil discoveries were made of adult *Australopithecinae* and related forms. They were used to reinterpret and restate the conclusions Dart had drawn from the Taungs skull. E.g. Broom 1936, 1937 1938, and 1949. By 1947 Keith had conceded and recognized the validity of 's original assertions (*Nature*. 159: 377, 1947).

¹³⁹No stone implements were found with the australopithecines but believed that they made use of tools made of perishable material— bone, ivory and horn.

¹⁴⁰Title of cap. 9 (Dart, 1959 pp. 109–119). The theory was widely popularized by Robert Ardrey in a series of books in the 1960s and 70s, the most significant, and the first being *African Genesis* (Ardrey, 1961).

ence of Elliot Smith's 'genius'¹⁴¹ and the strong ideas Elliot Smith had on his synthetic anthropology. Though Dart's assertions that the australopithecines indulged in cannibalism and other savageries,¹⁴² *and* were ancestral to modern man would appear to be contrary to Elliot Smith's (and Perry's) views on the innate pacificity of man, the australopithecines' savagery is also a consequence of social structuring. Theirs is perhaps not 'civilization' proper but it is a social grouping (it is not tribal— they have intelligence) developed in the environment of the South African Veld, and reliant on hunting.

The australopithecine material and Dart's osteodontokeratic theory remained anathema to those English anatomists, Elliot Smith included, who had placed emphasis on the brain in human evolution for twenty or so years. Dissonance between the Brain-biased Piltdown supported paradigm and the large amount of South (and, now, East) African material was growing. A formal recognition of the status of the australopithecines was recognized by LeGros Clark at Oxford:

So far as purely morphological criteria are concerned, there seems to be no serious objection to the conception of an ancestral relationship, for the fossil material so far available shows no evidence of any gross specialization which would necessarily prevent their inclusion.¹⁴³

¹⁴¹Dart, 1959 pp. 28–29.

¹⁴²Dart, 1959 pp. 196–199.

¹⁴³LeGros Clark, 1947 p. 330.

Human Biology

Wilfrid E. LeGros Clark reopened the dormant Readership in Physical Anthropology to allow one of Dart's students, Joseph Weiner, to work on the validation of his mentor's material.¹⁴⁴ This he did in the most spectacular way; he with other workers in Oxford were to expose the Piltdown fraud,¹⁴⁵ admit the australopithecines a place in human ancestry and propose a modern programme in human biology based on the 'modern synthesis'. The programme as it was outlined by Weiner and other workers from University College, London in the 1950s owes a great deal to the department Elliot Smith had himself established there and to that in which Weiner had studied under Dart.

A symposium was held at the Ciba Foundation on November 6th, 1957 to discuss 'The Scope of Physical Anthropology and Its Place in Academic studies'.¹⁴⁶ One of the results of the symposium was the establishment of the Society for the Study of Human Biology which had as its aims the expansion and recognition of physical anthropology as something other than palæoanthropology. At the core of the S.S.H.B.'s aims was the greater application of anatomy and physical anthropology to the study of populations

¹⁴⁴Weiner occupied the position from 1945 (*Oxford University Calendar*, 1946).

¹⁴⁵Weiner, Oakley & LeGros Clark, 1953.

¹⁴⁶Subsequently published under the same title (Roberts and Weiner, 1958).

and to the changes that affect the body in the various environments that people inhabit (including artificial ones).¹⁴⁷ Those at the symposium were generally less concerned with the evolution of man and his sociology than with the practical applications of anatomy within human biology and the significance of human biology. J. Z. Young, however, recognized in Physical Anthropology something that Elliot Smith had pointed out in his programme at University College—that social conditions may be understood from the (evolutionary) morphology of primate bodies,¹⁴⁸ or, if this were considered too reductionist, that physical anthropology was at least to be recognized as the closest approximation that they had to a discipline that would allow medical students to cross the biological–cultural boundary.¹⁴⁹ A course in human biology, at an elementary level, was therefore the best introduction to medical studies, especially as medicine could be viewed as applied human biology.¹⁵⁰

¹⁴⁷Two of the members of the S.S.H.B. from LeGros Clark's department of anatomy at Oxford had, for example, collaborated on the British Standards Institute guide, *Principles in the design of Office Chairs and Tables*, B.S. 3044. This was serious research which included the functional anatomy of particular muscle groups, the effects of posture and fatigue and other anatomico–physiological studies

¹⁴⁸Young, 1958 p. 19.

¹⁴⁹Young, 1958 p. 23.

¹⁵⁰Tanner, 1958 pp 55–62. Tanner outlines a medical curriculum with human biology/physical anthropology forming a united base upon which clinical studies can be raised. As a basis for the medical curriculum a human biology is considered more coherent than the disparate connexion of pre–medical sciences that form the first three years of a medic's study. Textbooks of anatomy at the time were also taking the 'human biological' approach, that of Boyd et al., 1956 is a case in point and it represents the development of a new style of anatomy text. The anatomy is arranged into 'systems' that have functional significance—e.g. the bones, joints and muscles in one chapter united by their common interplay with movement and posture. Further, a section on growth and senescence charts the 'life history' of man.

There was also expressed in the published papers of symposium a renewed interest in an honours degree programme in anatomy (a B.Sc.). The proposed scheme of practical classes outlined by Weiner¹⁵¹ for the degree is surprisingly similar to the conception of an expanded anatomy that Elliot Smith had. The degree had as its aims a fuller understanding of human biology, not quite as extensive as Elliot Smith's 'Greater Humanity', but it shares in common with it a linking of structural anatomy, evolution and a less easily defined 'functional anatomy'. In Weiner's programme the comparative anatomy of man and the primates, and the evolutionary anatomy of man forms the largest single component of classes; other areas to be included are those that may previously have been included under physiology, and a large section predominantly concerned with the genetic variation of human populations. Morphology as used in the determination of evolutionary relations '...requires the ancillary employment of genetic, physiological and biometric methods', Taking an example, '...the types, distribution, number, histology and histochemistry of sweat glands, apocrine and eccrine, of the primates are barely known. In the understanding of the evolution of the human heat regulatory system, this remains a singular lack'.¹⁵² This could hardly be called classical structural anatomy, yet it is this type of work with which the modern anatomist/ physical anthropologist is concerned; not with the origin of man, nor the explanation of the origin or development of structures but

¹⁵¹Weiner, 1958 p. 50.

¹⁵²Weiner, 1958 p. 46.

of ‘systems’. Further it is a continuation of the type of anatomy practised in the department of anatomy in University College, London Elliot Smith.

The scope of human biology, as highlighted by the published papers of the symposium, was broad and the study of the genetic variation of humans was considered a priority. However, of the eight English departments or laboratories listed by Weiner as being involved with ‘human biology’¹⁵³ four were involved with the resolution of man’s relations with the primates. In many instances the techniques may have changed from ‘classic’ anatomical measurement with callipers and rulers to more modern techniques of histochemistry, but the aim was the same: to better understand the anatomical origin of man. Again, the adoption of the cellular and sub-cellular anatomical approach to understand the evolutionary relations of man was not new, Elliot Smith was attempting the same in his studies of the microstructure and actions of brain cells.

Whilst the range of human morphological variation had long been recognized and studied by physical anthropologists, the peculiarities of the crania and of skin and fleshy anatomy were known from the cataloguing of races and ethnogeny, the S.S.H.B. had recognized that less was known of the variability of the individual physiological and biochemical responses of structures and the effect that the environment and climate had on hu-

¹⁵³Weiner, 1958 p. 44.

mans. An attempt to broaden physical anthropology to include such traditionally non-anatomical areas was attempted by many of the members of the S.S.H.B. In such a role the Oxford anatomy department offered simulated environments for the study of the effects of climatic variation on cellular morphology and physiology.¹⁵⁴ The anatomy that was studied in this regard was the anatomy of the cell, and the tools were microdissection, histochemistry and autoradiography— new and technical procedures that relied on other sciences to support them. An article, *In Defence of Anatomy*, published in the *Oxford Medical School Gazette*, though eight years following the founding of the S.S.H.B., reflects on these developments in histology and cytomorphology:

And the future of anatomy? Gone are the days when anatomical research could be conducted with a microscope and H & E staining— anatomy has changed and is now dependent upon ultimate physico-chemical analysis as most of the biological sciences are. This trend will continue and the distinction between disciplines will fade.

We have, on the one hand, extolled the contribution that anatomy has still to make, while at the same time, we have to recognize that beyond a certain level it no longer exists. This is as it should be.¹⁵⁵

¹⁵⁴*Facilities For Advanced Study and Research in the University of Oxford*. (annual from 1921–1972). Continues as the *Graduate Studies Prospectus*. 1973–.

¹⁵⁵Thomas, 1965. Of course, this may be the state of modern anatomical research, but medical students still had to plough through the same dull, gross anatomy they always had.

Conclusions

Elliot Smith views on the origin and diffusion of culture were intimately linked his view of the anatomy that was used in physical anthropology. Anatomy was not so much an attempt to understand the structure of the body but its function, its origin (evolutionary defined) and its destination (culturally defined). Culture and the body he believed to be biologically linked and understandable in terms of anatomy. Anatomy departments of the time were not suited to this cohesive approach; anatomists if they were researchers were solely concerned with the comparative morphology of animal structures (and drew evolutionary pictures therefrom) or, if they were surgeons they were associated with the accruing of detailed knowledge of gross anatomy. Surgeons had no practical use for a microscopic or physiological anatomy when the tools of surgery could not operate at the cellular level.

The anatomy that he was trained in by Wilson and that which he used as a neuroanatomist was experimental, viz. it encroached on many areas that was under the jurisdiction of physiology; Elliot Smith had said that whereas physiology was once merely appended to anatomy it had grown, become vibrant and taken the most interesting parts of anatomy with it. The blame lay with those misguided evolutionary anatomists whose concern was the search for purely structural homologies. His emphasis on a living anatomy was applied to the problems of human evolution, his own direct contribution came from his comparative and experimental neurological research. From the

brain alone it was possible to determine the evolutionary relations of animals; it is naive in that it classified the status of man solely by neurology, rather than by a complete biological appraisal of the anatomy–physiology of other bodily systems. His main contribution to evolutionary anatomy however, was indirect.

The fusion of previously distinct disciplines in a single anatomy that was primarily concerned with evolution is his most important contribution. In his department at University College, London he had expanded the uses to which anatomical research could be put, and placed the science of the structure of the human body at the centre of a larger scientific field of endeavour. Anatomy was integrated into a larger and broader discipline, he called it the ‘Greater Humanity’ and its aim the understanding of ‘Human History’; this emphasis is recognizable in the human biology programmes outlined in the S.S.H.B’s *The Scope of Physical Anthropology and its Place in Academic Studies*. The interdisciplinary approaches to anatomy in these programmes are a reflection of those developed by Elliot Smith at University College. Always, it is the evolutionary relations of man and the primates that lies at the core of these programmes.

These approaches were not used to show that the evolution of man had occurred, this had already been achieved, in scientific circles at least, by the beginning of the twentieth century; nor was it used to show the stages through which man had passed in his progressive ascent, but to unite disparate studies. The epistemological value of anatomy was raised beyond surgical

utility and beyond the biological origin of man. The significance is that the evolution of man could be understood *in toto* from the study of the physiological associations of structure, in his particular case this rested solely on the brain. His diverse approach to anatomy, the new teaching methods that he used, and his insistence on his students spending periods in the department of other universities where they might learn from material not available in Britain ensured that his ideas became widely recognized.

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