7 Does the Geological Evidence Support the Aquatic Ape Theory?

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SUMMARY

After a short discussion of the *Zeitgeist* associated with Hardy's introduction of the Aquatic Ape Theory, the use of analogy rather than of homology of features to support the AAT, as well as the lack of time dimension in the discussion by AAT advocates, is criticised in this chapter. An examination of the geological record appears to provide little support for a (semi-) aquatic phase in hominid evolution.

INTRODUCTION

The Aquatic Ape Theory (AAT) emerged during the 1960s and 70s, more or less at the same time that tremendous quantities of well packaged publicity concerning human origins were being offered to the general public and to scientists alike, from the East African hominid mines. At that time, the common perception of the East African Hominid Origins School (EAHOS) (and the South African one, one may add) was that humans originated during the Pliocene drought (cf. Ardrey, 1967), a sort of testing-ground through which mankind was supposed to have passed with flying colours, while the apes shrank primitively off to their permanently humid forest refuges. A tenet of this story was that into this Pliocene drought went a population of Miocene apes, small-brained, acultural, quadrupedal arborealists living predominantly on fruits and celery gathered in small home ranges, while out of the other end of the parched Pliocene evolutionary forge emerged a smart, larger-brained, cultured, bipedal, terrestrial hominid, eating animal proteins and ranging far and wide over the African savannah, with head held high.

It is no coincidence, in my opinion, that Hardy (1960) proposed the AAT at more or less the time that the publicity mills were blaring forth the EAHOS message at its loudest. He was apparently dissatisfied with much of the evidence being put forward, especially the absence of evidence concerning the Pliocene drought. In fact, if one searches the literature, no evidence was ever offered in support of such a drought. It was simply a prerequisite of the Pluvial Theory that the preceding period must have been dry, because by definition it could not have been as wet or wetter. But with the discarding of the Pluvial Theory in the late 1950s, the Pliocene drought concept persisted, initially vaguely voiced

but oft repeated, until it came to have a life of its own – just as did the Pluvial Theory – and reached its acme in Ardrey's book *African Genesis* (1967). Hardy was, in my view, merely raising an alternative hypothesis, perhaps with tongue in cheek, although the message itself was serious enough. The EAHOS message might just be wrong, and scientists ought to take a closer look at the evidence offered by the EAHOS, rather than blindly accepting (almost reverently) what has subsequently turned out to be wishful thinking and self-delusion on rather a daunting scale.

It is also no coincidence that at about the same time that the general public, particularly in America, was being bombarded with the Wall Street version of Human Origins, there was a re-emergence of Creation Science in America. Creation Scientists had every reason to be dissatisfied with the evidence put forward by the EAHOS; equally dissatisfied were many palaeontologists and geologists, as any perusal of the scientific literature will show. Different sectors of society reacted differently to their bewilderment; Creation Scientists took one course of action – a return to fundamental principles as revealed in the Bible; geologists and palaeontologists asked for more evidence and better accountability from EAHOS, while the Aquatic Ape School apparently plunged for the opposite of 'aridity' as a moulder of humanness, and so was born the concept of the watery past in human evolution.

DISCUSSION OF THE AQUATIC APE THEORY

In common with the drought theory, the watery hypothesis has these essential elements: a primitive ape goes through a 'trying time' in a 'strange' environment, in the process being transformed into a hominid. Instead of drought, the strange environment is a surfeit of water.

Most of the evidence put forward by Hardy and subsequent champions of the AAT, such as Morgan (1982) and Verhaegen (chapter 5, this volume), consists of anatomical and behavioural features, every one of which is an *analogue* of features found in a variety of distantly related mammals and other vertebrates, whose only commonality is their aquatic or amphibious lifestyle. The core of their argument seems to be that 'analogy' equates with 'commonality of selection pressure'. Wings, be they of birds, bats or bumble-bees, for example, suggest selection for locomotion through air regardless of relatedness among these winged creatures. Morgan and Verhaegen follow this kind of logic throughout their published work, pointing out one or another analogy between humans and one or another aquatic animal, until quite an impressive list of features has emerged. Differences between humans and the same set of animals seldom feature in their studies, similarity evidently outweighing differences on a constant basis. *Homology* has seldom, if ever, entered any of their scenarios.

Furthermore, virtually all the evidence supposedly supporting the AAT comes from the neontologic record. Very little solid evidence emerges from the fossil record, although Verhaegen appears to observe aquatic adaptations in Neanderthal man. (This evidence, though, is far too late to have a bearing on the ape–human transition.) It is unfortunate for the AAT that the bulk of the evidence thought to support it lacks the time dimension. Evolution, after all, occurs over time, which means that any source of data lacking that dimension is incomplete as far as evolution studies are concerned. The lack of the time dimension is the greatest drawback of the molecular phylogenetic method. All phylogenies produced using neontological data alone are nothing more nor less than *scala naturae*.

The possession of the time dimension is the palaeontologist's strongest point. The discovery of the depth of geologic time during the early part of the nineteenth century was the great contribution to science and humanity made by the founders of palaeontology. Without this discovery and what it means, we might still be saddled with the Aristotelian 'ladder of life' concept which was based mainly on what people observed in the extant biosphere, to which was added a modicum of religion and myth. The Aristotelian *scala naturae* lacked the time dimension, as does most molecular phylogeny and the AAT.

However, before we dismiss the AAT out of hand, we ought to examine the fossil record, as have Verhaegen and LaLumiere (this volume, chapters 5 and 3, respectively), to see if indeed there is any evidence which might be interpreted in such a way as to yield support for it. Verhaegen considers that there is taphonomic evidence from the East African, and anatomical evidence from the European, fossil record, which supports the AAT. LaLumiere sees no evidence as yet, but predicts that such evidence will be forthcoming if only we look in the right place; and in order to lend weight to his vision, he provides us with quite a detailed view of where to look, evidently being a supporter of the 'island biogeography' approach to speciation. It is strange that none of the known numerous hominoid and hominid localities discovered in Africa and Eurasia fulfils the requirements of LaLumiere. He apparently preferred to base his arguments on evidence that does not exist (but which might), rather than on evidence that has already been gathered.

Let us examine the geological evidence to see whether any of it can be interpreted in such a way as to provide support for the AAT. Whether one takes a long-term view of human origins, as did LaLumiere and as Verhaegen used to (that is, the transition from ape to man took place during the upper Miocene), or the short-term view that Verhaegen now seems to champion (aquatic analogues in Neanderthal man, millions of years after the ape–human transition), the geological record does not provide convincing evidence from which the AAT could benefit.

The early scenario

Of all the pre-hominid fossils recovered in the Old World, now totalling more than 3,000 specimens from hundreds of localities ranging in age from the lower Miocene (18 million years ago) to the Holocene, scattered through three continents, only a minute proportion of specimens has, to my knowledge, been found in fully lacustrine sediments or in marine (including littoral) strata. And this is despite the fact that an aquatic ape would have been living in the very environment most likely to lead to its preservation as a fossil.

In East Africa, for example, where fully lacustrine sediments abound, only a few specimens have been recovered, although the sediments yield a profusion of other fossils. The only lacustrine strata to have yielded such specimens in Kenya are those at Nachola, a *Kenyapithecus* site, from which postcranial evidence indicated an arboreal lifestyle rather than an aquatic one. At this site, *Kenyapithecus* may well have lived in the trees which grew in the area, the fossil trunks of which are a common feature of the sediments.

On the contrary, the richest concentrations of hominoid fossils occur in sediments which accumulated subaerially, well away from lakes (Pickford, 1986).

In the Siwalik Hills of Pakistan and India, all the fossil hominoids now totalling several hundred specimens from many different sites, the environment of the hominoids was a wooded to forested plain bordering the precursors of the Ganges and Indus Rivers. The various European and Chinese hominoids were also found in non-lacustrine settings; the closest that any of the sites gets to being lacustrine are the lignites which accumulated in swamp forests. Among these, even the enigmatic *Oreopithecus* was not aquatic, being instead an arborealist.

The late scenario

In Plio-Pleistocene strata of the Old World which have yielded hominids, the story repeats itself. None of the specimens occurs in fully lacustrine strata, nor in marine sediments. Instead, they occur in subaerial strata such as commonly accumulate in flood plains, volcanic slopes, palaeosols and cave systems. That many of these sediments were formerly misinterpreted as representing 'lake beds' and as such were used as evidence in support of the Pluvial Hypothesis of Wayland (1934) and others, is a historical fact that in no way provides support for the AAT. For many years any sediment in East Africa was erroneously called 'lake beds', regardless of its origin. For example, the type section of the Kamasian pluvial is an ignimbrite (a volcanic rock deposited as a super-hot ash which remelts under its own weight and temperature) which was deposited on dry land. We estimate that only about 5 per cent of the volume of sediment in the Gregory Rift Valley accumulated under fully

lacustrine conditions. For the Nyanza Rift, the figure is even less (0.01 per cent). In contrast, about 70 per cent of the volume of sediment in the Albert Basin of the Western Rift is lacustrine, yet only a single ape tooth has been found in these highly fossiliferous strata.

If the geological evidence is to be a source of support for the AAT, then all the positive evidence as to palaeo-environments that is currently available has to be discarded or discounted, and recourse taken to what the geological record 'might' yield. It is true that fossils of upper Miocene apes and/or hominids are rare (Pickford, 1988), and it could be argued that, during the critical period, the fossil record supports neither the AAT nor any other hypothesis concerning ape–human transitions. Search as we might in appropriately aged (upper Miocene to lower Pliocene) the lacustrin strata, of which there are vast sequences rich in fossils in Kenya (Mpesida, Samburu, Lukeino and Chemeron) and Uganda (Albert and Edward Basins), fossil hominoids continue to evade us.

CONCLUSION

The only conclusion to be drawn on the basis of available evidence (that is not to be derided for its quantity and quality), is that apes and hominids avoided lakes and seas throughout the Miocene and Plio-Pleistocene, just as they do today.* Any other conclusion, including the suggestion that we have not looked in the right place, must come under the heading of 'special pleading'. Under this category of reasoning, I place both LaLumiere's and Verhaegen's geological results.

REFERENCES

Ardrey, R., 1967, *African Genesis* (Glasgow: Collins).
Hardy, A.C., 1960, Was man more aquatic in the past? *New Scientist*, **7**, 642–5.
LaLumiere, L. P., 1991, Evolution of genus *Homo*: where it happened. (This volume, chapter 3.)
Morgan, E., 1982, *The Aquatic Ape* (London: Souvenir Press).
Morgan, E., 1991a, The origins of a theory. (This volume, chapter 1.)
Morgan, E., 1991b, Why a new theory is needed. (This volume, chapter 2.)
Pickford, M., 1986, Sedimentation and fossil preservation in the Nyanza Rift System, Kenya. In L. Frostick *et al.* (eds) *Sedimentation in the African Rifts* (Geological Society of London Special Publications), vol. 25: 345–62.
Pickford, M., 1988, From *Kenyapithecus* to *Australopithecus*. *Proceedings of the Vth Congress of the European Anthropological Association* (Lisbon), **1**, 7–11.
Verhaegen, M., 1991, Aquatic features in fossil hominids? (This volume, chapter 5.)

* Editors' comment: At least six species of primates have been recorded as swimming when free-ranging, and a further twelve swimming and wading in zoos; they represent all four primate major taxa (Ellis, this volume, p. 53).

Wayland, E.J., 1934, Rifts, rivers, rains and early man in Uganda. *Journal of the Anthropological Institute*, **64**, 333–52.

Author's note added at proof stage: The editors mention that there are several primates which swim and wade. I know about the cercopithecids which venture into the sea, and I know about the Orang which wades across narrow rivers. This is the reason why I was careful to confine my statement to hominoids and hominids, and to say that the Miocene to Pliocene forms tended to avoid lakes and seas. I still maintain this point of view, and the fact that six out of 172 species of extant primates enter water does not in my opinion greatly bolster the AAT, nor does it alter the fact that fossil primate remains seldom occur in lacustrine sediments.