

Is Paleoanthropology Science? Naming New Fossils and Control of Access to Them

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Progress in paleoanthropology is impeded when new fossil materials are published but unavailable for comparative study, as is too often the case. In this commentary, we review the stages of description and analysis that new fossils must undergo and conclude that it is disingenuous to argue that fossils have not been properly “published” when descriptions and new names formulated in accordance with the *International Code of Zoological Nomenclature* have appeared in leading scientific journals. Once such names and descriptions have been published, it is imperative that the original fossils concerned be available to the scientific community for comparative analysis, for by the very nature of science, no statement about such fossils, however carefully prepared by the original describers (or anyone else), can be regarded as definitive. Science is a system of provisional knowledge that constantly requires re-examination and testing. It cannot function as a system in which assertions have to be left unchallenged for want of free access to the primary data. *Anat Rec (New Anat)* 269:239–241, 2002. © 2002 Wiley-Liss, Inc.

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A recent “News Focus” article in *Science* (Gibbons, 2002) has again brought to the forefront an important and contentious matter for all interested in comparative morphology and human and vertebrate evolution. The matter in question is the crucial one of access by scientists to published type and other specimens belonging to fossil hominid and other species. And because the difficulties for the progress of science that this issue raises were originally addressed in the pages of *The New Anatomist* by Weber (2001), it seems worthwhile to attempt to clarify some of the issues that readers may have found a little hazy in the *Science* report.

Paleoanthropology is a comparative science that depends on fossil specimens, all of which are individually unique. Fossils representing the same species are frequently distributed among several institutions around the world, and all must, ideally, be seen by researchers working on the groups to which they belong. In beginning this commentary, it may thus be worthwhile to review the sequence of events involved as new material enters the arena of scientific debate.

New fossils are found by individuals or field teams and are deposited in museum or equivalent collections. To become part of the scientific database, they have to be identified to species and they have to be described in a recognized vehicle of publication. If they are believed to represent a previously unidentified species, they additionally have to be formally named. Also standard practice at this stage is a preliminary interpretation of the material’s phylogenetic significance. However, such interpretation by the describers merely introduces an ongoing process that will continue indefinitely, and will invariably involve many other systematists in the field.

All of this may seem pretty straightforward, but in practice, complications have nonetheless arisen over scientific access to published fossils, especially those ascribed to hominid species.

Description of fossils is usually a relatively uncomplicated process, even if it is not based on a standard formula. Naming of new species has to be done following rules laid down in the *International Code of Zoological Nomenclature* (ICZN, 1999). This document specifies minimum standards which, if met, make the new name official under international agreement. One of the requirements, in addition to a list of distinguishing features, is the designation of a “type” specimen (“holotype”), which will be the name-bearer for the species. A crucial factor is the scientific accessibility of such specimens, for all specimens that are allocated to a particular species have to be compared with the holotype of that species to confirm their specific identity. For this reason, the *Code* specifies procedures for replacing types in the case of their nonavailability for study.

It naturally takes a certain amount

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of time to describe a new fossil, to determine its affinities, and to publish it. During this period, it is generally agreed that the finders of the material in question have the right to exclusive access. Once the publication has appeared, however, the specimen is in the public domain. It has entered the scientific database and can no longer be ignored by other scientists—who require direct access to it to test the original describers' claims for it, or to compare their own specimens with it to determine whether or not all belong to the same taxon. Nonetheless, there is a growing tendency for some finders not to permit access even after this crucial *rite de passage*. In such cases, the usual claim recently has been that the initial publications, even when prepared in accord with the dictates of the *Code* and published in major vehicles such as *Nature* and *Science*, merely constitute “announcements” (Gibbons, 2002; B. Asfaw, personal communication). “Publication,” it is disingenuously contended, occurs only with the appearance of a long interpretive monograph.

Very occasionally, such a monograph appears within a few years of the original publication; but as commonly, this process takes decades, if indeed it is ever completed. Louis Leakey's *Homo habilis* type materials were monographed only some 30 years after their discovery (Tobias, 1991), while the important crania from Forbes' Quarry and Steinheim have still not been monographed, respectively, 150 and 69 years after their discoveries. Among more recently discovered fossils, several new hominid species legally published as early as 1994 still remain off-limits to researchers not belonging to the describing cliques. This has potentially harmful consequences, for, if not rapidly subjected to informed scrutiny, the initial describers' interpretation of the specimens' significance tends automatically to become established wisdom in the field. In this way, untested notions readily become incorporated into textbooks, the secondary literature, and the vast reaches of the popular media, without any consideration of alternative interpretations. As things too often are, alternative interpretations are difficult or impossible to formulate, because even casts (poor

substitutes for the originals in any event) are rarely available and, as most readers of this journal well know, photographs of specimens published in *Nature* or *Science* tend to be so small and lacking in contrast that much useful information is obscured.

Because of comments she had received from the leader of one of these describing cliques to the effect that he had assembled the best possible team to study one set of fossils concerned (and thus by implication that it was unnecessary for others to see them), the author of the *Science* report asked us if it “really mattered” whether only the describers and their cronies saw the type specimens of new species at first-hand. And while on the surface this question might seem to be perfectly reasonable, the appropriate response to it requires understanding how science works. Science is not a

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system of absolutes. A minimal description of a specimen will certainly serve to make it a legal holotype, but it is not a statement for the ages. The practice of science is a dynamic, self-correcting process, constantly testing (and discarding) ideas, rather than seeking to engrave them in stone.

Even what appear to be observations and plain descriptions are conditioned by hypotheses and expectations. For example, Tim White (who was, like us, interviewed for the *Science* report) was clearly a receptive student of Milford Wolpoff at a time when the latter was the leading advocate of the “single-species hypothesis” of human evolution. According to this hypothesis, there never was—and on ecological principle could never have been—more than one species of hominid on Earth at any one time. Accordingly, White is an even firmer believer

than his teacher in “chronospecies” (White, 2002), the notion whereby species are no more than ephemeral and arbitrarily delimited segments of evolving lineages. This outlook produces an entirely different picture of human evolution—and of the significance of particular fossils—than the one that emerges from the growing awareness that species are individuated entities and that hominid history has been a matter of diversity and evolutionary experimentation. We do not wish to argue here the relative merits of these two evolutionary models. We merely wish to point out that this difference of mindset leaves its mark even at the level of basic description, let alone that of analysis, and that no single exegesis of a fossil's form and significance will ever be definitive. Science itself flourishes on diversity, and the attempt to eliminate diversity of ideas and interpretation only redounds to the profound disadvantage of the scientific enterprise.

What is more, every branch of science is a corporate enterprise involving the activities of very many individuals. In paleontology, no one individual or group has found, or controls, all of the fossils necessary to carry out a particular research project. Everyone requires access to fossils in the control of others to carry out such research, and the fossils any individual finds will never be more than a fractional part of all the fossils he or she will ever study. Mutual recognition of this fact among paleontologists is crucial; and although nobody should ever disparage the efforts of those who undergo considerable discomfort and even hardship to find (or, worse, as we well know, not find) important new hominid fossils, it is nonetheless true that that discoverer's bias (the feeling that “only *I* know how to interpret *my* fossil”) is a danger that is not always avoided.

Paleoanthropology, like the rest of science, is thus inherently a corporate effort; and as a result, those with the good fortune to find important fossils need to accept the implicit responsibility to make them available to the scientific community, much as those who discover genetic sequences in the laboratory formally recognize as a condition of publication that those sequences need to be accessible to their colleagues by means of GenBank. To

put this another way, for paleontologists to claim that any fossil is uniquely theirs for study after it has been published, and thereby incorporated into the scientific canon, is equivalent to claiming that, for instance, only Kary Mullis should be allowed to carry out studies involving the PCR. Clearly, this would be absurd; and it is equally absurd to act as if the finders of particular fossils are alone qualified to study them.

There has been a good deal of informal discussion over how long those with control over particular fossils should retain exclusive access. Five years is accepted by many as reasonable; but numbers are always subject to dispute, and we would urge an alternative approach.

In our view, those who find fossils should never be obliged to share them with anyone before publication, i.e., the *Code*-legal announcement of a new name in a recognized journal, or an equivalent description of new material of species already named. Indeed, there should never be an obligation (although there will normally be a responsibility to funding sources) to

publish them at all. If finders want to take years or even decades confidentially preparing a monograph to the most exacting standards of perfection, fine; and even if they prefer simply to gloat secretly over their discoveries in their cellars, then so be it. But it must be recognized that any form of legal publication throws new fossils into

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the public domain. This is particularly true for holotypes and paratypes—the name-bearers of new species. But it also applies to other new fossils, too. For, once new materials are published by one group of paleontologists, other paleontologists *cannot* pretend they do not exist. They have to be able to make informed judgements about

them. What is more, despite new technologies of imaging and visualization, making such judgements will almost invariably involve first-hand examination and documentation of the fossils concerned. In a comparative science, this is the minimum requirement for making progress. It is one thing for high priests in temples to reserve access to religious relics; science is an entirely different case. Science is not a matter of faith (or of power); it is a matter of the free flow of information.

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