The primate fossil “Ida”: the science and the hype

By William Moore
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The recently announced discovery of a remarkably well-preserved early primate fossil promises to provide important new insights into the evolution of a wide range of later primate forms, including humans. However, the theatrics accompanying this announcement to the public have tended to both distort the find’s significance and reinforce widespread, but mistaken, concepts regarding the processes of biological evolution.

The specimen, which is dated at 47 million years ago, was first found in 1983 at the Messel Shale Pit, a stone quarry near Darmstadt, Germany. However, a significant fragment of the fossil remained in private hands until only two years ago, when it was acquired by Jörn H. Hurum, a paleontologist at the University of Oslo. The purchase price may have been as much as a million dollars. Once the pieces were reunited, this unusual fossil underwent detailed study leading to the interpretation that it represents a species that was close to the evolutionary split between so-called lower primates (Prosimians), including lemurs, lorises, and tarsiers, and higher primates (Anthropoids), including monkeys, apes, and humans.

The “Ida” fossil, so nicknamed after the principal researcher’s young daughter, is an extremely well-preserved specimen, including not only nearly the entire skeleton (missing a portion of one lower limb), but impressions of some soft parts (including fur) and even stomach contents, evidence of its last meal. The animal had not reached adulthood, as indicated by the presence of both deciduous (i.e., baby) and adult teeth.

Ida exhibits such uniquely primate features as opposable thumbs and fingernails rather than claws. Its general appearance would have resembled a combination of small monkey and lemur. The specimen is formally designated *Darwinius masillae*, a new genus and species. The genus name honors Charles Darwin’s 200th birthday and the 150th anniversary of the publication of Darwin’s *On the Origin of Species*. The species name refers to the location of its discovery. By tradition, taxonomic names are Latinized.

The public announcement of this discovery has taken the form of what can only be described as a public relations blitz including multiple press conferences (one involving the billionaire mayor of New York City, Michael Bloomberg, at the American Museum of Natural History), a television special (aired on the History Channel in the US and on the BBC), a popular book, and an overwhelming amount of hype and grandiose statements about the unparalleled importance of this fossil to the understanding of human evolution. Indeed, it is being referred to by its hucksters as a (or even *the*) “missing link” in human evolution. The television program and the book are, not to make too fine a point of it, both named “The Link.”

The tenor of this media circus can be exemplified by a couple of quotes from the *Guardian* newspaper:

“This little creature is going to show us our connection with the rest of all the mammals; with cows and sheep, and elephants and anteaters,” said Sir David Attenborough who is narrating a BBC documentary on the find.

“The 47m-year-old primate—named Ida—has been hailed as the fossil equivalent of a “Rosetta Stone” for understanding the critical early stages of primate evolution.”

Many in the scientific community have given Ida a cooler reception. For example, Elwyn Simons of Duke University, a prominent paleoanthropologist, stated, “It’s an extraordinarily complete, wonderful specimen, but it’s not telling us too much that we didn’t know before.” Professionals have also criticized the article formally announcing the discovery in the open-source scientific journal *PloS One* for failing to follow standard procedure of fully comparing this specimen with other known early primate fossils. Despite the claims of those involved in studying this specimen, its precise position with respect to the branching of the lemur and anthropoid lineages remains to be established.

The order *Primates* is a subdivision of the class *Mammalia* (mammals). While mammals already existed during the Mesozoic Era, the Age of Dinosaurs, they were a relatively minor part of the animal population. The ancestral mammals may be thought of as resembling (though certainly not identical to) small, modern rodents or shrews. They existed in the nooks and crannies of the dinosaurs’ world. However, the complex dialectical balance which was the ecosystem of the late Mesozoic, of which the mammals formed a minor component, was suddenly blown apart (perhaps almost literally, by a massive meteor impact, according to current theory) approximately 65 million years ago. Following the extinction of dinosaurs, a whole range of evolutionary opportunities opened for mammals (as well as birds).

As a result, a great diversity (known as a “radiation”) of mammalian forms developed during the Cenozoic, the Age of Mammals, both creating and driving a new, dynamic set of biological oppositions. The evolution of new species may be visualized as a branching process, beginning with a common ancestor as the “stem” and then undergoing repeated splits (speciation events), creating an ever-more-complex “bush” of increasingly differentiated species. All of the living species of mammals, and many more that have become extinct, descend from a small number of ancestral mammalian forms that existed in the early Cenozoic. Aside from primates, these groups, known in biological classification as “orders,” include, among others, rodents, carnivores, artiodactyls (even-toed ungulates such as deer and cattle), and perissodactyls (odd-toed ungulates such as horses).

The evolutionary branching patterns of these groups may be deduced in part from comparative studies of modern anatomy and, increasingly, by DNA analyses. However, the “ground truth” remains the fossil record. Unfortunately, at this time, the fossil record of early primates is very thin (i.e., there are very few known specimens). Therefore, while it is possible to project backward and hypothesize that there must have been an ancestral species from which prosimians and anthropoids diverged, only fossils can provide a view of what these animals looked like and what specific forms this process of differentiation followed.

What makes the Ida specimen so important is that it represents one small piece of a very large puzzle—a puzzle from which we have so far found only a few pieces. Because we have so little, each new piece seems to be a major step forward. The characteristics of this fossil do conform, in general terms, with what an animal near the split between prosimians and anthropoids should look like, based on the other lines of evidence mentioned above. It has some characteristics of each. However, not until many more specimens from this period are discovered, analyzed, and compared to each other will it be possible to draw a detailed picture of the evolutionary processes that took place and the factors that drove them.

Therefore, neither Ida, nor any other particular fossil specimen, should be called a "missing link," as has been done in some of the publicity surrounding its unveiling to the world. The term "missing link" has been so misused that it should probably be retired permanently. Possibly the most notorious example of the use of this term is that of the Piltdown Hoax.

During the late-nineteenth and early-twentieth centuries, the dominant view of human evolution among a significant number of researchers in the field was that intelligence evolved first, before the other primary characteristics that define humans, such as bipedalism (i.e., upright walking). This was an idealist view (i.e., thought is primary) that has now been definitively disproven by fossil evidence (e.g., the australopithecines were bipedal and yet had relatively small brains). Among the dissenters from the "brain first" hypothesis was Frederick Engels (see *The Part Played by Labor in the Transition from Ape to Man*).

Nevertheless, the idealists held sway at the time. So, when a skull was "discovered" that appeared to combine a large cranium (i.e., a large brain) with an ape-like jaw, the "brain firsters" accepted it without question and proclaimed it the "missing link" between apes and humans. Ultimately, after decades during which evidence accumulated showing that bipedalism and early tool-making preceded a substantial increase in brain size, the Piltdown skull was carefully reexamined and found to be a clever fraud.

Among the cautionary lessons to be drawn from this hoax, one of the most important is that no single specimen should, by itself, be taken as the basis for far-reaching interpretations. The small number of "hobbit" specimens from Indonesia rightly places a caveat on reaching any definitive conclusions regarding their evolutionary status, despite what appears currently to be strong evidence for their being a separate species (see "Hobbits" of Flores: Implications for the pattern of human evolution).

The concept of links of any kind, missing or not, in evolution is misleading since it promotes a static view of species in which some are singled out as "transitional" between other forms. On the contrary, each species is both itself and at the same time a link between those that came before and those that will come after (unless, of course, it becomes extinct).

The species concept must be understood dialectically (see Engels's *Anti-Duhring*). Every species is, on the one hand, part of the physical and biological environment in which it exists at any given point in time (i.e., in a historically specific context). In other words, each species is one component, one opposite, in the extremely complex dialectical interaction involving an immense number of other opposites which exist at a particular historical moment, each component both determining and being determined by all of those other opposites, to varying degrees. On the other hand, and simultaneously, this dialectical system and all of its components are in the process of becoming something else. The system and its components are evolving. It must be understood that the term "system" is not meant to imply something that exists in a positivist sense. It is merely a shorthand label used to refer to the dynamic "unity" that is created by the interaction of all its constituent opposites.

Of course, the different components of the system will change at their own rates, depending on the particular nature of that species' interaction with its effective environment (i.e., those elements of the total system with which it normally comes in contact) and the dynamics of those other environmental components. Some species—the horseshoe crab for example—have remained largely unchanged for millions of years. Their adaptation to a particular environment, on the one hand, and the relevant portions of that environment, on the other (collectively that species' econiche), have been in a relatively balanced opposition for a very long time. Others, such as viruses and bacteria that cause disease, may evolve very rapidly as a result of their dialectical interaction with their hosts (i.e., the species they are infecting).

Infectious disease presents a very good illustration of the dialectic of evolution. Disease organisms and their hosts are engaged in a never-ending evolutionary battle. Innovation by either side (e.g., greater disease resistance on the part of the host or improved infectious capability on the part of the pathogen) changes the environment of the other, which, in turn, may give rise to compensatory adaptations and so on, back and forth. Failure on the part of either side to make adjustments to changes occurring in its opposite may result in a decline in evolutionary fitness and, ultimately, extinction. Except for cultural adaptations by humans (e.g., medicine, hygiene), such struggles are not conscious, but the result of differential survival (i.e., greater or lesser reproductive success)—in other words, natural selection.

The singling out of a particular fossil specimen as a heretofore "missing" link in some evolutionary sequence represents a conception similar to the view that history is driven by the actions of "great men." Such a view tends to distort and obscure the fundamental processes that underlie both biological and cultural/historical change. It emphasizes the episodic and idiosyncratic, implying that there is really no way to understand why things happen.

Furthermore, such practices obscure the fact that science is a historical process that develops via the construction and critique of interpretations within the framework of theoretical traditions. Instead, new discoveries are seen as largely isolated, indeed unexpected, events that occur effectively at random and are judged on their "wow factor" rather than against the existing body of theory and data.

The Ida specimen is an important discovery. It begins to flesh out a period of primate evolution that is, as of yet, poorly understood. However, it is no more a "missing link" than any other fossil specimen.