Spanish find provides lift to ancient ape

Scientists excavating a site in Spain have found a 9.5-million-year-old, nearly complete skeleton of an extinct ape known as *Dryopithecus*. The discovery affords a rare look at how bodily features needed for climbing, hanging, and swinging in trees evolved in ancient apes.

The evolutionary affiliations of *Dryopithecus*, however, remain in dispute (SN: 10/23/93, p. 270). The scientists who unearthed the new specimen argue in the Jan. 11 NATURE that it represents a direct ancestor of orangutans, an Asian ape. Other investigators familiar with the find assert that it may have served instead as a direct predecessor of African apes and hominids (members of the human evolutionary family), or perhaps even as a common ancestor of all later apes and hominids.

The newly unearthed bones, as well as a partial *Dryopithecus* skull previously found at the same site, apparently come from a single adult male, assert Salvador Moyà-Solà and Meike Köhler of the Miquel Crusafont Institute of Paleontology in Sabadell, Spain.

A number of lower-body features indicate that *Dryopithecus* favored climbing and swinging from one tree branch to another at a fairly slow pace, much in the fashion of modern orangutans, the Spanish researchers contend. The fossil creature has long arms and short legs relative to its estimated body size, a large hand with long, curved finger bones marked by grooves where powerful muscles attached, and a large clavicle resting atop a broad chest.

Moyà-Solà and Köhler theorize that a common ancestor of all later apes and hominids existed well before *Dryopithecus* first appeared in Europe 12 million years ago. They speculate that *Dryopithecus* spawned a related extinct ape, *Sivapithecus*, whose fossils have been found in Asia, and that it eventually led to modern orangutans.

In that case, Asian apes would have descended from *Dryopithecus,* evolving bodies built for slow climbing and hanging from branches, the scientists hold, whereas African apes veered toward a four-legged gait on the ground and hominids adopted an upright stance.

The Spanish *Dryopithecus* find indeed shows some similarities to orangutans, but its evolutionary position cannot yet be firmly established, assert Peter Andrews of the Natural History Museum in London and David Pilbeam of Harvard University in an accompanying commentary.

Some features of the Spanish skull and lower-body skeleton suggest a similarity to African apes and hominids rather than to orangutans, Andrews and Pilbeam maintain. For example, the body proportions of the new *Dryopithecus* specimen closely resemble the proportions of African apes, Pilbeam argues.

The Harvard investigator also argues that the shape of *Sivapithecus* arm bones differs substantially from those of *Dryopithecus*, indicating no direct evolutionary relationship between these ancient apes.

"The Spanish fossil is a wonderful find," Pilbeam remarks. "But I think it comes from a creature that was close to what the common ancestor of all [later apes and hominids] would have looked like."

— B. Bower

Building structures molecule by molecule

Workers constructing a building rely on heavy equipment to push, pull, and lift stone blocks into precise locations without damaging them. On a nanoscale level, materials scientists want to accomplish the same task.

To construct the tiniest objects, they are aiming for the ultimate molecular control—a mastery achieved by placing each molecule into a new substance according to an exact design.

The trouble with attempting such precise control is that scientists often end up damaging the very molecular building blocks they are trying to assemble.

Now, T.A. Jung, a materials scientist at IBM's Zurich Research Laboratory, and his colleagues have found a way to position the individual molecules into stable, predefined patterns without disrupting the bonds that hold the molecules together.

In the Jan. 12 SCIENCE, the researchers explain how they use the tip of a scanning tunneling microscope to push around molecules on a surface at room temperature, creating a two-dimensional array of intact molecules.

In one case, the researchers hooked four bulky porphyrins to a rigid copper-containing unit. These molecular blocks held strongly enough to the work surface to prevent thermal agitation from causing them to hop around—a substantial problem in manipulating and placing single molecules.

Next, the scientists pushed these blocks, one by one, into stable hexagonal rings. Such structures "do not naturally form" when these particular molecules come in contact with each other or a surface, they explain.

Nanofabrication, a group of techniques that have been developed during the last decade, combines physical and chemical methods to achieve precise molecular assembly, Jung says.

In the past, scientists used voltage pulses, electric fields, and mechanical contact to break atomic bonds. They succeeded in repositioning molecules only at temperatures low enough to quell thermal agitation.

The new molecular design technique works at room temperature and is, according to Jung's team, "a step that goes beyond current approaches of engineering on the molecular scale."

The success of this new technique depends largely on the shape and stability of the molecule to be positioned, Jung says.

"Their work is a major contribution," says Calvin F. Quate, a materials scientist at Stanford University. "They've had some spectacular results."

"This represents an advance in our ability to control, image, and move molecules," Quate says. "It means that our techniques are advancing to the point that we can handle molecules as individual entities. As the techniques mature, information obtained from these experiments may enable us to do interesting things with these molecular entities."

— R. Lipkin

Yew drug fights cancer

Paclitaxel, the cancer-fighting drug derived from the Pacific yew tree, gives women suffering advanced ovarian cancer an additional year of life, compared to standard therapy, according to a new study.

A group of researchers from across the United States studied 386 women who had recently had surgery for advanced ovarian cancer. Half of the group received a combination of paclitaxel and cisplatin, another anticancer drug, while the other half received a standard therapy—cisplatin and an anticancer drug called cyclophosphamide. The researchers report in the Jan. 4 NEW ENGLAND JOURNAL OF MEDICINE that the women receiving paclitaxel had a median survival of 38 months, compared to 24 months for the group receiving cyclophosphamide. Moreover, the paclitaxel delayed the reoccurrence of the cancer for an additional 6 months, on average, compared to cyclophosphamide.

Previous, smaller studies had indicated that paclitaxel therapy is beneficial. "Frankly, the survival advantage that we saw in this study was a surprise to everybody, including me," says study leader William P. McGuire of Emory University in Atlanta. The researchers are now looking at paclitaxel as therapy for less advanced ovarian cancers. That study is at least 2 years from completion, McGuire notes.

— L. Seachrist