Anthropology

Robust about-face

In the human evolutionary family, the so-called robust australopithecines claim the dubious honor of possessing the weirdest-looking heads. Their massive jaws extend up to about eye level. Hefty, peglike teeth at the back of their mouths give way to much smaller ones in front. A small brain case topped by a bony crest resembles an explorer's helmet perched perilously above a colossal set of choppers.

Researchers usually view the robust australopithecines as a dead-end lineage comprising three species—one in South Africa and two in East Africa—that lived between 2.7 million and 1.3 million years ago. Using a statistical method for organizing species according to recently evolved anatomical features they share, some anthropologists place robust australopithecines into its own genus, *Paranthropus*.

This evolutionary scenario probably is misleading, contends Melanie A. McCollum of Case Western Reserve University in Cleveland. Most facial traits of robust australopithecines arose as developmental by-products of their unusual set of teeth, she proposes. The anthropologists' statistical method, called cladistics, generates valid evolutionary insights only when it's used to compare anatomical traits that have developed independently of one another, McCollum says.

Her case rests on developmental biology data documenting primate skull changes that occur during growth of the brain, the nasal airway, and the mouth.

Two anatomical traits that robust australopithecines required to accommodate their unusual tooth proportions probably triggered the formation of many skull features used in cladistic studies, McCollum holds. First, the large cheek teeth required support from swaths of lower-jaw bone running up each side of the face, which became longer and thicker in these hominids. This development also instigated a thickening of the mouth's roof and more oral remodeling.

Second, these bone and tooth expansions created an extension of part of the nasal septum, which completely separated the nasal and oral cavities. This resulted in nasal structures pushing up and oral structures spreading down, thus sparking many more anatomical changes, McCollum maintains.

Variations in the shape of their huge cheek teeth also suggest that southern and eastern robust australopithecines evolved separately, a possibility that clashes with the cladistic findings, McCollum argues in the April 9 SCIENCE.

The new report underscores the need to confirm the developmental independence of anatomic traits used in cladistics, comments Tim D. White of the University of California, Berkeley. "Robust australopithecines provide a good example of how cladistics can be misleading," White asserts. —*B.B.*

Redrawing the human line

Despite criticisms that statistical comparisons of anatomical features, known as cladistic analyses, have a propensity to mislead, Bernard Wood of George Washington University in Washington, D.C., still sees value in them. In the April 2 SCIENCE, he and Mark Collard of University College London reanalyze several cladistic studies and conclude that the two fossil species called *Homo habilis* and *Homo rudolfensis* do not in fact belong to the genus *Homo*. For now, they regard both species—each dated at around 2 million years old—as australopithecines, a genus that includes the 3.2-million-year-old partial skeleton from East Africa known as Lucy.

Wood says that anatomical similarities once taken as support for placing fossil species in the same genus may instead provide insight into independent evolution of those species in a common environment. That still represents a useful application, he argues, although "there's probably more noise than [evolutionary] signal in our cladistic data." —*B.B.*

Biology

A second living-fossil species?

Two research teams have found evidence that the Indonesian coelacanth reported last year is a new species.

One group bases its claim on mitochondrial DNA and morphology. The newly discovered fish is distinct from, but closely related to, the only other known coelacanth, say Laurent Pouyaud of Jakarta's branch of the French Scientific Research Institute for Development and his Indonesian coauthors.

Their formal description of the new species and its name, *Latimeria menadoensis,* appear in the April COMPTES RENDUS DE L'ACADEMIE DES SCIENCES.

The other research team includes Mark V. Erdmann of the University of California, Berkeley. He had spotted, but not purchased, one of the living fossils in a market on his honeymoon and then chased rumors for months before fishermen brought him another specimen (SN: 9/26/98, p. 196). He later donated the specimen to the Indonesians who worked with Pouyaud. His team's analysis of the fish agrees with that of Pouyaud's group: Genetically, the coelacanth seems to be a new species.

Saying that when he donated the fish he had expected the Indonesians to do any naming, Erdmann protests Pouyaud's publication of a name. "The fish is now *Latimeria menadoensis* Pouyaud *et al.*," he laments. Responding for Pouyaud, his colleague Patrice Levang argues that "the Indonesians were the rightful owners of the fish," and they could work with whomever they wished. —*S.M.*

Long-sought migration trigger stinks

A molecule in the distinctive perfume of fish could be one of the triggers for a mysterious daily migration in lakes.

Water fleas, among other tiny aquatic creatures, swim to the protective dimness of lower depths during the day. At night, when fish retire, *Daphnia hyalina* venture back up to warmer water, where growth and reproduction are easier. The triggers for this migration, or for just about any other so-called inducible defense, have long eluded scientists.

The water fleas' cue may include trimethylamine (TMA), an element of fish odor, report Hinnerk Boriss and his colleagues at the Max Planck Institute for Limnology in Plön, Germany. In the April 1 NATURE, they describe water fleas clustering lower in the laboratory tubes holding water with greater concentrations of TMA.

Stanley I. Dodson of the University of Wisconsin-Madison calls the paper "important." Once the molecular alerts are identified, he says, "we will be able to design elegant experiments" on chemical communications in water. —*S.M.*

Nuptial balloons: Size doesn't matter

The biggest balloon is not the one that gets the girl, at least among dance flies. That's the conclusion of the first analysis of the shiny saliva orbs that the males clutch as courtship gifts, report Jennifer A. Sadowski of the University of Kentucky in Lexington and her colleagues. They describe the nuptial balloons of *Empis snoddyi* in the March BEHAVIORAL ECOLOGY AND SOCIOBIOLOGY.

Males hold balloons a few millimeters in diameter between their rear legs as they swarm in the early morning. "It's like little points of light," notes coauthor Allen J. Moore of the National Science Foundation in Arlington, Va. The gift presented to the female "looks nice, but there's nothing of value," he says.

Flies of some related species offer nutritious gifts instead. "Females prefer a male with a big dead insect to a male with a small dead insect," Moore explains.

After monitoring wild swarms of dance flies, Sadowski reports that the shiny gifts of *E. snoddyi* don't follow the pattern of big dead insects. The bigger male may win, but a bigger balloon doesn't help. Moore speculates that too much empty glitter proves unwieldy when males fight. —*S.M.*