Plus, is the product of an 18-month-long internal review. Its recommendations were formulated by some two dozen Max Planck researchers and administrators, who sought input from every institute. "We found a real spirit of innovation," says Eduard Arzt, a director of the Max Planck Metal Research Institute who compiled the report's materials science section.

Noting that "competitive, high-tech research is, in many cases, beyond the scope of one or several institutes," the 2000-Plus report seeks to remedy that flaw by having scientists develop "an even more intensive collaboration" with universities and other research outfits. Toward that end, Markl says, Max Planck will soon launch the first nine International Research Schools for Ph.D. students, many from outside Germany.

To cope with the data flood from "big science" efforts such as the international Human Genome Project, the report urges the rapid development of bioinformatics research at various institutes and multidisciplinary teams spanning several institutes and including other organizations. Some of this is happening already: Max Planck's astronomy researchers, for example, work closely with counterparts in Europe and North America to avoid costly redundant research.

These changes, once implemented, could whittle away a researcher's ivory tower independence. But Markl thinks the trade-off—more collaborations and an influx of young minds—will spur a new era of creativity. "The most important driving force," he says, "will be the increasing mobility of scientists, especially young researchers, across borders and among institutions." –ROBERT KOENIG

PALEONTOLOGY

New Feathered Dino Firms Up Bird Links

BEIJING—Volcanic eruptions some 125 million years ago entombed a menagerie of ancient animals at a site in northeastern China that is proving to be a treasure trove for paleontologists. It has also become ground zero for the continuing debate on the origins of birds. Last week, Chinese scientists presented evidence from a new specimen dug up in Liaoning Province (*Science*, 13 March 1998, p. 1626) that they say strengthens the case for a link to dinosaurs—and for the value of further work at the site.

The finding, one of several fossils displayed at a meeting here,* is the third known specimen of a strange creature known as *Caudipteryx*. When the first *Caudipteryx* was discovered in Liaoning in 1998, most paleontologists classified it as a member of a group of two-legged, carnivorous dinosaurs known as theropods (*Science*, 25 June 1999, p. 2137). Unlike any other known dinosaur fossil, though, the tail and stubby forelimbs of *Caudipteryx* showed the unmistakable imprints of feathers—features most paleontologists believed it had inherited from a dinosaurian common ancestor it shared with birds. However, *Caudipteryx* appears to have been earthbound, lacking a full set of wing feathers and other features of wings.

The new specimen was described by Zhou Zonghe, a paleontologist at the Chinese Academy of Sciences' Institute of Vertebrate Paleontology and Paleoanthropology (IVPP) in Beijing. Although the fossils reveal some beautifully preserved feather impressions, "it's the bones that are important," says Zhou. The fossil lacks a head, but the rest of its skeleton (see picture) is better preserved and better articulated than those of its two predecessors. Zhou admits that the bones show a number of birdlike characteristics usually absent in dinosaurs, including a thumblike appendage for perching. But he has identified 16 characteristics more similar to dinosaurs than to early birds, including the proportions of the bones in the foot and the shape and orientation of the pelvis and bones in the pelvic region. He has labeled the new species *Caudipteryx dongi*, after prominent Chinese dinosaur expert Dong Zhiming.

Nom de plume. China's latest *Caudipteryx* fossil has a pelvis (above bent leg) similar to that of other theropods.

Zhou's work reinforces the views of most Western scientists. "The Chinese finds are [illustrating] very nicely the transition between things that are true dinosaurs to fully avianlike creatures," says Luis Chiappe, a paleontologist at the Natural History Museum of Los Angeles County. University of Chicago paleontologist Paul Sereno agrees that identifying more dinosaurlike features "is big news" that lends support for the idea that there is no sharp evolutionary dividing line between dinosaurs and birds.

A minority remain unconvinced, however. The feathers on *Caudipteryx* are considered less evolved than those on *Archaeopteryx*, the oldest commonly acknowledged bird, notes Storrs Olson, an avian paleontologist at the Smithsonian Institute in Washington, D.C., yet the Liaoning fossils are 25 million years younger than *Archaeopteryx*. And although *Caudipteryx* may have had true birdlike feathers, he says, that doesn't make the case for other recent Liaoning finds such as *Sinosauropteryx*, whose hairline "protofeathers" he dismisses as "fuzz." The Liaoning sites, he adds, "are showing us kinds of birds we didn't know a whole lot about. But there is no information about the origin of birds."

Zhou disagrees, saying that placing *Caudipteryx* with the birds would require its bird ancestors to have evolved an implausible number of dinosaurlike characteristics. It is more likely, he says, that the creature's handful of bird characteristics are either due to parallel evolution or appeared on the way to the origin of birds.

The dinosaur-to-bird believers think it can only be a matter of time before more of the missing links are uncovered. "We are convinced that birds evolved from theropod dinosaurs," says Ji Qiang, director of China's National Geological Museum in Beijing. "But we don't know yet from just which group [of theropods]." He and others hope that the ground will yield more definitive answers. And they agree that the most logical place to dig is in Liaoning Province.

–DENNIS NORMILE

CREDIT: IVPP/CHINESE ACADEMY OF SCIENCES

* 5th International Meeting of the Society of Avian Paleontology and Evolution and the Symposium on Jehol Biota, IVPP, Beijing, China, 1 to 4 June.