



Foundation in Ithaca, New York, and president of the Association of University Technology Managers, which monitors patenting activity on U.S. campuses. Still, he notes, “the kinds of patents that have this kind of potential financial impact are relatively rare, maybe one out of 1000.”

—DAVID MALAKOFF

PALEOANTHROPOLOGY

Is Alexander the Great's Father Missing, Too?

The remains of Alexander the Great—the warrior who conquered much of the known civilized world in the fourth century B.C.—have been lost for more than 1500 years. But in 1977, Greek archaeologists unearthed a tomb in the town of Vergina, in northern Greece, that they claimed contained a worthy consolation prize: the remains of Alexander's powerful father, Philip II, who had started expanding the Macedonian empire and had enlisted Aristotle to tutor the precocious prince. A team of British scholars confirmed this identification in 1984. But on page 511, a paper by Greek paleoanthropologist Antonis Bartsiokas argues that close-up photographic analysis of the remains suggests that they are not those of battle-scarred Philip II, but belonged to a less important historical figure: Philip's son (and Alexander the Great's half-brother), Philip III Arrhidaeus.

The new report also offers the tantalizing possibility that some of the tomb's artifacts, including a helmet and a ceremonial shield, may have actually belonged to the great conqueror himself. “Are we lucky enough to have found the helmet of Alexander the Great?” wonders Eugene N. Borza, a leading expert on the ancient Macedonians and professor emeritus of ancient history at Pennsylvania State University, University Park. “It's too good to be true, but a tempting thought nonetheless.”

There is general agreement that the Great Tumulus of Vergina, originally excavated by Greek archaeologist Manolis Andronicos, was a burial ground for some members of Alexander's royal family. Of the four tombs, one almost certainly contains the remains of Alexander's only son—murdered at a young age—but questions have always surrounded the identity of the male and female remains in the richest tomb, Royal Tomb II. A team including Uni-

versity of Bristol anatomist Jonathan H. Musgrave concluded in 1984 that markings on the skull and other bones appeared to correlate with reported injuries suffered by Philip II, including an arrow wound to his right eye during the siege of Methone in 354 B.C., 18 years before his assassination. That identification forms the centerpiece of a new museum at Vergina.

But Bartsiokas, the director of Greece's Anaximandrian Institute of Human Evolution and an assistant professor at Democritus University of Thrace, says his new close-ups of the bones, taken in 1998, do not reveal such damage. He scrutinized the bones to see



Identity crisis. This skull, once thought to be that of the warrior king, Philip II of Macedonia, may instead belong to his son, Philip III Arrhidaeus.

whether the previously reported “notch” and “bone pimple” on the skull were consistent with healed wounds from an arrow injury. He rejects this hypothesis, reporting that the marks “bear no evidence of healing or callus formation” and are simply normal anatomical features. “Despite the severe injuries suffered by Philip II, there is no skeletal evidence whatsoever of any injuries to the male occupant of Royal Tomb II,” he concludes.

He also notes that historical records show that Philip III Arrhidaeus—who had ruled for 6 years after Alexander's death and was murdered in 317 B.C.—had been buried for about 6 months before his exhumation and cremation by Cassander. And the condition of the skeletal remains were consistent with bones that had been “dry” of flesh before cre-

mation. “Only the bones of Arrhidaeus would show these characteristics,” Bartsiokas contends. As for the Vergina museum's description of Tomb II as that of Philip II, Bartsiokas says: “I hope they change that.”

The later burial date leaves open the possibility that some of the artifacts in the tomb—including a helmet, a gilded silver diadem, an iron-and-gold cuirass, and the ceremonial shield—may have belonged to Alexander himself, who had died in 323 B.C. and whose remains were interred in Egypt before being lost. Borza says the Vergina tomb's items fit several historical descriptions of Alexander's paraphernalia.

Despite that exciting prospect, Musgrave—who made the original identification along with Manchester archaeologist John Prag and medical artist Richard Neave—stands by his group's findings. He insists that the facial bones he examined showed signs of healed wounds and suggests that the bones' condition may have degraded during the 15 years between his examination and that of Bartsiokas. He also contends that several details of Tomb II—including its apparent hasty construction—argue against it being the tomb of Philip III Arrhidaeus. Bartsiokas “has concentrated on evidence that is limited in the extreme to postulate a hypothesis that cannot be sustained,” Musgrave says.

But Borza and Bartsiokas dismiss those objections. Borza argues that two artifacts in the tomb—a piece of ceramic pottery and a Macedonian silver wine strainer—are clearly dated later than Philip II's death. The new analysis of the bones, along with the late artifacts, says Borza, “drive the final nail in the coffin of the Philip II identification. Clearly, this is not the tomb of Philip II, but of the next generation.”

—ROBERT KOENIG

GERMAN VOTE

Animal Rights Amendment Defeated

German scientists who experiment on laboratory animals can breathe a bit easier—for now. On 13 April Germany's lower house of parliament narrowly defeated an effort to amend the nation's constitution to guarantee animal welfare. Such an amendment could have led to court challenges of much of the country's lab-animal research.

The amendment, supported by the ruling

ScienceScope

coalition of Social Democrats and Greens, won a majority in the 669-member Bundestag. But it failed by 54 votes to garner the two-thirds margin necessary to alter the constitution, thanks to opposition from the center-right Christian Democrats. "It is frightening that what could have been a major disaster to science and research ... was only prevented by a single party," says Andreas Kreiter, a Bremen University neuroscientist whose brain research using macaques has been a high-profile target of animal rights activists.

Germany already has one of Europe's toughest laws requiring researchers to treat animals humanely by providing adequate caging and food while minimizing suffering. The amendment would have tacked onto the constitution a one-sentence guarantee of animal rights with no allowances for lab animals. If the amendment had been adopted, Kreiter asserts, activists would have brought "a huge number of court trials" to halt experiments involving animals. This, he says, "would have, in effect, stopped biomedical research in Germany."

The close vote energized animal rights leaders, who have vowed to make the Christian Democrats pay, politically, for their stance. Eisenhart von Loeper, who heads the animal rights group Bundesverband der Tierversuchsgegner, says the battle is heating up in Germany's 16 states, half of which already have added animal rights provisions to their own constitutions. (These have far less impact than would a national amendment.) Adds Wolfgang Apel, president of the Deutscher Tierschutzbund: "We are not giving up."

—ROBERT KOENIG

GERMANY

Panel Urges New Slots For Young Researchers

Four years after getting his Ph.D. from Cologne University, physicist Norbert Pietralla is on a fast track. In the rigid, tradition-bound German academic system, that also makes him a pioneer. Pietralla, a postdoc at Yale University's Wright Nuclear Structure Laboratory, is one of 100 young scientists chosen last year for a new fellowship program named after noted German mathematician Emmy Noether. When he returns to Germany after 2 years abroad, Pietralla will receive 3 years' funding for an independent research position—a step ahead of his contemporaries.

The Noether program is the most visible effort so far to loosen up the country's hidebound university research structure and speed young scientists' passage into independent academic research. But more

sweeping changes may be on the way: Last week, a panel of German scientists and public officials recommended phasing out the notorious post-Ph.D. Habilitation requirement—a kind of extended postdoc that puts young researchers under the thumb of senior professors for 10 years or more—and replacing it with "junior professor" slots similar to assistant or associate professors at U.S. universities. And last month, the DFG, Germany's major granting body, added peer reviewers in part to speed up its review procedures.

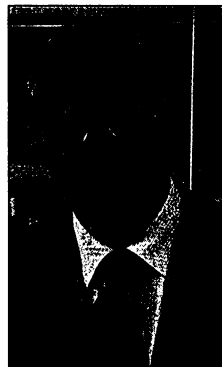
German Research Minister Edelgard

Bulmahn supports the "junior professor" concept as a way to "give more independence to bright young researchers." So do Pietralla and other Noether grantees. "The Habilitation slows everything down and immobilizes you," says

Noether fellow Christine Thomas, an earth sciences postdoc at the U.K.'s Leeds University. But the proposals, which the German parliament may debate later this year, face some tough opposition. An influential organization of university professors objects to the idea, warning that such new posts would simply lead to a second tier of "cheap professors" who lack the rigorous training of the Habilitation degree.

Another weak link in the scientific chain, say critics, is the DFG's peer-review system, which sometimes stumbles over interdisciplinary projects and includes too few women and young scientists. Objections to the system came to a head last month when Mark Benecke, a 29-year-old forensic entomologist whose application for a Noether grant was rejected, wrote a scathing op-ed in Munich's main newspaper. His commentary led to a flood of comments on the newspaper's Web site, prompting a letter defending the DFG that has been signed by several hundred German scientists.

"We are moving as quickly as we can ... to promote independent research by talented young scientists," says DFG president Ernst-Ludwig Winnacker, who was a member of the Research Ministry panel that reported last week. Noting that Benecke's application had been voted down by four reviewers, Winnacker says "there are always unhappy researchers who think their grant applications should have been approved." But he concedes that interdisciplinary research pro-

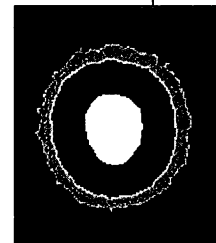


Young and restless. DFG's Winnacker says "we're moving as quickly as we can" on reforms.

BeppoSAX Slimmed Gamma ray scientists are losing more observing time. Last month, NASA said it would destroy the 10-year-old Compton Gamma Ray Observatory (*Science*, 31 March, p. 2393). Now, the 4-year-old Italian-Dutch BeppoSAX satellite is trimming operations due to budget cuts.

The Italian Space Agency on 15 April began shutting down BeppoSAX's instruments on Saturday and Sunday nights, and staff will no longer work around the clock. As a result, astronomers won't be able to react quickly to some gamma ray bursts, the high-energy explosions that occur about once a day in the far reaches of the universe (above). On 16 April, for instance, BeppoSAX missed a chance to study the afterglow of one unusual burst, notes Luigi Piro of the Institute for Space Astrophysics in Rome. "It's a pity," adds John Heise of the Space Research Organization Netherlands in Utrecht.

Heise expects BeppoSAX to be shut down permanently in April 2001. But gamma ray bursts will still be monitored by a network of interplanetary satellites, and a new gamma ray observatory—NASA's High Energy Transient Explorer—is slated for launch within a few months.



Lame Duck Soars Neal Lane has avoided the political limelight during his 7 years as a senior science official in the Clinton Administration by hewing to the party line and speaking in generalities. But last week, at the annual R&D colloquium sponsored by the American Association for the Advancement of Science (which publishes *Science*), Lane threw out some uncharacteristically specific science policy goals. "In 10 years, the federal government should double [spending on civilian research] to 1% of GDP," he declared. Corporate America, he added, should double its investment in university-based research. And universities should promise to increase the number of minorities and women awarded science-related degrees by 10% a year.

What's behind the sudden spurt of specificity in the waning months of the Administration? Lane wanted to "sharpen the debate," says a White House source, especially with regard to minorities, where "collectively we've been sitting on our hands." Others discern an agenda outline for presidential contender Al Gore. All agree that it's a striking departure for the mild-mannered Lane. Says one Washington insider: "It's like he felt suddenly unchained and free to speak his mind."