project will produce immediate results," says Norio Kaifu, director-general of the National Astronomical Observatory in Tokyo.

The new procedure represents a significant change in the way Japan crafts its research budget. In the past, when ministries submitted funding requests at the end of August, they expected the numbers to be shaved a little by the time the budget was finalized in December, but the overall science spending trend and the fate of particular programs would be set. In early August, however, the Council on Economic and Fiscal Policy, which is chaired by Prime Minister Junichiro Koizumi, centralized the priority setting.

Sink or swim? Funding for completing the derrick for this ocean drill ship could be among the initiatives swept away by Japan's efforts to trim government spending.

The council invited bureaucrats making proposals for a certain category of science spending—which provides most of the money for actual research but doesn't cover salaries or facility construction—to ask for up to 20% more than they are getting this year. "The requests will be squeezed [by the council] so science-related spending will be about the same as in the current year," says an Education Ministry official. An official on the staff of the Council for Science and Technology Policy, which is also part of the prime minister's office, explains that the administration wants "more flexibility in dramatically redistributing budget resources," something that was difficult when each ministry decided where money would go.

The budget requests already tilt heavily toward four fields the cabinet deems economically important: life sciences, information technology, the environment and energy, and nanotechnology and materials science. The Education Ministry's requested 36% increase, to $2.6 billion, for the priority fields compares to a proposed 13% increase, to $1.6 billion, for grants to individual researchers and a rise of only 2%, to $370 million, for operating large facilities such as accelerators. Kaifu argues that this rapid shift in priorities not only short-changes basic research but wastes money by pumping up funding in the priority areas faster than labs can increase staffing and facilities to absorb it.

Just how wide the disparities between fields will become, and even whether science spending is headed up or down, won't be clear until the budget is finalized around the end of the year. **–DENNIS NORMILE**

CREDITS: (TOP TO BOTTOM) JAMSTEC; A. TSIARAS/ANATOMICAL TRAVELOGUE INC.

EMBRYOLOGY

Embryo Development At the Click of a Mouse

After a 5-year gestation, the Visible Embryo is close to term. A Web site with hundreds of thousands of images capturing in mind-boggling detail the earliest stages of human development, the Visible Embryo is expected to debut later this month. "It's incredibly cool to look at how an embryo develops," says medical illustrator Elizabeth Lockett, who oversees the project for the U.S. National Museum of Health and Medicine (NMHM).

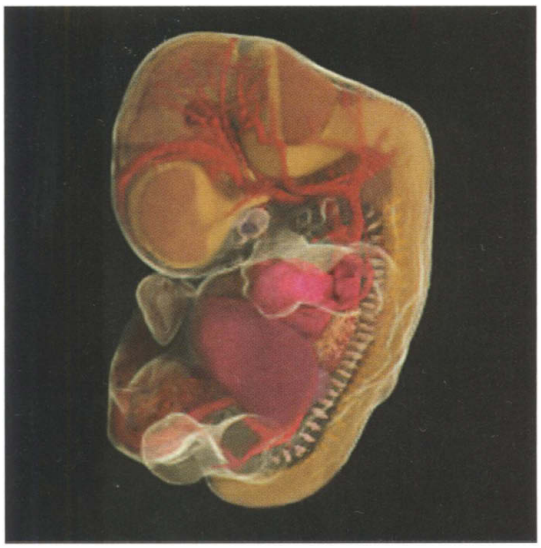
The Visible Embryo is based on the 115-year-old Carnegie Embryological Collection, a remarkable set of 7000 human embryos now housed at the national museum, a branch of the Armed Forces Institute of Pathology at the Walter Reed Army Medical Center in Washington, D.C. Initially, the project will post multiple high-resolution digital images of slices of 25 normal embryos at various stages of development. These are a subset of 700 embryos that researchers at the Carnegie Institution of Washington had carefully sliced into serial sections, all of which will eventually be included in the Visible Embryo. In all, the database will take about 9 terabytes of space at the San Diego Supercomputer Center, making it one of the largest medical image resources in the world.

An array of collaborators joined forces to make the Visible Embryo much more than a trove of pretty pictures. Coordinated by George Mason University in Fairfax, Virginia, the project will have educational tools, developed by a team at the University of Illinois, Chicago, that will include animation of organ systems as they develop. Researchers at Johns Hopkins University in Baltimore, Maryland, are designing ways for clinicians in separate locations to discuss and manipulate images that apply to specific cases. Technicians performing ultrasounds on pregnant women, for example, will be able to compare stored images of normal embryos with those in utero. Oregon Health & Science University in Portland has the task of modeling and annotating images of the heart. The whole enterprise, which has cost about $3 million so far, was funded by the National Library of Medicine (NLM) as part of its Next Generation Internet Initiative. NLM also backed the Visible Human Project, a database that posted digital cross sections of a complete male in 1994 and a female the following year.

Until now, researchers interested in using NMHM's collection had to travel to Washington; they came from all over the world, often staying for several weeks. "It's an absolute treasure," says Shirley A. Bayer, a professor emeritus at Indiana University–Purdue University Indianapolis who, with her husband Joseph Altman, used the collection for their extensive publications about the development of the brain. Making the images more accessible by putting them online will have tremendous benefits, Bayer predicts.

Two years ago, Lutz Breitsprecher, a maxillofacial surgeon at the University of Greifswald in Germany, spent nearly a month studying the Carnegie embryos to learn better surgical techniques. "Understanding facial development is important for better understanding how to do cleft surgery in the right way," says Breitsprecher. "There are different opinions about how to select the skin incision points. I found my answer there, and I never would have found it in the literature." Other surgeons, physical anthropologists, and the dying breed known as anatomists also have used the collection extensively.

The museum—which is famous for such macabre displays as a leg in a jar and an arthritic skeleton in a rocking chair—is planning two offerings in late October to tie into the birth of the Visible Embryo. One is a new exhibit titled "From Conception to Birth" featuring photographs by Alexander Tsiaras of embryos in the collection (see above), and the other is an overhaul of its long-standing exhibit on human development, which will include more embryos and fetuses at various stages. For those who can only visit the museum in cyberspace, log on to www.natmedmuse.afip.org for a tour of the museum and a link to the Visible Embryo Project. **–JON COHEN**



Digital embryo. Colored photograph by Alexander Tsiaris of 7-week-old embryo in collection at the National Museum of Health and Medicine.