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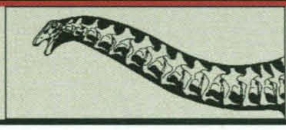
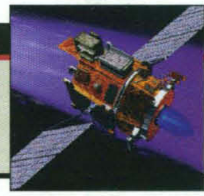


Quick-growing dinosaurs



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A robot at the controls

1999 BUDGET FINALE

NIH Wins Big as Congress Lumps Together Eight Bills

It wasn't elegant, but the grand budgetary finale of the 105th Congress last week was generous to many constituents—particularly biomedical scientists. In addition to bestowing billion-dollar subsidies on electric utilities and scores of highway projects on favored regions, White House and congressional leaders negotiated a last-minute deal that gives the National Institutes of Health (NIH) a record $2 billion raise in 1999. They also boosted energy science programs and extended tax breaks for corporate research through the current fiscal year, which began on 1 October.

The plums are part of a massive, 4000-page omnibus appropriations bill that, as *Science* went to press, was still being finalized by harried congressional staffers. It tacks together eight of the 13 annual spending bills that had become mired in election-year politics. Legislators had already approved, and the president has signed, budgets for the rest of the government (*Science*, 9 October, p. 209). The deadlock was broken only by a marathon horse-trading session held behind closed doors. As a result, few details of the package were publicly available before the vote, and many agencies remained uncertain about which of their programs might expand or shrink. Indeed, one veteran lobbyist estimates that this "embarrassing" tangle of legislation could take weeks to sort out.

Still, biomedical research leaders are delighted with what they've seen so far. Draft legislative documents obtained by *Science* indicate that Congress has put together a dream budget for NIH that should please even the agency's most ardent supporters. The omnibus bill—expected to be approved on 21 October—boosts total NIH funding by 15%, putting it on track for doubling within 5 years. This matches the optimistic target set by biomedical advocates early this year—and is big enough to prevent destructive competition among disease interest groups.

The big NIH raise is also a triumph for Senator Arlen Specter (R–PA), chair of the Senate appropriations subcommittee that oversees the agency's budget. By insisting on a 15% increase for NIH, Specter outbid both the Clinton Administration, which had proposed an 8.7% raise, and the House appropriations subcommittee chaired by Representative John Porter (R–IL), which had suggested 9.1%. Clinton had suggested paying for the increase with a new tax on tobacco, while Porter's subcommittee found the money by cutting subsidies for low-income energy assistance and summer jobs. Congress rejected both ideas. Instead, it contrived an "emergency" that allowed it to break existing budget rules and use this year's $70 billion federal surplus to pay for a host of old and new projects. The $21 billion in emergency, "off-budget" spending on military readiness, farm aid, and other programs also freed up funds for increases in programs constrained by budget caps.

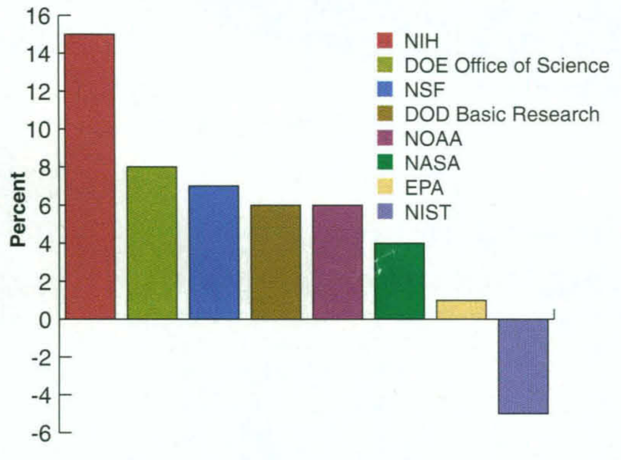
The largest chunk of the NIH appropriation, about one-fifth of the total, goes to the National Cancer Institute, whose budget increases by 15% to $2.9 billion. The smaller, but highly visible, National Human Genome Research Institute gets a 22% raise, to $264.9 million. Funding for the office of the NIH director grows by 27%, to $306.6 million, in part to accommodate a new Center for Complementary and Alternative Medicine. A draft conference report sets aside $50 million for this venture, a darling of Senator Tom Harkin (D–IA), and specifies that "not less than $20 million" be spent on "peer reviewed complementary and alternative medicine research grants and contracts … as proposed by the Senate." The draft report also gives its blessing to a cancer control program for minorities, a Cooley's anemia clinical network, an Alzheimer's disease prevention initiative, and others, but doesn't earmark funds for them.

Biomedical types were already celebrating. "I've been on a high all day," said William Brinkley, president of the Federation of American

SELECTED U.S. SCIENCE PROGRAMS: HOW THEY FARED
(millions of dollars)

Agency or program	FY '98 budget	FY '99 request	FY '99 budget	% change
NIH	13,622	14,803	15,652	15%
DOE Office of Science	2228	2445	2407	8%
NSF	3429	3773	3672	7%
DOD Basic Research	1042	1111	1105	6%
NOAA	2050	2180	2166	6%
NASA*	3661	3672	3797	4%
EPA†	633	627	642	1%
NIST	678	715	647	–5%

* Space science, life and microgravity sciences, and earth science programs. † Science and technology.



Big step up. NIH's budget increase over 1998 dwarfs the raises given to several other research organizations.

SOURCE: AGENCIES AND LEGISLATION

Societies for Experimental Biology (FASEB), noting that 15% exceeded his expectations. "We worked hard for his," he added. "I think we're seeing the fruition of a lot of active participation by individual scientists going to Washington." Brinkley says FASEB leaders have already held strategy meetings to discuss how best to spend the money, including striking the right balance between individual investigator grants and centers and other large awards.

Climate change scientists and renewable energy advocates were also celebrating an unexpected $210 million boost in research spending. Earlier this month, in approving budgets for the Department of Energy (DOE) and the Environmental Protection Agency, Congress had severely pruned the Administration's request for funds to fight global warming. At DOE, for instance, lawmakers approved just $275 million of a $357 million request for the solar and renewable energy program. In the closed-door negotiations, however, "the Administration twisted some arms until the global warming money appeared," said an exuberant but exhausted White House staffer.

In contrast, officials at the Commerce Department's National Institute of Standards and Technology (NIST) were happy that the news wasn't worse. The agency's core research programs received $280 million, $8 million more than last year, while the Advanced Technology Program—a once-incendiary effort that funds public-private research partnerships—got $204 million, an $11 million increase but $56 million below the request. Although the levels are only about 90% of what had been sought, a NIST source labeled them "excellent."

Another Commerce Department agency, the National Oceanic and Atmospheric Administration (NOAA), got a 6% increase, to $2.2 billion. NOAA's Sea Grant program, which funds university researchers, will grow by less than 3%, to $57.5 million, although lawmakers earmarked $4 million of the funds for research on zebra mussels and oyster diseases. The good news is that the earmarks, which aren't popular with many marine researchers, take up a smaller portion of the program's budget than they did last year, says Kerry Bolognese of the National Association of State Universities and Land-Grant Colleges in Washington, D.C. The bad news, he adds, is that "Sea Grant is not keeping pace with inflation."

In other moves watched by the research community, negotiators postponed a bitter partisan fight over the use of sampling in the 2000 Census by agreeing to fund the Census Bureau only through 15 June. This spring the Supreme Court is expected to rule on two cases involving the technique, which is aimed at making up for a serious shortfall in the 1990 headcount. Republicans oppose sampling because they say the Constitution requires an actual headcount, while Democrats and statisticians have generally supported the concept (*Science*, 6 February, p. 798). Use of the technique is expected to increase population estimates in neighborhoods seen as Democratic strongholds.

Although the ink is barely dry on the new budget deal, science lobbyists are already positioning themselves for the 2000 budget battles, which will formally begin when President Clinton presents his request to Congress next January. "Every scientific society," says one congressional aide, "is asking itself how it can replicate what the biomedical community did with NIH."

–DAVID MALAKOFF AND ELIOT MARSHALL

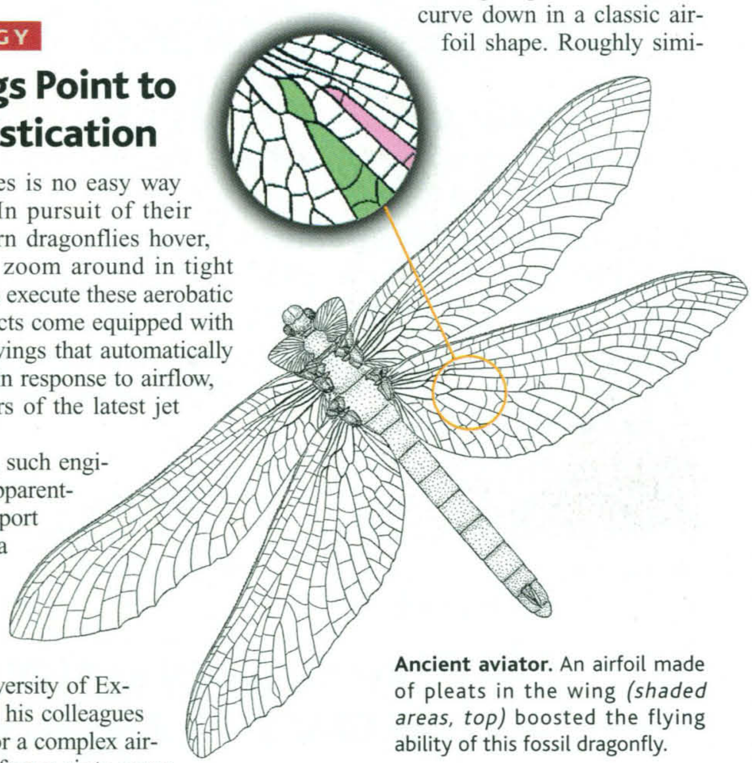
PALEOBIOLOGY

Insect Wings Point to Early Sophistication

Catching mosquitoes is no easy way to make a living. In pursuit of their darting prey, modern dragonflies hover, fly backward, and zoom around in tight high-speed turns. To execute these aerobatic maneuvers, the insects come equipped with highly engineered wings that automatically change their shape in response to airflow, putting the designers of the latest jet fighters to shame.

But in evolution, such engineering tricks are apparently old news. In a report on page 749 on a 320-million-year-old dragonfly from Argentina, entomologist Robin Wootton of the University of Exeter in the U.K. and his colleagues describe evidence for a complex airfoil, a structure that forces air to move faster over the top of a wing than underneath it, creating a pressure difference that gives a wing its lift. Not only did evolution come up with such sophisticated flying adaptations very early, but it also produced them more than once. Although the ancient fossil structures have the same effect as the airfoils of modern dragonflies, they are different enough that scientists think the two systems evolved independently. "It's a startling example of convergent evolution," says evolutionary aerodynamicist Adrian Thomas of Oxford University in the U.K.

To achieve the airborne agility needed to chase prey such as mosquitoes and houseflies, a dragonfly must be able both to twist its wings and change their shape to alter the airflow around them. Unlike birds and bats, which have muscles that control the shape of their wings, an insect wing is simply a membrane stretched over a series of veins. But in an example of what Wootton calls "smart engineering," modern dragonflies have a complex system of veins that stabilize and shape the wings without any muscle power. One region, called the basal complex, forms a series of pleats arranged so that when the insect flaps downward, the air pressure on the underside of the wing forces the trailing edge to stiffen and curve down in a classic airfoil shape. Roughly similar to the flaps that open on planes during takeoff and landing, the mechanism allows dragonflies to stay aloft at lower speeds.



Ancient aviator. An airfoil made of pleats in the wing *(shaded areas, top)* boosted the flying ability of this fossil dragonfly.

Wootten and paleoentomologist Jarmila Kukalová-Peck of Carleton University in

CREDITS: J. KUKALOVÁ-PECK