

Plan for Chiropractic School Riles Florida Faculty

Faculty members are questioning a plan to make Florida State University (FSU) in Tallahassee the first public U.S. university with a chiropractic medicine school. This week the faculty's graduate policy committee voted to examine the proposal amid concerns that implementing it would sully the university's reputation. But FSU administrators say such a graduate program, if ultimately adopted, would be a valuable addition to health care education and could benefit millions of Americans who suffer from back pain.

"There's a very good reason why no public university offers a degree in chiropractic medicine," says Raymond Bellamy, director of orthopedic surgery at FSU's Pensacola campus and leader of the opposition campaign. "It's because having a chiropractic program would seriously undermine the scientific tradition of any institution." Not so, says FSU provost Larry Abele, an invertebrate morphologist: "A graduate education and research program aimed at moving chiropractic medicine into a scientific and evidence-based realm is certainly worth exploring." The flap is reminiscent of a dispute at York University in Toronto, Canada, when faculty members blocked a plan to offer an undergraduate degree program that would have been affiliated with the Canadian Memorial Chiropractic College (*Science*, 19 February 1999, p. 1099).

Last March, at the urging of a state senator who's also a chiropractor, the Florida legislature authorized \$9 million per year to establish such a school. FSU administrators conducted a feasibility study and drew up a proposal for a College of Complementary and Integrative Health that would offer a 5-year Doctor of Chiropractic degree. That proposal, which cited studies that it claimed showed "why more than 15 million Americans use chiropractic care," was to be presented this week to the university's board of trustees and 2 weeks later to the state Board of Governors.

Abele says chiropractic medicine is a legitimate field of study that deserves a place in the academic mainstream. He also says the university will not implement the proposal unless it has the support of the faculty: "The legislation simply authorizes funds for setting up the school. It does not require that we do so." Even so, FSU officials advertised in November for the posi-



Realignment. This fictitious map of FSU's main campus, by chemist Albert Stieglman, has helped rally faculty opposition to a chiropractic school.

tion of dean of the proposed school.

Richard Nahin, a senior adviser at the National Center for Complementary and Alternative Medicine at the National Institutes of Health, says the popularity of chiropractic care among Americans makes it

important to understand whether "chiropractic works, what conditions it may work for, and how it may work. Having a state chiropractic school could be of benefit to the field," he adds, "as that school would probably educate chiropractors using the same scientific, evidence-based approach used to train medical doctors."

None of those arguments is enough to convince neuroscientist Marc Freeman, one of 40 FSU professors—including Nobel Prize-winning chemist Harry Kroto and physicist J. Robert Schrieffer—who have signed a petition against the proposal.

Apart from the lack of a scientific basis, he says, the chiropractic school is a threat to FSU's academic independence. "We cannot have the legislature forcing a program on a public university," he says.

—YUDHIJIT BHATTACHARJEE

DEVELOPMENTAL BIOLOGY

Bird Wings Really Are Like Dinosaurs' Hands

Molecular studies have smoothed a wrinkle in the assumption that modern birds had dinosaur ancestors. After tracing the expression of two genes important in the development of digits in wings and other limbs, researchers have concluded that the three digits in bird wings correspond to the three digits in dinosaurs' forelimbs. For years,

most embryologists had considered them different. "This may settle a long-standing controversy and will strengthen the theropod [dinosaur]-bird link," says Sankar Chatterjee, a paleontologist at the Museum of Texas Tech University in Lubbock.

Over the past decade, new fossils and phylogenetic analyses have convinced most paleontologists that birds are dinosaurs. A few researchers have refused to accept this evolutionary pathway, and one tenet of their argument has to do with how to count fingers.

Terrestrial vertebrates typically have five fingers, numbered 1 to 5. In both dinosaur fossils and birds, just three of these digits are fully developed, a trait that at first glance supports a dinosaur-bird connection.

But dinosaur forelimbs have the first three digits, with stubs for the last two. In contrast, going by some embryological evidence, birds appear to have retained the middle three fingers. In 1997, for example, ornithologist Alan Feduccia, a noted critic of the bird-dinosaur link at the University of North Carolina, Chapel Hill, and a colleague tracked digit ▶



Telltale tracers. The initial digits in developing wings arise where *Hoxd13* is expressed (right, dark stain) and *Hoxd12* isn't (left, dark stain).

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formation in turtles, alligators, ostriches, cormorants, and chickens. They concluded that the bird "fingers" were the middle three, whereas the reptiles' were the first three out of those five possibilities (*Science*, 24 October 1997, p. 666). That inference fueled arguments against a dinosaur-bird connection. In 1999, Yale University's Gunter Wagner and Jacques Gauthier, proposed a controversial compromise: that in avian ancestors, developmental signals transformed tissue in position to become digits 2, 3, and 4 into digits 1, 2, and 3.

Determined to resolve the issue, Alexander Vargas, an evolutionary-developmental biologist at the University of Chile in Santiago, and John Fallon, a developmental biologist at the University of Wisconsin, Madison, compared the embryological development of digits of mice and chickens. Working in Fallon's Wisconsin lab, they traced the activity of two genes crucial for digit development, *Hoxd13* and *Hoxd12*. Fallon and others had already shown that among other differences, the development of the first digit in mice relies on *Hoxd13* but not *Hoxd12*, whereas the other digits need both. The first digit also forms differently. "There are several molecular and developmental reasons to consider that digit 1 is distinct from other digits," says Vargas.

When the researchers looked at the chick embryo, they found that the wing's initial digit—until now considered to be digit 2, especially by opponents of the bird-dinosaur theory—used *Hoxd13* but not *Hoxd12*, indicating that it really is the first digit, developmentally speaking. Birds therefore have the same digits as dinosaurs, Vargas and Fallon conclude in the January issue of *The Journal of Experimental Zoology Part B: Molecular and Developmental Evolution*. In birds, the first digit is simply masquerading as the second one. "I think it's the best evidence yet that digits gain their identities from [their genetic milieu] and not from position," says Richard Prum, an ornithologist at Yale University.

Friesten Galis, a functional morphologist at Leiden University in the Netherlands, is not convinced. Studies of digit development in other animals do not show as clear a difference in *Hoxd13* and *Hoxd12* expression as Vargas and Fallon presume, he points out. Galis cites new evidence he's recently obtained by studying birds with abnormal digit patterns that continues to support the idea that the digits in bird wings are equivalent to digits 2, 3, and 4 in other animals. And Feduccia is even more skeptical about the study and its conclusion. Hand development is just not that malleable, he insists.

The flap over bird wings continues.

—ELIZABETH PENNISI

STEM CELLS

California's Bold \$3 Billion Initiative Hits the Ground Running

Controversy over California's new stem cell initiative didn't end when the state's voters approved Proposition 71 in November by 59% to 41%. But now that the new California Institute for Regenerative Medicine (CIRM) is beginning to take shape, the debate has shifted from ethics and costs to how the enterprise will operate. Supporters are still brimming with confidence, however.

The new institute as yet has no staff, no home, and just a one-page Web site (www.cirm.ca.gov). But at a press conference last week, Robert Klein, CIRM's newly elected chair of the board, repeated assurances that he expects grants to start flowing by May. "I admit that I am an optimist," he added.



Committed father. Newly anointed stem cell czar Robert Klein with son Jordan.

At its first full meeting, held on 6 January at the University of Southern California in Los Angeles, the 29-member board, called the Independent Citizen's Oversight Committee (ICOC), set up subcommittees to find outsiders for "working groups" that will establish policies on research funding, ethics, and facilities construction. They also launched the hunt for a president for CIRM—ideally a seasoned research administrator who will be in charge of recruiting scientific advisers, directing staff, and participating in the formation of policies from lab construction to intellectual property agreements. Klein will head the search.

At the meeting, ICOC also elected as Klein's vice chair Edward Penhoet, a chemist who has straddled many sectors as a Berkeley dean, co-founder of Chiron Corp. in Emeryville, California, and most recently as president of the Gordon and Betty Moore Foundation in San Francisco. As a scientist and public health expert, Penhoet has a "complementary set of skills" to Klein's, says ICOC member Edward Holmes, dean of the University of California, San Diego, Medical School.

Penhoet is heading the search for space for the institute's administrative headquarters. Also on the front burner is securing a start-up loan of \$3 million from the state.

The critics have been busy as well. A primary concern, voiced by the Center for Genetics and Society in Oakland, among others, is that the initiative—which is immune from legislative tampering for the first 3 years—has been framed so that it may freely violate state and federal regulations on matters such as open meetings and conflicts of interest. Critics also worry that taxpayers won't get proper returns from patent and royalty fees, and some are troubled that Klein designed the entire initiative and slid into the top job without a hint of competition.

But supporters seem to have limitless confidence in 59-year-old Klein, who put more than \$3 million of his own money into the Proposition 71 campaign and helped raise more than \$20 million. A graduate of Stanford law school and president of Klein Financial Corp. in Fresno, California, which finances the construction of low-cost housing, Klein was drawn into the stem cell issue because his 14-year-old son Jordan has juvenile diabetes.

Committee members say they can negotiate the ethical minefield. "Whatever connections we might have anywhere" have to be a matter of public record, notes Holmes. Klein has pledged not to hold investments in biomedical or real estate enterprises "reasonably likely to benefit" from the stem cell program. He plans to step down after serving 3 years of his 6-year term. And he has resigned as head of the California Research and Cures Coalition (CRCC), which has been reconstituted as a nonprofit education and lobby group. CRCC hopes to build confidence with four community forums to be held around the state this month, at which citizens will discuss "practical and ethical issues" with scientists.

For now, at least, supporters seem to outweigh critics. "I think [the organizers of the CIRM] are drawing in the best this country has to offer," says Michael Manganiello of the Christopher Reeve Paralysis Foundation. Some scientists have expressed skepticism about the wisdom of funding research by means of popular vote and worry that the public has been oversold on the promises of the research. But it's hard to find a critic among stem cell researchers, who stand to benefit from the \$3 billion and the new wave of attention that CIRM will bring to their field.

—CONSTANCE HOLDEN