

The shape of things to come: Florida hopes that the planned development of Scripps Florida at Palm Beach will provide a huge boost to the state's economy.



Upstart states

The United States has a settled arrangement for distributing its research budget around the country, and the same states have dominated it for decades. But, as Emma Marris discovers in Florida, the have-nots have had enough.

Seen from the air, Florida's Palm Beach looks like paradise. There's the aquamarine sea, the sandy line of beach studded with palms, the pastel cul-de-sacs with their deep-blue squares. It is only as you descend that you realize that the squares aren't swimming pools, but plastic tarpaulins — makeshift repairs after last summer's hurricane season. Welcome to the future home of Scripps Florida.

Scripps is the state's heavyweight contender in a battle to win promotion to the first division of science. Jeb Bush, the president's brother and governor of Florida, has helped to arrange \$310 million in state funding to attract the Scripps Institute in La Jolla, California, to the state. Palm Beach County has promised a further \$200 million, including a 777-hectare former orange grove as a site.

Will the arrival of Scripps succeed in establishing a premier biomedical research centre and nurturing a string of spin-off biotechnology companies in this playground for the rich, tanned and famous? It's not only a question for Floridians. Other states that fare badly in the carve-up of

federal research funds (see map, opposite) will be watching Florida's progress with interest. One way or another, they all want the answer to the same question: is it too late for them to get into the science game?

Prestigious start

The basic geography of research funding in the United States dates from the system's establishment after the Second World War. Scientists, credited with the development of the atomic bomb, found their prestige at an all-time high, and the agencies set up by federal government to support their work had no hesitation in awarding the lion's share of the money to places where the scientists wanted to live and work. Mostly that meant Ivy League institutions on the east coast, the strong public universities in the midwest, and Stanford and the University of California system in the west.

The amount of funds available has since expanded to some \$23 billion, which the federal government will this year spend on basic and applied research in universities. Hundreds of less-celebrated institutions have

been seeking a share of the spoils, as have state governments such as Florida's. A successful research university is increasingly seen as a route to economic development. States that have traditionally received little research funding hope that building such institutes and encouraging spin-off companies will create high-paying jobs and attract new companies.

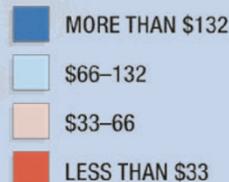
"When a university gets money, the effect is not confined just to that university," says Daniel Greenberg, a Washington-based journalist and author who has been writing about research policy for decades. "When you have a university with a thriving chemistry department you might get a paint manufacturer who says: 'This is a good place to locate a plant, because we can get consultants down the road very easily'."

Most federal science funds are distributed by government agencies on a competitive, peer-reviewed basis. Despite occasional carping that the peer-review system acts as an 'old-boys' network', most analysts consider it to be in pretty good shape. In general, good science is done by the best scientists, who are

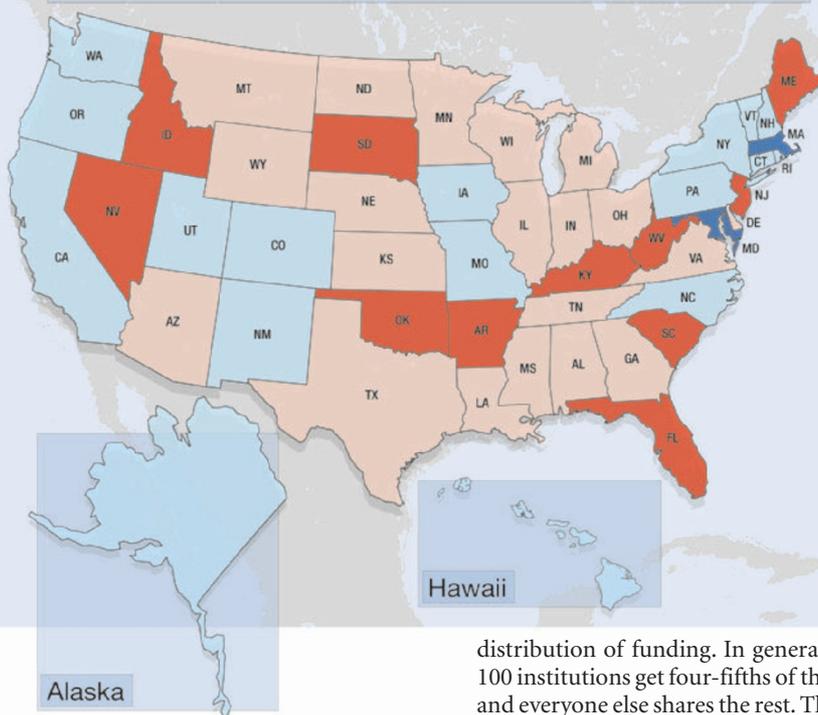
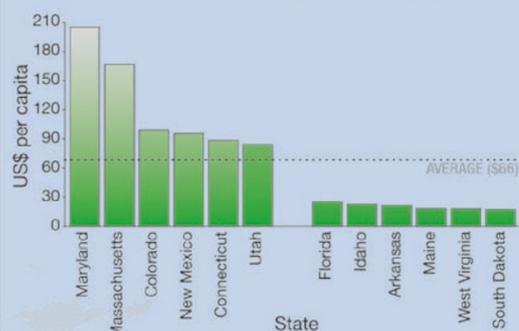
Federal spending on academic research and development

In 2000 (the year of the most recent census), the US federal government spent an average of \$66 per head of population on academic research and development. But this figure varied widely from state to state: in Maryland the spend was \$206 per person, in South Dakota, it was just \$18.

SPENDING PER CAPITA, 2000



WINNERS & LOSERS



attracted to the best institutions in search of the best research environment. It's a fair system — but a self-perpetuating one. States such as Texas, Florida and Arizona, which have enjoyed massive growth in their populations and economies during recent years, are still struggling to make their mark in science.

The National Institutes of Health (NIH) has come to dominate the research scene since its budget doubled to \$27 billion in the five years to 2003, and it now accounts for two-thirds of funding for academic research and development. But the agency's rise in funding has now flattened out. And some observers say that the boom, which benefited every academic research centre in the nation, has fostered delusions of grandeur in the 'have-not' states.

Big ideas

Joe Cortright, an analyst at Impresa, an economics consultancy based in Portland, Oregon, says that a study he did in 2002 for the Washington-based Brookings Institution showed a clear trend. Almost everywhere had twice as much biomedical funding in 2001 as in 1995, he says.

"What the governor hears is 'Our state doubled its funding.' This has led a lot of people to believe, naively, that their community is a big player," Cortright says.

Yet the boom hasn't radically altered the

distribution of funding. In general, the top 100 institutions get four-fifths of the money, and everyone else shares the rest. There is no sign that this will change as funding growth slows. Yet from coast to coast, Cortright notes, relatively obscure universities continue to spin off research parks left, right and centre, and local politicians are flush with money for scientific initiatives.

Florida is the fourth most populous US state, and its economy and population are among the fastest-growing in the nation. But in 2000 — the year of the most recent census — it ranked 44th out of 50 in a league table of the number of research dollars that academic institutions attracted per head of population. The state's best-known research facility is probably NASA's Kennedy Space Center, home of the space shuttle and assembly point for the International Space Station. The University of Florida advertises its science programmes as "more than just Gatorade", referring to the electrolyte-laced sports drink — the Gainesville university's most famous invention that has generated \$80 million in licensing income for the university.

The Scripps initiative is Jeb Bush's attempt to transform the state's scientific reputation in one fell swoop. He hopes that science can become a pillar of the state's economy, providing better-paid jobs than the current big employers: tourism, military bases and citrus farming.

Scripps would be the largest of a number

of science projects, from a small, existing medical-device industry to a 'high-technology corridor' stretching across the centre of the state from the Gulf of Mexico to the Atlantic and anchored by the University of Central Florida in Orlando and the University of South Florida in Tampa.

Attractive prospect

The Scripps project isn't the first attempt to kick-start high technology in the 'sunshine state'. In 1990, Florida unexpectedly beat Massachusetts to host most of a national magnet laboratory, a facility supported by the National Science Foundation. The National High Magnetic Field Laboratory (NHMFL) is now well-established, with one site tucked behind Florida State University at Tallahassee, another at the University of Florida in Gainesville, and a third at Los Alamos National Laboratory in New Mexico.

The NHMFL is a world leader in very powerful magnets. The Tallahassee site houses some of the world's largest resistive and hybrid magnets, which look like out-sized water heaters and use about 10% of Tallahassee's entire power supply. The lab is used by some 1,000 researchers each year in various disciplines to investigate molecules and materials.

Greg Boebinger, who joined the NHMFL as director last year, was as surprised as anyone when Florida won the laboratory from its previous site at the Massachusetts

Institute of Technology. “I was among the people who said: ‘What is this?’” he admits, laughing. “One of the main reasons Florida got it was state support.” The state put up about \$80 million to get the contract.

Boebinger is a great believer in the economic value of basic research. The magnet lab is like most scientific investments, he says: it repays into the community “an order of magnitude” more than it cost the state to build it. Federal funds for the NHMFL flow on into the local economy. An economic assessment conducted for the state last year by Florida State University’s Center for Economic Forecasting and Analysis reported that Florida had got back three-and-a-half times its initial investment in the facility.

The NHMFL has also been mentioned by Scripps officials as a possible collaborator. Pat Griffin, head of drug discovery for Scripps Florida, visited the facility in January to discuss this idea. Florida officials are betting that Scripps can replicate the magnet lab’s success on a far grander scale.

Sunny outlook?

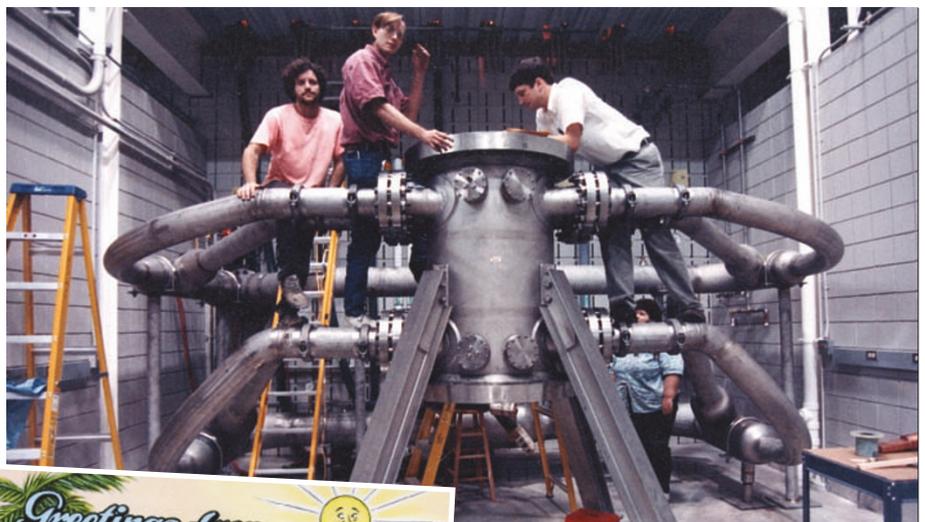
Last September, at a meeting of the economic development organization Enterprise Florida, several speakers argued that Scripps could act as the centrepiece of a coordinated plan for the development of the life sciences in Florida. Presentation after presentation forecast a rosy scientific future for the state. An analyst from Ernst & Young assured the audience, for example, that biotechnology in the United States was “clearly on the road to profitability for the first time”, and predicted it would be reach that goal in 2008.

But some speakers were more cautious. Kenneth Kirby, now president of TransDermal Technologies, said he had encountered difficulties in starting up his drug-delivery company in Lake Park, Florida.

He identified a funding gap for start-ups in the state, saying that venture capital there is relatively under-developed. Another speaker hit a nerve by joking that Florida universities, conditioned by years of competitive football, can’t seem to collaborate very well.

Indeed, several competing universities would like to be champions of Florida’s scientific future, and their rivalry could hold the state back, suggests Irwin Feller, an economist and science-policy specialist at the American Association for the Advancement of Science in Washington. Florida, he says, “fits the profile of a state where politics is in the way”. Feller adds that local politicians tend to expect an unrealistically quick return on their investment. “All their interest is economic.”

Sena Black, a vice-president of Enterprise Florida, notes that science-based companies started by researchers from outside the state can depart as soon as they become large enough to hire an experienced chief execu-



Ray of hope: Florida has already carved out a scientific niche by hosting the National High Magnetic Field Laboratory (above).



tive. “To get them to stay in Florida, they have to be Florida-bred, but Floridians are not being educated in science,” she complains, adding that school science and mathematics education is weak. But she remains optimistic. “We have these pockets of science. It’s more than meets the eye.”

Digging deep

Now the state seeks a larger pocket of excellence. In October 2003, Palm Beach County spent \$60 million buying a large family farm for the Scripps site. What was once wetlands, and then rows of citrus trees, is now a muddy field surrounded by slash pines and palmettos. But lawsuits from environmentalists have put the choice of the site into some doubt, and Scripps may now consider at least one other site near Palm Beach for the complex.

Cortright isn’t convinced by the ambitious Scripps Florida project. “I am extremely sceptical that it will produce any kind of biotech industry there. Just because they do research doesn’t mean that companies will open up. The money they are spending on Scripps moves it from way, way, way below to just about where everyone else is,” he says.

Griffin, who moved to Palm Beach from New Jersey to work at Scripps, is cautious too. “It’s definitely not a guaranteed success,” he says, “and I think the next few years will determine whether Scripps can do what it wants.” In the meantime, he is enjoying living where he used to go on holiday.

Greg Schuckman, director of government

“If a region can pull together the faculty and provide the resources, the opportunities are there.” — Irwin Feller

relations at the University of Central Florida, thinks that Florida should be able to exploit its reputation as a land of sun, beaches and easy living. He hopes that scientists can be lured from “the tundra of the midwest, the cost of living in California and the winters of the northeast”.

Yet attempting to boost a regional economy with science is a risky move, perhaps riskier than some realize. Many state initiatives, including Florida’s, are focusing on biotechnology. In Cortright’s judgement, the game in this sector is over and the winners are already in: San Francisco, Boston and San Diego, plus pockets around the NIH in Maryland and at Research Triangle Park in North Carolina. “Anyone pursuing it now is throwing their money away,” he thinks.

Feller is less dismissive. “If a region can pull together the faculty and provide the resources, the opportunities are there,” he says. Larger states that are trying to punch their weight in science will only do so if local institutional rivalries within the states are kept at bay, he suggests. But history shows that it is possible for states with little scientific activity to work their way up into the system over decades. “The system isn’t rigid,” he says. “It’s just very stable.”

Greenberg generally agrees. He also points out that projects funded by Congress without peer review — known as ‘earmarks’ — can give a leg-up to institutions in the have-not states. These are generally absent from the National Science Foundation and the NIH, he says, but even these agencies have programmes aimed specifically at states that attract little peer-reviewed funding.

Still, any movement tends to be glacial in pace. “The country and its scientific enterprise are both very mature now,” says Greenberg. “These are not the gold-rush days anymore.”

Emma Marris is a reporter for *Nature* in Washington DC.