

Some marine science is being sunk

Despite considerable lobbying from British scientists, Britain's Natural Environment Research Council (NERC) was unable to drum up the requisite \$2.5 million by Oct. 1 to join the international Ocean Drilling Program (ODP). That leaves the United States with only four (Canada, France, Japan and West Germany) of the five international partners needed to help support ODP's \$32.5 million annual operating budget. That also leaves the United States, which already contributes \$20 million a year, with a larger bill to foot.

According to Alexander Sutherland of the National Science Foundation (NSF) in Washington, D.C., the extra money will probably come from a companion U.S. science program that supports much of the activities required before ODP cruises such as surveys of drill sites, development of instruments and workshops. This program was funded at \$6.85 million during fiscal year '86.

Britain's failure to meet an earlier deadline to join ODP (SN: 4/20/85, p. 249) has already taken its toll. "We had to cut back last fiscal year by \$2 million, in a series of across-the-board cuts," says Sutherland. A past concern was that Leg 107, hard rock drilling into the Mid-Atlantic Ridge, would be scrapped for lack of funds. But this cruise was saved and the ODP drillship the *JOIDES Resolution* will be at the ridge from October through December. However, ODP has no more money to purchase hard rock drilling equipment or to develop the technology for drilling into hot rocks. This was one determining factor that led to the cancellation of Leg 111 to the East Pacific Rise off the coast of South America, originally scheduled for next summer.

With Britain out of the picture at least for now, the ODP has been courting other nations. A nine-country consortium of the European Science Foundation has raised two-thirds of the money needed for a full partnership. It had been hoped that the Australians would kick in the extra \$1 million needed to complete the membership fee but they have been unable to do so. Now the European countries are determining if they can muster the funds themselves.

On a bright note, the prospect of the Soviets signing up became more likely when, according to Sutherland, a senior Russian geologist last month visited the executive committee of JOIDES (Joint Oceanographic Institutions Deep Earth Sampling), which oversees ODP. ODP has full clearance from the U.S. government for such a partnership, he says, and NSF plans to send the Soviets a formal letter of invitation within the next few weeks.

As for the British, they are still struggling to find the funds. Britain's Depart-

Learning how to fly, reptile style

Next June, a strange and ancient shadow will pass over the tourists and congressional staff who crowd Washington, D.C.'s parklike Mall. The shadow, which last glided over the earth 65 million years ago, will belong to a mechanical model of the pterodactyl *Quetzalcoatlus northropi*, the largest flying reptile, distantly related to the dinosaurs. Last week, Paul MacCready, chair of AeroVironment Inc. in Monrovia, Calif., announced that the model — complete with an onboard computer, latex coverings, advanced aerodynamic material for bones, six pounds of nickel-cadmium batteries for powering five minutes of flight and even some neck hair — was finished and ready for its first flight test. The 35-pound replica has wings spanning 18 feet and is patterned after the few fossilized remains of a pterodactyl with a 36-foot wingspan found in 1971 in west Texas, as well as the more complete skeletons of some much smaller pterodactyls.

In designing the model, MacCready's group had to solve some rather tough engineering problems. *Quetzalcoatlus*, for example, didn't have a tail, which keeps modern-day birds and airplanes from heading into a nosedive. By progressively shortening the tail on preliminary models, the engineers learned how to compensate for the lack of a tail by changing the characteristics of the wings. *Quetzalcoatlus* also didn't have a vertical stabilizer, as planes do, but it did have a very narrow and movable head, which could be used as a front-end rudder for controlling yawing (the tendency to swing from side to side). "We've always supposed that this is what they did, but until we have a working model of it that will actually do that, we can't be sure that this is feasible," says Wann Langston Jr., a paleontologist at the University of Texas in Austin whose graduate student discovered the giant pterodactyl wing in Texas. The researchers will find out when testing begins next week. Movable fingers midway down the wings will also provide drag for the animal.

The mechanical model's public debut on the Mall in June will publicize its role in a new movie on flight, which will be



Designs and model of the largest flyer.

just opening at the nearby Air and Space Museum. While the replica looks hauntingly lifelike for its movie role, it differs from the genuine article in two main ways. First, while the mechanical animal will propel itself by flapping its huge wings, paleontologists suspect that only the smaller flyers could generate a steady stream of energy necessary to lift their bodies and continuously flap their wings. Instead, scientists think that *Quetzalcoatlus* flew much like modern-day vultures, storks and cranes, which primarily soar and glide and are capable of only very feeble wing flapping, usually during takeoff.

Another difference between the model and the living beast are the brain and sensors that monitor and correct flight. "The computers and sensors that they're going to use in the model are quite sophisticated from our standpoint, but compared with what nature produced through the evolutionary process, it's still in the stone age," says Langston.

The design and capabilities of the real animal also impress MacCready, who has become well known for his Gossamer Condor and Gossamer Albatross crafts, which demonstrated sustained and controlled human-powered flight. Says he: "I've gotten to appreciate Mother Nature, the engineer." —S. Weisburd

ment of Energy has been trying to coax the oil industry into offering more money than it has in the past, but the oil companies don't appear to be very enthusiastic. NERC reportedly has placed the ODP membership second only to university research grants in its budget request, which will be considered in the next two months.

In the meantime, British scientists have lost their observer status, which enabled them to keep tabs on ODP planning but not to participate in cruises. Sutherland says

that throughout the funding ordeal British scientists have urged ODP to expel them in order to show their government that they can't tag along for free. Sutherland also notes that many British marine scientists, disillusioned with their country's funding quandary, have left the United Kingdom. "You'll find it throughout JOIDES," he says. "There are British accents in Canada and the United States in some of the big institutions. ... It's a bad brain drain for the U.K." —S. Weisburd