of dollars a year to health and educational organizations. It has become a major funder of vaccine programs for developing countries, including a $750 million grant over 5 years to the Global Fund for Children's Vaccines to pay for childhood vaccinations in the 70 poorest countries worldwide.

Paving the way for the foundation's big-time plunge into AIDS vaccines was a dinner party at the Gates mansion in 1998 attended by IAVI chief Seth Berkley. The Microsoft chair was seeking advice on how his foundation might significantly improve public health through contributions of large sums of money. At the dinner, Gates told *Science* that he asked Berkley, "Where is money a limiting factor in stopping AIDS?"

Berkley had long argued that a vaccine is the best hope for stopping AIDS. He pitched Gates on IAVI's "social venture capital" approach, in which the nonprofit gives drug companies the rights to produce and sell vaccines that it helps develop, as long as the firms pledge to distribute vaccines widely to poor nations at a reasonable cost.

Intrigued, Gates says he started reading up on AIDS vaccines. Encouraging evidence that vaccines could be feasible included experiments demonstrating protection conferred to some primates, and the fact that some people who have been exposed to HIV multiple times have not become infected; they appear to be resistant. But the bottom line was a showstopper: "There was no market incentive to create a vaccine" against AIDS in developing countries, Gates says.

So when Gates decided to create that incentive, Berkley's connection paid off. The Gates Foundation gave $1.5 million to IAVI in 1998, and another $25 million a year later. Gates is well known for putting money only into projects that he has researched. For that reason, says Pfizer CEO Hank McKinnell, the Gates Foundation confers credibility on grant recipients: "A lot of [charitable] organizations send out a lot of little checks," McKinnell says. "Gates sends large amounts of money to a few organizations, but they're the very best."

The 1999 cash influx from Gates and from other organizations allowed IAVI to put one promising vaccine program on a fast track. In this effort, a team from Oxford University in the U.K. and the University of Nairobi in Kenya are developing a vaccine based on the clade A HIV-1 virus, the most common form of HIV in Kenya. They inject DNA from the strain into skin or muscle cells to produce an immune response. They follow this with a vaccinia Ankara vaccine, a cowpox virus modified to produce HIV proteins to stimulate a second immune response. Early clinical trials of this one-two punch began in Oxford last August and were scheduled to start in Nairobi earlier this week.

The new money from the Gates Foundation will come in $20 million chunks over each of the next 5 years. It's a challenge grant, meaning that the foundation expects other organizations to help IAVI raise the $550 million needed to launch the three trials; counting the Gates money, IAVI has $230 million. That puts the nonprofit in the AIDS vaccine big leagues.

It's unclear how easy it will be to raise the rest. Although Glaxo Wellcome has contributed to IAVI, other drug companies are taking a wait-and-see attitude. McKinnell says that if IAVI comes through with an effective vaccine, Pfizer—which is not now working on an AIDS vaccine—would consider producing and selling it. By "taking an almost free-market approach" to charity, says McKinnell, Gates and Berkley are giving AIDS vaccines a chance.

–RICHARD BRANDT

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PALEONTOLOGY

Doubts Raised About Dinosaur Heart

The discovery quickened pulses around the globe. Last April, a team of scientists unveiled a fossilized dinosaur heart—evidence suggesting that dinosaurs were indeed warm-blooded (*Science*, 21 April 2000, p. 416). The dinosaur itself, a 4-meter-long *Thescelosaurus* found in the Hell Creek Formation of northwestern South Dakota, became the hugely popular showpiece of a new $71 million museum in Raleigh, North Carolina. But in *Science* Online this week (see Technical Comments at www.sciencemag.org/cgi/content/full/291/5505/783a), two paleontologists and a geologist argue that the grapefruit-sized structure is no heart at all but only a deceptive lump of minerals.

Funny valentine. Paleontologists disagree about whether a stony lump in the chest of *Thescelosaurus* is a fossilized heart or a common rock.

Fossilized soft tissue is extraordinarily rare, even in the best conditions, says Tim Rowe of the University of Texas, Austin. So it was "a real stretch" to suppose that a dead heart could have turned to stone in the delta rivers that coursed through South Dakota some 66 million years ago. Hungry bacteria in the flowing waters would have made short work of such tasty tissue, Rowe says.

Rowe, a noted expert in computerized tomography scanning of fossils, says CT images posted on the Web by the dino-heart enthusiasts bear out his skepticism. "If it's a heart, it ought to look like one," he says—and to him it doesn't. He notes that one of the two supposed ventricles appears almost entirely closed and thus lacks any way for substantial amounts of blood to enter or leave. Features of a normal heart, such as the atria and coronary arteries, are missing, and the aorta lacks the branching vessels found in living relatives of dinosaurs. Instead, Rowe thinks the structure is an ironstone concretion. Such concretions, precipitated by bacteria, are common in the Hell Creek Formation, he says.

But Dale Russell, a paleontologist at North Carolina State University in Raleigh, thinks the heart is getting a bad rap. The decay of heart tissue, he says, could have been delayed if the dinosaur lay in an anoxic, swamplike microhabitat—a scenario that seems plausible to Ray Rogers, a sedimentologist and taphonomist at Macalester College in St. Paul, Minnesota, who's familiar with the Hell Creek Formation. The lack of detail is easily explained, Russell says: "This heart was rotten; it wasn't the kind of heart you can lay on a dissecting table." Russell and his colleagues since have done higher resolution CT scans of the heart and are searching them for other details.

But what's the point, wonders Larry Witmer of Ohio University's College of Osteopathic Medicine in Athens. "Even if it is a heart, it's not clear that it's telling anything about the biology of the animal," he says, because key features of the organ may have rotted away. The main value of a certified heart, he says, would be as palpable proof that the Hell Creek rocks hold more than just the bones of ancient creatures. And that prospect alone may be enough to get some hearts beating again. **–ERIK STOKSTAD**

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