IDeA: A Program Whose Time Has Come

FROM THE TITLE "A CONTROVERSIAL IDEA TO shrink the biomedical gap" and this News Focus article's teaser "How should NIH help states that do poorly in the race for federal research dollars? A new and growing program draws criticism" (J. Mervis, 21 Sept., p. 2195), one would never know that the Institutional Development Award (IDeA) program has not only been well planned by the National Institutes of Health (NIH) and the relevant scientific community, but has wide support in Congress and among scientists throughout the country. While Mervis notes that William Brody, president of Johns Hopkins University, is critical, one must remember that Brody's institution alone has more NIH dollars than the entire IDeA community combined.

I have three points regarding the article. First, the IDeA program, which is administered by the National Center for Research Resources (NCRR), was conceived to correct issues surrounding state-to-state disparities in biomedical research funding and, at least from my standpoint, it has done it well. The scope of this experimental program should distress no one. The $100 million in a $20-billion budget should not cause alarm among the premier biomedical scientists and institutions in our nation. This represents 0.5% of the NIH budget. As Congress seeks to double the NIH budget, the NIH itself should begin to address the widespread disproportional distribution of NIH dollars.

Second, IDeA's grant approval process entails the same rigorous peer review as with any other NIH program. In the competition for Centers of Biomedical Research Excellence (COBRE) grants, only 16 of 50 proposals were funded, a success rate similar to that for other NIH grants. At a feedback session coordinated by the NCRR, I found that the evaluators functioned as if they were reviewing any other NIH program. Similarly, the Biomedical Research Infrastructure Network (BRIN) underwent peer review, at both the national and local level.

Third, when resources are meager, collaborations among institutions are essential. For example, the COBRE grant that the Oklahoma Medical Research Foundation received involved our two major research universities (Oklahoma State University and the University of Oklahoma Health Sciences Center), as well as a more distant campus in Tulsa. The first year of operation has seen more interaction among these groups than anyone locally has ever witnessed.

In conclusion, the IDeA states cannot "catch up" with non-IDeA states without some help. Nobody advocates the elimination of the peer-review system or the distribution of NIH funds on a per capita basis, but it seems appropriate for the NIH to redress what has become a severe inconsistency over the years. The COBRE and BRIN grants are appropriate and successful venues to redress this serious discrepancy.

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Invasive Carp in China's Plateau Lakes

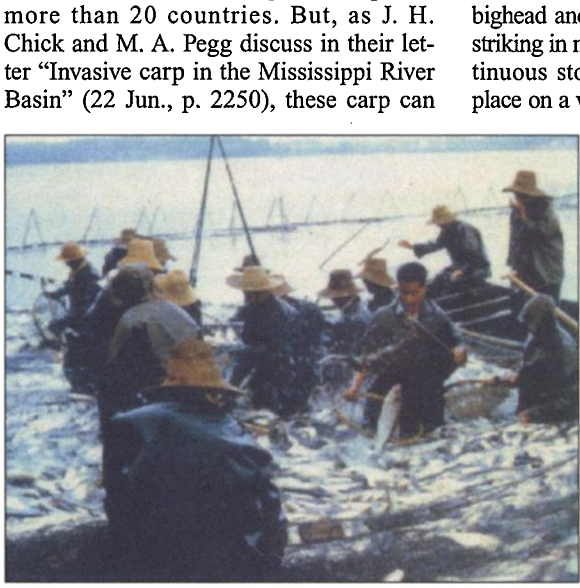
BIGHEAD AND SILVER CARP, WHICH ARE NATIVE to eastern Asia (*1*), have been popular species for aquaculture and algal control (*2*), and since the 1960s, both fish have been introduced worldwide—silver carp into 34 countries and bighead carp into more than 20 countries. But, as J. H. Chick and M. A. Pegg discuss in their letter "Invasive carp in the Mississippi River Basin" (22 Jun., p. 2250), these carp can be so successful as to pose a threat to aquatic ecosystems, a caution our studies in China certainly support.

The natural range of silver carp is in the rivers and lakes of China, North Vietnam, and Siberia; that of bighead carp is smaller, extending only from the Yellow River in the north of China to the Pearl River in the south. In the Yangtze River, these carp migrate between river and lakes, and during the monsoon flood season they lay pelagic eggs, which, along with the hatched small fry, drift with the current (*3*). Successful reproduction of both carps requires a long river.

In the early 1950s, bighead and silver carp were introduced into Lake Xingyun for the purpose of aquaculture (*4*). About 50% of the fish yield from this lake in the 1950s was from the endemic barbless carp, *Cyprinus pellegrini* Tchang. This carp is also a filter-feeder, feeding mainly on zooplankton, but its feeding apparatus is less developed and less powerful (filters less water) than those of bighead and silver carp because its filter-feeding apparatus experienced a relatively short period of differentiation during evolution (*5*). Since the introduction of bighead and silver carp, the proportion of barbless carp in the total fish yield declined to 20% in the 1960s, to 10% in the early 1970s, and now to less than 1% since the 1980s (*6*).

In China, the disastrous impacts made by bighead and silver carp have been especially striking in many plateau lakes, where the continuous stocking of fingerlings has taken place on a wide scale since the late 1950s for increasing fish production. The invaders have suppressed and in some instances eliminated the native or endemic species (*7*). Such ecosystems may be especially vulnerable, because these lakes are usually isolated and the food webs are relatively simple.

There are four major reasons why introduced bighead and silver carp can pose a threat to local fish communities: (i) They are powerful filter-feeders. (ii) These carp have an extremely wide food spectrum, including phytoplankton (usually >10 μm), zooplankton, and suspended



Chinese fishermen harvest bighead and silver carp—an economic boom, but a potential ecological bust.

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detritus. They can cause significant decline in zooplankton abundance (*8*). (iii) They grow fast and reproduce quickly (*9*). (iv) Because all fishes forage on planktonic organisms during their early life-history stages, bighead and silver carp have the potential to compete for food with every species of fish, and some native fishes are filter-feeders as adults.

Thus, the possible impacts of introduced bighead and silver carp on local fish communities urgently need to be assessed, especially in those waters (e.g., the Mississippi River) where the carp have successfully established reproducing populations.

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4. Lake Xingyun is located in the Yunnan-Guiyang Plateau, surface area 39 km^2, mean depth 9 m, 1723 m above sea level, N24°17′ to 24°23′, E102°45′ to 102°48′.
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8. P. Xie, Y. Yang, *J. Plankton Res.* **22**, 1757 (2000); P. Xie, *Aquaculture* **180**, 295 (1999); P. Xie, *Aquaculture* **195**, 149 (2001).
9. In the Yangtze River, the weight of a 3-year-old fish reaches 3.6 kg for silver carp and 7.4 kg for bighead, the maximum size of bighead is 35 to 40 kg, and the mean egg number per adult female is 1.07×10^6 for silver carp and 2.0×10^6 for bighead carp (*3*).
10. This research was supported by the State Key Basic Research and Development Plan (G2000046800) and a key project of the Chinese Academy of Sciences (KZCX2-403). J. K. Liu, Y. F. Shen, and W. X. Cao gave useful suggestions on the draft of the letter.

The Real Cost of Wind Energy

THE COST OF ELECTRICITY FROM WIND IS about 4 ¢ per kilowatt-hour (kWh) according to M. Z. Jacobson and G. M. Masters' estimate in their Policy Forum "Exploiting wind versus coal" (*Science*'s Compass, 24 Aug., p. 1438), making wind energy competitive with new coal-fired generation. There is a 1.5-¢/kWh federal credit for wind energy producers, and, in addition, consumers are willing to pay a premium for wind. Given this credit, and a conservative 0.5-¢/kWh green power premium (*1*), one might expect wind producers to break even at ~6 ¢/kWh. If their costs are 4 ¢/kWh, producers should make large profits and wind should dominate new electric capacity. No such boom is observed; wind generates only 0.1% of U.S. electricity and accounts for only 1% of capacity additions in the last 5 years (*2*). Two factors—transmission and intermittency—raise the real cost of wind and explain the discrepancy between simple estimates of cost and observed installation of capacity.

Jacobson and Masters propose replacing ~60% of coal capacity with wind farms in North Dakota that have an average power of ~130 GW. At this scale, wind is a significant fraction of capacity, and its intermittency must be addressed. To derive a conservative estimate for the cost of backup generation under suboptimal wind conditions, suppose that 130 GW of gas turbine capacity is installed.

Wind power generated beyond the mean output can be sold, roughly compensating for fuel costs when backup generation is used. The amortized cost of the gas capacity is ~1 ¢/kWh. In addition, Jacobson and Masters dismiss transmission costs, suggesting that they "can be offset with turbine mass production." We are unconvinced. The best sites for wind farms are in the Great Plains, far from demand centers concentrated on the coasts, so transmission costs must be included if wind is to supply a significant fraction of national demand. Using modern HVDC (high-voltage direct current) technology, transmission costs are ~1.5 ¢/kWh for 2000-km lines (*3*). Therefore, combining the cost of backup and transmission adds 2 to 3 ¢/kWh to the cost of wind, partially explaining the discrepancy between simple cost estimates and observed behavior.

We believe that the challenges posed by remoteness and intermittency are surmountable, but it is an exaggeration to say that wind is now competitive with coal.

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