In response to comments that the term "restoration" does not convey the practice of restoration ecology, a discussion of the field's philosophy and practices are offered in rebuttal. Scientists in an advocacy role "should not dictate what society wants, but rather, interact vigorously with other scholars and the public to achieve ends that both are feasible and make sense scientifically." In the so-called "science wars" between realists and relativists, "it may be time for scientists to worry about Trojan horses in their midst." And, it is discussed whether mice that lack the gene for the dopamine transporter are a suitable model for studying attention-deficit hyperactivity disorder.

Restoration Ecology

In response to the News Focus article "Returning America's forests to their 'natural' roots" (Keith Kloor, 28 Jan., p. 573), Mark A. Davis posed three problems with restoration ecology in his letter (18 Feb., p. 1203): the choice of a "target" time period is arbitrary, the term "restoration" equates with ecological stasis, and "true restoration" is impossible because of such processes as extinction and climate change. But these arguments are too oversimplified.

In contrast to a whimsical choice of some past "target" condition, reference conditions for restoration are based on a thorough study of historical ecosystem structure and processes as well as on knowledge of ecological relationships. Ecologists seek to understand the evolutionary environment of indigenous ecosystems to determine whether and how degradation has occurred and what intervention may be useful in restoring natural processes. Reference conditions are not linked to specific places but to the conditions of climate and disturbance—including long-term human disturbance—that influenced the adaptations of species and their interactions with the environment.

Far from stasis, restoration ecology aims at reversing recent degradation so that dynamic processes such as fire, flood, herbivory, predation, and regeneration can resume their natural flux. The fact that permanent changes such as extinctions have occurred only underscores the importance of restoration to forestall continued declines. As Earth's ecosystems move into an uncertain future of atmospheric change and growing human pressures, the concept of restoring the integrity of indigenous ecosystems as closely as possible to evolutionary habitats is central to the conservation of native biological diversity.

Humans, and indeed all species, practice "ecological architecture" (Davis's proposed substitution for the term "restoration") by modifying their habitats to facilitate their survival. As the ultimate ecosystem engineers, humans have distorted global ecological processes, causing deforestation, desertification, and other damage. Ecological restoration offers practical, realistic strategies for helping nature's architecture reassert itself.

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Evolution of an Advocate

The coverage given to advocacy in the News Focus articles "Ecologists on a mission to save the world" by Jocelyn Kaiser (18 Feb., p. 1188) and "A new breed of scientist-advocate emerges" by Kathryn S. Brown (p. 1192) seems to fall into the journalistic "give the two extremes" trap. Over three decades, my ideas on advocacy have evolved, and I now have a personal file of past mistakes. The idea that science should (or can) be value-free is wrong. Scientists must make value judgments all the time—at the very least in the choice of projects (what is "worthwhile" investigating), in the choice of methods (for example, what level of impact on ecosystems or on individual organisms would be justified by the information gained), and in the interpretation of results ("the most important conclusion is..."). We cannot avoid such judgments: being steeped in values is part of being human.

The success of science comes not from researchers' attempts to be objective, but from its adherence to rules (honesty, disclosure of procedures, attempts to disprove hypotheses) and its adversarial nature (peer review, replication by others, rewards for shifting the paradigm), and from the fact that nature serves as a final arbiter. When predictions are not met, it often points to where a system was misunderstood. Scientists' credibility should rest on openness about uncertainties, being clear if their own views oppose the consensus, readiness to change conclusions in response to new data, and persistence in telling policy-makers what they can reasonably expect from science.

In addition, scientists who wish to be effective in helping change public policy on issues must increasingly participate in interdisciplinary research. In virtually all cases, society will be faced with difficult trade-offs, and scientists must help to clarify them. Scientists should not dictate what society wants, but rather interact vigorously with other scholars and the public to achieve ends that both are feasible and make sense scientifically.

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Trojan Horses

In his Essay "Deconstructing the 'science wars' by reconstructing an old mold" (Pathways of Discovery, 14 Jan., p. 253), Stephen Jay Gould posits that the fashionable issue of "science wars" between those who approach knowledge as realists and those who approach it as relativists is a spurious one. To that effect, he suggests that currently both scientists and humanists are relativists and are fully aware that absolutes in the natural sciences may not be attainable. Yet Gould's stance seems too conciliatory: There is in fact a war. It is the war between the historical tradition of rhetorical humanism and the experimental enlightenment of the last few centuries. Galileo's predicament is not over yet. Scientists and humanists alike may be aware of cognitive interferences, our internal biases exemplified by the Baconian idols that Gould describes. The difference between them, however, is that scientists strive to control these idols, whereas humanists lean on them to proclaim that anything goes and the equal worth of any conjecture, down to Feyerabend's assertion that science is on equal footing with astrology and prostitution (*1*).

The real war hinges on differences of method. Science relies on experimentation. Experimental scientists address hypotheses amenable to testing. Other hypotheses may enter into exploratory theories, some may be shelved and waiting for feasible experimentation, and yet others may remain untestable and useless to science. Scientists accept the unknowable and the differences of predictive knowledge and conjecture and are humbled by their limitations. Not so the humanists, who sense science's method as a threat to their untestable almagests. As a remedy humanists have been able to turn scientific illiteracy into a main advantage in an environment where a scientifically naïve public and media are easily drawn to the facile side of a debate.

Alarms have been sounded and enemies of science have been exposed (*2*), but it may be time for scientists to worry about Trojan horses in their midst. It should be apparent that equivocation has long been a part of what passes for legitimate science. Think of regulatory sciences, which like mystical persuasions are grounded on default assumptions; global climactic models forced on international deliberations as if factual; flimsy epidemiologic speculations proffered as established risks or remedies; or sociologic conjectures empowering massive social policies.

It does not help to ignore or belittle a war, for the future of science—and likely of humankind—may well hang in the balance. Scientific truth is problematic but has yielded objective worth. Contrived delusions are not a reasonable alternative.

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"Model" Behavior

In their report "Role of serotonin in the paradoxical calming effect of psychostimulants on hyperactivity" (15 Jan. 1999, p. 397), Raul R. Gainetdinov *et al.* present their study, which indicates that, in mice in which the dopamine transporter (DAT) gene has been eliminated or "knocked out" (DAT-KO mice), and which therefore have elevated levels of extracellular dopamine, methylphenidate has clinical effects on hyperactivity without altering dopamine levels. They conclude, on the basis of other published work, that "the primary calming effect of psychostimulants in DAT-KO mice is mediated by the 5-HT system," although they did not measure 5-HT (serotonin) levels. They add that the DAT-KO model may be a valuable animal model for the study of attention-deficit hyperactivity disorder (ADHD) and for testing new therapies, and that it "may also provide insights into the basic mechanisms that underlie the etiology of this and other hyperkinetic disorders."

As a clinician working primarily with ADHD, I have two questions regarding Gainetdinov *et al.*'s conclusions. Is this phenotype a model of ADHD, or could it be a model of a different hyperkinetic syndrome? and, how can one apply this model to the study of ADHD when the presumed biological mechanisms in ADHD differ so much from those of the model?

Regarding the first question, the authors say that phenotypically DAT-KO mice resemble ADHD patients because the mice are hyperactive and are extremely poor learners. However, there are many presentations of hyperactivity, only one of which is ADHD. For example, the most severe clinical presentations of hyperactivity are often found in children with pervasive developmental disorders (PDDs). These children usually respond poorly to stimulant therapy, but they may derive some benefit from selective serotonin re-uptake inhibitors and dopamine antagonists. They also demonstrate a more profound inability to learn than is usually found in ADHD children. Although ADHD children may have impaired learning, they