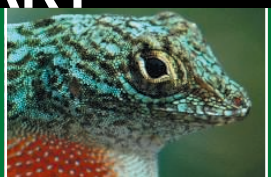

LETTERS

edited by Jennifer Sills

Bushmeat Hunting and Climate: An Indirect Link

J. F. BRODIE AND H. K. GIBBS ("BUSHMEAT HUNTING AS CLIMATE THREAT," Letters, 16 October 2009, p. 364) argue that bushmeat extraction threatens the carbon stocks of tropical forests because (i) bushmeat hunting reduces abundances of large-bodied vertebrates; (ii) tree species with large seeds reproduce poorly without large-bodied vertebrates on which they depend for seed dispersal; (iii) large seed size is correlated with high wood density in tropical trees; and (iv) trees with high wood density contribute disproportionately to the carbon stock.

Lianas climbing a tropical canopy tree.

Their first point is well-established, but evidence regarding the others is mixed. Killing animals reduces seed dispersal of vertebrate-dispersed trees (*1*–*4*) but does not necessarily reduce the reproduction of large-seeded trees (*5*), perhaps because large-bodied animals also function as seed predators and herbivores (*2*, *6*). Likewise, the correlation between seed size and wood density in tropical trees is at best weak (*7*). Finally, plots with trees of higher wood density do not necessarily have higher total tree carbon stocks; depending on the site, carbon stocks may be positively related, negatively related, or unrelated to mean wood density, because of the usually countervailing effects of tree volume (*8*).

Lianas (woody vines that climb into the tree canopy) provide an alternative possible link between bushmeat hunting and carbon storage. Hunting is a disadvantage for species with seeds dispersed by animals, and therefore gives a comparative advantage to species with seeds dispersed by wind (*5*, *9*). This strategy is much more common among liana species than trees (60 versus 20%). Liana leaves displace an equal mass of tree leaves (*10*), and lianas store much less carbon per leaf area than trees (*11*). Thus, hunting may favor lianas, and an increase in lianas is likely to reduce carbon storage.

Whatever its effect on forest carbon stores, the bushmeat crisis is unarguably a major threat to tropical biodiversity (*2*, *12*, *13*). This by itself is reason to fight it.

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Gray Wolves Not Out of the Woods Yet

IN APRIL 2009, THE U.S. FISH AND WILDLIFE Service (FWS) removed the northern Rocky Mountain population of gray wolves (*Canis lupus*) from all protections under the Endangered Species Act (ESA). Following the ESA's mandate to base listing determinations "solely on the…best scientific and commercial data available," FWS conducted an extensive analysis of regional threats to wolves. They concluded that while "[p]ublic hostility toward wolves led to excessive human-caused mortality that extirpated the species," subsequent improvement in attitudes toward wolves ensured the long-term viability of the species.

We agree that human behaviors (and the attitudes and values underlying them) ultimately caused the extirpation of wolves in the northern Rockies, but we find little support for FWS's conclusion that attitudes toward wolves have improved, or are improving. Indeed, the larger body of research points to the opposite conclusion (*1*–*5*). Although FWS provided more than 200 citations in their analysis, they cited just one empirical study that examined attitudes toward wolves (*4*). [This cannot be explained by a lack of published literature; a recent review identified 50 publications that specifically addressed the topic (*6*).] Thus, it appears FWS was either unaware of the extensive body of research on attitudes toward wolves, or chose to ignore this research. In fact, the only empirical article cited by FWS—

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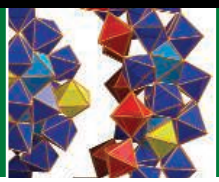
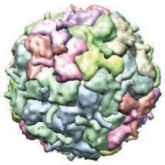


Capture of a transient guest

38



Protein shell designs

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a meta-analysis—comes to a very different conclusion: "Across the 37 attitude surveys we studied, the reported statistics were stable over the last 30 years…[t]his contradicts a recent perception among some ecologists that wolf support has recently grown" (*4*).

The FWS's analysis of the threat posed by negative attitudes toward wolves is wholly inadequate. When threats to a species' continued survival are primarily social in nature, FWS must use the same standard that goes into analyzing biological and ecological threats. It is time for FWS to expand its view of what constitutes "science" and fully incorporate the social sciences into listing determinations.

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Patents: A Threat to Innovation?

IN THE POLICY FORUM "BALANCING INNOVATION and access: Patent challenges tip the scales" (16 October 2009, p. 370), M. J. Higgins and S. J. H. Graham's claim that Paragraph IV patent challenges are "increasingly stifling new drug innovation" is misleading.

Economists have repeatedly cautioned that correlation is not causation. The increasing number of Paragraph IV challenges, coupled with the decreasing number of FDA-approved new compounds is an interesting, but not causal, relationship. Declines in approvals could be due to a range of factors, including decreasing research productivity. Reasons for the decline in productivity include the increasing difficulty of understanding the science of more complex diseases and the focus of pharmaceutical companies on low-risk "me too" drug development (*1*).

Not all Paragraph IV challenges lead to early generic entry. In research documenting Paragraph IV challenges between 2004 and 2006, I found that only 13 (11%) of the 115 lawsuits resulted in a generic win (*2*). When

the branded company prevails, there is neither early generic entry nor revenue loss. Perhaps more important, 73% ended in settlements, of which a subset—about 60% (*3*)—did not appear to result in early generic entry (*2*). Hence, a count of patent challenges is an unreliable indicator of losses for branded companies. The fact that so many of the lawsuits end in settlements precludes information on the patent strength and boundaries that is revealed through judicial determination.

In addition to these factors, branded pharmaceuticals are increasingly retaliating by producing or licensing authorized generics that dampen their revenue loss and the incentives for future patent challenges. For instance, in 2003, Apotex was granted the 180-day exclusivity period for its generic version of Paxil, an anti-depressant marketed by GlaxoSmithKline (GSK). Apotex had expected to generate sales of approximately $575 million during its 6 month exclusivity, but the introduction of GSK's authorized generic lowered the actual sales to around $200 million (*4*).

Paragraph IV challenges are an important mechanism for identifying patents that should not have been granted in the first place. They should be allowed to continue unless there is much more compelling evidence that they are in some way slowing innovation.

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Response

WE AGREE WITH MANOCARAN THAT "CORRElation is not causation" and say as much in our Policy Forum's first paragraph. But Manocaran's suggestion that the pharmaceutical industry may not be facing an innovation crisis is not supported by the weight of evidence (*1*–*3*).

Companies rely critically on patents to recoup their R&D expenditures, and patent rights are only as good as the human agents (such as judges and juries) who review them. This fact increases uncertainty for innovators, and the U.S. federal courts' weakening of patent rights over the past several years has made eventual payoffs from innovation even less likely. Added incentives offered to generic entrants in the Hatch-Waxman Act to launch Paragraph IV patent challenges, and the strategic use of this regime by generic firms, are exacerbating this problem by further undermining the market incentives to do pharmaceutical research. We are unconvinced by Manocaran's assertion that the use of authorized generics will dampen incentives to engage in Paragraph IV challenges; preliminary evidence actually suggests otherwise (*4*, *5*).

Regarding the outcomes of Paragraph IV patent suits, the most credible evidence to our knowledge comes from a 2002 Federal Trade Commission (FTC) report cited in our article (*6*). Although we cannot definitively refute Manocaran's claim that 73% of a sample of cases she studied ended in settlement, we note that another researcher, using a larger sample that includes more recent cases, finds settlement rates at trial were as low as 20% and no higher than 39% during the 2006–2009 period (*7*). This same research shows that generics won 25% of all cases at trial (and 41% of those that did not settle), a share substantially different than the 11% that Manocaran reports (*7*). Moreover, we note that the 41% figure is virtually identical to the 42% generic win rate reported by the Federal Trade Commission for earlier years (*6*).

These inconsistencies notwithstanding, Manocaran correctly raises the issue of collusive settlements, an issue with which the competition authorities are rightfully dealing (*8*). However, her general observations about settlement do not affect our main thesis: The Hatch-Waxman Act is creating incentives to challenge patents and, with shifting treatments of patent law by the courts, industry revenues are increasingly threatened. In a market system, the predictable outcome without intervention will be less innovation, to the detriment of public health in the long run.

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Let Top Students Go Forth and Prosper

THE NEWS OF THE WEEK STORY "STUDY FINDS science pipeline strong, but losing top students" (Y. Bhattacharjee, 30 October 2009, p. 654) decried the "steep drop in the percentage of the highest performing students taking science and engineering jobs." But why not let these talented, scientifically trained human catalysts shift gears and move into areas such as public policy, legislation, law, finance, economics, public relations, and yes, even entertainment—that seemingly silly place where ideas and visions are formed?

It would help to have scientifically trained policy makers and legislators who truly understand the scientific and technologic issues they are voting on, with enough clout to get others on board. It would also help to have management consultants and financial analysts who avoid entrenched mindsets and realize that some "visionary" business approaches are de facto Ponzi schemes.

A protectionist attitude that expects the best students to stay within their formative disciplines has pernicious consequences. Top students in science and engineering form a gift to society—and to the scientific enterprise—when they fly forth to pollinate areas of vital importance to the public discourse. Cross-disciplinary ambassadors should be encouraged, not discouraged, if we are to build a bright new, sustainable future.

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Letters to the Editor

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