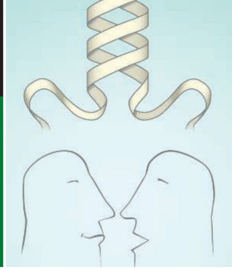
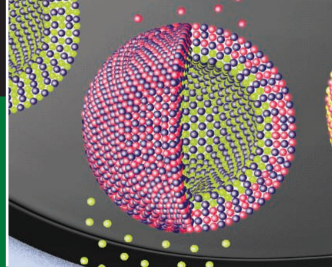


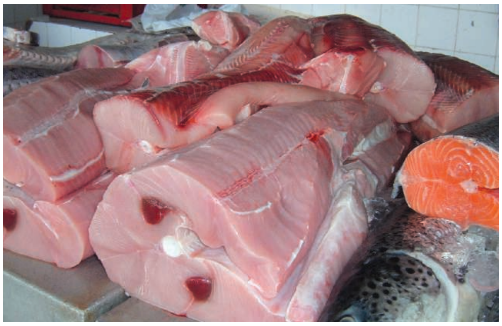


LETTERS

edited by Jennifer Sills

Shark Mislabeling Threatens Biodiversity

AS COMMERCIAL FISHERIES STRUGGLE TO APPLY REGULATORY AND LEGAL MECHANISMS THAT depend on reliable species-specific data (*1*), the shark industry faces an even greater obstacle to transparency: Sellers change product names to overcome consumer resistance. For instance, South Africa sells shark meat (shortfin mako shark) mislabeled as "ocean fillets" or "skomoro" and in doing so threatens a vulnerable species (*2*). Conversely, the European Union (*3*) requires listing the species name on shark products to avoid fraud and to help conserve certain species (*4*).



For sale. Shark meat in a Brazilian market.

The situation is even worse in many developing countries [e.g., Mozambique, Costa Rica, India, Sri Lanka, and Borneo (*5*)], where shark meat is commonly sold without proper identification. In Brazilian supermarkets, elasmobranchs (members of a fish subclass distinguished by the lack of swim bladders) are sold as "cação," a popular name for any small shark species or pup. Consumers do not understand that cação refers to any elasmobranch, regardless of its size or species. This intentional mislabeling compromises efforts to lessen shark consumption or to promote consumption of nonthreatened species.

Only a few isolated initiatives have been attempted to force supermarkets to better inform customers of which shark species they are consuming. For example, on 1 July 2011, Instituto Justiça Ambiental (the Environmental Justice Institute) filed a public civil action against the Walmart and Carrefour supermarket chains requesting that they sell shark meat with appropriate scientific species identification (*6*). This is a critical step for shark conservation everywhere, and especially in Brazil, where 18 shark species are threatened, overexploited, or under threat of overexploitation (*7*).

Meanwhile, another five oceanic shark species and manta rays were recently added to the list of animals whose trade requires permits as described by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). With CITES oversight, the international trade of these species can only take place if the meat is shown to be obtained legally and sustainably (*8*).

Proper labeling and identification can be done by trained individuals monitoring elasmobranch landings from artisanal to industrial fisheries or in supermarkets with modern genetic identification techniques (*4*, *9*, *10*). With this action, the general public would be able to make educated decisions about whether or not to consume shark meat. This matter is fundamental to marine conservation and to maintaining sustainable and transparent seafood consumption.

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Letters to the Editor

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Pollination Decline in Context

THE REPORT BY L. A. GARIBALDI *ET AL.* ("WILD pollinators enhance fruit set of crops regardless of honey bee abundance," 29 March, p. 1608; published online 28 February 2013) demonstrates that wild pollinators enhance production of many crop species. However, it is premature and possibly mistaken to relate this result directly to food production ("The global plight of pollinators," J. M. Tylianakis, Perspectives, 29 March, p. 1532; published online 28 February 2013). Pollination is but one of many, often conflicting, factors that affect the production of animal-pollinated crops. Justifying conservation of pollinators (and pollinator habitat) on the basis of food production remains a spurious argument if other factors are not considered.

From a farmer's perspective, management to enhance pollinators makes little sense if that same action has high opportunity costs.

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Californian almond farmers continue to intensify production despite declining honey bees because pollinator service costs are insignificant compared to the increasing returns from intensified production (*1*). Indian coffee farmers intensify production despite recognized costs to pollination because returns on coffee increases as a result of such action (*1*, *2*). Globally, the rate of increase in crop production does not appear to differ between crops that do and do not depend on pollinators (*3*, *4*), and in any case there is no doubt that intensification has increased production of all crops. Thus, although it is difficult to disagree that "biodiversity has a direct measurable value for food production," the more important issue is whether management to secure biodiversity-related benefits is more rewarding for crop production than management less favorable to biodiversity. It is this measure that will (or will not) persuade farmers to promote pollinators within agricultural systems.

We agree that many pollinators face serious threats. Along with other threatened species, their conservation is warranted. Yet pinning conservation arguments to food security is questionable if benefits to food production and farmer revenues compared to other management systems cannot be established. For the sake of farmers, policy-makers, and our own credibility as conservation scientists, let us consider the implications of pollinator decline in the context of the entire agricultural management system.

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Response

OBVIOUSLY NOBODY WOULD ARGUE THAT pollination is the only factor affecting food production, and of course other factors can limit the importance of pollination for any particular crop (*1*). The purpose of studies like that of Garibaldi *et al*., and others from single-crop systems (*2*), is to determine whether diverse pollinator assemblages improve production all other things being equal. Garibaldi *et al*. clearly demonstrated that for 41 crop systems, diverse native pollinators do increase crop production, and Ghazoul presents no evidence to the contrary.

Intensification of production can drive

CORRECTIONS AND CLARIFICATIONS

Reports: "A localized Wnt signal orients asymmetric stem cell division in vitro" by S. J. Habib *et al*. (22 March, p. 1445). In the legend to Fig. 4D, the last line should have stated: "Red bar: H3K27me3 stain in the bead-distal cell; yellow bar: H3K27me3 stain in the bead-proximal cell; blue bar: no H3K27me3 stain in any cell." The HTML and PDF versions online have been corrected.

Reports: "Conduction of ultracold fermions through a mesoscopic channel," by J.-P. Brantut *et al*. (31 August 2012, p. 1069; published online 2 August 2012). Equation 1 was incorrect. The correct version is below. The HTML and PDF versions online have been corrected.

$$\frac{d}{dt}\Delta N = -\frac{G}{C}\Delta N$$

Reports: "Heterochromatic silencing and HP1 localization in *Drosophila* are dependent on the RNAi machinery" by M. Pal-Bhadra *et al*. (30 January 2004, p. 669). The author Madhusudana Rao Chikka was mistakenly listed by his first and middle names.

TECHNICAL COMMENT ABSTRACTS

Comment on "ApoE-Directed Therapeutics Rapidly Clear β-Amyloid and Reverse Deficits in AD Mouse Models"

Nicholas F. Fitz, Andrea A. Cronican, Iliya Lefterov, Radosveta Koldamova

Cramer *et al*. (Reports, 23 March 2012, p. 1503; published online 9 February 2012) demonstrated in a mouse model for Alzheimer's disease (AD) that treatment of APP/PS1ΔE9 mice with bexarotene decreased Aβ pathology and ameliorated memory deficits. We confirm the reversal of memory deficits in APP/PS1ΔE9 mice expressing human APOE3 or APOE4 to the levels of their nontransgenic controls and the significant decrease of interstitial fluid Aβ, but not the effects on amyloid deposition.

Full text at http://dx.doi.org/10.1126/science.1235809

Comment on "ApoE-Directed Therapeutics Rapidly Clear β-Amyloid and Reverse Deficits in AD Mouse Models"

Ashleigh R. Price, Guilian Xu, Zoe B. Siemienski, Lisa A. Smithson, David R. Borchelt, Todd E. Golde, Kevin M. Felsenstein

Cramer *et al*. (Reports, 23 March 2012, p. 1503; published online 9 February 2012) demonstrates short-term bexarotene treatment clearing preexisting β-amyloid deposits from the brains of APP/PS1ΔE9 mice with low amyloid burden, providing a rationale for repurposing this anticancer agent as an Alzheimer's disease (AD) therapeutic. Using a nearly identical treatment regimen, we were unable to detect any evidence of drug efficacy despite demonstration of target engagement.

Full text at http://dx.doi.org/10.1126/science.1234089

Comment on "ApoE-Directed Therapeutics Rapidly Clear β-Amyloid and Reverse Deficits in AD Mouse Models"

Ina Tesseur, Adrian C. Lo, Anouk Roberfroid, Sofie Dietvorst, Bianca Van Broeck, Marianne Borgers, Harrie Gijsen, Diederik Moechars, Marc Mercken, John Kemp, Rudi D'Hooge, Bart De Strooper

Cramer *et al*. (Reports, 23 March 2012, p. 1503; published online 9 February 2012) tested bexarotene as a potential β-amyloid–lowering drug for Alzheimer's disease (AD). We were not able to reproduce the described effects in several animal models. Drug formulation appears very critical. Our data call for extreme caution when considering this compound for use in AD patients.

Full text at http://dx.doi.org/10.1126/science.1233937

Comment on "ApoE-Directed Therapeutics Rapidly Clear β-Amyloid and Reverse Deficits in AD Mouse Models"

Karthikeyan Veeraraghavalu, Can Zhang, Sean Miller, Jasmin K. Hefendehl, Tharinda W. Rajapaksha, Jason Ulrich, Mathias Jucker, David M. Holtzman, Rudolph E. Tanzi, Robert Vassar, Sangram S. Sisodia

Cramer *et al*. (Reports, 23 March 2012, p. 1503; published online 9 February 2012) reported that bexarotene rapidly reduces β-amyloid (Aβ) levels and plaque burden in two mouse models of Aβ deposition in Alzheimer's disease (AD). We now report that, although bexarotene reduces soluble Aβ40 levels in one of the mouse models, the drug has no impact on plaque burden in three strains that exhibit Aβ amyloidosis.

Full text at http://dx.doi.org/10.1126/science.1235505

Response to Comments on "ApoE-Directed Therapeutics Rapidly Clear β-Amyloid and Reverse Deficits in AD Mouse Models"

Gary E. Landreth, Paige E. Cramer, Mitchell M. Lakner, John R. Cirrito, Daniel W. Wesson, Kurt R. Brunden, Donald A. Wilson

The data reported in the Technical Comments by Fitz *et al*., Price *et al*., Tesseur *et al*., and Veeraraghavalu *et al*. replicate and validate our central conclusion that bexarotene stimulates the clearance of soluble β-amyloid peptides and results in the reversal of behavioral deficits in mouse models of Alzheimer's disease (AD). The basis of the inability to reproduce the drug-stimulated microglial-mediated reduction in plaque burden is unexplained. However, we concluded that plaque burden is functionally unrelated to improved cognition and memory elicited by bexarotene.

Full text at http://dx.doi.org/10.1126/science.1234114

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both declines in biodiversity and increases in production—or even alter the importance of biodiversity for ecosystem processes (*3*). However, intensifying production to overcome declining biodiversity is not a sustainable way forward in a changing environment. The dust bowl in the Great Plains of the United States and increased salinization in Australia are sobering reminders of the long-term impacts of intensification on both the environment and production.

Ghazoul argues that "pollinator service costs [in Californian almonds] are insignificant compared to the increasing returns from intensified production." Yet, in an entirely pollination-dependent crop like almond, this only remains true as long as honey bees can be purchased in large numbers at low cost. The suite of pests and diseases historically and currently threatening honey bees (*4*) makes them a precarious future foundation for entire industries. In times when honey bee abundance is low, wild pollinators (when available) have been shown to fill the gap in pollination (*5*).

Conservation of bee-friendly habitat in Germany was recently shown to generate 150% increases in yields of cherry by wild bees, whereas farmers had assumed that honey bees were the main cherry pollinators (*6*). Therefore, intensification and reliance on single species may well mask the costs of declining biodiversity in the short term, but they will not necessarily maximize crop production or its sustainability in the long term.

The key to Ghazoul's argument is that "management to enhance pollinators makes little sense if that same action has high opportunity costs," yet he provides no evidence to suggest that such opportunity costs are, in fact, generally high. The importance of opportunity costs to conservation on private land has been discussed for decades, and initiatives such as the EU Agri-environment schemes (*7*) were developed precisely to alleviate these costs to landowners. Even in developing countries, where no such schemes exist, there is growing evidence that wildlife-friendly farming approaches need not come at a cost to yield (*8*). Ecosystem services may even make threatened-species conservation actions by landowners economically beneficial (*9*).

Therefore, the important challenge will be to find local and landscape approaches to maintain pollinator and other species diversity in agricultural landscapes (*10*), without generating large opportunity costs for landowners (*11*). Of course it won't be easy, but this will be one of the most important scientific, social, and political challenges of the near future.

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