LETTERS

edited by Jennifer Sills

Switch to Corn Promotes Amazon Deforestation

THE UNITED STATES IS THE WORLD'S LEADING PRODUCER OF SOY. HOWEVER, MANY U.S. FARMERS are shifting from soy to corn (maize) in order to qualify for generous government subsidies intended to promote biofuel production (*1*); since 2006, U.S. corn production has risen 19% while soy production has fallen by 15% (*2*). This in turn is helping to drive a major increase in global soy prices (*3*), which have nearly doubled in the past 14 months.

The rising price for soy has important consequences for Amazonian forests and savanna-woodlands (*4*). In Brazil, the world's second-leading soy producer, deforestation rates (*5*) and especially fire incidence (*6*) have increased sharply in recent months in the main soy- and beef-producing states in Amazonia (and not in states with little soy production). Although dry weather is a contributing factor, these increases are widely attributed to rising soy and beef prices (*5*, *7*), and studies suggest a strong link between Amazonian deforestation and soy demand (*8*, *9*).

Deforestation. The aftermath of forest burning in central Amazonia.

Some Amazonian forests are directly cleared for soy farms (*8*). Farmers also purchase large expanses of cattle pasture for soy production, effectively pushing the ranchers farther into the Amazonian frontier or onto lands unsuitable for soy production (*9*). In addition, higher soy costs tend to raise global beef prices because soy-based livestock feeds become more expensive (*10*), creating an indirect incentive for forest conversion to pasture. Finally, the powerful Brazilian soy lobby is a key driving force behind initiatives to expand Amazonian highways and transportation networks in order to transport soybeans to market, and this is greatly increasing access to forests for ranchers, loggers, and land speculators (*11*, *12*).

In a globalized world, the impacts of local decisions about crop preferences can have far-reaching implications. As illustrated by an apparent "corn connection" to Amazonian deforestation, the environmental benefits of corn-based biofuel might be considerably reduced when its full and indirect costs are considered.

WILLIAM F. LAURANCE

Smithsonian Tropical Research Institute, Apartado 0843-03092, Balboa, Ancón, Panama. E-mail: laurancew@si.edu

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CREDIT: WILLIAM F. LAURANCE

NASA Funding Slow, Not Steady, After Space Race

AFTER READING D. KENNEDY'S EDITORIAL "Sputnik nostalgia" (5 October, p. 17), I find myself in a state I did not expect—one of disappointment. Kennedy writes about the positive effects the launch of Sputnik had on education and the nation's educational community. These improvements resulted largely from an increase in federal sponsorship that came as part of the backlash from Sputnik. Yet, there lies within this seemingly fine outcome an issue that needs to be addressed.

The National Aeronautics and Space Administration (NASA) was formed along with a dramatic increase in federal funding for science and science education in response to the former Soviet Union's incredible achievement (*1*). When Neil Armstrong became the first person to set foot on the moon, the government's interest in science dropped almost immediately. Because of the sudden lack of funding, the Apollo program was discontinued just 6 years after Apollo 11 landed in the Sea of Tranquility, in order to save funds for the shuttle and Skylab programs (*2*). Lately, NASA has received additional funding to attempt a second series of missions to the moon as part of the Constellation Program (*3*), but the long-awaited increase is the bittersweet result of an imaginary space race (*4*).

It seems that only when faced with the threat of looking stupid or coming in second place does our government open its wallet to science (*1*, *4*).

MICHAEL J. GOLDSTEIN

Department of Biology, Rutgers University, Camden, NJ 08102, USA.

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Memory Suppression in PTSD Treatment?

IN THEIR RESEARCH ARTICLE "PREFRONTAL regions orchestrate suppression of emotional memories via a two-phase process" (13 July, p. 215), B. E. Depue *et al.* suggest possible "implications for therapeutic approaches" for emotionally distressing memories. They speculate that the results "provide the possibility for approaches to controlling memories by suppressing sensory aspects of memory." As experimental psychopathologists, we applaud the elegant experimental approach and welcome new ideas for clinical innovation. However, the proposal that suppression would be a beneficial strategy for clinical intrusive memories is directly counter to treatment outcome data. For example, the gold standard treatment for posttraumatic stress disorder (PTSD) is cognitive behavior therapy that involves repeatedly and intentionally bringing the trauma memory and associated affect to mind—a technique that is antithetical to suppression (*1*).

Empirically supported theories of PTSD implicate cognitive avoidance (e.g., via thought suppression) in its persistence (*2*), with avoidance of trauma memories in the acute phase predicting PTSD at one year (*3*). While suppression may reduce distress in the short term, it predicts symptom maintenance (i.e., exacerbated trauma memories) in the long term.

The tension between epidemiological and treatment data and the apparent implications of the Depue *et al.* observations are worthy of attention, and may provide a more sophisticated understanding of both areas. In the meantime, there is a need for caution and for careful consideration of the relevant literature before inferring clinical implications from experimental studies such as these, particularly when a suggestion is liable to harm patients.

EMILY A. HOLMES,[1] MICHELLE L. MOULDS,[2] DAVID KAVANAGH[3]

[1]Department of Psychiatry, University of Oxford, Warneford Hospital, Oxford OX3 7JS, UK. [2]School of Psychology, The University of New South Wales, Sydney, NSW 2052, Australia. [3]School of Medicine, The University of Queensland, Herston, QLD 4029, Australia.

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Response

HOLMES *ET AL*. RAISE THE EXCELLENT POINT that suppression seems antithetical to the use of cognitive behavior therapy (CBT), especially exposure therapy, for disorders like

Letters to the Editor

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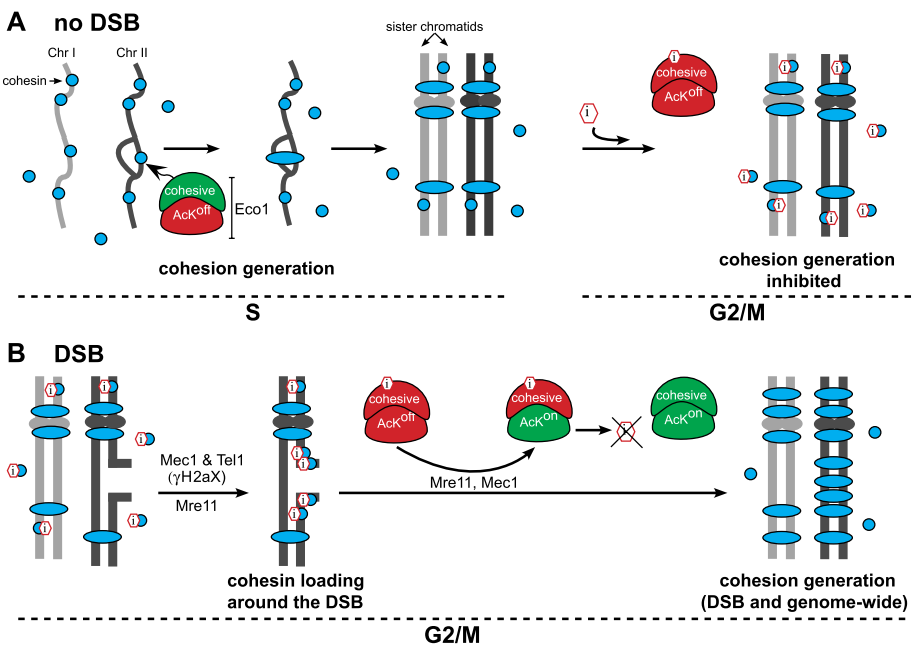
CORRECTIONS AND CLARIFICATIONS

Reports: "DNA double-strand breaks trigger genome-wide sister-chromatid cohesion through Eco1 (Ctf7)" by E. Ünal *et al.* (13 July, p. 245). In the print and HTML versions, the labels on the red and green shapes in Fig. 4 are missing. The corrected figure appears here. The labels appear in the PDF version.



TECHNICAL COMMENT ABSTRACTS

COMMENT ON "Tumor Growth Need Not Be Driven by Rare Cancer Stem Cells"

James A. Kennedy, Frédéric Barabé, Armando G. Poeppl, Jean C. Y. Wang, John E. Dick

Kelly *et al.* (Brevia, 20 July 2007, p. 337) questioned xenotransplant experiments supporting the cancer stem cell (CSC) hypothesis because they found a high frequency of leukemia-initiating cells (L-IC) in some transgenic mouse models. However, the CSC hypothesis depends on prospective purification of cells with tumor-initiating capacity, irrespective of frequency. Moreover, we found similar L-IC frequencies in genetically comparable leukemias using syngeneic or xenogeneic models.

Full text at www.sciencemag.org/cgi/content/full/318/5857/1722c

RESPONSE TO COMMENT ON "Tumor Growth Need Not Be Driven by Rare Cancer Stem Cells"

Jerry M. Adams, Priscilla N. Kelly, Aleksandar Dakic, Stephen L. Nutt, Andreas Strasser

A critical issue for cancer biology and therapy is whether most tumor cells or only rare "cancer stem cells" sustain tumor growth. Although the latter model seems supported by the minute proportion of human leukemia cells that can grow in immunodeficient mice, evidence that more than 10% of cells in many mouse leukemias and lymphomas are transplantable challenges its generality.

Full text at www.sciencemag.org/cgi/content/full/318/5857/1722d

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PTSD. In responding, we need to consider complexities in the treatment of these disorders that we could only briefly allude to in our Research Article (13 July, p. 215) (*1*).

First, Holmes *et al*. note that PTSD patients who characteristically avoid their traumatic memories have a poorer prognosis. However, unsystematic avoidance by a patient is not the same as a systematic therapeutic process of directed suppression, which involves the acquisition of neural suppression over a number of trials. Second, we do not advocate suppression as a sole means of treatment for PTSD, but rather as a complementary treatment with other methods. For example, it may be necessary to revisit an emotionally distressing memory before it can be controlled [our Research Article and (*1*)].

Currently, only about 30 to 70% of PTSD patients respond successfully to exposure therapy alone. Even these "responders" are only classified as such because they experience reductions in just one or two key symptoms (*2*). Other symptoms may still be vivid, and patients may suffer from relapses.

Few long-term comprehensive studies of the relapse rate of PTSD symptoms have been reported beyond 6 months. Furthermore, because PTSD research lacks rigorous randomized clinical trials, "responder" levels have been overreported (*3*). We believe, therefore, that conceptualization and testing of complementary therapeutic approaches is needed.

Some forms of CBT may tap into the brain mechanisms underlying suppression. Research suggests that cognitive restructuring could benefit sufferers of PTSD (*4*). Cognitive restructuring processes may involve attaching a new emotional significance to a negative memory or cognition, as well as lessening physiological arousal (*5*, *6*). Furthermore, new responses paired with an original conditioned stimulus may have inhibitory influences over the amygdala via a pathway from the medial prefrontal cortex to the basolateral amygdala to the central amygdala (*7*, *8*). In addition, research examining the cognitive manipulation of emotional significance, known as reappraisal, has shown increased activation in areas of the middle and inferior frontal gyri and decreased activation in the amygdala (*9*). These are the specific prefrontal areas involved in suppression in our Research Article. Perhaps all of these findings explain why it may be necessary to revisit an emotionally distressing memory before it can be controlled via suppression. In any case, such processes may provide part of the biological basis for exposure and restructuring CBT methods.

BRENDAN E. DEPUE,[1,2]* TIM CURRAN,[1,2,3] MARIE T. BANICH[1,2,3,4]

[1]Department of Psychology, University of Colorado, Boulder, CO 80309, USA. [2]Center for Neuroscience, University of Colorado, Boulder, CO 80309, USA. [3]Institute of Cognitive Science, University of Colorado, Boulder, CO 80309, USA. [4]Department of Psychiatry, University of Denver Health Sciences, Denver, CO 80208, USA.

*To whom correspondence should be addressed. E-mail: depue@colorado.edu

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