

tion of magneto-chiral dichroism, *Nature* **390**(6659):493–494, 1997. The complex was  $\text{Eu}(\pm\text{tfc})_3$  (tris (3-trifluoroacetyl- $\pm$ -camphorato) europium III), where  $\pm$  indicates handedness. It was dissolved in deuterated dimethyl sulfoxide. MChD was observed via luminescence anisotropy.

21. Rikken and Raupach, Ref. 10, Fig 3b.
22. T = tesla, the SI unit of magnetic flux density.  $1 \text{ T} = 10^4$  gauss.
23. Solar System, *The New Encyclopædia Britannica* **27**:504–603, 15<sup>th</sup> Ed. 1992; p. 561.
24. The time constant ( $\tau$ ) is the time for an exponentially decaying quantity (in this case, e.e.) to decrease to  $1/e$  (~36.8 %) of its initial value. The half life ( $t_{1/2}$ ) is related to the time constant by  $t_{1/2} = \ln 2 \cdot \tau$  (~0.693 $\tau$ ).

### Sloppy science

‘Moreover, in evolutionary biology there is little payoff in repeating other people’s experiments, and, unlike molecular biology, *our field is not self-correcting* because few studies depend on the accuracy of earlier ones.’

Coyne, J.A., 1998. Not black and white. *Nature* **396**(6706)35–36 (quote on p. 36, emphasis added).

## Evolutionary professor encourages critical thinking

Michael J. Oard

An interesting opinion article appeared in a recent issue of *Physics Today*, entitled *Teaching and Propaganda*.<sup>1</sup> Motivated by the 1999 Kansas Board of Education decision and the outcry by scientists, Mano Singham is a voice of reason within an irrational overreaction.

Although he makes it clear that he is not a closet creationist (a statement many evolutions feel obligated to make — likely to avoid ridicule for daring to criticize evolution), he goes on to cheer those students in his physics classes that have been skeptical enough to question some of the doctrines being taught. He admits that teaching is really *brainwashing* because the students trust the teacher, the institution, and the school that granted the degree that allows one to teach. He admits:

*‘And I use that trust to effectively brainwash them. We who teach introductory physics have to acknowledge, if we are honest with our selves, that our teaching methods are primarily those of propaganda. We appeal — without demonstration — to evidence that support our position. We only introduce arguments or evidence that support the currently accepted theories, and omit or gloss over any evidence to the contrary. We give short shrift to alternatives theories, introducing them only in order to promptly demolish them — again by appealing to un-demonstrated counter-evidence.’<sup>2</sup>*

Most professors prefer these ‘good’ trusting students. However, he is bothered by this type of student, who seems to readily accept almost anything. The danger is that these students can believe anything from some other ‘expert’ or ideologue, which can be dangerous. He marvels at their easy

acceptance of relativity and quantum mechanics upon first hearing, in spite of these concepts being so contrary to everyday experience. Unfortunately, he also gives creationists dishonourable mention as those ‘other propagandists’. Nevertheless, his point is well taken, and he prefers the student who thinks for themselves and weighs arguments, even if that student is a creationist.

However, Professor Singham justifies the brainwashing because of practical considerations, such as ‘not enough time to develop all the arguments’, or that he wants his students to be accepted as ‘modern’ people. He considers he has the best of intentions for his students:

*‘... of course we do all this [brainwashing] with the best of intentions and complete sincerity. I have good reasons for employing propaganda techniques to achieve belief.’<sup>2</sup>*

Obviously, he believes he is imparting truth to the students, which justifies the means. I would not mind if he stuck only to observational physics, but when he applies this same attitude to historical science, he is too trusting and lacks critical thinking himself. But still, he prefers critical thinking students:

*‘The best I can hope for is to enable my students to think critically, to detect propaganda and reject intellectual coercion, even when I am the one doing it.’<sup>3</sup>*

I am grateful to Professor Singham for his candidness and for allowing dissent by creationist students. I now look forward to the time when he can apply this critical thinking to his own evolutionary assumptions and worldview.

### References

1. Singham, M., Opinion — teaching and propaganda, *Physics Today* **53**(6):54–55, 2000.
2. Singham, Ref. 1, p. 54.
3. Singham, Ref. 1, p. 55.