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Stubborn Facts Call for Stubborn Scientists

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It is not only acceptable but desirable for scientists to speak out publicly in defense of science; moreover, given the current political environment, such actions are increasingly necessary. In the process, it is crucial that we remain open to rethinking our most cherished beliefs.

"Facts," according to one of Ronald Reagan's more notorious pronouncements, "are stupid things." In all fairness, Mr. Reagan had supposedly meant to say "stubborn." But in any event, facts can certainly be troublesome, especially when they require us to give up a cherished notion, or when devotion to facticity requires us to step outside the ivy-covered halls and confront another messy reality: that of public opinion and political turmoil.

Science has proved troublesome of late to non-scientists as well, especially those whose ideology trumps their intellectual integrity … and sadly, people of this sort have been in control of the executive branch of the U.S. government since January of 2001. Accordingly, the editors' call for comparative psychologists and behavioral neuroscientists to assess their role in the public sphere is especially timely. Never in American history have science and the primacy of objective facts been considered more irrelevant, more suppressed, twisted and subordinated to ideology on the part of those controlling the purse-strings of research, and therefore, never in American history has it been more important for scientists to speak truth – if not to power (because the sad truth is that those currently in power simply refuse to listen), then to the American people: those who are supposed to hold ultimate sway in a democracy.

Although the misrepresentation and outright abandonment of science has been especially egregious of late, emanating largely from right-wing political ideologues (e.g., the censoring and denial of climate science with respect to global warming, false characterization of numerous aspects of reproductive biology, creationist threats to the teaching of evolution), the reality is that historically, left-wing ideologues have also been guilty: consider the suppression of Darwinism during the 1930s and 1940s in the former Soviet Union, in favor of Lysenkoism, or current refusals by predominantly left-leaning social scientists to acknowledge the power of sociobiology – aka evolutionary psychology – to illuminate human behavior.

Given such threats to scientific integrity as well as to the public understanding of science, I believe that the communication of science to the hoi polloi, far from demeaning our enterprise or polluting the priesthood, is a noble and indeed a necessary activity. After all, science has changed dramatically since the days when it was reserved for a tiny number of inspired geniuses (Archimedes, Leonardo), whose work was supported by personal or family wealth (Darwin), or could otherwise be accomplished using minimal resources (Leeuwenhoek).

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Science now requires resources, which must come, in turn, either from private industry or the public purse. If the latter, then we have an obligation to tell the public what we are doing and why; at minimum, we should cheer those who do so.

This will require humility no less than hubris, and a willingness to be disappointed. Sometimes, our reports will be twisted and used to support positions we have never espoused, such as the creationists' manipulation of Stephen Jay Gould's work on punctuated equilibrium to make it look as though evolution by natural selection had somehow been undermined.

At other times, prompt reporting of recent findings may backfire. Consider the following bad news for those of us who were intrigued by reports of a new species of dwarf human being: it might well turn out to be our same old species after all. Thus, in 2004 anthropologists announced the discovery of fossil remains of members of the genus *Homo* on the island of Flores, in Indonesia. Named "*Homo floresiensis*," and standing barely three feet tall, these miniature people were said to have lived as recently as 13,000 years ago, hunting pygmy elephants and overlapping regular *Homo sapiens* in both time and place (Brown et al., 2004).

But then a reanalysis of the find – by other researchers – suggested that these tiny "Hobbit people" may have been normal pygmies of the sort currently living nearby, and thus regular *Homo sapiens* after all; moreover, one skull – upon which most of the earlier analysis was based - probably came from a pathologic individual who suffered from microcephaly (Jacob et al., 2006).

I at least had been rooting for *Homo floresiensis*, just as I still hold out hope – increasingly forlorn – for Bigfoot ("Sasquatch") reputed to stomp about in the forests of the Pacific Northwest, for the Abominable Snowman or "Yeti" of the Himalayas, even for "Nessie," the legendary monster said to inhabit Scotland's Loch Ness.

The scientific jury is still out on the "Hobbit people," which is the really important point: "We are not here concerned with hopes or fears," wrote Darwin, at the end of *Sexual Selection and The Descent of Man*, "only with the truth as far as our reason allows us to discover it." I like diversity: different foods, different cultures and languages, different environments, different people, even – if reality would permit – different species of people. But science (and in our daily lives, common sense) demands that we be "reality-based" rather than "faith-based" or "preference-based." At the same time, and despite the occasional opprobrium from our colleagues as well as the risk of misperceptions and misunderstanding from the public with whom we struggle to communicate, the need of such communication continues, even if we sometimes appear foolish in the process, at least in part because we sometimes have to retract precisely these communications. After all, if you accept the deeply non-postmodern notion that science engages in progressively closer approximations to the truth, then a kind of trial-and-error is one of the most powerful ways of getting there.

Konrad Lorenz once quipped that a good scientist should be prepared to discard several cherished ideas every day, before breakfast. Although I don't recall the Nobel Prize-winning ethologist often following his own advice, it remains a touchstone, and one that doesn't apply only to downcast devotees of *Homo floresiensis*.

For example, many of us grew up with giraffe necks, which textbooks consistently proclaimed were not merely a giraffe's way of keeping its head above

its shoulders, but also the iconic example of how to distinguish evolution by natural selection from Lamarck's now-discredited notion of the "inheritance of acquired characteristics." Whereas Lamarck would claim that giraffes evolved long necks because their ancestors stretched their heads to reach high-elevation leaves, thereby somehow bequeathing elongated necks to their descendants, Darwinians attribute giraffe anatomy to the consequence of longer-necked individuals leaving more successful offspring than their shorter-necked compatriots.

It now appears, however, that sexual selection may hold the real key to Why Giraffes Have Long Necks, somewhat displacing the hoary traditional wisdom. More than a decade ago, researchers found that long-necked giraffes don't actually forage much higher in the leafy canopy than do short-necked ones; rather, males with long necks use them effectively as clubs, with which to battle their sexual rivals. And females also prefer to mate with longer necked males. It is thus as least possible that giraffes have long necks not because the ones so endowed got more to eat, but rather, primarily because they were more successful in defeating and intimidating other giraffes, as well as being found attractive by lady giraffes (Simmons & Scheepers, 1996).

If true, the mechanism is still Darwinian natural selection, with evolution proceeding by differential reproduction of alternative forms, although the details will need to be rethought. Herein lies both the frustration and the glory of science and its "reality-based" and fact-driven approach, as well as the need to communicate … not only with each other, but also with the public. Even if we end up losing a purported long-lost Hobbit cousin, or must wave good-bye to the seemingly settled story about giraffe necks, we can cling confidently to one thing at least: the wisdom of attending to the real world and of keeping an open mind. Similarly, it would in a sense have been easier if the public had never been told of "*Homo floresiensis*," so that creationists wouldn't have it as potential ammunition with which to dispute human evolution generally, or if generations of biology students hadn't balanced their understanding of Darwinism vs Lamarckism on the apparently vulnerable necks of giraffes.

It would also be easier for scientists to keep quiet about global warming, AIDS, neurobiology, stem cell research, or cloning – and simply try to do their work, in silence, secrecy and subordination, especially when political pressures urge them to do so. But facts are indeed stubborn things, and so are those of us who believe in them.

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