

## Editorial

# Combating the Tithonus Error: What Works?

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*"Let me go: take back thy gift:  
Why should a man desire in any way  
To vary from the kindly race of men,  
Or pass beyond the goal of ordinance  
Where all should pause, as is most meet for all?."*

—Alfred Tennyson

**“WHAT’S THE TITHONUS ERROR?”** Yes, I appreciate that many readers will appreciate a scrap of orientation. The Tithonus error is the conviction (which I hope explains why I say “combating” rather than simply “correcting” in my title) that the effort to develop interventions combating aging is a bad idea because, if such efforts are successful, the result will be what Fukuyama has notoriously termed<sup>1</sup> “a global nursing home”—an increase in the average period that people spend in a frail, diseased, and dependent state at the end of life. The term derives from the Greek myth in which Tithonus, a Trojan warrior, won the heart of the goddess Eos. Eos was of course immortal and thus despondent at Tithonus’s inevitable demise, but she was too junior a deity to have the power to grant her lover immortality, so she asked her father Zeus to do so, and he complied. However, Eos “forgot” to ask that Tithonus remain eternally youthful, so the result was that he became increasingly decrepit, until eventually Eos had no choice but to turn him into a grasshopper.<sup>2</sup>

The Tithonus error is, of course, one of the innumerable expressions of what I have termed<sup>3–5</sup> the “pro-aging trance,” the impulsion to leap to embarrassingly unjustified conclusions in order to put the horror of aging out of one’s mind.<sup>6–9</sup> As I have surveyed elsewhere, this naked abandonment of customary standards of logic is the historically, but not currently, rational response to the realization that a truly ghastly fate awaits one, some quite long time in the future, and there is nothing one can possibly do about it. In such circumstances, it makes perfect sense to engage in arbitrarily irrational rationalizations to get on with one’s miserably short life in a state of minimal preoccupation with that fate. Now that the inevitability of the fate in question is crumbling, however, the pro-aging trance has become a massive part of the problem, dissipating as it does the ardor we should be feeling to bring about the defeat of aging as quickly as possible. The magnitude of that problem is evident largely in the impressive variety of outrageous arguments that the pro-aging trance has engendered; but, for a number of reasons, the Tithonus error is an argument that is worth tackling with particularly high priority.

Let me first make clear that the Tithonus error is *not* widespread within biogerontology. Those who study the biology

of aging are abundantly aware that the overwhelming message from both theory and data is that being frail is risky, and, thus, that the path of least resistance to extending life (if that is even the objective; see below) is to extend healthy life.

However, when biogerontologists make public statements—and here I include not only statements addressed directly to the general public, but also statements likely to come to the attention of nonspecialists, particularly politicians—they have an unedifying record of overplaying this hand. An early example of what I mean was the slogan emblazoned on the cover of the first issue of the *Journal of Gerontology*, the first academic publication focused on the biology of aging: “Giving life to years, not just years to life.”<sup>10</sup> The idea that giving life to years is a laudable goal is uncontroversial and should surely be highlighted. What is altogether more problematic is that giving years to life should be somehow dismissed. Strictly, of course, the slogan did not do that: It merely stressed that it would be wrong to view giving years to life as the *only* goal. But inevitably the tendency was, and remains, to fail to hear the word “just” in this slogan and to infer a prioritization of goals that leaves life extension as second best. Why inevitably? Because of the allure of the Tithonus error. What allure? The fact that the Tithonus error props up the pro-aging trance.

So far, so unpromising. . . . But wait: What’s the problem with overplaying this hand? If the audience is nonspecialists, might it not be altogether advisable to emphasize the aspect of one’s goals that that audience finds the most palatable? So it might seem, and so it certainly did seem to most biogerontologists back then, and to most biogerontologists to this day. Unfortunately, this conclusion is in fact disastrously wrong. The problem with it is that the emphasis on health rather than life irresistibly translates into an emphasis on disease-specific interventions rather than preventative, biogerontological interventions—precisely the reverse of the effect that biogerontologists sought, and seek, to have on policy.

This logic duly played out over the first few decades of the postwar era, with the biology of aging playing a frustratingly marginal role in public debate and public funding. Had the story been uniformly bad, perhaps biogerontologists

would have seen the error of their ways and shifted to a more objective portrayal of the potential value of their work. Unfortunately in the long term (though, obviously, fortunately in the short term), there was a conspicuous exception to this tale of woe, namely the founding, in the U.S. National Institutes of Health, of the National Institute on Aging (NIA) in the mid-1970s.<sup>11</sup> The existence of the NIA brought the promise of legitimacy to a field that had hitherto labored under a cloud of suspicion within mainstream biology, actually, to be perfectly frank, a reputation for mediocrity. It also, of course, brought money.

What, then, was the long-term problem? It surfaced even at the outset, with the biogerontologists involved in the genesis of the NIA (most prominently, Bernard Strehler) being forced to accept the dilution of their original concept: The NIA was created with only one minority component being focused on the basic biology of aging, the remainder being dedicated to specific age-related diseases (principally Alzheimer disease) and the psychosocial context of aging. As time went on, it became apparent that even the hoped-for respectability of biogerontology was not emerging: It really only arrived in the 1990s, with the discovery of single-gene mutations that greatly extend the longevity of model organisms<sup>8,9</sup> and the consequent opportunity for biologists with no primary interest in aging to apply fashionable techniques in an area that readily makes headlines.

It got worse, of course. As I have lamented previously in this space,<sup>12,13</sup> the dominant response of the biogerontology community was not to draw back from their misguided de-prioritization of longevity *per se* but to compound it, by broadening it from its initial focus on the sociopolitical agenda to encompass the biology itself. Fries's original highlighting of the compression of morbidity as a feasible goal<sup>14</sup> had nothing whatsoever to do with the biology of aging, yet biogerontologists, even those in positions of the greatest political influence,<sup>15</sup> gleefully embraced it as their own, paying no attention to the biomedical implausibility of the idea that postponing morbidity would not similarly postpone death. Did this solve the problem? Not so much. The continued parlous state of biogerontology funding provides one answer<sup>16</sup>—the continued ability for bioconservatives and others to get away with spouting the Tithonus error in print and elsewhere is another. In a nutshell, far from having been banished by biogerontologists' preferred rhetoric in recent decades, if anything the Tithonus error has become more entrenched.

What, then, are the alternatives? There are at least two.

The first is to examine the roots of the Tithonus error. Yes, those who are healthy do not relish being decrepit; but if they truly hope to *die* before they get old, they would do well to consult those who are well along that slippery slope and are mysteriously making the best of it. They would also do well to consider whether they would prefer to wake up tomorrow or to die in their sleep, and whether they will think any differently about that at a greater age but in possession of no lesser vigor. Since the result of such reflections is clear, it can readily be seen that compression of morbidity, at least when taken to its logical conclusion, is not merely a biological mirage but a psychological and sociological one too. As such, perhaps the only "good death" (if there is any at all) is one that is sudden and *unscheduled*. If (as in today's developed world) one's age at death is probabilistically highly

constrained, and its likely timing thus anticipated all one's life, prefacing it by a modest period of decline during which the victim and his/her loved ones can get used to the idea may in fact be the best situation.

But the above is a subtle and, thus, perhaps weak argument. The second alternative for banishing the Tithonus error, and in my view the most promising, is to be honest with the world and focus on the biology itself—not the theory, but the data. In my view, repeating the platitude that biogerontologists do not *seek* to extend frail life, only to extend healthy life, is ineffective for one reason above all: that policy-makers and the public know full well, and are strongly inclined to recall when the pro-aging trance requires it, that scientists often create things that are not what they sought to create. Therefore, I conclude that what is most needed is a demonstration that the rhetoric of biogerontologists with regard to what is possible, not merely what is desirable, is actually true. That rhetoric is abundantly supported by data that biogerontologists consider sufficient; specifically, that every single example of the substantial extension of longevity in the laboratory has featured an unextended period of end-of-life frailty. But what is needed for nonbiogerontologists is something closer to home: a demonstration that what has been done in the pursuit of knowledge is genuinely representative of what might be done in the future in the pursuit of long life for its own sake.

In the Methuselah Foundation, my colleagues and I have facilitated this by offering a monetary prize for the extension of mouse lifespan, whose rules say nothing whatsoever about health. The thinking here is that, over time, more and more researchers (whether or not they break the mouse longevity record, which is the criterion for winning the prize) will try to increase mouse longevity, with no regard for increasing healthy longevity, and yet . . . lo and behold, the interventions that do well will all be ones that do not extend end-of-life frailty.

I feel strongly that only by the accumulation of irrefutable data of this sort will the Tithonus error be truly corrected. Any effort by publicly funded sources to support, hence legitimize, intervention in aging<sup>17</sup> is a step forward, but most such efforts do not powerfully challenge the Tithonus error. The idea of focusing our explicit goals on lifespan rather than healthspan certainly sounds, at first hearing, like a remarkably poor way to challenge the Tithonus error; but we have more than half a century of experience teaching us that the more obvious approach is ineffective, whether commercially<sup>18</sup> or politically.<sup>19</sup> It's high time to analyze that experience like the scientists we are, to recognize that the available data cannot be reconciled with our original hypothesis, and to revise our strategy accordingly.

## References

1. Fukuyama F. *Our Posthuman Future: Consequences of the Biotechnology Revolution*. Farrar, Straus and Giroux, New York, 2002.
2. Encyclopaedia Britannica. Entry for "Tithonus (Greek mythology)". <http://www.britannica.com/EBchecked/topic/597223/Tithonus> (accessed July 15th 2000).
3. de Grey ADNJ. Aging and airborne HIV: a reassuring analogy. *Rejuvenation Res* 2007;10:1–3.
4. de Grey ADNJ. The need to debalkanize gerontology: a case study. *Rejuvenation Res* 2007;10:431–434.

5. de Grey ADNJ. Understanding and tackling aging: two fields communicating (a little) at last. *Rejuvenation Res* 2007;10:637–640.
6. Bains WA. Can I have volunteers to die tomorrow? *Rejuvenation Res* 2007;10(4):648–650.
7. Harris J. Interview with John Harris. Interview by Vicki Glaser. *Rejuvenation Res* 2007;10:107–111.
8. Wilkes R. SENS: an engineer's point of view on feasibility and bioethics dialogue. *Rejuvenation Res* 2007;10:235–236.
9. Horrobin S. The value of life to persons as conative processes. *Rejuvenation Res* 2007;10:S33.
10. Anonymous. *J Gerontol* 1946;1:cover.
11. Binstock RR—Binstock RH, Fishman JR, Juengst ET. Boundaries and labels: anti-aging medicine and science. *Rejuvenation Res* 2006;9:433–435.
12. de Grey ADNJ. Compression of morbidity: the hype and the reality, part 1. *Rejuvenation Res* 2006;9:1–2.
13. de Grey ADNJ. Compression of morbidity: the hype and the reality, part 2. *Rejuvenation Res* 2006;9:167–168.
14. Fries JF. Aging, natural death, and the compression of morbidity. *N Engl J Med.* 1980;303:130–135.
15. Hodes RJ. National Institute on Aging. Interview by Vicki Glaser. *Rejuvenation Res* 2006;9:419–422.
16. Warner HR. Making the political case for biogerontology funding: a view from the trenches. *Rejuvenation Res* 2007;10:S51.
17. Strong R. The National Institute of Aging Interventions Testing Program. *Rejuvenation Res* 2007;10:S50.
18. Powers LF. Pots of gold in anti-aging regenerative medicine? *Rejuvenation Res* 2007;10:S46.
19. Siegel B. The inevitable legal battle over engineered negligible senescence. *Rejuvenation Res* 2007;10:S48.

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2. 2009. Personal Profile: Interview with James Joseph, Ph.D. *Rejuvenation Research* 12:6, 475-478. [[Citation](#)] [[PDF](#)] [[PDF Plus](#)]
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4. Iain Inkster . 2009. Imagination and Demand. *Rejuvenation Research* 12:5, 307-309. [[Citation](#)] [[PDF](#)] [[PDF Plus](#)]
5. 2009. Interview with Thomas Okarma, M.D., Ph.D.; CEO, Geron. *Rejuvenation Research* 12:4, 295-300. [[Citation](#)] [[PDF](#)] [[PDF Plus](#)]
6. 2009. Interview with Nigel M. de S. Cameron, Ph.D. *Rejuvenation Research* 12:3, 227-230. [[Citation](#)] [[PDF](#)] [[PDF Plus](#)]
7. Aubrey D.N.J. de Grey . 2009. Why Are So Many People So Unashamedly Selfish About the Prospect of Combating Aging? *Rejuvenation Research* 12:3, 165-167. [[Citation](#)] [[PDF](#)] [[PDF Plus](#)]
8. Vicki Glaser . 2009. American Federation for Aging Research: Interview with Stephanie Lederman. *Rejuvenation Research* 12:2, 155-158. [[Citation](#)] [[PDF](#)] [[PDF Plus](#)]
9. Vicki Glaser . 2009. Interview with John Vincent, Ph.D. *Rejuvenation Research* 12:1, 59-64. [[Citation](#)] [[PDF](#)] [[PDF Plus](#)]
10. Aubrey D.N.J. de Grey . 2009. Cracks in Social Gerontology's Pro-Aging Edifice. *Rejuvenation Research* 12:1, 1-2. [[Citation](#)] [[PDF](#)] [[PDF Plus](#)]