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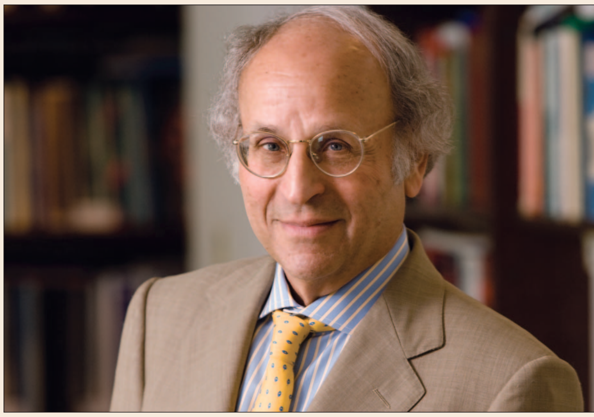
If you want to learn to swim, jump into the water. On dry land, no frame of mind is ever going to help you. —Bruce Lee



JOSHUA FRANZOS

Have you heard about the Benjamin Button jellyfish? This tiny hydrozoan, *Turritopsis dohrnii*, has the uncanny ability to regenerate with such success and frequency it's been called "immortal." Not only does the jellyfish regenerate, but it seems to age backwards. (Hence the reference to Fitzgerald's Benjamin Button character.) The organism starts out as a polyp, then transforms into a medusa. If attacked or sickened, the medusa will collapse into a gelatinous ball and then, within days, become a polyp, and the cycle starts all over again. Not surprisingly, this astonishing creature's population keeps growing, swarming the oceans. Yet only a few scientists study *Turritopsis*, in hopes of learning something about the aging process; the most resolute among them aspire to discover a biological fountain of youth.

Speaking of aging and aquatics, meet the single-celled pond swimmer *Tetrahymena*. It has tons of chromosomes, the ends of which seemed less complex than those of other animals. For these reasons, in the 1970s, Elizabeth Blackburn studied *Tetrahymena*'s chromosomal ends (like the caps on shoelaces) where she found an odd "stutter" of DNA sequence repeats. It turns out, these stutters, or telomeres, are shared by all eukaryotes (including us, of course), and play roles in cellular lifespan, cancer, stress, and diseases of accelerated aging. Blackburn shared a 2009 Nobel Prize for her telomere findings, which *Tetrahymena* made possible. Other scientists discovered catalytic RNAs by studying this organism (resulting in the critter's earlier Nobel triumph in 1989), as well as a host of important cellular acrobatics, including synchronized cellular division. The endlessly intriguing *Tetrahymena* happens to have two nuclei, and, believe it or not, seven different sexes—that can mate in 21 combinations. The organism "decides" which sex it will be.

Some of the fish tanks here at Pitt hold clues to another critical aspect of human biology, "innate" immunity. Like a sea sponge or a coral, the *Hydractinia symbiolongcarpus* is an ocean-dwelling colonizer. As it comes across other *Hydractinia*, the animal makes a determination of whether or not to fuse—i.e., allow the newcomer to join it or not. What *Hydractinia* does in these instances is a lot like what our frontline immune defenses do. This salty has been inspiring two scientists in our Starzl Transplantation Institute, Fadi Lakkis and Matthew Nicotra; they are using the *Hydractinia* model to address what have long seemed to be intractable issues of organ rejection.

We haven't even left the water yet, but I could tell you much more about insights that scientists are gleaning from "exotic" and "primitive" organisms. What these cases share is a willingness by some granting entity, as well as individual scientists, to value the deep and hard work of basic science and to take risks. These leaps of faith not only tell us more about the animal kingdom, of which we are members, but often they set a path to new therapies. And sometimes they shift our thinking in fields where we seem to be at a scientific dead end.

But for all we learn from animal models, be they jellyfish or mice, we still need to understand the workings of the human body—or I should say "bodies." Of late, it seems that every few weeks there's another startling finding about how complex and person-specific human biology really is. Maybe we shouldn't be so surprised. After all, our cells have evolved over 3 billion years; I doubt that even our hugely talented faculty could fully illuminate this complexity during a four-year grant cycle!

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