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MICROBIAL LIFE AND BELONGING

Tony Milligan*

*Senior Researcher in Philosophy of Ethics with the *Cosmological Visionaries* project, King's College London, Anthony.milligan@kcl.ac.uk.

Ideas about *belonging* are complex. A human might have a causal history linking them to a particular time and place such as a home or even a planet, and still feel that they do not truly belong there. They may feel that they could fit in better somewhere else and that they are, in Eugen Bacon's words, "human beans that could be displaced, ones who nobody noticed." There are beans that get a lot of attention, like Peruvian cocoa beans, and beans whose disappearance would go unacknowledged, or without comment.

These ideas about belonging cross worlds, in the sense of *moving between* human and non-human forms of life. We may think of ourselves as having roots or lacking them. We may think of ourselves as flourishing in one place but not in another. In Bacon's text, we might think of ourselves as so many beans to be counted, or admired, or lost. Our understanding of ourselves continually, and often in unnoticed ways, draws upon a series of analogies with other forms of life. These analogies then feed back into our thinking about those other forms of life, from animals to trees, from plants to microbes.

Discussions about species preservation are also discussions about a place and time where species belong—for instance, would you support "de-extinction" of the dodo? The woolly mammoth? Or, far more speculatively, dinosaurs that roamed the Earth tens of millions of years ago? Where do we draw the line? Also, discussions about reforestation to combat climate change are discussions about which plants and trees are native, and native relative to a time span and to the underlying geology of place. Belonging does not stop with us.

If this was not the case, then it would be difficult to make sense of why the discovery of microbial life, or historic evidence for such life, on another world would matter to us in the way that it does. The discovery of life that *belonged* to another place would matter to us irrespective of its biochemical structure and rudimentary nature. Of course, we might prefer it to be exotic, or at least a little different from us and to shed light upon the difference between life and non-life, but we would still consider it worthwhile and important to discover life that belongs elsewhere. If it happened to be biochemically indistinguishable from some microbial life form that we kill inadvertently and without malice on Earth, as we go about our daily business, this would not justify us in treating such alien life elsewhere in exactly the same way.

Another way of putting the point would be to say that, from an ethical point of view, all microbes are not equal. We have reasons to protect some, that we do not have to protect others. The fact that *life is from elsewhere*, or that we have encountered *life that belongs to some other planet*, would make a difference. Perhaps not to all of us, but to many and probably most of us. And there is a case for saying that we would have a reason to protect such life *for its own sake*, and not just for the sake of science. It might be confusing to say that such life has *rights*, because the concept of rights does a different kind of work. But nonetheless, I might put a picture of a rudimentary alien life form on my office wall, yet I would probably not put a picture of its terrestrial counterpart on the wall.

Wema, in Eugen Bacon's story, is concerned about belonging. Not directly in the way that astrobiologists are typically concerned, but in a way that is part of the continual *movement between* described above. Movement between places, movement between kinds of beings. There is also a continual interplay in the story between the biological and the social, which is reflected in the variety of pronouns in use. "Sie" as well as "she," "hir" as well as "her." Wema and many others who are unhappy and wounded being on this Earth are

transported to a different and much better place, to Super Earth^{1*}. A better world, realizing a different set of possibilities for life, “a rainbow of colors resplendent in spiral symmetry,” hundreds of light years from old Earth. A reminder that life could have taken a different path, that some of the processes which have led to our way of living are a matter of what Jacques Monod² called *chance* rather than *necessity*.

This Super Earth is a place where thylacines (dog-like marsupials with tiger-like stripes) are not extinct, where gender prejudice and domestic violence are left behind, and where “no species is superior in its demands on the other as to make it extinct.” Science fiction stories often describe worlds we might like to visit, but on which we would not necessarily want to live. Super Earth sounds instead like a good place to live. Humans there are good to one another, and their acting in such ways is connected to better ways of living with non-human creatures and as part of the Super Earth ecosystem. Super Earth is not “blood red in tooth and claw.” We may wonder whether life can really be like this, altruistically symbiotic and never caught up in biological trade-offs and harms. But it is not a stretch of the imagination to think that the relation between human life and non-human life might be *more like this*, and that it would generally be good if Earth was more like Super Earth. It sounds like a more sustainable place.

It is certainly a more integrated place, with something akin to what E. O. Wilson³ called “sociobiology” practiced by priests who “study the evolution of human macromolecules, early life and development, to create optimal conditions for humankind to thrive.” I mention Wilson here not only because of the integration of the biological and the social on Super Earth, but because he believed in a kind of love of life, a *biophilia*, that also

^{1*} Which actually might be a super-Earth in the astronomical sense (put simply, a rocky planet with a mass greater than Earth, but not enough to become a largely gaseous planet such as the ice giants Uranus and Neptune); this seems to be a very common class of exoplanets. Some have also been found around pulsars, a type of neutron star (e.g. PSR B1257+12) such as in the story, although their habitability is a far more

²
speculative topic .

seems to be in place there. It is not driven by Thanatos, by longings for death, but by a shared belonging and symbiosis. Yet, even if done for good motives, we might worry about the outcome. Tigers may live in zoos or in wildlife parks, but they do not belong there. A creature may be kept alive in a place, a species may even be preserved there and nowhere else, without our imagining that this is ethically equivalent to ensuring survival in its natural habitat. At a certain point, we sometimes have to let go. Even of the things that we love. And even if it is an admission of failure.

Wema and the other human beans transported to Super Earth are not like tigers in a zoo. They can truly belong there, even though they come from another place. This is an idea that works well in the case of the humans, who can reflect upon the process of transportation, upon gravitational singularities and upon an infinite distortion of space and time. One of the interesting things is that this idea of belonging also works well with the extinct species. Members of these species can live and love and flourish on Super Earth. They can belong, even if they cannot speculate about the nature of belonging. The thylacines might easily be a better fit for Super Earth than for actual Earth. It might be a more reliable home for them, given our threatening and overwhelming human presence here. In a little time, they might truly *belong* there, in spite of their Earthly origins.

How far does this thought go? Does Wema's idea of belonging, with some suitable modification, reach from human beans all the way down to the most rudimentary forms of life? Could even microbial life transported from Earth *belong* on Super Earth, in the same way that microbes discovered beneath the Martian regolith or in the waters of Enceladus, would belong to these places and excite our attention if discovered?

There may be a way to answer this question, but it involves subversion of Bacon's pleasing rainbow scenario. Human action on Super Earth is clearly more sustainable than it is on Earth. It is a better place to be. But still, the universe does not come with any guarantee

against harms. When Wema is reassured that “Super Earth will never suffer from atmosphere overloading, overpopulation, degraded soil, crop failures, famine, and pandemics—all things that plague humankind,” she is given a promise that cannot automatically be kept. The emergence and history of life may not be quite so accidental and dependent upon chance as Monod once thought, but vulnerability is a feature of life. And when we care for one another, or for any living beings, recognition and acceptance of vulnerability are built in.

Let us briefly subvert the tale and imagine that the Super Earth experiment fails badly, wiping out Wema, her friends, and the thylacines. Leaving only rudimentary life alive. In a scenario in which everything goes horribly wrong, and the things that plague humankind take their toll, Super Earth would become an analogue of failed reforestation, or failed cultivation on difficult terrain, with almost everything washed away. This would be hugely disappointing. Yet superficially, it would make Super Earth look like the kind of place that astrobiologists are currently seeking, i.e., a place with *only* microbial life, or evidence that it once existed. Should we find somewhere like that, we would be anything but disappointed. Disappointment is relative to hopes and expectations and, from an astrobiological point of view, the discovery of such a place would be momentous rather than disappointing.

The unhappy scenario in which Super Earth fails, leaving only microbial life, is not of course a claim that any good place must eventually collapse, and that it must do so because of the dynamics of life, or because of our human flaws. There is no obvious necessity of that socially-driven sort, even if there are natural processes that do tend towards periodic mass extinctions. Generalizing upon the basis of a single example of life here on Earth, with our multiple social problems, is not always a safe thing to do. Other pathways may be possible, and even likely. An appeal to the more unhappy scenario of Super Earth failure is just one more way of reflecting upon *belonging* in the light of loss. And a way of reflecting upon the goals of astrobiologists when we consider the origins, extent, and future of life. If we were

able to study the failed Super Earth in some direct way, travelling there by the water portals of Bacon's story, examining its microbial life would be interesting, different from the kind of "discovery" of life that so many astrobiologists and other humans hope for. In the usually imagined discovery scenarios of astrobiology, the microbial life that is sought has not recently come from Earth, but *belongs* to another place, and has done so for a far longer time than the Super Earth experiment.

This need not mean that the life sought by astrobiologists must have a different ultimate *origin*. It need not trace back to a second figurative genesis of biology out of abiotic materials. Life could, after all, have originated only once and then shifted around through chance and long before intelligent beings started to look for it. After all, it's a plausible speculation that all life as we know it originated on Mars and was transported to Earth by lithopanspermia—within rocks thrown into space by violent impacts so common in the early Solar System. Such a scenario may not provide the simplest explanation, but it is not fanciful. It seems entirely possible in light of current scientific knowledge and, if we ever discover signs of life on Mars, we might get around to testing this possibility^{4,5}. In some ways, biochemical similarities that point towards a shared ultimate origin might open up exciting possibilities and help us to pose questions about where we belong: to a single planet, or to some larger region of space.

We are not looking for life that must have a different ultimate origin. We are looking for *life with a history that is significantly different from the history of all terrestrial life*, and different for a period of time that is vastly greater than our own human history. We are, in some sense, looking for life that is *indigenous* to some other planet, even if it turns out to be biochemically indistinguishable from life that we have already encountered. Carl Sagan once remarked that Mars would belong to the Martians if there were any, even if they were microbial⁶. He was not speaking about microbes taken to the planet by a previous space

mission. He was speaking about life that *belonged* on Mars in some longer-term sense, even if it shared a singular origin with Earth life.

When we consider matters in these terms, the ways in which human beings such as ourselves think about our belonging, and the ways in which we think about the belonging of other forms of life, do seem to interconnect. They share a world, live together, and influence one another.

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