

# **The global biosphere and its metaphysical underpinnings: Ecumenical alternatives in animism and astrobiology**

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Abstract:

The term *biosphere* designates the “zone of life” on Earth. Outside this sphere, everything becomes “alien.” In this view of things, which I take to be canonical in the modern West, terrestrial life and biosphere overlap more or less neatly. Yet this idea of an almost perfect convergence is not the only view possible. This study presents two anthropological cases which demonstrate, *a contrario*, that the modern tendency to envisage the biosphere as “our home environment” or as “our familiar world” is in many ways a historical accident. Other ecumenical possibilities (by which I refer to the ancient Greek notion of the “inhabited world,” the *oikumene*) are by no means unthinkable. Examining the ecumenical originality of two communities that at first sight seem unrelated – Chachi indigenous people in Ecuador and scientists involved in the search for extraterrestrial life – will allow us to cast new light on the metaphysical underpinnings of the modern biosphere concept.

Keywords: conceptions of life, biosphere, animism, Chachi people, astrobiology

Schlagworte: Konzeptionen von Leben, Biosphäre, Animismus, Chachi, Astrobiologie

## **1. Introduction**

A key feature of the biological notion of life is its ecumenical dimension: under the rules of modern metaphysics “we, living beings” form an interconnected whole, an extensive family. Life is in effect the most extensive “us” thinkable. If one refers to “us, inhabitants of the terrestrial biosphere,” one delineates the limits of the modern oecumene. All organisms that pertain to the Darwinian “tree of life” are included. However, recent work in the social sciences and the environmental humanities challenges this conceptual setup profoundly. It turns out that the ecumenical role of the biosphere may not be that self-evident after all. Further, the currently dominant meanings of “biosphere” were in all likelihood not inevitable. One strand of critique derives from research on “the Blue Marble,” which refers to the iconic photo 22727, taken from

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the Apollo 17 spaceship in 1972. The image of our blue planet as a tiny marble floating in pitch-dark nothingness serves – as the geographer Denis Cosgrove (1994, 274) has put it – as a visual signifier for the notions of *One-world* and *Whole-earth*.

The Blue Marble, the anthropologists Sophie Houdart and Christine Jungen (2015, 5) note, is the culmination of one of modernity's major achievements, which goes back to the spread of terrestrial globes in the fifteenth century: the institutionalization of the view from afar or, as they call it, “the inversion of our look” from an inside to an outside vantage point. It replaces the earth beneath our feet with Earth the planet, as Tim Ingold (2015, 75) has summarized it. Indisputably, the terrestrial globe and the biosphere that envelopes it have become powerful emblems of the modern epoch. Images such as the Blue Marble, the environmental humanities scholar Tobias Boes (2014, 160) remarks, “are perhaps the closest equivalent to a religious icon that our secular age has ever produced.” The image of the world as a sphere does indeed have theological origins, as the philosopher Peter Sloterdijk (2014) has shown in his *Spheres* trilogy. A lot has been written on the colonial and imperial ideologies that inform this globular, totalizing view (e.g. Haraway 1991; Ingold 1993; Jasanoff 2001; Olwig 2011; Lazier 2011; DeLoughrey 2014). Several authors have serious reservations about the notion of a unified biosphere and even about its “spherical” character. Anna Tsing, for one, has not only pointed out that there is nothing spherical about the Meratus Dayak equivalent *bulu gumi* (“the body hair of the Earth”). She also suggests that the modern notion of “biosphere” is perhaps better envisaged as an interconnected mess or an undifferentiated mass rather than as a globular shell or sphere (Haraway et al. 2016).

A number of scholars have advocated replacing this dominant blue-marble image of the world, which in the words of Bruno Latour (2015, 180), has so durably poisoned our thought. Referring to current debates on climate change, the historian Thomas Lekan (2014, 175) has argued that “Blue Planet images [are] decidedly anachronistic and unsuitable icons of our current predicament.” This type of critique is complemented by the intuition that representations of the biosphere as a thin film or a global varnish covering our blue planet are no longer satisfactory. That is why a number of scholars are now experimenting with alternative biospheric images. Such “Gaia-graphic” depictions aim to give more depth and volume to the terrestrial biosphere, thus remedying a key problem that arises when the Earth is viewed as if from outer space: all life forms are squeezed to the point of becoming invisible (Arènes, Latour, and Gaillardet 2018). My aim here is not to discuss the advantages or disadvantages of such innovative depictions (but see Olson and Messeri 2015). I merely mention it to highlight that the topic of the biosphere and the problem of representing “our

home environment” are central themes in contemporary social scientific research (Pitrou 2014).

There is another line of research in the environmental humanities that critically engages with the notion of a global biosphere: it does not so much focus on the fallacies of blue-marble imagery as on the difficulty of defining the exact limits of the biosphere, on issues of scale and on the porousness of the dividing lines between the social, the biological and the geological. Gisli Pálsson and Heather Anne Swanson have coined the notion of “geosocialities,” in a move to elucidate the intricate yet often ignored link between human bodies and Earth systems or, as they put it, to ethnographically investigate “the intertwining of biographies and planetary systems in ways that challenge our sense of what is ‘big’ and ‘small’” (2016, 164). Other social scientists, especially those interested in what are known as the new materialism, are also theorizing the commingling of the biologic and the geologic in unprecedented ways. Examples are Jane Bennett’s work on “vibrant matter” (2010), Kathryn Yusoff’s writings on “geologic life” (2015) and Elizabeth Povinelli’s (2014) “geontologies of the otherwise.” Finally, it is worth mentioning the work of the historian of science Leah Aronowsky (2017, 2018), who has traced the post-WWII career of the concept of the biosphere across multiple scientific disciplines and who has shown that the scientific meanings it assumed were neither univocal nor unavoidable. In short, the question of the biosphere is very much at the forefront of environmental humanities research today.

The aim of this article is to contribute to this burgeoning debate in an indirect way. Rather than studying how the biosphere concept is mobilized in specific scientific settings or scrutinizing the role it plays in current discourses about the changing planetary environment, I propose to focus on its ecumenical dimension. My aim is to establish a comparative framework in which “the biosphere” is just one among many ecumenical options. Such a framework will make it obvious that the biosphere must be grasped as an “anthropological” rather than a “natural” phenomenon, in the sense that it is premised on particular metaphysical assumptions. This approach is inspired by recent anthropological work that seeks to “provincialize” modern thought (e.g. Descola 2005; Viveiros de Castro 2009). As the starting point of my comparative endeavour I have chosen the first-person plural pronoun. It is well known that the remit of any pronoun is contextually defined. Yet modern metaphysics is configured in such a way that certain upper limits appear to be set in stone: “we, humans” and, ultimately, “we, living beings.” Beyond that, it becomes difficult to conceive of an ecumenical unity: expressions such as “we, humans and volcanoes” or “we, animals and planets” sound awkward to modern ears. The zone of life remains our ultimate oecumene in this modern setup.

But viewing the ecumenical prerogative of the biosphere as an obvious, universally accepted fact would be misguided. In this study, I discuss two cases that diverge in interesting ways from the standard model I have just outlined. First, I examine the animistic notion of life of the Chachi of northwestern Ecuador, where I conducted ethnographic fieldwork between 2002 and 2008. Second, I document how certain practitioners in the field known as astrobiology are redefining the boundaries between “us” (alive, familiar) and “not-us” (not alive, alien); this is based on multi-sited research that I started in 2010. Although these two examples – animism and the search for extraterrestrial life – might seem disparate at first sight, they will make clear that the distinction between what is alive and what is not is neither intuitively clear-cut nor rationally self-evident. The same goes for the distinction between what qualifies as “home” and what is conceived of as “alien.” Indirectly, it emerges that the modern boundary between the terrestrial and the extraterrestrial, between the biosphere and the interplanetary medium, is by no means “natural” – it is rooted in a prior and rather peculiar metaphysical decision.

## **2. Chachi animism**

The ancestral territories of the Chachi are situated in Esmeraldas, a tropical lowland area between the Pacific coast and the Andean highlands of northern Ecuador. Numbering approximately 9,000 people who speak a distinctive language, *cha'palaa*, the Chachi are an Amerindian minority – the bulk of Esmeraldas' population is constituted by people of African and/or Hispanic descent (Lorcy 2011). In the region, they have a reputation as excellent hunters, expert basket-weavers and skilful canoe-crafters. Identifying a specific “Chachi notion of life” may be regarded as problematic. Even within such a relatively small and homogenous population there are different opinions, internal disagreements and views that evolve over time. What is more, most Chachi are fluent in Spanish. Their bilingual education system is locally regarded as efficacious. Chachi children are taught basic notions of biology, in the schools one finds books and posters explaining evolutionary theory, and one teacher I knew fairly well had even coined a neologism for “dinosaur” (*tupiñi*, literally “land dragon”). A few exceptional individuals have earned university degrees in biology or medicine. The presence of environmental NGOs and conservation organizations in their ancestral territories (i.e., the southernmost extension of the Chocó forest, which wildlife experts consider to be one of the world's “biodiversity hotspots”) has contributed to the spread of the standard Darwinian conception of life. Insofar as they have adopted the tenets of modern biology, Chachi people are not in any way different from “us”, educated Westerners. Yet, in an important sense, they

are also much better off because – unlike most Western populations – they have managed to conserve a rather singular concept of life that differs from the modern biological one.

First, it should be noted that there is no vernacular term that overlaps with the modern concept of “life.” In *cha’pala*, there exists no equivalent for an expression such as “living beings,” even though people do occasionally refer to *seres vivos* in local Spanish. The question that arises, then, is: what is the most extensive “us” in Chachi animism – how do people define the ecumenical “we”? The puzzle can be resolved by examining more closely the way in which they designate themselves, as I have shown elsewhere (Praet 2009a, 2013a, 2013b and 2013c). The term *chachi*, which anthropologists and Chachi people themselves nowadays use as an ethnonym, is crucial in this respect. Originally, “Chachi” did not designate a specific tribe or indigenous community; nor did it refer to a particular “culture” or a “society.” It rather denoted humanity as a whole and is literally translated as “us, the real people” or “us, the veritable human beings.” In a more extended sense, it can also be understood as “us, the living ones.” A crucial point, however, is that one’s status as “Chachi” is premised on a specific, continuous effort and cannot be reduced to a list of fixed criteria. It is a work-in-progress rather than a predetermined identity (Lorcy 2008).

In order to qualify as a proper Chachi and to remain human one has to “live well” or “live tranquilly” (*ura’chunu, vivir tranquilo*) at all times. First and foremost, living well entails proper marriage. Strict monogamy and strict endogamy are highly valued. The Chachi have instituted a rather unique judicial system to enforce those values. Jokingly, a Chachi friend once told me that, as a Chachi, you can get away with a lot of things – murder, pillage, dropping nuclear bombs on populous cities – as long as you stay with your wife. Having an affair, polygamy and divorce are among the most abhorrent crimes imaginable. And respected elders spend a considerable amount of their time ensuring that such problems are nipped in the bud. They are known as *chaitarukula* (literally “men with whips” or “men carrying sticks”) or, in local Spanish, *policía*. When it emerges that someone is having an affair, this remarkable police force is called upon without delay. The task of the policemen is to dissuade Chachi adulterers and – quite literally – to whip them back in line. During their interventions, they often don old-style military uniforms and colourful caps, in many ways reminiscent of what Hispanic officers wore during the colonial epoch. Punishing somebody is a public affair: the entire extended family and, ideally, the entire village are expected to attend. The services of the man with the whip are not free: he is paid in kind, that is, by means of cigarettes and copious amounts of rum. The tobacco and the alcohol are consumed before and during the punishment, which helps to bring the policeman into the requisite state of agitation to fulfil his duties.

In the upper River Cayapas village where I was living between 2002 and 2004, the tariff for a first-time misstep was fifty lashes, applicable to both men and women. In case of recidivism, the amount of lashes could be doubled or even tripled. While the whippings are administered, the policemen launch into formidable speeches that aim to instil the importance of “living well,” not just for the individual(s) concerned but for the Chachi community as a whole. Failing to obey the “Chachi law” (*la ley chachi*, as it is sometimes referred to in local Spanish), they threaten, will inevitably trigger all kinds of catastrophes and will ultimately lead to the end of the world. Stirring up commonly recurring anxieties, they may add that recent earthquakes or floods are just preliminary warning signs. If these manoeuvres are still unsuccessful and the adulterer does not change his or her ways, the policemen can still resort to their ultimate weapon of persuasion: the stocks. In extreme cases, those who fail to “live well” are indeed transported to the ceremonial centre where their feet are restrained in the stocks (a torture instrument that was commonly used by Hispanic hacienda owners during the colonial epoch). Those who, after all this, still do not comply are ostracized; they are (or at least used to be) forced to leave the village and are no longer considered Chachi. Strictly speaking, they are no longer human beings, for proper – that is, monogamous – marriage and humanity are inextricably entwined in this context. In Chachi animism, working on one’s marriage and fabricating one’s humanity are two sides of the same coin. (This is a central argument, it would be good to have some ethnographic evidence that convinces the reader that what the author writes is indeed the case. I do not doubt the accuracy of his analysis, but evidence would add to the force of the argument.)

In short, to be human is not envisaged as a solid foundation but as a continuous effort. It is premised on the condition of “living well.” In an animistic framework where things are judged by what they do rather than what they are, committing adultery – i.e., failing to live well – is tantamount to suspending and, eventually, losing one’s humanity. The idea that one can be stripped of one’s humanity will sound strange to Western ears but – upon reflection- it reveals the strangeness of “our” modern conception of humanity, with which I assume most readers of this article are familiar. In modern thought, humanity is an absolute birthright: if you are born of a human mother, no blunder or faux pas can affect your status as a human being. The same goes, more widely, for life. As long as you keep breathing, no misstep or crime can put your status as a living being in doubt. Yet this way of thinking, where humanity and life are deemed “given,” is much less self-evident than commonly thought. Within Chachi animism humanity and life are always conditional, relying on the maintenance of a specific effort.

This type of argument is not new: in 1979 Anthony Seeger, Roberto da Matta and Eduardo Viveiros de Castro suggested that – in native Amazonia – people are “made” or “fabricated.” Subsequent research in lowland South America has vindicated the idea (e.g. Vilaça 2002; Santos-Granero 2012; Ewart 2013). What is more, it has emerged that similar conceptions are also prevalent in forms of animism in other geographic areas (e.g. James 1979; Straight 2009; Pandya 2009). For my purposes here, the important thing is that in all these forms of animism, humanity is conceived of as something that has to be earned. It is not a given, and it never comes for free. It must rather be envisaged as an ongoing act, an achievement requiring constant maintenance. In order to illustrate that the same also applies to life more broadly, it is useful to consider the topic of pets (cf. Rival 2012).

Along the River Cayapas and its tributaries, one would be hard-pressed to find any Chachi household without pets. Most families keep one or more dogs. I already mentioned that the Chachi have a reputation for being excellent hunters, and good hunting dogs are highly valued. But the hunt itself is also a source of pets, for it often happens that young prey animals are captured alive and brought back to the village. Macaws, peccaries and felines are kept at home and constitute a great source of entertainment for children and adults alike. Some tame animals become local celebrities: the parrot able to sing the national anthem and the spider monkey pulling off all kinds of stunts and acrobatic feats at fiestas fall into that category. But even specimens with no obvious talent may be given a great deal of attention. The fruit tree in front of the riverside house of one of my host families harboured their pet sloth. When – during a rainstorm – the animal lost its grip and plummeted into the river the children jumped into their canoes and mounted a major rescue operation to save it.

In short, cross-species comradeship is part and parcel of everyday life in the River Cayapas area. Crucially, pets are not kept for food. While all the animals I have mentioned are in principle comestible (even felines are occasionally eaten) nobody would ever dream of eating their pet. The very suggestion is deemed horrific. To eat your pet would be a major infraction of the ethos of “living well” or “living tranquilly”; it is the antithesis of *ura'chunu*. In the words of the policeman I cited earlier: “Hispanics may keep their own rabbits and eat them, but we Chachi would never do such a thing.” Moreover, to be absolutely clear, he added: “In the village we all live well, we Chachi and our animals, and those who live well do not eat each other.” In this instance, pets are subsumed under “us” (*lala* or, in local Spanish, *nosotros*). Even though they do not marry monogamously, the fact that they eat, play, walk and sleep together with their owners imbues them with a basic sense of “living well.” Chachi people and their companion animals thus constitute an oecumene.

Now I come to my punchline: it does not go beyond that. In Chachi animism, there is no lowest common denominator. The most extensive “us” does not stretch beyond those who live tranquilly – that is, the Chachi and their pets. They are not some but *all* the inhabitants of the world. That is the full extent of their “biosphere,” which is neither spherical nor global. Foreigners (Blacks, Hispanics, Whites) and wildlife (untamed animals living in forests and mountains) are never included among “us.” In fact, using the very terms “foreigner” and “wildlife” is already problematic because such outsiders are conceived of as entirely unrelated: strictly speaking, they are the Chachi equivalent of what we moderns refer to as *aliens*. Indeed, I would argue that within Chachi animism, faraway cities and the deep forest are the structural counterpart of outer space within modern cosmology. They may be situated on Earth, but metaphysically they take up exactly the same position as “the extraterrestrial” in modern thought. A direct consequence of premising humanity and life on a specific effort is that these respective concepts are much more limited than their modern, scientific counterparts. Animism is premised on a restricted humanity and a restricted life. At the same time, however, this is also an open humanity and an open life. Elsewhere I have explained these twin concepts in excruciating detail (Praet 2013a), so I will limit myself here to a few key observations.

Hispanics and Gringos (*uyala*) are not fellow human beings but consummate aliens. That is why they are stereotypically depicted as wild and uncivilized (Praet 2009a, 2009b, 2011). They eat pets and humans (the term *uyala* originally signified “man-eater”) and their lifestyle is one of terrible promiscuity. Divorce is rife in their land, which indicates that they are ignorant about monogamy and proper marriage. And they are fierce and warlike too – many myths and narratives are about violent confrontations with the conquistadors and other white or black intruders. To call such excitable misfits “foreigners” is clearly misleading, for they are envisaged as “non-humans” rather than as “other humans.” Such narratives are best understood as the structural equivalent of modern stories that feature alien invasions. The key point is that the Chachi are not confronted with hostile familiars but with inimical aliens – the European conquest of the Americas rethought as an attack by space invaders (cf. Danowski and Viveiros de Castro 2017, 104-106). The theme of “alien abduction” is arguably also very present. If you are incapable of “living well” and behave too much like a Gringo, you are bound to “cross to the other side” and will end up excluded from humanity. And what goes for Gringos also goes for forest animals. They, too, are commonly depicted as alien and dangerous. Plenty of stories are told about hunters who are “seduced” by their intended prey and never make it back home.

Just like violent Gringos and promiscuous Whites, forest animals are “terrestrial aliens,” to coin a term that will sound paradoxical to modern ears. They are aliens because they

have absolutely *nothing* in common with the Chachi and their pets (Praet 2013a). Therefore, what we have here is an extended sphere of death, an “outer space” which includes all those that Westerners habitually designate as “foreigners” and “wildlife.” This alternative outer space envelops a much more restricted sphere of life. Yet the boundaries between both domains are not hermetically sealed. Provided that they put in the appropriate effort, enemies and outsiders can always be made human. Aliens can become familiars. If a Gringo learns to live well, marries properly, eats decent food, speaks a few words of *cha’palaa* and perhaps becomes a skilful canoe crafter, he or she will eventually be considered *chachi*. In other words, he or she is literally *made alive*. The same applies to wild forest animals captured during the hunt. Taming them and turning them into pets can be grasped as a process of *making them alive*. It is the inverse of an alien abduction. In short, the treatment of enemies and prey is essentially alike: in both cases a non-living being is transformed into a living one, an alien is transformed into a familiar being. Aliens may be terrible, the Chachi teach us, but they do have friendship potential.

### **3. Astrobiology and Saturn’s moon, Titan**

Astrobiology, the scientific search for extraterrestrial life, self-consciously presents itself as an endeavour that is eminently interdisciplinary. Its practitioners come from a wide variety of backgrounds: they are astrophysicists, biochemists, microbiologists, planetary scientists, experts in microfossils, comparative geneticists, or geochemists. Yet one academic domain is conspicuous by its absence: anthropology, as are the social sciences more generally. In an age of unprecedented space exploration, the interest of anthropologists in outer space seems limited (but see Battaglia 2005; Pálsson 2009; Helmreich 2015; Messeri 2016; Olson 2018). By focusing on the case of Saturn’s largest moon, Titan, I attempt to redress the balance and indicate a possible route towards a fruitful engagement between contemporary space research and anthropology. My starting point is the question that is usually seen as the central problem of all astrobiological enquiries: “are we alone?” And I propose to concentrate on what must be the question’s most understudied aspect, namely the “we.” At first sight, it may seem obvious what astrobiologists mean when they use pronouns such as “we” or “us”; they simply refer to “life on Earth.” Anything that qualifies as a living organism counts as one of “us.” Yet, defining “life” is notoriously difficult and depends to some degree on one’s disciplinary background (Morange 2009). Astrobiologists, for whom the unambiguous identification of alien life is a primary task, are aware of this difficulty. The fact that nobody has managed to come up with an absolute definition is usually seen as a setback. But let me first introduce Titan.

When the Cassini-Huygens spacecraft was launched from Cape Canaveral in October 1997, it had already been established that Saturn's biggest moon is rather special. Because it possesses a dense atmosphere – unlike any other moon in the Solar System – it is conceived of as the most Earth-like celestial body (Gilmour and Sephton 2004, 172). Titan is shrouded in a thick orange haze, concealing its surface from view. Planetary scientists have confirmed the presence of a considerable variety of hydrocarbon gases such as methane and ethane interacting in complex ways, which indicates that Titan's atmosphere is not in chemical equilibrium. In July 2004, Cassini-Huygens arrived in the Saturn system (which includes dozens of moons) after a seven-year journey. The robotic spacecraft was a joint project of the American space agency NASA and its European equivalent ESA. At the end of the year, the craft split in two. The Huygens probe was released from the Cassini orbiter and parachuted through Titan's atmosphere, down to the surface in January 2005. This first ever attempt to land a probe on a celestial body in the outer Solar System succeeded and Huygens transmitted information for over three hours after landing. Cassini continued its own programme of remote sensing and mapping Titan's weather and surface conditions until September 2017 (Lorenz and Mitton 2008; Coustenis and Taylor 2008).

One of the mission's most intriguing findings is that the average temperature and pressure on Titan are strikingly close to the triple point of methane (90.7 K at 1.6 bar). This means that methane can occur in gaseous, liquid and solid form – just like water on Earth. A considerable proportion of Titan's surface actually consists of water but given the extremely frigid conditions it only occurs as ice, which is as hard as rock on Earth. In a remarkable switch of roles, methane plays the part of water while water itself is the substitute for rock. It is thought that under its icy crust the moon possesses an extensive subsurface, liquid-water ocean containing ammonia, which acts as an antifreeze (Coustenis and Blanc 2012). Contrary to the initial expectations of many space researchers, the extremely low temperatures have evidently not resulted into a congealed world. Titan has clouds, rain, wind, and what appears to be a permanent hurricane at its south pole. But whereas the weather on Earth is water-based, that on Titan is methane-based. Observations with the Hubble Space Telescope have shown that the opaque orange haze undergoes some kind of seasonal change: sometimes Titan's northern limb is brighter (i.e., covered by a denser haze) than the southern one; sometimes it is the other way round.

The pressure and temperature distributions of Titan's atmosphere bear an almost uncanny resemblance to those of the Earth, a planetary scientist explained to me in 2013, even though it is vertically stretched (because of the moon's lower gravity, among other things) and

much colder. During one flyby a couple of years ago, Cassini spotted a croissant-shaped lake near the southern pole; it was baptized *Ontario Lacus* because it is roughly similar in size to the eponymous Great Lake. More recently, the Cassini spacecraft has detected a variety of differently shaped and sized lakes near the northern pole (Stofan et al. 2007). They are believed to be bodies of liquid methane and/or ethane. What is more, there is compelling evidence that the lake levels evolve over time because lakebed sediments have become exposed parallel to the edges of the lake, leaving a distinctive mark not unlike bathtub rings (Barnes et al. 2009; Coustenis and Blanc 2012, 186). “What would be the role of these lakes in Titan’s potential biosphere?” one of my interlocutors at a 2018 Tucson workshop wondered. It is a question I heard time and again during fieldwork trips. How to imagine *another* biosphere? What would a non-terrestrial “zone of life” look like? Are biospheres necessarily global or could one envisage planetary bodies dotted with smaller biospheric oases – can planetary surfaces be covered by numerous independent mini-biospheres? Astrobiologists have speculated about the possibility of life, which could use hydrocarbons as its solvent rather than water, in Titan’s lakes (e.g. Bains 2004; McKay and Smith 2005). But beyond what might be found *in* them, the status of the liquid bodies themselves is not without ambiguity.

Let us return to Earth for a moment. Terrestrial liquid bodies of a certain size are not usually included within the ecumenical “us”: in contemporary Western societies it is unorthodox to speak of “we, humans and lakes” or “we, humans and oceans.” The Earth’s hydrosphere may be teeming with life but the oceans themselves are normally not considered alive. Unlike biology, hydrography and oceanography are generally conceived of as “not-us sciences.” As Stefan Helmreich (2006, 2007, 2008, 2011, 2012) has shown in his aptly titled monograph “Alien Ocean,” this perceived estrangement is far from self-evident. It is, in fact, downright contradictory if one takes into account that all earthly life originates from the sea and that the chemical composition of the fluids of the human body does not differ that much from that of sea water. Many oceanographers are aware that we, living beings, are much more ocean-like than we realize. The same point was already proven in rather dramatic fashion in the early twentieth century, when the French physician René Quinton bled a German shepherd to near death, and then replaced the blood plasma with sea water (the dog survived, seemingly unscathed). From this point of view, humans and mammals more generally are – notwithstanding the vastly different scales at which they operate – liquid bodies very similar to earthly oceans. If one accepts this extension of the concept of “ocean,” a new ecumenical “us” emerges: “we, the watery beings” or “we, the sea-like bodies.” Considering Titan’s liquid bodies, one could then ask whether “they” – even though they consist of hydrocarbons rather

than water – are really that different from “us,” watery bodies. The answer may be disputed but what is certain is that astrobiology’s basic question “Are we alone?” suddenly looks different.

A similar line of reasoning has been developed by those who study Titan’s atmosphere. I reiterate that Saturn’s biggest moon has a weather system based on a methane cycle, analogous to the terrestrial water cycle. There are seasonal winds and, at the moon’s southern pole, a permanent hurricane. Technically, such atmospheric whirlpools are known as “far-from-equilibrium dissipative structures.” Such structures may appear lifelike to some extent, but they are usually not deemed alive in the biological sense. It is not coincidental that meteorology – just like oceanography – is generally conceived of as a “not-us science.” The basic assumption is that clouds, rain, winds, and hurricanes are obviously unlike “us.” Yet some astrobiologists have begun to challenge the presumed obviousness of that dissimilarity. A remark by Charles H. Lineweaver (2006, 7) is particularly pertinent in this respect:

At the [Earth’s] equator there is more carbon-based life and there are more hurricanes. This is no accident. The trees of a rain forest and hurricanes are the same sort of structure. They are far from equilibrium dissipative structures that dissipate the radiative, thermal, pressure and chemical gradients set up by the flux of the Sun.

When I had the opportunity to quiz Lineweaver about this statement in 2017, he was unequivocal. Basically, he proposed reformulating the modern oecumene altogether: instead of living beings inhabiting a terrestrial biosphere, why not imagine an ecumenical community comprising living beings and meteorological phenomena inhabiting a much more extensive sphere stretching across the Solar System? After all, he insisted, living organisms and things like hurricanes are deeply similar at their root. In his view, current biological definitions of life are too parochial to be useful in a cosmic context. He advocates a broader definition of life premised on thermodynamic principles rather than the more traditional DNA-based ones. If one accepts that more general definition, Lineweaver argues, one can only conclude that “we” are not alone – we have already detected extraterrestrial life. At the very least, we have a fellow far-from-equilibrium dissipative structure at Titan’s southern pole.

Such tentative reappraisals of the modern oecumene are in fact very common within astrobiology. They go back to the early twentieth-century Russian geochemist Vladimir Vernadsky who decisively set out the modern notion of “biosphere.” It is not a coincidence that Vernadsky is also seen as one of astrobiology’s great precursors. Basically, Vernadsky viewed “us” as mineral or geological beings – life, he posited, is a specific kind of rock. What he had realized was that living beings, taken in aggregate, are a primary geochemical force on

Earth – from the smallest worms and algae to the biggest birds and mammals, they produce, transport and transform some fifty different minerals across the globe. In this perspective, a flock of migrating geese is a geological transport system for nitrogen, while a swarm of termites (whose bodies make magnetite) is a redistribution mechanism of iron (Vernadsky 1998[1926], 62-63). Humans, who are (among other things) composed of calcium and phosphorus, are also envisaged as minerals in motion or “rocks gone wild” – they are of the same order as the processes of erosion or plate tectonics.

“We underestimate how planet-like we are,” the astrobiologist Michael Russell told me during an interview at the NASA Jet Propulsion Laboratory in Pasadena, California. And he specified: “We are ocean-like and we are geologic – in an important sense we are not just living beings but planetoid beings.” On another occasion, in an Edinburgh pub after the 2014 EANA conference, Vernadsky’s idea of rock-like beings was invoked directly. At one point during the ensuing discussion, one of the pub goers challenged his colleagues: “With that in mind, would you regard Europa or Titan as an alien moon or as a fellow rocky being?” (the Jovian moon Europa is another favourite among astrobiologists). In sum, one could say that astrobiologists have a distinctive talent for the exploration of ecumenical plasticity.

The idea of grouping together humans and a moon in the outer Solar System may seem far-fetched at first sight but in astrobiology, where the intimate link between living beings and the wider stellar environment is stressed time and again, such a move is not that outlandish. In fact, Titan is not the only example of a celestial body that bears a curious resemblance to terrestrial life. Recent space research has confirmed that the principal elements that constitute the fabric of life – hydrogen, carbon, oxygen and nitrogen – are also present in comets. The astrobiologists Dominique Proust and Jean Schneider (2007, 94) have compared the composition of the Sun, a famous comet, and the human body:

<b>Element</b>	<b>The Sun</b>	<b>Comet of Halley</b>	<b>Human</b>
Carbon	0.02%	9.5%	11%
Hydrogen	92%	63%	55%
Oxygen	0.08%	26%	28%
Nitrogen	0.01%	1%	2%

Table 1: Comparison of the composition of the Sun, a Comet of Halley and the Human. Source: Proust and Schneider (2007, 94).

Schneider, whom I interviewed at the Meudon site of the *Observatoire de Paris*, pointed out to me that it would be far from absurd to speak of “us, humans and comets” as opposed to starry beings such as the Sun. In this unusual perspective, “we” are quite common, not just on Earth but throughout the Solar System. One could even go further and argue that the difference between terrestrial organisms and the Sun is overrated. This is exactly what happened at a 2012 astrobiology conference in Szczecin, when a senior Polish astronomer opened his presentation with the question: “Do people realize how fundamentally similar human beings and the Sun really are?” Of course we are made of stardust, as the popular saying goes, but this particular astronomer was much more precise – he compared the carbon/oxygen ratio of the Sun (0.41) with that of a living being (0.37) and concluded: “In terms of carbon/oxygen ratios, we are virtually indistinguishable.” In an important sense, “we” are not just living beings inhabiting a terrestrial biosphere but “solar being” inhabiting the heliosphere. What these various examples illustrate, in the end, is that equating our home environment with “the terrestrial biosphere” is ultimately a rather arbitrary decision.

#### **4. Conclusion**

In this article, I have highlighted various ecumenical options that diverge in distinctive ways from the dominant one promoted by modern biology, that is, the one whereby a DNA-based life constitutes a planetary biosphere. For one thing, “our home environment” is not necessarily globe-spanning; it can also be conceived of as a much more local phenomenon premised on highly specific conditions. One could think of an alternative whereby only those who are properly married and know how to live tranquilly are part of the oecumene, for example – and whereby anyone who is deemed promiscuous or behaves in a violent manner qualifies as a de facto alien. Faraway cities, the deep forest and snowy mountaintops are not necessarily part of a common biosphere: within Chachi animism, they are not conceived of as exotic yet ultimately familiar geographic spaces but as domains of the alien. Metaphysically, such cities, forests and peaks are the equivalent of what we moderns designate as “outer space.” In short, I claim that in Chachi cosmology, the remote forest, highland towns and the summits of the Andes fulfil the same role as the extraterrestrial in modern cosmology.

The so-called Kármán line, the putative boundary between the terrestrial atmosphere and outer space, between the biosphere and the interplanetary medium, is just an accidental

convention after all. The line defined by Theodore von Kármán is not a “natural” boundary but an anthropological one: it derives from the peculiar settings of modern metaphysics. The fact that modern history textbooks invariably state that the Space Age began in the post-WWII period actually betrays a certain lack of imagination. We moderns tend to imagine space exploration in a narrow way and strongly associate it with such things as rocketry, aeronautic high tech, robotic spacecraft and fancy space suits. This curious obsession with rockets prevents us from appreciating the formidable advances that others have made in the exploration of the alien. Chachi shamans have always travelled beyond their tropical lowland homelands, visited Hispanic highland towns and climbed mountain peaks to perfect their curing skills and to cultivate their shamanic powers. The present study suggests that something can be gained by approaching such travels not as indigenous feats of geographic exploration but as astronautic adventures.

We have also seen that “our” oecumene is not necessarily bound to planet Earth; within the Solar System the ongoing discovery of things with lifelike properties, such as Martian dust devils or Saturn’s “musical” radio emissions, continues to fascinate space scientists and lay people alike. As the molecular biologist Michel Morange (2009, 180) has pointed out, astrobiologists are bound to be confronted with objects at the borderline between life and non-life in the not too distant future and that “whether or not we call them living will be a human decision.” It may be an illusion to believe that an absolute boundary between what is alive and what is not exists. Life, as the anthropologist Tim Ingold (2000, 2011 and 2013) has argued, cannot be grasped as an inherent property of things. Who says that “we” necessarily have to view ourselves as “living beings” in the first place? We could choose to envisage ourselves as cometary beings, for instance. Given that we humans are rocky, according to the astrobiology precursor Vernadsky, and possess an internal ocean of sorts, we could even opt to view ourselves as moon-like beings, or at least as Titan-like beings. In this unusual perspective, our “home environment” would be extended from the biosphere to the heliosphere. If animism is a treasure trove for those interested in the possibilities of ecumenical shrinking, astrobiology offers us insight into the prospects of ecumenical stretching.

Focusing on unconventional ways of marking out the boundaries of our widest thinkable “us” is instructive because it reveals the parochial quality of modern biology and of modern thought more generally. The evolutionary “tree of life” from which all current organisms in the biosphere sprout, according to neo-Darwinian orthodoxy, is just one ecumenical possibility among many others. It also puts the standard division of the modern sciences into “us sciences” (anthropology, biology) and “not-us sciences” (geology,

astronomy) into perspective. In an indirect manner, the present study shows that this division was by no means inevitable. Depending on how broadly one is prepared to define one's oecumene, meteorological phenomena, oceans, entire planets and even the Sun itself could be included – Earth science and astronomy can be envisaged as “us sciences” too, at least in principle. Understanding ourselves primarily as living beings rather than as geological beings is merely a convention, if a deeply entrenched one. And to think that being alive is somehow more fundamental than being properly married or upholding a tranquil lifestyle is equally arbitrary.

**References (One reviewer mentioned Povinelli (Do rocks listen?), and Canguilhem (The living and its milieu) Are these irrelevant?)**

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