Chapter 8
Humanity in the Living, the Living in Humans

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Abstract Recent studies in biology, ecology, and medicine make it clear that relationships between living organisms are complex and comprise different forms of collaboration and communication in particular in getting food. It turns even out that relations of collaboration and valuing are more important than those of aggression and predation. I will outline the ways organisms select and value specific items in their network of living and non-living entities. No organism eats everything; all organisms prefer certain foods, companions, and habitats. Relations between organisms are established on the basis of communication, exchange of signs, actions and goods, through mutual learning processes on all levels of life. Micro, meso and macro organisms participate in this process of valuing and communication. Animals and plants therefore show features that were traditionally attributed only to humans, like selfless assistance. The usual distinction between humans and other living beings on the basis of human's sensitivity for altruism, language and values crumbles down due to the circumstance that also non-human living beings are prone to selfless assistance, communication and valuing.

8.1 Introduction: Animals, Plants and Humans

In the past the relations between different species and between species and human beings were seen as quite limited. Studies analysed the enduring competition of non-human living beings with each other in their struggle for survival, and members of different species didn't mix. Eating and being eaten was seen as the main principle. Moreover, it was conceded that whereas humans can act altruistically, other living beings cannot. It was proven that humans had a sensitivity for beauty, but other living animals did not. Anthropomorphism, projecting human-like values as motives for animal behaviour, was seen as a big scientific sin. As a consequence, living entities were conceptualised either from a narrow behaviourist, or from a survivalist and

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objective point of view: members of different animal species don't mix, don't show altruism, and don't have a sensitivity for beauty. Animal relations were studied from a survivalist, 'objective' approach: animals of a species and species were always acting according to their own advantage, survival of the fittest meant an enduring struggle with each other in a race towards fitness. Although evolution was acknowledged as the important dynamic force, when a species had established itself and its competitors had died off, it kept developing in trying to establish fitness with its environment. For example, bacteria present in the gut system of animals and plants were seen as egocentric agents (driven by selfish genes), in the best case not harming the host, but in worse case killing it. These bacteria were seen as parasites, as for example by Wilson (2014): "Almost all species of plants and animals carry parasites. Which by definition are other species that live on or inside their bodies and in most instances take some little part of the hosts without killing them" (idem, p. 180).

I will argue that what Wilson calls a parasite should count as a worthy collaborator, or even as a separate organ. Cows, squirrels, all animals and plants have microbial collaborators, which ensure food digestion and stimulation of their immune system and even determine their cognitive capabilities. More and more biologists are studying these forms of cooperation (e.g. Bray 2019; Valles-Colomer et al. 2019; Cryan et al. 2019).

Not only values like cooperation and altruism were victims of the behaviourist, survivalist or genetic outlook on nature's processes, but also a value like beauty. It was crazy to argue that beauty played a substantial role in the relations between animals or between plants and animals. Geneticists allowed beauty only as a genetic advantage. However, I will argue that in light of recent research these differences between humans and other living beings collapse. The exceptional place of humans in nature does not hold, not because humans are more like non-humans, but on the contrary, because non-human beings are more like human beings, at least like the ideal human being. They embrace values; they act altruistically and they are sensitive to beauty. I therefore fully agree with the proposition of Harry Kunneman (2017), that humans participate in animality and animals and plants participate in humanity. Moreover, these values comprise a kind of non-egotistic agency: organisms are beings, and this means that in looking for food, assisting others or appreciating beauty they are not ego's acting in an objective world. They are, just like the early Heidegger (1963) or Sartre would say, modes of being: being in the web of food or being in the assistance or in the web of beauty.

First, the role of food will be discussed, secondly the role of values in animal interactions will be tackled. Next, I will discuss various types of relationship, the misleading metaphor of the tree of life and the difficulties anthropocentrism causes in analysing these interactions. Finally, I will argue for caution in deriving practical recommendations of changing these complex connections between beings and their world.

8.2 Food Makes the World Go Around

Food processes are an illuminating focus to find out how members of a species and a species in general are embedded in altruistic relations and value altruistic actions. Looking for food, eating and digesting are for all living beings time consuming and daily activities. Nutrition also establishes an intrinsic relationship between dead entities such as earth, and living organisms, or better: between non-living and living processes. Water, air and minerals play a decisive role in producing the right quality of food. Animals (including humans) are important links in this. Animals live on water but also on sunlight, sugars and oxygen via plants. And animals also feed on minerals and deadly gases made digestible through plants, such as nitrogen. Carbon users such as plants in turn need animals for their reproduction and food production: mammals, insects and birds pollinate flowers and plant shrubs and trees and therefore maintain forests. Plants and trees warn each other for predators through the emission of odours and other signals (Kohn 2013; Wohlleben 2015; Mancuso 2015). Worms and bacteria make the soil fertile for crops and trees. Trees provide food (sugars, water) for other plants and so indirectly for plant eating animals. The fact that all living beings need food, and can feed themselves, assumes that they are assisted by other living beings in providing them their food either directly or indirectly, via their contribution to the establishment and the maintenance of an useful food-context.

Darwin had an idea of these processes in his analysis of the activities of worms in *The Formation of Vegetable Mould, through the Action of Worms*, from 1881: "When we behold a wide, turf-covered expanse, we should remember that its smoothness, on which so much of its beauty depends, is mainly due to all the inequalities having been slowly levelled by worms. It is a marvellous reflection that the whole of the superficial mould over any such expanse has passed, and will again pass, every few years through the bodies of worms. (…) Some other animals, however, still more lowly organised, namely corals, have done far more conspicuous work in having constructed innumerable reefs and islands in the great oceans; but these are almost confined to the tropical zones" (p. 313).

Darwin makes it clear that worms prepare the soil by making it a fertile context of nutrients for plants and other living beings. Worms do this probably unintentionally by digesting soil debris, and as a consequence bringing air, nitrogen, and improving nutrient availability for plants in general. Here they work in their own advantage assisting other living beings.

Another relationship is established when two or more parties evolve in reaction to each other to their reciprocal advantage. The coevolution of flowers and pollinators like bees and certain birds is a very good example. I can only shortly raise the issue of intentionality here. My main point here is that organisms have intentions (for example to select, eat, exchange or give food), however they differ in how many consequences their intentions take into account.

However, living beings can also assist other living beings without pursuing their own advantage. More radical thoughts on this have been proposed and are verified (Simard 2018; Mancuso 2015; Wohlleben 2015). Many individuals of a species assist

other individuals of different species in finding their food or even in producing their food without any advantage for the assisting actor. Oaks for example provide with their large underground root system sugars to smaller trees, in particular in times of scarcity.

8.3 Values in Animal Plant Interactions

Organisms cherish a lot of different values, like consoling and assisting others, playing, and enjoying beauty. For example, mammals can give consolation to others when they are sad and apparently are grieving their misfortune. Taking the position of the other and offering others their preferential food stuff or improving their food context happens quite regularly, in particular in parent child relations, but also in inter- and intra-species relationships when for example an elderly animal perceives helpless young being. The case of a gorilla trying to comfort a young child that has fallen in its compound is an emotional example (Goodall 2016). Between species and within species play of elder members with young ones and between young ones is a quite common spectacle.

Susanne Simard (2018) analysed forests and identified what she called a hub tree, or "mother tree". Mother trees are the largest trees in forests that act as central hubs for vast below-ground mycorrhizal networks. A mother tree supports seedlings by infecting them with fungi and supplying them with the nutrients they need to grow. In this way birch and firs communicate by exchanging nutrients. She discovered that Douglas Firs provide carbon to baby firs. She found that there was more carbon sent to the baby firs that came from a specific mother tree, than random baby firs not related to that specific fir tree. It was also found that mother trees change their root structure to make room for baby trees.

Crows cause fires to keep forests open for birds and other animals. The Aboriginals talk about the 'Karrkkanj' (hawk falcon) that brings a burning branch to a forest to set it on fire and catch small fleeing animals. Haviksevken steal bread and throw it in a river to catch fish. Scientific research has confirmed these processes (Bonta et al. 2017). Red squirrels start forests in their diligence to make stocks.

Last but not least, many animals are sensitive to beauty, i.e. which is a value that is not directly related to utility or survivalist motives. Birds and fishes are motivated by beautiful looking members of their species. Perceiving and tasting something as pleasant and as delicious, a phenomenon that regularly happens to animals, cannot directly be connected with a struggle for survival or an advantage for fitness (Prum 2017). Just as with humans, the sensitivity of animals for beauty and something delicious is at least clearly influenced by social context and upbringing. These aesthetic preferences for certain types of food or partners don't seem to have any adaptive benefit. Birds with certain feathers can attract partners and their offspring can have a mix of the best genes, but it is not always the case. Strong evidence seems not to support the good-genes hypothesis (Noble 2016). Colored skin or feathers are both

signs of evolutionary progress and of a capacity for beauty of valuing animals (Ryan 2017).

8.4 Do They Communicate with Each Other?

No individual or species arises, lives and dies by itself. Animals are core and junction points in processes of exchange of substances that are food. Animals in this sense work together with plants to produce food and drink, as well as oxygen and other chemicals. All are sensitive to signs other organisms are showing to their own and other species. Demand and response are a general feature of their collaboration.

For many biologists it is increasingly clear that animals, plants and microbes are dependent on a network, where some species jointly develop (in co-evolution), others have the lead, and others just emerge or are parasitic. The cooperation between living beings has remarkable connections. Everyone knows the intensively interlocked evolutionary developments of flowers and those of pollinators (insects, birds). Deeper chalices were accompanied by longer tongues; some plants even suggest fake flowers to attract certain insect species (Peeters 2015).

But there is a lot more to it: for example, animals, including humans, cannot live without the enormous numbers of bacteria and viruses in their gastrointestinal tract (Enders 2013). The human brain is also inspired by these food processing and producing gut microbes (a fact that was denied by science ten years ago, Sonnenburg and Sonnenburg 2015). Every animal species, including humans, consists of a combination of various different species (Margulis 1998). Communication, i.e. the exchange of information and of claims and preferences via instinctual, but also cognitive, learned, processes play a role in all these processes. There is learning, communicating and threatening. And there is collaboration.

8.5 Collaboration as a Mechanism of Co-evolution

Darwin has done extensive research on co-evolution in orchids and their pollinators. In a centuries-long developmental process these organisms constantly adapt to each other. But co-evolution goes even further than Darwin's views on orchids. All parties in a co-evolutionary network exert pressure on each other to specify, that is, to look for a niche that has not yet been used in the food supply and more broadly, in the ecosystem. This selective pressure is not often a form of competition or even war, because the goal is different for all parties. The pressure can go in all directions, with often not directly clear consequences. The birds that build forests by burying seeds from trees, or even by burning forests, provide their own food supplies. But they also create open spaces at the same time, with the effect of the germination of other, new seeds (Wall et al. 2013).

The selective pressure on species does not necessarily imply a war for their own survival. The warning systems and defence mechanisms that plants use to warn their own species of predators are sometimes also intended for other species. Some plants ward off predators by luring the enemies of those predators and they warn other species. For example, some plants emit odour signals when they are affected by spider mites. In this way they attract the natural enemies of spider mites, namely predatory mites.

8.6 Tree of Life or Network?

In fact, Darwin has underestimated the full meaning of collaboration and co-evolution due to his idea that evolution can be represented by a tree with branches of species (Kropotkin 1902 was the first to mention this). According to Darwin the general development of species is supposed to form a tree of life, a Great Chain of Being (Peeters 2015). Once species have become a separate branch of this tree, they develop on their own. The branches represent the classifications of species of living beings. Traditionally, it is assumed that species once separated from their ancestors follow their own path separated from other species. But recent evolutionary genetic research shows something completely different. Molecular researchers such as Eric Bapteste, an evolutionary biologist, show that hybridisation (crossbreeding between species) and symbiosis are important factors in evolution (Margulis 1998). Bapteste (2013) says about the tree:

> Ever since Darwin, a phylogenetic tree has been the principal tool for the presentation and study of evolutionary relationships among species. A familiar sight to biologists, the bifurcating tree has been used to provide evidence about the evolutionary history of individual genes as well as about the origin and diversification of many lineages of eukaryotic organisms. Community standards for the selection and assessment of phylogenetic trees are well developed and widely accepted. The tree diagram itself is ingrained in our research culture, our training, and our textbooks. It currently dominates the recognition and interpretation of patterns in genetic data.

However, this metaphor of the tree of life has its limitations. Organisms from different branches can transfer genes to each other—and often do; branches are not separated from each other with an origin in a single main stem.

The transfer of properties (now we would say: genes) between species takes place much more often than Darwin originally thought. There are hardly any separate branches on the tree of life, and the species do not evolve on their own, but they also integrate foreign DNA. Microbes do this to a large extent, but also animals such as mice and rats. Frogs generally have at least ten percent of foreign DNA. Horizontal gene transfer happens quite often, and therefore genomes are not completely isolated within species boundaries. In nature different species can exchange genetic information, as it has been shown for rice to millet (Diao et al. 2006). Even gene transfer takes place between very different species from different kingdoms, as from Agrobacterium to sweet potato (Kyndt et al. 2015). Reproduction between different

species does not always lead to infertility, as the dogma still reads. The metaphor of the tree of life must be replaced by a kind of network of constant fusion and differentiation.

The tree of life with its classifications is also problematic in another way. Central here is the overall classification of living organisms in various 'kingdoms', such as Linnaeus distinguished between animals and plants. However, new additions have to be made each time, often on the basis of the invention of new detection methods, such as DNA and epi-genetic research methods. That is why this overall classification has now been replaced by eight 'kingdoms'. Moreover, a major problem of these distinctions is that there are always intermediate forms that are difficult to classify. Every classification remains a human invention, which always tries to capture complexity and renewal, but never completely succeeds.

The 'tree of life' concept misinterprets the mutual cooperation between species. Through this cooperation, species can develop in response to each other (selective pressure) and to the symbiotic networks and processes that organisms are part of. Scholars come up with all sorts of terms for this biosocial collaboration, such as co-evolution, bio-socialities (Rabinow 1996), naturecultures (Haraway 2003), entanglement of matter and meaning (Barad 2007). Barad argues: "matter and meaning cannot be dissociated, not by chemical processing, or centrifuge, or nuclear blast. Mattering is simultaneously a matter of substance and significance, most evidently perhaps when it is the nature of matter that is in question, when the smallest parts of matter are found to be capable of exploding deeply entrenched ideas and large cities."

8.7 Symbiosis, Symbionts, Holobionts and Place

As can be seen from the foregoing, symbiosis is one of the most important mechanisms of evolution. This includes selective pressure, place and co-evolution. Most individuals, or species are mixed forms (holobionts). They consist of different species (symbionts) and yet are ecological units (Margulis 1998). People are also holobionts, which bring symbiotic expression to both their own genome and that of other species, the symbionts. Plants work together with microbes, and feed on inorganic material and thus establish a link between dead matter and life and via-via with live animals (Hansen 1993).

Because of these mutual connections in a locally developed ecosystem, the locally evolved relationships are extremely important. The place is a breeding ground. The mutual symbiotic adjustments of the symbionts in a holobiont are disturbed when one species is removed. Biologists call this preference for locally evolved relationships 'Home-field advancement' (Rúa et al. 2016). The geographical location and the specific soil and aboveground condition is the place where adaptations and co-evolution with micro-organisms take shape. Manure from animals that have eaten local plants and that is broken down by bacteria and insects belongs to one network. Local manure fertilizes the soil better than manure from elsewhere.

Ultimately, the entire web of relationships is carried by microbes (Rosenberg et al. 2016). For example, in humans, communication between the brain and the stomach is just as fundamental to capabilities and behavior as the brain. These stomach-brain connections apply to all mammals. One of the most famous researchers in this area, Emeran Mayer, writes in *The Mind-Gut Connection: How the Hidden Conversation Within Our Bodies Impacts Our Moods, Our Choices, and Our Overall Health* (2016), that the gut and the inhabitants of the gut, the microbes, think for the brain. That is why he calls the bowels the 'second brain'. The bacteria in the gastrointestinal tract play a central role: the presence of certain types of bacteria and their products have a major influence on the willingness to take risks, on thought processes and on moods such as apathy and depression. In addition, the digestion of foods is largely provided by intestinal bacteria, as is the stimulation of the immune system. This microbiome is a second brain.

8.8 Different Types of Relations Inter- and Intra-species

Categorising these different types of relations is a little pretentious (giving the complexity), nevertheless can be useful for further study. Kunneman (2017) has done an interesting job in outlining at least four relations. Relations can be either beneficial or advantageous to all parties, or only to one, or not harmful to the other, or harmful. Advantage means here improving fitness, or even improving quality of life. Short term and long term are often difficult to distinguish. The best known and earliest analysed relation between species that is distinguished is that of parasitism. A relation where only one party profits at the cost of the host can be called parasitic. For example, striga is a plant that is totally dependent on grain species, and after a certain time the host is so exhausted that it dies. Probably inspired by the dominant nineteenth and twenty century societal ideas about outcasts and beggars, biologists were eager to analyse 'parasitic behaviour' in plants and animals and neglected symmetrical relations. A more mutually beneficial relation happens when both organisms improve their chance for survival. Famous and fundamental example are the mycorrhizal relations between roots of plants with fungi and bacteria, that provide plants with inorganic compounds and trace elements and plants that provide the fungi and bacteria with sugars and other chemical compounds. Many plants have these relations and they are therefore crucial for ecosystems. Seed dispersal by animals which gives them food advantages is also a very good example of mutual symbiosis. Without animals dispersing seeds of trees, shrubs and other plants couldn't move to other places than that of the mother plant.

Cooperation is happening with members of the same species, for example when dolphins chase after fishes, or wolves try to catch a deer. However, other animals are often also involved, and cooperation can therefore be an inter species affair. Altruistic types of symbiosis are also well-known.

8.9 Matter and Meaning; Philosophical Questions

When humans are dependent on other species to such an extent, especially microbes, to what extent do the microbes control them, rather than the people themselves? Did microbes start wars? Do organisms determine how we think? These are difficult questions. Jared Diamond (2000) seems to suggest a positive answer: people are driven by microbes. I think we still do not know enough to say something sensible about this.

There are proposals to answers to these questions. One of these is that we have so many health and psychological problems due to the fact that our modern food is not adapted to our gut system. We have to return to the wild food that our microbiome has received over the past millions of years (thus type of food changed considerably since the agricultural revolution about 10,000 years ago). Jeff Leach (2015) explicitly states that people (not just animals) must also become wild, and therefore he likes to crawl through mud in Central Africa to get rid of health problems.

According to many, the emphasis on hygiene, especially since Pasteur showed the influence of bacteria on food, is having a detrimental impact on health. The 'hygiene hypothesis', for example, states that the excess of hygiene is the cause of a weak immune system, so that people are more susceptible to diseases and allergies (Blaser 2014; Okada 2010). Bacteria function as impulses to strengthen the immune system and when they are no longer present, the immune system does not develop or develops insufficiently.

Incidentally, in the tree and plant world it has been much more common to anticipate the role of fungi (microbes) in the way roots feed (Rainer 2015; Hansen 1993). The roots give sugars through those leaves through photosynthesis, and the roots through the fungi and their fungal threads have a very wide network that provides water and inorganic minerals. Fungi also protect the roots against infections. When plants root between the right fungi, mycorrhiza (i.e., symbioses between roots and fungi) develop and they improve their growth processes. Almost all plants and trees take part in mycorrhiza.

Anyhow, the notions of value, cognition and communication also merit recalibration: animals and plants value their contexts, they remember their predators and develop defence mechanisms. They also warn their fellow species. I hereby join the research of Frans de Waal (2016), who uses a broad concept of cognition, "a wide range of cognitive mechanisms", such as memory and information processing (2016, 282). Values enable to select the information that an individual and a group believe to be relevant.

8.10 Barriers: Classifications, Anthropocentrism and Hubris

Thinking and learning about evolution and cooperation between species is hampered by a number of rationalistic principles. Western rationalism, from Descartes to Heidegger, places strong emphasis on the individual ego that is in a world full of things with qualities, but also on the view that humans are superior to other living beings (Korthals 2018). The view that man is a symbiotic being contradicts this idea of individuality. Men as symbionts means there is no I, there is everywhere a (widespread) we-process, composed of different species, namely symbionts of life and death.

Because of our inadequate senses, our unilateral communication ability through spoken language and the growth of our brains, people believe that other beings do not communicate. That is why it took so long to discover communicative and cognitive skills in other species (see also Meijer and Bovenkerk in this volume). The evolutionary achievements of the brain have simultaneously equipped man with very deficient senses. The brain has shrunk the senses (Wilson, 2014, 48) Language is an extensive network of useful communication with the world for people and therefore the specific possibilities the senses can realize are diminished. With spoken language and a thinking brain, people see themselves as separate beings, separate from plants, animals and microbes. Man is secluded at the top of evolution, or sees himself as a world-shaping against all those other world-blind beings.

As a result of this anthropocentrism, man is blind to important, life-feeding interactions and communications between other animals, plants and dead matter. Due to the great emphasis on language as a superior communication system, other communication systems are not covered. But animals and plants have other, equally effective communication systems that enable co-evolution. Slowly we become a little smarter in research into how living beings live, communicate and, above all, feed themselves and others (De Waal 2016).

In western philosophy, many barriers have been raised against the elaboration of this idea. In particular, the view that man is an exceptional being due to rationality or consciousness makes it difficult to see that animals and plants also think, feel and communicate in a certain way.

This anthropocentrism can be found in leading philosophers such as Descartes, Kant or Wittgenstein. Heidegger also has a strong anthropocentric view in his own way: man and animal differ according to him because man is ‘world-meaning’, the animal is ‘world-poor’ and the plant is ‘without world’. He claims: “Throughout the course of its life the animal is confined to the environmental world, as it is within a fixed sphere that is incapable of further expansion and contraction” (1995, p 198). That is why he says: “The animal is poor in the world” (idem, p. 186). Plants and animals are locked up in their own environment (Umwelt) and they are never in the open space (Lichtung) of being. “In its essence, language is not the utterance of an organism; nor is it the expression of a living thing. Nor can it be thought in an essentially correct way in terms of its symbolic character, perhaps not even in terms

of the character of signification. Language is the clearing-concealing advent of being itself" (idem, p. 248).

However, it is quite naive to single out language as the distinctive feature between man and animals. There are so many other important features that some animals possess and humans do not possess. As I have argued, all living beings have preferences, and communication systems with respect to these preferences. They value their contexts of life and their own life. Here I agree fully with Korsgaard, who in her newest book (2018), starts her reasoning with the acknowledgement that animals (in the quote a rabbit) value items, and then concludes in this way:

> For even if the rabbit's life is not as important to her as yours is to you, nevertheless, for her it contains absolutely *everything of value*, all that can ever be good or bad for her, except possibly the lives of her offspring. The end of her life is the end of all value and goodness for her. So there is something imponderable about these comparisons. (p. 65)

8.11 Philosophical Challenges: Pandora's Box Versus New Skills

The philosophy that symbiosis and mutualistic relationships through eating and excretion are central to life confronts philosophy with countless new issues. It is over with the 'superior man', who, as lord and master of nature, dominates all the living beings. Human rationality, thinking, communication and feeling are not unique. Man does not stand alone. The interwovenness with dead and living processes necessitates attention to local and long-term processes.

At the same time, a new temptation arises: to make this insight useful, and to open a Pandora's box. "Symbiotic relationships are fundamental for all forms of life on the planet and for our own existence, if we could learn to redirect some of them the results could be spectacular, for example if we could transform the symbiotic relationships of plant and nitrogen fixing bacteria from just the legumes to all crops we could change the face of agriculture for ever" (Mancuso 2015, 93).

What Mancuso points out is an important issue: the technological impact of this view. The temptation strikes: technologies are being developed and applied that intervene in holobionts, in microbiomes, such as the introduction of fungi, bacteria and other organisms into the soil. But also by means of intervention in animal or human stomachs and intestines with 'psychobiotics', biotechnologists want to bring about certain health effects. A Pandora's box opens with the knowledge about symbiotic relationships. Countless commercial companies propagate the development and use of these psychobiotics. Regulating bodies do not know how to give these psychobiotic interventions a legal framework (Green et al. 2017).

The question here is whether we know enough about these complicated and subtle relationships, and whether we do not seriously disrupt them with simple interventions. The risks to food supply for animals and people are great, as are those for health. The search for the right combination of, for example, plants and soil bacteria,

of human behavior and gastrointestinal bacteria cannot be concluded with a few association studies, some longitudinal studies and a clinical practice.

Philosophically these developments could be seen as challenges to find the right way in which we could and should deal with this process-based embedding of people. This embedding in a context is the biological equivalent of the hermeneutical concept of 'place' and the pragmatic concept of 'practice' (Keulartz et al. 2002). Place is where people (and living organisms in general) grow up and live; it is the starting point for pluralism of opinions, and of practices. Partly because of their place of embedding, plants, animals and people differ more or less from each other.

The other philosophical challenge is how we deal with pluralism and with the differences that are so much needed for the symbiotic networks. For the many who strive for unity that pluralism is a stumbling block. Ethically dealing with symbioses also requires a substantive valuation of the processual and local relationships in a globalizing world society, where place is increasingly difficult to determine and respect. But the place of embedding matters. That is why place has an enormous significance for symbionts and holobionts and it should be a central point of attention. Endless mobility of people, plants, animals and even entire habitats has its clear limits.

There are therefore various epistemic and moral skills to formulate from the idea that people live in the midst of animals and animals in the midst of people. I speak here about 'skills' in the sense of Sen's 'capability theory' (2009). Epistemic skills should focus on complexity and on setting priorities in the enormous amount of relevant connections. Moral skills should focus on responsive interactions with totally different organisms and on the responsibility for the interventions they want to do and their consequences. The question is not: can people govern microbes? But: what does a responsible symbiotic biopolitics look like? Caution and respect are required. One small change and one whole ecosystem changes completely, or even collapses. Mancuso's desire for profound changes in mycorrhiza networks bringing about a new agriculture should be postponed for the time being.

8.12 Conclusion

All living beings communicate with each other and value elements of their ecological contexts, be it as food, partner, companion or enemy. Values like beauty, solidarity and sociality play an important role in living their life. A neutral objective, utility perspective on living organisms neglects these values and the role they play in ecological processes. Although the exact motivation to value for example feathers, colours, and certain types of food is unclear, this cannot only be determined by a genetic disposal (Noble 2016). Kunneman (2017) is right about his idea that animals participate in humanity. Moreover, these values comprise a kind of non-egotistic agency: organisms are beings embedded (located) in a broader food web or web of assistance or a web of beauty. The misleading metaphor of the tree of life causes difficulties in analysing these interactions because it rules out coevolution and symbiosis. Anthropocentrism erect a barrier between humans and other living organisms and

therefore denies the wide variety of processes of communication, valuing and solidarity with non-human animals. Finally, I argue for caution in deriving practical recommendations in changing these complex connections between beings and their world.

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