BODIES OF KNOWLEDGE AND WISDOM: SCIENCE AS COLLABORATION AMONG BEINGS

A CONVERSATION BETWEEN MONICA GAGLIANO AND ALICE BENESSIA

A.B. In your book[1], you trace back to a specific moment a turning point in your personal and professional life, when the animals you were studying made you realize that you were known.

One of the main pillars of scientific practice is the possibility, even the need, to isolate one's own inner self from the outer world of investigation, keeping an ideal neutral position. A protective wall between in and out is erected through a meticulous training. In a parallel move, the entities to be examined are taken to be devoid of any inner life, as neutral and homogeneous objects of inquiry.

It seems to me that the moment you describe was crucial, as animals dissolved both assumptions for you, at once. Could we begin from your memory of that?

M.G. We go back to the years of my PhD. I was trained as a marine scientist and plants at that time were just things in the background. I was obsessed with the ocean and animals. I was interested in ecology, not in how things work – in their molecular bits and pieces – but in the behavioral aspect of life, expressed in non-human form. I did my PhD thesis on the ecology of coral reef fishes and specifically on the role of intergenerational information, how it is shared through behavior in the relationship between moms, even grandmas, and the future generations. How healthy or stressful conditions in one generation can make someone, in the next one, more or less adaptable and flexible to change. So I was looking at how these so called parental effects are transmitted not genetically but behaviorally, in what is known today as epigenetics.

Most of my work was underwater, many hours a day for months at a time, over several years. My field site was in Australian waters, around a little island in the middle of the Great Barrier Reef, closer to the external edge. When I saw it for the first time, from the tiny plane that was flying me there, I couldn't believe how beautiful it was. Over time, I got to know that chunk of the reef in many of its details, currents, creatures. It became a very intimate place and I loved being there, as you would love your favorite path in a forest, the one where you walk everyday. Where you feel at home, your mind gets quiet and you don't have to explain anything. And of course my fish lived there. It was their home. I would meet them for hours every day, sometimes multiple times a day. As I was scuba diving, I was trying to be very quiet with my breathing out, because bubbles are noisy and I wanted to be quiet.

With time, I became intimate with them.

1 Monica Gagliano 2018. "Thus Spoke the Plant: A remarkable journey of groundbreaking discoveries and personal encounters with plants", North Atlantic Books, Berkeley, California

My eyes got trained to perceive nuances in their shape, color, movement and I could tell them apart, males from females at first, then individually. As I was looking at intergenerational phenomena, I would be observing them in pair, a male and a female, in their entire life cycle: the mating, the eggs, the hatching, and the amazing transformation of the alien-like, transparent larvae into colorful adult fish. It was a miracle to me, every time.

So this was the kind of space I was in, and that experiment, as I report in the book, was both an opening and a break, in a good way. If I think of it now, I remember the feeling of connection with animals I had when I was a child. Then, during the training process to become a scientist – for which I am grateful anyway – that part of me needed to be put in the background, because of the way in which we currently teach and practice science, as you mentioned. What we think as objectivity is required, and to be objective you have to completely discount the presence of the "other" as a being, as a subject, and think of it as the object of study.

So my fish became objects of study and yet I used to give them names – which is totally "illegal" and still everyone does it. I knew them so well. I knew that in the little reef I numbered as 12, for example, the male was a bit aggressive and the female was very calm, or that both fish in the reef number 43 were very relaxed, or very reserved and so on. I visited everyone everyday and took notes, monitoring their behavior and what kind of babies they would be producing, in relation to social and environmental stress, responses to resources and temperature.

And of course they got to know you as well.

Yes, except I didn't know that, or I wasn't acknowledging that.

These fish are wild animals of course. They are not trained nor kept in tanks, so at the beginning they were all very suspicious, wondering who I was and what I was doing there. As I was supplementing them with food, after about a week they started to get closer and accept it. Then, later, they would come and just sit in my hand, literally, whether there was food or not. I was building personal relationships. They were individuals. I would curl my hand around them and they would be sitting there, they knew who I was. It was beautiful.

And then, at the very end of the experiment, after about three months, ¬I had to do what I had done many times before, a standard procedure. I had to kill them all and get "my bodies", "my organs", so that I could do my analysis of the liver, or the heart, or the brain, or evaluate their hormone levels, or whatever else. It was part of my job: at the end of the experiment you collect your fish and you go home, with your data.

I had applied, as usual, for ethical approval and, as the ethics was cleared, so was I.

I didn't have to take any other responsibility.

The day of gathering my data came and with no particular reason, that morning I decided to dive just to say goodbye, before collecting the fish in the afternoon. I had never done that before, in any other experiment. I didn't have any nets, any chemicals, only my usual gear.

Nobody came out. They were all hiding in their little holes, looking at me. I even tried to bribe them with some food left in my pockets, but there was something that they knew, that no food could fix. They were clearly not happy and there was nothing different on the outside, in the weather or otherwise, including my physical appearance. Except that there was a big thought in my head that was different from all the other mornings.

Your intention.

Yes, my intention to say goodbye before slaughtering them all. At that moment, as you said nicely, something came down on the outside. Some permeable membrane started to work, getting the flow going in and out. And then something came down also inside of me. It hit me and I knew exactly what it was, but then conflict emerged: "And what am I going to do with this now?" So, on one side you have these beautiful relationships, that you have been nurturing and sharing for months, and on the other side you have "I am doing my PhD, I need to get my data, I need to perform, I need to tick my boxes, I need to get going". And what was I going to do, come out of the water and tell my supervisor: "I am sorry I didn't finish the experiment because I was feeling sorry about killing the fish"?

Funny enough, during the time I was doing my PhD, there was a girl who was a Buddhist and she would refuse to kill as part of her religious practice. She was working with marine snakes and they had to find a special project for her. And the attitude of all of us, as the other students in that cohort, was very dismissive: why doesn't she get a grip, why is she making this so difficult? If she can't kill the snakes, then she shouldn't be doing science. Instead of questioning, why are we doing this, it was more like, why is she doing that? And why isn't she conforming to the rules? If you want to do science this is how you do it. So in that moment underwater I just felt this freezing cold feeling inside: "Oh, no…." And there was guilt, of course, because I thought I was going to do it, I had to. I couldn't see any way out. And then there was this feeling of being totally powerless, wondering how I could do it differently. I didn't even know if it was possible. Anyway, I finished that dive, I came back out and I didn't tell anyone but I was a mess inside.

In that conflict, not knowing what to do, I did what I knew. I came back in the afternoon and this time I had my nets and my chemicals, the things that I needed to actually capture the fish. It was such a hard work. They fought all the way. I actually dismembered and lifted rubbles of dead

corals under which they were hiding. It was a full on fight and they were fighting for their life.

And it didn't happen before? The other times were not a fight? Or you didn't perceive it as a fight?

Or maybe I simply didn't care. It was a matter of fact: this is what you do. And normally I was getting really sneaky at catching them, without making too much of an effort. I think this time it was a struggle because I didn't really want to catch them. So maybe my inner drama played out in the exchange. Anyway, eventually I caught them all. I brought them home, gathered their organs, collected my data. And then I felt like: never again. The fish were very clear: "you have no right to do this".

A few months later, I was doing a ten-day silent meditation retreat, and I remember that half way through I felt blood dripping off my hands. I started sobbing and I spent the next two days sobbing and feeling the blood of all of the animals and everything that I had killed, ever. And the message was constantly the same. You have no right to take anybody's life. It is not for you for the taking. And that was it. That sealed it.

I had to find out how to be in the world in a more respectful way. At that time, from one day to the next, I became vegetarian. It didn't require any effort, it just happened. It was my initial compromise. And there was still my science to sort out, as I realized that there was no question that was important enough to justify me killing another being.

Before we move to the next phase of your professional life, involving a deep relationship with plants, I would like to ask, or maybe to point out that there is also a matter of trust involved. The fish *trusted* **you. Not only they saw you, they knew you, but also they trusted you. I encountered a way of thinking about trust years ago while talking with a philosopher at a conference. I remember him telling me that trust is when you make yourself vulnerable, in the hands of someone. He made it real for me. So, the fish deeply trusted you, they were literally putting themselves into your hands. And that trust they gave you was broken.**

Absolutely, I was betraying everything.

And then, listening to your story, I am thinking that the etymology of truth and trust is the same[2]. It seems very significant. With that in mind, in this case the scientific pursuit of experimental, objective truth becomes almost paradoxical, as it involves the breaking of trust at its foundation. So we could wonder: what kind of truth can we pursue by applying a method that implies the breaking of trust?

That's right. But as you are immersed in the process you don't know. At the time I

2 *deru, *dreu, Proto-Indo-European root meaning "be firm, solid, steadfast".

just felt a sense of shame, and I didn't know how to resolve it. It was about breaking the trust not only with the fish, but also, actually, with the life supporting me. How did I dare? And you are right, what kind of understanding are we getting of life if we are pulling it apart? Life is about bringing it together, bringing the interconnections together. That's when you see the whole picture. But at the time I didn't know, what I learned in my training was how to dissect.

It seems to me that in this training process one also, in a way, breaks another kind of trust, with oneself and one's former self. As they specialize, most people loose track of their initial motivation to become scientists, which is deeply relational. When asked if they have a memory of some early inclination towards science, they usually trace it back to a sense of wonder about some natural phenomenon, or creature.

That's right. The element that comes to mind, as I am listening to you, is that what gets extracted, pulled out, is the emotional connection. Because, as you said, it comes down to "I loved animals" or "I loved nature" and that is an emotional connection. It is true for me, and for many. It is not a generic interest. It is a form of emotional pull that brings us there. Interestingly, as we remove our emotional engagement, we also discard the emotional life of the "others". The emotional life of animals is a recent acceptance, but even that is only for certain ones, not everyone.

So we extract the emotional life of animals, as you say, and then somehow we insert it back, when we measure it, we certify it. It is bizarre, if you see it that way, a little crazy even.

Exactly. Also, we put it back in our own terms. We tell them how emotional they are, in our own terms. It is the quintessential anthropocentric view. I am not interested in seeing you for who you are, I am interested in seeing you through my lens and so I'll make you what I think you are.

Anthropocentrism comes up a lot in conversations for me. I feel that it is a word that has a bad wrap, and actually it depends on how you deploy it. How can I be anything else than anthropocentric? I am human so of course I have this perspective. If it ends there, that's fine, it is not a problem. Actually it is a beginning: how do I connect with a nonhuman "other", from my human, inherently biased perspective? A different move is using anthropocentrism as a template, for evaluating and judging the "others". Even worse, for building hierarchies and putting everyone else below us, so that then they need to somehow prove themselves worthy, or be lifted. When returning the emotional life to those we took it from, we see if they check some very specific boxes. And if they don't, we don't have proof – end of story. So the dissecting continues, and it happens in many ways.

Another thing that comes to mind in this idea of anthropocentrism is

the belief that we are separate. All of it can be seen in a different way. We could contemplate the possibility that reality – the phenomenon of life – happens in between: you learn who you are by encountering others. In the relationship, you find out what it means to be human. If you take that out, your own sense of humanity is very limited.

Yes, and if you fully acknowledge that, you realize that in killing the fish over there, you are actually inflicting pain over here, in a form of self violation. In that sense, not being aware of the connection is a very pathological condition.

So the question becomes, is it possible to make science differently, taking all this into account, with a relational stance? and what does it mean? It seems to me that the choices you made since that pivotal event hss been towards dealing with these open issues. Maybe we can talk about that for a moment.

Yes, sure. First, I believe that we have to be open to explore. Science is supposed to be about searching without preconceived ideas of what we are going to find. And instead most of the research we are doing these days is directed to a particular objective. The range of questions we ask is limited. We are creating and designing experiments that are testing very specific outcomes.

Also, a more open science allows for the messiness of the emotional bodies to enter, and it doesn't see that as a conflict, but as enriching the research that really needs to be done, the questions that should be asked. Other than my own approach, a very good example of this way of doing science comes from one of my colleagues, Barbara Smuts, who did an amazing work with baboons. She sat and spent a lot of time observing them and being there with them. At one point she said she had to become a baboon. Not becoming one of them, not understanding what it meant to be there with them could be dangerous. She could get attacked. So, to be able to be there she needed to enter, allowing her subjective experience to really permeate their space, becoming a subject among subjects. Then she could see things that would have been unimaginable within the traditional scientific ideal of neutrality. She simply wouldn't have access. So in the end she made the most interesting scientific discoveries *because* she allowed her subjectivity to come in, not in spite of that. Our emotional body and subjective experience cannot be extracted. We are delusional if we think we can. As a scientist you are there, you are never objective.

Which incidentally of course comes out of quantum mechanics, where the very notion of neutral observer looses its meaning. So the issue is at the heart of science, in a way.

That's right. And going back to Darwin, the core was about the interconnectedness of things, the continuity of forms. All of these

forms have different subjectivities, and this is worth exploring. Especially as ecologists we are looking at how different forms and subjectivities are entering, exiting, shaping each other and creating what we call environment. And plants are involved in this, obviously, as well as many "others" that we don't even consider.

For me, one of the most interesting aspects of your work is the fact that you make room for all these "others" to question, in their own terms, the way in which we look at them, the way in which we make science. And they start by questioning you in the first place. It happened with the fish and then it goes on with your experiments with plants. In your account of these experiments, there is always a moment when you realize that they are showing you things that you were not ready to see. You have to make yourself available to understand what they are actually showing you.

In time, I have been learning to *lean in* to them more and more. This *leaning in* to "others" is part of my scientific methodology. It is not against it.

For example, in one of my first experiments with plants, peas seedlings showed me that they could learn by association, responding to a neutral conditioning stimulus – a little fan at the end of a maze – just as dogs did with the bell in the famous experiment by Ivan Pavlov. As the experiment went on, I realized that I had almost missed the show. They were actually showing me that they were learning but I couldn't see it. I was interpreting their behavior through the lens of a standard hypothetical expectation that was in fact incorrect. It didn't matched how *real* pea seedlings behave[3]. In other words, my scientific training was not allowing me to see what was actually in front of me. I realized what was happening while being there in silence with them, in the darkroom where the experiment took place, as I was ready to give up. In that moment, when I realized "Ah, I almost missed the show", I learned that although I was trying to be very aware of my own conditioning, my own biases from my scientific training were still there, they were still playing. And they keep sneaking on me so I need to be very alert.

So there are many layers in my experiments with plants. On one side they are showing me what they can do – remembering an event, learning by association, perceiving and emitting sound, and so on – on the other they are pointing to my own biases, helping me to

3 The standard hypothetical expectation was that, without learning, half of the pea seedlings would grow to the left and half to the right of the maze. However, real peas seedlings that have been exposed to light actually always grow in the direction where they last experienced light. So, unless trained to do otherwise (the aim of the experiment) pea seedlings would grow 100 percent of the time where they were last presented light. Thus, what looked like a random 50:50 distribution (no learning) was actually about 50 percent of the seedlings overriding their innate tendency and use instead the direction of the fan as a reliable indicator of future light. For more details see Gagliano 2018.

dismantle them. And in doing that, they also allow me to appreciate where the disbelief and the hostility of some of my colleagues come from. They are where I was in that darkroom, before changing my perspective and letting go of my conditioning, even just for a moment.

What I think is unique in your practice is the fact that you apply this relational approach in a lab, a Galilean type of setup.

I am following the rules.

Yes, and because of your personal journey with plants through indigenous knowledge, you are able to have a full experience in that very controlled environment, a place that is designed to 'extract' experiences: a paradoxical situation that is a little miraculous, destabilizing and also subversive, in a way. Just as in the work of Barbara Smuts, bringing in your emotional body and your subjective experiences in designing and performing these experiments, allows you to ask different questions and find out things that seemed inaccessible.

They become accessible as I allow for the walls of my conditioning, even if temporarily, to come down. And then there is a possibility to see something different.

In my personal life, as you mentioned, I have done work that has demanded total surrender – that is the only way to do it – to a process or to another that is nonhuman, a plant. I have been exercising to that form of surrendering, which then allows me to call in that training when it's time to pull the veil down now – so to speak: to open up to what is actually happening. Just as I resort to my scientific training when I design the experiment. I guess in that sense I inhabit a world that is a little bit wider maybe than the one of traditional academic setting, and in this world there are more possibilities, more questions and also more answers that I can explore.

We are taught that when we do science, we are the knowers who gather knowledge and then deliver it to someone else, and that is how we advance. But what if we didn't have to do all of this work by ourselves – it sounds so exhausting! What if instead we were collaborating? And what if we were collaborating with "others" that have different kinds of knowledge, plants in my case – but also other animals, even land, rivers, the planet, whatever we want. What if we were to really open to the fact that we can collaborate with these "others", that they would be just happy to collaborate with us. Suddenly it would become a much lighter job, with all this support, all these different bodies of knowledge and wisdom becoming available. It would make science a totally different affair, which maybe it is closer to what it was supposed to be in the first place, a collective, even playful exploration of the unknown.

The cave paintings of our origins come to my mind, at Lascaux for example. They evoke a fundamental impulse

to understand, to share – with these "others" – the mystery of being alive, in a form, for a tiny fraction of time. The openness you talk about, to collaborate, to approach together this mystery, could become a way to learn how to thrive collectively, as much as possible, not only to survive. Moving all together towards a realization of the common Self[4].

Exactly.

This is related to the last thing that I wanted to talk about, which is the relationship between knowing and acting. Despite its clear empirical inadequacy, the modern ideal of science speaking truth to power, and power then acting for the common good, is still present in our culture. It is the ingenuous belief that once we know something in the language of science, which is supposedly objective, exhaustive and universal, then the right normative action – ethical, political, legal – follows inexorably, as a rational demonstration.

In terms of your work, once we have proved in scientific terms that living beings without a nervous system and a brain – such as plants – can manifest behaviors that we normally ascribe to cognition, we are then supposed change our normative stance – and therefore the way we act towards them – as inevitable consequence.

Clearly it doesn't happen, just as with animals, and more generally with any of global crises we are facing at the moment. In light of what we talked about, we could argue that scientific knowledge in itself doesn't do the job because it is produced in isolation, by extracting the emotional and physical experience. Then it is given back as information, namely to our mind only, so it doesn't induce change. What are your thoughts about it? What kind of research practice could trigger some form of collective transformation in our way of being in the world?

What is coming to mind is our understanding of what knowledge is and what it does, on one side, and wisdom on the other. They are two very different things, obviously. My feeling is that in our cultural roots the search was about wising up, not about collecting facts. The drive was a curiosity for what this is all about, the mystery as you said. I think that anybody who delve into that mystery, the alchemy of this life, will inevitably end up in strange places, in places that are supposed to be strange, so that they break down the preconceived idea of what you think you know. So it is almost as if knowledge is there to be broken down, so that then you can grow. Instead we are using science to pile up knowledge. We are never breaking it down and growing through the process.

4 In this regard, see for example the principle of Self-Realization, or realization of the ecological Self, in the perspective of deep ecology by Arne Naess, in his book: "Ecology, Community and Lifestyle", Cambridge University Press 1989.

In the disruption of knowledge there are opportunities for wising it up, and wisdom is what we really need right now, more than ever.

Ultimately for me science is just one channel of exploring, it is a performance. You used before the word, "performing an experiment": for me it is literally a performance. And when you are preparing for a performance, a theatrical performance, an artistic performance, you look at all the possibilities that you can explore to make that thing become something different.

To transcend its boundaries, in a way.

Exactly. And instead we do precisely the opposite. We keep making experiments that fit as much as possible with what we already expect, suffocating the possibility for wisdom to bubble up. And wisdom bubbles up when we are ready to give up. That is when it is presented to us: 'here it is'.

So now it seems to me that we are circling back to trust and truth, from the other end. We could say that we have a chance of encountering some form of truth – wisdom – when we surrender, we give up our control, meaning that we trust: not only the "others", but also ourselves. We have to be confident enough to make ourselves vulnerable, open to whatever will surface.

Yes, that's right. So, going back to your question, we should create spaces in which "others" can collaborate with us in developing that trust, in disrupting what we think we know. That is when wisdom typically emerges, through the embodied and shared experience of letting go. And that is how new possibilities arise, to transform our way of being in the world.

Post scriptum: Etymology

Dear Monica, today I went back to the etymology of truth and trust, to refresh my memory and make sure I got the correct information. The common etymology is *deru also *dreu-, a Proto-Indo-European root, meaning "be firm, solid, steadfast". As I kept reading, it came to my mind that another word could have the very same root: tree. I checked and yes, it is the same root. Actually, it is the main root: the way older Sanskrit *dru. So trust and truth are one, in a way, and they are rooted, quite literally, in tree. I thought you should know.

That is so beautiful! Thank you for sharing, I will ponder on this.