INTELLIGENCE IN NATURE: A PREDATOR'S INQUIRY
by Jeremy Narby

One day in 1985, as a young anthropologist living among Ashaninca people in the Peruvian Amazon, I accompanied my main informant to visit his old shaman teacher. The old man was wrinkly and seemed at least 80, but there was no way of knowing for sure because he was born before Ashaninca people started counting years. He was sitting on a mat wearing a traditional cotton gown and licking tobacco paste from a short stick that fit into a gourd. When I was introduced, he looked at me with a glint in his eye, and asked if I was his father-in-law. Ashaninca people often improvise kin relations, but this was clearly a joke, as I was not even a third his age. Yes, I replied, not to be out-done. He laughed and hooted, then asked again. "Konki?" "Father-in-law?" Yes, I replied, and again, he laughed loudly. We went back and forth like this at least twenty times, and he seemed to think this was one of the funniest things. I learned later that evening from my informant that his question also meant "can I have sexual access to your daughters". So the joke was on me. Besides, I didn't have any daughters. In any case, I finally interrupted the exchange by asking whether I could have some of his tobacco paste. He handed me the gourd and I placed a stick's worth between my lips. Then I went to sit to the side, so my informant and the old shaman could get on with it. After about ten minutes, as I sat thinking about nothing in particular, I ran my tongue under my front teeth, and they seemed unusually long and sharp. I touched my face and felt what seemed to be whiskers. My mouth tasted of blood, and though I was a vegetarian, this tasted good. My senses were telling me I was turning into a feline. This was the first time in my life this had happened to me, and it was not the kind of thing I believed possible. But the impression was lasting, and felt real. This feline feeling was exhilarating and made me feel powerful and wise. Like a benevolent jaguar I eyed some chickens that were clucking about, and decided not to pounce on them.

This feline, predatory impression was so strong it remains with me to this day, but I didn't discuss it in my doctoral dissertation. In fact, for years I didn't know what to make of it. Understanding Amazonian ways of knowing can take a lot of time.

Amazonian people believe plants and animals have intentions, and shamans communicate with other species in visions and dreams, while Western science has tended to deny intention in nature and consider living beings as "automata".

Over 2 decades I searched for common ground between science and indigenous knowledge, and in recent years found increasing scientific evidence that nature teems with intelligence. Now scientists show that single-celled slime molds solve mazes, brainless plants make correct decisions, and bees with brains the size of pinheads handle abstract concepts.

Philosopher John Locke proclaimed in the seventeenth century: "Brutes abstract not." But, in fact, brutes abstract, and reductionist science just proved it.

Western observers have come to see that we are nearly identical to many animals, eye for eye, brain for brain, gene for gene. Many behaviors once thought to be uniquely human turn out to be shared by other species. The zone of the specifically human, as determined by science, has been shrinking. There has been "an awkward growth of knowledge", as the editor in chief of the journal Science recently put it. Awkward, because the evidence is making us step down from the pedestal.

In 2001 I began investigating "intelligence in nature", by traveling to the Amazon, and speaking with Ashaninca, Shipibo, Shawi, Kichwa, Kandoshi, and Awajun, shamans and specialists of their culture. These people believe that all beings have souls, that plants and animals think, make plans, have knowledge.

In Amazonian cosmologies, humans have kinship with other species, and humanity is a condition that applies to all the beings in the world. We see birds and fish, but when these beings go home, they take off their animal suits, and out step people. Here the dichotomy between nature and culture, so dear to anthropology, flies out the door.

By investigating intelligence in nature I wanted to act as a diplomat between systems of knowledge. The point was to see if the two sides could work together. As an anthropologist with field experience in the Amazon, I was going to have to take on a new field, of scientists and laboratories in different countries. I decided to put everyone on the same ontological footing, and treat scientists with the same respect as indigenous shamans.

I started in Toulouse, France, at the laboratory of animal cognition, at the National Center for Scientific Research, where a biologist called Martin Giurfa and his colleagues demonstrated that bees handle abstract concepts. They did this by devising a simple Y-shaped maze, the entrance to which was marked with a symbol, the color blue for instance. Bees flying through the entrance encountered a branching pathway where they could choose between paths. One path was marked with the color blue, the other with the color yellow. Bees that followed the blue-marked path discovered at its end a vial filled with sugared solution. Bees that took the yellow path received no reward. The bees soon learned that the route marked with the same symbol as the one marking the outside entrance led to sugar. “Same” equals “sugar” in other words. In subsequent experiments, the signs were changed, horizontal and vertical lines for example, and the bees passed with flying colors. This experiment shows that bees, with brains containing about 100’000 times less neurons than our own, can handle abstractions such as “sameness” and “difference”.

Martin Giurfa, the man behind this experiment, said the more we understand how animals make decisions and learn, the more we have to admit that they do not act mechanically. Bees have minds of their own, he said, and they are capable of “extracting the logical structure of the world”.

Bees are sentient, minded beings, not flying toasters. But what about plants? Plants lack brains entirely. So what does science say about plant intelligence? In 2002 I found an article in the journal Nature by a biologist called Anthony Trewavas, stating that plants have intentions, make decisions, and compute complex aspects of their environment. Trewavas is a professor at Edinburgh University and a member of the Royal Society, and he was claiming that the investigation of plant intelligence was becoming “a serious scientific endeavor”. I traveled to Scotland to interview him in early 2003, and he explained that the molecular genetics of the 1990s had revealed the signals and receptors used by plant cells when they communicate and learn. Plants can assimilate information and respond on the whole plant level, and they use cell-to-cell communication based on molecular and electrical signals, some of which are identical to those used by our own neurons. Plants do not have brains, so much as act like them.

Just being a plant, sending down roots in a branching structure and deploying leaves to gather a maximum amount of light, involves sensing a wide range of variables, calculating correct decisions, and then enacting and embodying them. For example, the Amazonian stilt palm, which has a stem raised on prop roots, moves towards sunlight by growing new prop roots on the sunny side and letting those in the shade die off. By doing this over several months, the stilt palm actually walks around, fending off competitive neighbors and foraging for light at a speed imperceptible to humans. Trewavas called this “avoidance action” a clear example of “intentional behavior” and plant intelligence.

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But what is “intelligence” exactly? In its original meaning, the word refers to choosing between, inter-legere, and implies the capacity to make decisions. But the concept has often been defined in exclusively human terms, so, by definition, it could not apply to other species. And people have fought over the definition of intelligence so extensively that it is probably not very intelligent to try to define it any further at this point. This was made most clear to me in Japan.

I traveled to Hokkaido to interview Toshiyuki Nakagaki, the scientist who demonstrated that single-celled slime molds solve mazes. He and his colleagues published their results in the journal Nature, in an article that used the word intelligence. In the media attention that ensued, Nakagaki told me, Japanese reporters were mostly concerned with the details of just how such an organism was able to solve a maze -- whereas Western reporters tended to focus on whether or not the phenomenon constituted intelligence. Nakagaki attributed the difference to the animist background of Japanese culture, and to the Japanese word for intelligence, chi-sei, in which chi means to know, and sei means property. Many Japanese people do not hesitate to attribute chi-sei, or a capacity to know, to other species, including single-celled slime.

I asked Nakagaki how he resolved the dilemma regarding intelligence and Westerners. He said he noticed that when he used the word smartness to refer to the slime mold, instead of intelligence, Western people agreed. So now he only uses that term. Which is pretty smart. The only problem being that “smartness”, in its first meaning, refers to cleanliness, tidiness, and elegance, which is not so pertinent to “intelligence in nature”.

“Nature”, itself, is a tricky concept. Dictionaries often define it as “the phenomena of the physical world…as opposed to humans or human creations”. “Nature”, as an idea, implies a disengagement from the world. If one is strict with words, “intelligence in nature” is a contradiction in terms, because “intelligence” excludes non-humans and “nature” excludes humans. But this mainly shows that our concepts, which disengage us from other species, hamper our thinking. We struggle over words when the slime mold solves the maze, because our concepts don’t fit the data. It is not that nature lacks intelligence, but that our own concepts do.

Objective knowledge of the biological realm runs into an obstacle: each and every observer is a subjective biological being. I long for a biology in which observers include themselves as objects of study and state their point of view. Mine is:

I am an animal. I move about to feed on organic matter. Unlike plants, I can’t stay still and eat sunlight. Though I feed on other species, I recognize that I am related to them through genes and kinship.

I see myself in simple life forms, like the hydra, a small tube-like animal that lives in the water. The hydra has no head, no back or front, no legs or fins, no heart, no brain, but it does have a nerve network that concentrates around its mouth. We animals tend to have neurons concentrated close to our mouths, because active feeding is so important to us. That’s why my brain is situated close to my mouth. I know I am a predator, and come from a long line of predators.

As a contemporary human I stand at the top of the food chain. In the Amazon, jaguars do the same. They eat, but are not eaten. It’s easy to identify with them on this basis. Shamans claim they can turn into jaguars, or get into jaguar mind-set, by means of certain songs and by ingesting certain plants. Well, jaguars are versatile cats; they can both swim and climb trees, and their prey ranges from fish, turtles and caimans to rodents, deer and monkeys. They often kill their prey by piercing the skull with one swift bite. They have no rivals besides humans, but they lead discreet lives. In fact, they move about with such stealth that biologists have a hard time studying them.

These impeccable predators control their power. Top of the food chain, but discreet: they could be role models.

Homo sapiens sapiens is a young species. We have only been around for about 200'000 years, according to the fossil record and to analyses of DNA. That is barely 10'000 biological generations, next to nothing for a species. Jaguars and other efficient predators, like octopuses, have been in business much longer than we have. Octopuses have been around for 350 million years. By comparison, we are just getting started. We still have a lot to learn when it comes to controlling our predatory nature.

Shamans believe human predation requires mediation. When shamans mediate human predation, they try to turn it into a revitalizing exchange with nature. Their understanding is that humans as predators have a responsibility towards other species because we are related to them and because we eat them to live.

Shamans have been pointing out for a long time that nature undergoes constant transformation. Scientists agree, and show that we are all hybrid beings, produced by on-going evolution.

Science itself is evolving, and moving away from a mechanical view of nature. The idea of a kind of intelligence active throughout nature is gaining support within the scientific community – affirming the view long held by shamans and indigenous people.

Now the edifice of life, from top to bottom, seems shot through with intelligence – suggesting that the evolutionary process itself may be intelligent, that evolution is guided by an intelligence within, rather than by blind chance or by an intelligence above. But that debate is about final causes, and the different views cannot be conclusively demonstrated one way or another. Some questions are intriguing to people because they concern us, but that does not mean that they can be answered in any definitive way.

The urgent question we can work on is: how can we learn as predators to stop degrading the world we live in? Our predation is souped-up through knowledge, ideas, and technology, so we need to get a grip on our science and industry.

THIS would be intelligent evolution: by understanding ourselves as animals, by understanding other species as intelligent, and by understanding the intelligence of predators in particular, we can learn to transform ourselves into intelligent predators.