



## OPINION

## Ethics and Science: one or two paths to a final encounter

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*“I feel the suffering of animals so deeply that I have never taken to hunting or sport shooting. The cry of a lark would reach my soul, but when we must probe the mysteries of life or attain new truths, the sovereignty of purpose takes precedence”. Luís Pasteur.*

## Stage 1: The Sea

When I was eight years old, I discovered the sea. My brother drove me to the city of Mar del Plata. It was immense and magical to me. Having grown up in the countryside, I had never seen so much water combined with such ceaseless movement. “The sea is alive,” I thought, and I felt somewhat perplexed. At that time, I was a small-scale breeder of ornamental fish, so I wondered: how many fish suitable for my aquarium could there be in this sea?

## Stage 2: The Resurrection

In my early experience as an aquaculturist, when I was 14 years old, the fish were afflicted by various diseases of which I was unaware; they would die seemingly without cause, or so I thought, and my knowledge was severely lacking. One day, I observed that a goldfish, one for which I had a great affection, began to show signs of illness it was swimming abnormally and had developed white spots on its skin. At that time, my father was undergoing dental treatment, and among the medications he was taking were a few drops of Filotricina A, which, according to its label, served as both a disinfectant and an antibiotic. I transferred the

“patient” into an aquarium with clean water and added 20 drops of this medication. Within seconds, the fish was floating. I thought to myself, “My mother, the fish has died I have killed it with these drops!” I had a habit of not discarding a fish that had died; instead, I would place it into another aquarium with clean, well-oxygenated water. When I returned a few hours later, to my astonishment, the fish was swimming as if nothing had happened and had clearly recovered. I was both shocked and intensely curious: what had occurred? I quickly went to the local pharmacist (in those days, every neighborhood had its own pharmacy, and the owner was the pharmacist; there was no suspicious pharmaceutical conglomerate monopolizing everything and withholding information). The pharmacist, Raúl, after listening to my story, smiled and explained: “Of course this medication contains sodium hypochlorite as a disinfectant, a tetracycline antibiotic, and benzocaine, a local anesthetic used in human medicine.” Evidently, the primary factor responsible for my fish’s sedation was the latter ingredient.

The year was 1967, and a science fair was being held in which each school showcased its best project and competed at the state (provincial) level. We participated

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in the local fair and went on to win the state fair with an exhibit entitled “Anesthetizing Fish.” Visitors witnessed the anesthesia of guppies, which rapidly turned belly-up, were then transferred to another aquarium with clean water, and subsequently “resuscitated.” General anesthesia in fish had been previously described initially by McFarland in 1960. In 1969, McFarland and Klontz proposed a new classification of general anesthesia in fish, delineating it into six stages. Unbeknownst to me at the time, this episode constituted my first contribution to science (Meinertez, 1999).

### **Stage 3: The Beginning of Scientific Thought and Ethics**

My interest in the biological sciences began early. I studied medicine and specialized in Medical Pathology. I had a professor, Dr. Celestino Croxatto, who taught me and instilled in me the value of ethics in the daily practice of pathology as well as in scientific research, never losing sight of the fact that the patient is a person who suffers, loves, hates, nurtures life, experiences emotions, harbors dreams, and envisions a future. We performed autopsies, dissecting cadavers with an almost religious reverence and profound respect. Similarly, in the Pathology department, Dr. Rubén Laguens conducted animal experiments with strictly ethical practices. The university not only trained me as a physician but also provided me with the tools to develop a critically ethical mindset and a deep humanistic education. There was no ethics committee; ethical principles were deeply ingrained in our education from the moment we crossed the doors of the medical school.

### **Stage 4: Now, Indeed, We Speak of Science and Ethics: Definitions**

Science is a well-founded paradigm a paradigm in that it establishes a universal model or standard for the

behavior of reality and can tell us how this reality will behave. In other words, science can predict the behavior of an object because it provides the model under which it operates; thus, science does not merely “tell us” how an object behaves, but rather how an object “should” behave. It is well-founded because it utilizes the scientific method, which is responsible for corroborating the model’s adequacy with reality through every possible means. The word “philosophy” comes from the ancient Greek *philos* (φίλος), meaning “love” or “lover,” and *sophia* (σοφία), meaning “wisdom.” Therefore, philosophy (*philosophía*) means “love of wisdom”.

Philosophy is the study of certain fundamental problems related to issues such as existence, knowledge, truth, beauty, mind, and language. Philosophy distinguishes itself from other approaches (such as mysticism and mythology) to these issues through its critical and generally systematic method and its emphasis on rational arguments. By definition, Ethics would be the science of morals. Heidegger defines it as “the thinking that affirms the dwelling of man.” Heidegger’s tactic: if we listen carefully, the word itself speaks. The power and force of an argument lie in the word. “Ethos” means character, in the sense of a manner acquired by habit. Ethos is derived from the Greek *êthos*, which implies that character is achieved through habit rather than by nature. Such habits are born “from the repetition of identical acts,” meaning that habits are the intrinsic principle of actions. Scientific medicine was born out of observation and experimentation on animals. Since William Harvey’s experiments comparing heartbeats in different species, the data obtained through animal experiments have remained a topic of enduring interest both to better understand the nature and capabilities of various zoological groups and for their eventual application to human well-being.

It will be difficult for us to stop using animals for





scientific research. Despite alternative models, we will always need these living beings to progress.

My granddaughter said to me, 'But Grandpa, if cows, chickens, and pigs are killed to feed humans, what is wrong with using animals to discover cures for diseases or produce vaccines that are essential to sustaining life, just as much as eating?' It's a difficult question to answer, but it's not about whether we use animals, rather about how we do it. That is why numerous protocols have been established around the world to respect animal welfare.

Science is a socially organized and planned activity that pursues consciously chosen objectives and is essentially practical in nature. It plays a profound role in every aspect of human activity and in all fields of endeavor. In our daily lives, modern humans benefit from an avalanche of contributions from science and technology such as the automobile, the watch, the telephone, and communication systems, to name just a few. Although not all knowledge can be classified as scientific, science represents a specific type of knowledge used to transform material elements, raw materials, data, and information into goods or services by altering their nature or characteristics.

Science influences human life in two ways: it can be considered both an environmental, external variable and an organizational, internal variable. Over the course of the twentieth century, science evolved in increasingly close relation to the development of knowledge. This evolution had significant consequences. On the one hand, science established itself even institutionally within industrial production companies, which provoked a profound change in the organization of research and, in a certain sense, in the nature of scientific knowledge and the philosophical problems raised by its application and development (Brown, 1998).

In various intellectual circles, it is said that

modernity is coming to an end; however, we could only accept that this supposed extinction occurred exclusively within such circles and others like them, with the significance that this assertion implies. The core of Western societies remains modern. Moreover, it can be said that in our time modernity is at its peak, with only weak collective reactions opposing it.

The Modern Era is equivalent to the "scientific-technological era." Following Heidegger, we established that the scientific era first emerged in the 17th century in Europe (Quintanilla, 1991). For a long time, the rest of the planet ignored this development; they were completely unaware of the previous eras and of the destiny of their people. The current situation is, by the way, entirely different from that of the 17th century. In fact, the fundamentally technical relationship between man and the Universe spread from Europe in all directions. It is therefore possible to say that today virtually the entire planet is living in a scientific-technological era. Some characteristics of the modern technological era that is, of our time are "functionalization, perfection, automation, bureaucratization, and information" (Caletti; Carpio, 1985).

The 21st century demands a profoundly humanized science, based on highly integrated systemic approaches. This imperative arises from the characteristics that the development of science and knowledge have acquired. These advances in knowledge are present in almost every field of scientific activity. Such leaps also have severe impacts on the entire social structure of their direct and indirect, local and global environments. Therefore, now more than ever, the advancement of knowledge carries ethical, economic, legal, political, and, of course, ideological connotations. And it is not that we are politicizing or strictly imposing an ideological profile on the field of knowledge; nothing





tied to politics or ideology (Hernandez, 1998). Rather, the advancement of knowledge today embodies nuances of transcendental importance for the very conception of life, man, the human, and social coexistence. Science, which adheres to the foreseeable consequences, falls into “consequentialism” if it ignores the objective discourse of normative standards, for it then reduces ethics to a subjective appraisal based solely on circumstances, denying the possibility of developing a discourse capable of guiding the subject in different situations. A further distinction is made between the ethically good or bad attitude of a person which depends on the will (or lack thereof) to incline toward good and morally right or wrong behavior, which depends on the judgment that dictates whether an action should or should not be carried out.

Now, that child who once marveled at the sea, the fish, and rural life begins to grasp the splendor and complexity of existence. We are no longer children, and when we say, “Let’s care for the planet for our children,” it is a hypocrisy so profound that it should shame us as adult humans.

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