



Garcia de Orta
And Alexander von Humboldt
Across the East and the West

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Universidade Católica Editora

Palma de Cima – 1649-023 Lisboa

tel. (351) 217 214 020 fax (351) 217 214 029

uce@uceditora.ucp.pt www.uceditora.ucp.pt

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organização **Anabela Mendes**



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Science of Nature: Garcia de Orta as a Philosopher of Science



KOSHY THARAKAN*
IIT, Gandhinagar - Gujarat

ALITO SIQUEIRA*
Goa University, Goa

“Thus set up, pen in hand, for the sake of greater truth, I would turn Portugal into a fiction. That’s what fiction is about, isn’t it, the selective transforming of reality? The twisting of it to bring out its essence?”

Martel

Introduction

In what follows, we attempt to chart the philosophical underpinnings of Orta’s contribution to the plant sciences. In doing so, the emphasis would be on the methodology that Orta adopted in the study of the natural world of plants as embodied in his *Colóquios dos Simples e Drogas da India*. Thus, we hope to bring alive Orta as a ‘Philosopher of Science’. Was Orta ever a scientist? Is the *Colóquios* a scientific treatise or a semi-fictionalised account of natural history? Before answering these questions, let us turn our attention to a recent description, purportedly by a ‘zoologist’, of a rain forest mammal:

“There are two-toed sloths and there are three-toed sloths, the case being determined by the forepaws of the animals, since all sloths have three claws on their hind paws. I had the great luck one summer of studying the three-toed sloth in situ in the equatorial jungles of Brazil. It is a highly intriguing creature. Its only real habit is indolence. It sleeps or rests on average twenty hours a day. Our team tested the sleep habits of five wild three-toed sloths by placing on their heads, in the early evening after they had fallen asleep, bright red plastic dishes filled with water. We found them still in place late the next morning, the water of the dishes

* koshy@iitgn.ac.in and alito@sify.com.

swarming with insects. The sloth is at its busiest at sunset...It moves along the bough of a tree in its characteristic upside-down position at the speed of roughly 400 metres an hour. On the ground, it crawls to its next tree at the rate of 250 metres an hour, when motivated, which is 440 times slower than a motivated cheetah. Unmotivated, it covers four to five metres in an hour.” (Martel 3-4)

To be sure, all of us are familiar with similar descriptions by Orta about plants and even some animals in the *Colóquios*. Just to draw a parallel, let me quote Orta’s description of ‘Pepper’ in his forty-sixth Colloquy:

“The tree of the pepper is planted at the foot of another tree, generally at the foot of a palm or cachou. It has a small root, and grows as its supporting tree grows, climbing round and embracing it. The leaves are not numerous, nor large, smaller than an orange leaf, green, and sharp pointed, burning a little almost like betel. It grows in bunches like grapes, and only differs in the pepper being smaller in the grains, and the bunches being smaller, and always green at the time that the pepper dries. The crop is in its perfection in the middle of January. In Malabar the plant is of two kinds, one being the black pepper and the other white; and besides these there is another in Bengal called the long pepper.” (369)

Now, we know that Orta’s claim about there being two kinds of plants in Malabar yielding white pepper and black pepper is a completely mistaken belief. The ‘white pepper’ is nothing but the black pepper shorn of its flesh and is just the seed. On the other hand, the account given by our ‘zoologist’ about sloth seems to be wholly true. Shall we then conclude that Orta could not have been doing science, though he might have been a successful physician of his times! If ‘truth’ were to be the sole yardstick to determine whether an account is scientific or not, then many scientific theories and facts would not have been counted as part of science and many so called ‘truthful’ accounts like the one about sloths would eminently qualify to be recognised as science. We only have to recall that our zoologist’s true account of sloths were part of Yaan Martel’s 2002 Man Booker Prize winning novel *Life of Pi*. And if fiction is “the selective transforming of reality”, is not science too a fiction?

Science and Non-science: The Centrality of Method

How do we then assess a work as part of science? What makes a particular practice scientific? Here comes the relevance of methodology in science. Though, the

question about the method of science has been raised from the time of Greek thinkers, particularly Aristotle, it was in the twentieth century with logical positivism that 'method' was construed as the distinguishing characteristic of scientific practice. According to positivism, science is distinct from other human activities by virtue of having a unique method, namely 'inductivism'. The post-positivist philosophy of science has called into question many assumptions of logical positivists particularly their belief in 'pure observations' as the foundation of science. With the virtual retreat of positivism in the later part of the last century, there emerged what has been labelled as the 'New Age' philosophies of science comprising the perspectives of sociology of scientific knowledge, feminist critiques of science as well as the postmodern attack on science (Koertge). The cumulative effect of this discourse was one that undermined the special status that science has been enjoying because of its unique method. Thus, *within the framework of new age philosophies of science*, there is no clear-cut boundary between science and other human pursuits like literature or art. In such a context, raising the question of method of science would be futile to many contemporary thinkers, as they would lodge any discussion on scientific method into the haunted house of history. However, many philosophers of science argue against the summary trial and dismissal of method and find virtue in Imre Lakatos' suggestion of the need to distinguish between 'external' and 'internal' factors while studying history of science. Thus, Koertge observes that though Lakatos's 'division of labor' between 'external' and 'internal' factors presume what Bloor and Edge referred to as the 'zero-sum assumption'—the assumption that the cognitive and social factors are mutually exclusive, there are good reasons for scientists to adhere to such a division. As Koertge points out:

“Although it is fashionable in philosophy of science today to deny the legitimacy of talking about the scientific method, nevertheless, a central part of science education comprises methods of avoiding error...In fact almost every methodological maxim has the intended function of preventing a causal link between interests and results.” (671)

The contemporary suspicion about methodologism in philosophy of science is not so much an offshoot of sociology of scientific knowledge or feminist perspectives, nor even postmodern influences, though these had some definite role to play. Rather, it was certain interpretations of the works of Kuhn and Feyerabend that got the better of Popper and Lakatos that seemed to have undermined the role of method in science. Nonetheless there are also philosophers of science who are *critical of reading Kuhn and Feyerabend as 'irrationalists'* or as advocating

'anti-methodology' stance. As Nola and Sankey point out that Kuhn's theory of 'values' as determining theory choice across the sciences and within the history of a particular science—that is, values as paradigm transcendent unlike his own earlier 'paradigm' specific account of scientific theories together with his attempts at providing an analytical justification of rationality squarely places him amongst those philosophers who have defended the traditional philosophical concern about scientific method (Nola). Similarly, Feyerabend despite his earlier polemics like *Against Method* and *Farewell to Reason* confesses in his autobiography *Killing Time* published just before his death, that he never “denigrated reason” but only opposed some “tyrannical version” of it. Nola and Sankey point out that Feyerabend too appeals to some 'meta-methodological' theory. However, unlike Kuhn, Feyerabend does not hold the possibility of demarcating science from non-science once for all, even though he accepts that there are differences between science and other human pursuits like art and religion (Kulkarni 42).

Doing Science in the 16th Century: the Aristotelian Legacy

Having thus portrayed the idea of 'method' as a legitimate and crucial aspect of any discussion of science within the framework of recent philosophy of science, we may now examine what method Orta was adhering to in his investigations of the natural world. First, a note of caution: in philosophising on any work of the distant past in present times, we may end up either in distorting it or in preserving it as it is, without relating it to the present. As MacIntyre says:

“Either we read the philosophies of the past so as to make them relevant to our contemporary problems and enterprises, transmuting them as far as possible into what they would have been if they were part of present-day philosophy, and minimizing or ignoring or even on occasion misrepresenting that which refuses such transmutation because it is inextricably bound up with that in the past which makes it radically different from present day philosophy; or instead we take great care to read them in their own terms, carefully preserving their idiosyncratic and specific character, so that they cannot emerge into the present except as a set of museum pieces.” (227)

However, as mentioned at the beginning itself, our aim is to bring Orta alive as a philosopher scientist and not to display him as a 'museum piece'. At the same time we have to guard against the possible 'misrepresentations' and 'transmutations' or 'selective transformings'. In order to achieve the end we need to make careful

manoeuvrings so that we would not bump against the 'either/or' predicament so tersely stated by MacIntyre. To realize this complex task we would better proceed initially by locating Orta in his times and then to show within that context what he had achieved was definitely liberating him from being perceived as a museum piece – incidentally, Orta himself was apprehensive of the risk of being shunned as a museum piece. Orta writes in his Second Colloquy:

“Some day a little book may be printed, making a joke of me, or showing up my errors and badly arranged reasons. Some people in reading, not finding in the beginning anything that they like, without considering further, will give this book to the four winds, covering me with a thousand curses and vituperations, and, what is worse, will direct against me invectives and other kinds of abuse when I do not deserve it.”(5)

Though Plato makes certain methodological remarks in his *Dialogues*, the first full-blooded account of 'scientific' method can be traced back to Aristotle's *Organon*. If for Plato, the world of Reality is the world of Ideas or Forms and access to that realm consists not in sensory experiences, for Aristotle, it consists precisely in observation. He made many correct observations in the areas of botany and biology, though he also has his share of wrong information about them. However, despite all his accolades for observation, Aristotle relied not so much on observation than pre-suppositions like 'teleos' in studying Nature. According to Aristotle, the substance that makes up the natural order consists of four different elements, namely, earth, fire, water and air. For the diverse phenomena such as the falling of objects down to earth, water finding its own level, air spreading into space around it and flame leaping upwards Aristotle offered teleological explanation by stating, 'these elements moved in such a way as to return to its natural state' (Spangenburg 13-17). Also, the Aristotelian notion of *scala naturae* and the idea of universe as a 'plenum' or 'continuum' later transformed to hypotheses like the 'great chain of being' are evidence of the tension between empiricism and rationalism in Aristotle's philosophy.

Aristotle's teleology was a major obstacle for centuries to come in the path of the development of science, and his influence continued until mid sixteenth century. As Copernicus revolutionised the study of astronomy overthrowing Ptolemaic Geo-centric theory, Vesalius (in 1543) brought a revolution in the study of human body and medicine by questioning the theories of Galen. Galen (A.D. 130-200) believed in a grand purpose or design in everything, thus basing his views on teleology (Spangenburg 81-82). Galen and other influential personae that preceded him such as Dioscorides (A.D. 50) and Pliny (A.D. 23-79) were the point of reference

for the study of life sciences and medicine around that time (Spangenburg 27). In Orta's work we see repeated reference to these men of authority, sometimes paying homage and at other times highly critical of them. Other sources of influence came from the Arab world; particularly Avicenna (980-1037) and Averroes (1126-1198) were the most important thinkers in the Arab world who followed Aristotelian science. Averroes remarked that Aristotle "comprehended the whole truth—by which I mean that quantity which human nature, in so far as it is human, is capable of grasping." (as quoted in Spangenburg 26). However, despite their appreciation of Aristotle, the Arab thinkers were critical of Aristotle's method of induction and privileged the deductive reasoning as it gives knowledge with the stamp of certainty (Benmakhalouf). Thus, the blending of hypothesisism and empiricism is visible in the Arab thinkers.

By way of a Conclusion

In the light of this discussion, we argue that Orta's *Colóquios* is not to be understood as a mere work of fiction. True enough, though science is a 'selective transforming of reality' like fiction, not all 'selective transformation of reality' is science. Orta's work too reveals the ambivalence characteristic of the Arab thinkers, a mixing of reasoning that founds hypothesisism along with empiricism. We see in Orta's work repeated reference to these Greeks and Arabs, sometimes paying homage and at other times being critical. Thus, rebutting Avicenna and Serapiam who say that "amber is swallowed by a fish called AZEL which dies as soon as it has eaten it", Orta points out that in the third Colloquy:

"I say that the unreasoning animals, by a natural instinct, seek the food that is suitable for them and not that which is poisonous, except when what is injurious gets mixed with that which is wholesome...So that we need not suppose that the fish goes to seek for the amber which will kill it." (23)

Again, in refuting Averroes' claim that "amber is a kind of camphor" Orta advances reasons that can be counted as formulating hypothesisism along with his empiricism. Orta remarks:

"But that the statement of Avenrrois (sic) is false and unworthy of the great philosopher is clear. First in saying that camphor originates in the sea, for camphor is cold and dry in the third degree, while amber is warm and dry in the second degree, whence it is clear that they cannot be included in the same genus." (23-24)

While discussing camphor in the twelfth colloquy the confusion of Averroes regarding amber and camphor is again mentioned. It is to be noted that this time unlike in the third colloquy, it is Ruano (the rationalist side of Orta) and not Orta (the empiricist self) who mentions about Averroes taking the two as belonging to one and the same genus. What is intriguing here is the way Ruano presents this confusion of Averroes as if it was being discussed for the first time between the two. In the twelfth colloquy on Camphor Ruano states:

“Avenrois says that there is another very different kind of camphor. He affirms that it is engendered in the sea, and that it is warm and dry in the second degree. *What is more wonderful, he says that amber is a sort of camphor and that it comes into the sea by fountains. Have you by chance heard of that kind?*” (93-94, emphasis added)

The “great error” of Averroes already mentioned by Orta to Ruano in the third colloquy (on amber) becomes now something “wonderful” to Ruano in the twelfth colloquy (on camphor). Here we wish to suggest that despite Orta’s avowed empiricism explicitly stated as “For me the testimony of an eye-witness is worth more than that of all the physicians, and all the fathers of medicine who wrote on false information,” (125) he seems to deploy an empiricism filtered by hypothesisism. Thus, contrary to the view expressed by Count Ficalho that the spirit of Orta’s work is empiricism (Markham xii-xiii), we believe that Orta ingeniously blends the method of hypothesisism and empiricism. We are justified in saying so when we analyse how Orta twists the “great error” into something “wonderful.”

Let us recall Ruano’s question regarding the identity of amber and camphor. He asks Orta, “Have you by chance heard of that kind?” Orta answers Ruano:

“*I never heard of it; and the people of India think so much of this medicine that if they had heard of what you say, it would never have been forgotten. If the amber had been a kind of camphor it would not be in such esteem in China, whither it is brought, and fetches the high price I have already mentioned. Besides, amber is warm in the second degree, and camphor is cold in the third, so that they cannot be included under the same genus.*” (94, emphasis added)

From the reply Orta gives to Ruano, it is clear that he remembers well the previous conversation on Amber as he refers to the high price it has in China as already mentioned. Now, on what ground does Orta reject Averroes claim this time around? Not on any testimony of the witnesses as he says, “I have never heard of it”. Rather, Orta now seems to base his reasoning upon the absence of any testimony, neither

his own nor of the “people of India”. This is against the spirit of a full-blooded empiricism, as empiricists treat only that knowledge that can be traced to sense experience as legitimate. Thus the earlier certainty of the “great error” now yields to a sense of amazement and wonder that prods him to consider the hypothesis that “If the amber had been a kind of camphor it would not be in such esteem in China” in order to establish the falsity of Averroes’ claim. It is pertinent here to note that the “error” noticed earlier by “Orta the empiricist” gave way to an amazement that is characteristic of a sort of hypothesisism that needs to be confirmed later in order to qualify as knowledge. Thus, we submit that in Orta both hypothesisism and empiricism are at play as indeed any proper methodology of science demands.

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