The Idea of Nature

R.G.Collingwood

May 12-14, 2007

What is the philosophy of science? Does philosophy come at the beginning and guide the work, or does it come at the end as a kind of summary. Yes and no. Neither or both. Science always starts with questions, even before anything is really known, to say nothing about there having been an opportunity to formulate even a rudimentary philsophy. Details are amassed, and in the process of doing so, one invariably reflects on what one has been doing as well as what one think one is up to. Clarification of the issues brings the formulation at least of some tentative principles which guides further work, which in its turn necessitates new reflection in a perpetual see-saw movement. This see-saw is of great help to the strong mind, but it may tempt the weak mind to put undue emphasis on provisional principles to the detriment of the particular features of the problem at hand, Collingwood warns the reader. Because philosophy can never be done in isolation, the philosopher who ventures to expound on natural science, without having studied it, let alone have done work on it himself, is apt to make a fool of himself. The reader naturally starts at this point to wonder about the necessary qualifications of Collingwood himself.

Collingwood discerns three stages in the history of the idea of nature. The first, non-surprisingly, originated with the Greeks, and in which Nature was conceived of as an organism. Thus in particular the division between mere matter and life was never really an issue back in those time. After the renaissance, Nature was thought of as a machine. That means something that was purposefully designed. Finally in the nineteenth century a more historical conception of nature took root as evolution became more understood. Collingwood certainly must think of this as progress, although he is in general wary of taking such a concept seriously, because he assumes that an even more historical approach to nature is the key to its understanding.

It all started with Thales and the question of what was everything made of. Thales assumed water. Why not? It was obviously thought that on a sufficiently small scale all matter was the same. Then the Pythagoreans came along and suggested that what mattered was not matter but form. Abstract form. An example thereof was music, in which what reached the ears, and was reconstructed therein, was not the actual bronze of the bell that chimed, but the frequencies of the rhythms it engendered. From then on the idea that the material world was ultimately mathematical took root, something that was further confirmed by Galileo who famously stated that the language of Nature was mathematics, a powerful idea which has survived into our modern age. This is a metaphysical statement, and a beautiful example of how those should be phrased, abstract and immanent, and providing a seamless link between Pythagoras and his modern incarnations of string theorists[1]. Never mind that the mathematics is vastly more involved and sophisticated, it

[1] That string theory concerns itself with 'vibrating strings' must be a beautiful irony, which should not be lost on its modern proponents.

is the principle that counts. Pythagoras set Western Science on the right track.

Collingwood is a classical scholar, and he is at his most comfortable when he discusses the ancients, especially Plato and Aristotle, whom he does very well. A common theme is the interplay between matter and form, the former being the putty with which the latter can be manifested. One may think of form either as immanent or transcendent. In the latter case it is disjointed from its material incarnation and thought of as existing on its own. According to Collingwood Plato does not commit himself to either view, both are options. Collingwood himself does elsewhere profess that he has trouble conceiving of abstract entities without any kind of concrete manifestation. This is a universally recognised phenomenon, and it lies at the root of all didactic instruction, namely the presentation of the concrete example for the illustration of some general principle, which is seldom explicitly enunciated, because if so, it would not need to be put in 'Gestalt'. The notion of abstract entities 'existing' transcendentally is a very controversial one, and the source of much ridicule. Thus some philosophers, known as nominalists, have gone to some length to avoid it by severely restricting the notion of 'existing'. Personally I find such measures a bit too extreme, motivated by an inhibiting dread of metaphysics.

Aristotle developed the ideas of Plato further. But as always in Metaphysics, once it starts to become an edifice, it becomes very vulnerable to criticism. Of course the ideas of Aristotle are very clever, but lack of empirical input is very dangerous. In the development of philosophy backpedalling is inevitable and the ramifications provided on Plato by his most distinguished disciple will have to be cut, and as a consequence Plato appears even wiser. Platos metaphysics has admirably stood the test of time because it is both commendably vague and conceptually focused. Platonism can of course be understood at many levels, the more concrete, the more encrusted in history and personal idiosyncracy, the easier to ridicule and dismiss. The beauty of course is the self-referential nature of Platonic Metaphysics. You can see all those historical manifestations (including most religions?) of Platonism as mere shadows cast by the ultimate Platonism. But such fancies of philosophical speculation Collingwood does not allow himself. His approach is sober and factual.

The Copernican revolution is always thought as pivotal in Western Civilization, the great significance of which, being dispelling man from a special position in the universe. This interpretation is misleading, Collingwood claims, what it did was to show that the universe has in fact no center, and thus doing away of the spatial division of the universe in the divine and the human, hence making everything fair game for human study. It was this metaphysical insight which allowed Newton to assume that the laws of nature, including gravitation, would be the same everywhere else as on earth, giving in one go the entire universe to the dominion of human thought.

The world picture which emerged was a mechanical one, ruled by laws. This is of course beautifully illustrated by the world as a mechanism set on its own determinate path once it had been set in motion by the ultimate mover - God, who henceforth could safely withdraw from his creation. But this world picture was gradually abandoned in the 19th century, and in a sense there was a return to the ancient view of the world being an organism amendable to change and developement. A machine does not evolve. Something that evolves may very well build machines but cannot by itself be a machine.

A machine is, Collingwood reminds us, a finished product. Before it is finished it is not a machine, it can only function as such when it is completed. A machine can only change by breaking down and ultimately stop functioning. It cannot improve itself. A machine is the manifestation of purposeful design, and conceiving the world as a machine presupposes a designer, i.e. an ultimate being, a Deity. Collingwood dying already in the early forties did not live to see the revolution brought about by the computer. The revolution of the computer consists in the invention of soft-ware, which can be seen as abstract Platonic form imposed on a material basis of hard-ware. Soft-ware can in principle be implemented on whatever material computer, and is as such abstract and transcendent. Utimately it is about algorithms and mathematics, which makes the Platonic connection less startling and shocking. But with the computer the idea of a developing machine took root. Programs can improve themselves, in fact evolve, and as such it is tempting to look upon them no longer as machines. But one should not forget that this is what they are deep down. Also the emerging culture of soft-ware programs fitted very well into the paradigm of Darwins forces for evolution. In fact in modern synthesis, evolution is seen as the unfolding of some basic algorithms, an ultimate kind of bootstrapping enabling order to arise out of chaos, without any purposeful designer.

Nevertheless natural science is ultimately concerned about space and time. Basic to modern science is that space and time is not inifinitely divisible, there are smallest amounts of space and times in order for which a given phenomenon has to make sense. Water does not exist on a sub-atomary level. This is of course well known to modern students of science, even of the elementary kind; what is perhaps more striking is that the same goes for time. Happiness, Aristotle claimed, needed a whole lifetime to manifest itself, in particular it means that the question of whether you are happy now, really does not makes sense except as a statement of transitory well-being. To judge a life you need all the evidences. Similarly to be a writer it takes time. Writing a sentence is not the same thing as writing. Writing a sentence is the particular response to a local question that may be related to a more global one, connected to the writing of a book, or more ambitiously that of an oeuvre, but those more global questions cannot even be phrased in the time it takes to write a sentence, their formulations develope along with the writing of the book (or series of books), and may not be at any instance awared of. Of course if you follow those ideas consistently they bring you back to the classical paradoxes of Zeno pertaining to what is movement, at what scale movement can be said to exist[2] Pursuing those speculations further, Collingwood concludes that animals much larger or, maybe more to the point, much smaller than ourselves, would feel different rhytms, and hence conceive of the natural world in very different terms. On firmer ground, Collingwood refers to his subject of history, in which the time-scale very much determines what kind of things we study[3]. Short timescales will necessarily concentrate on destruction, because destruction takes far shorter time than construction. Thus such a history would be a record of catastrophes and give no indication of how those very things subjected to destruction ever came about.

[2] To a mathematician such preoccupations are of course puzzling, he or she assumes infinite divisibility, in fact this has been forced on mathematics, as is the discovery of the continuum.

[3] This brings forth the Braudelian notion of 'temps de longue duree'

As Collingwood points out over and over again. What makes a scientist is not his knowledge of facts, such come with the territory, but his ability to ask questions. And by questions one means good and intelligent questions, which can not only be answered but also stimulate the asking of new questions, because any kind of study involves a series of questions, a so called question-answering complex, where not only answers are linked to questions, but questions linked to answers. The Ionians, the scientific precursors, were of course quite capable, but what stunted their science, was their insistence on asking two unanswerable questions. a) How to form a clear mental picture of the universal primitive substance and b) how to deduce the world of nature from this substance. The Pythagoreans of course changed all that. It is not the substance *per se*, whatever that is, which expalins anything, it is the form it takes, in particular its mathematrical form, from which, as we have noted above, the mathematical inquire into nature took off.

Theology is of course hard to avoid in any metaphysical contemplation of nature, and the Ancients were no exceptions. It is however sobering to realise how abstract Aristotle was in his conception of a deity. In fact the crucial thing is not that God loves the world, but that the world loves God. However, Collingwood is reluctant to make too much of this difference from classical Christianity, and as we all know, Christian theology derived much of its intellectual rigor and respectability from Aristotle. According to Collingwood we should simply pause and consider two words for love - $\epsilon\rho\omega\zeta$ which means the love that longs for perfection and hence is directed upwards, while the Christian love is associated to $\alpha\gamma\alpha\pi\eta$ which is the love concerned with compassion and hence looking downwards with the condescension of the superior for the inferior[4]. Thus Aristotles contention is simply that God being perfect, he has no longing for further perfection, and hence cannot feel any erotical love. Once again we may wonder to what extent the God of Aristotle was anthropomorphic, or whether he thought of it in very abstract terms. (This is of course a question also to be asked about modern theology.) With Aristotle there is the continued distinction between form and matter, and it is only form which the intellect can comprehend, thus matter, by defintion, remains outside mental reach. In fact matter is to Aristotle basically negative, something that obstructs the trend towards perfection, this trend which in organic life is identified as 'nisus'- the drive to develope. Thus nisus is an example of form, but something that takes an extended time to manifest itself. Thus to Aristotle Nature mired in matter is mostly accidental. The great transition in the Renaissance was to renounce this view, and instead to think of form being immanent in Nature, not outside of it and so to speak imposed on it. This, Collingwood remarks, lent to Nature a new dignity, and thus a willingness to observe it more closely, giving rise to the modern empiricism of western science, seeking the secrets of nature inside nature itself, not as something to be gained by pure thinking.

The mechanical cosmology of the Renaissance gave birth to 'dualism'. Implict in Bacon, according to Collingwood, explicit in Descartes. The 17th century being a hotbed for dualisms. Body and Mind, of course, in the Metaphysical realm, while in Cosmology a division between God and Nature, the latter being the creation of the former. And less important, in epistomology, making a distinction between rationalism and empiricism. Renaissance science achieved its maturity with Galileo, who clearly delineated what was

[4] and actually the kind of love that Nietzsche famously thought should be abolished

the scientific method (initiated by Bacon) and to what it would restrictive itself, namely the quantitative. What is not measurable does not exist scientifically, in the sense of being scientifically knowable[5]. This was of course a major step away from Metaphysics (although the very distinction can be seen at least as a epistemological statement of metaphysical nature). The objects of Natural Science was thus restricted to space and time. The next natural step was of fullfledged Materialism. Gassendi, a neo-Epicurean, stated that what was not scientifically knowable did in fact not exist. Thus Mind was reduced to Matter as being just a peculiar pattern of matter, a view that obviously dominates modern science, as exemplified by neurology. Collingwood sees in this radical view a religious conviction true to its monotheistisk roots. God is done away with, simply by having transfered his attribute to matter itself. If so, there is no need for another God but matter itself. Collingwood is adament in pointing out that materialism is more in the nature of an aspiration than an achievement.

Newton is the ultimate icon of scientific incarnation, at least of the Mechanical world-view. In particular he stands as a giant, regardless of whether on the shoulders of other giants, on the pinnacle of Renaissance scientific achievement. But as a philosopher Collingwood does not have a high opinion of him. In particular his proof of the existence of God (based on the elegant structure of the solar system) is nothing but an exaltation of the shortcomings his own method. Newton was of course nevertheless aware of the shortcomings of his programme, which he had only partially fulfilled[6].

Collingwood contrasts Greek Science with Renaissance Science, in which the former took mathematics seriously and asked not whether it was possible, but how it was possible. Renaissance natural scientists took physics seriously, and did not question whether the quantitaively described world can be known, but why it can be known. This was the legacy of questions bequested by the 17th century to the 18th century. Thus we enter into the idealists reflections of Berkeley, Kant and ultimately Hegel. Reflections that steer dangerously close, in its subjective varieties, to Solipsism, i.e. that nothing is knowable but your own mind[7]. Hegel is in many ways the direct heir of Plato and Aristotle, or at least the only philosopher with ambitions of filling out their evacuated mantles. This of course led to a systematic approach to philosophy resulting in building up an edifice. But edifices of a metaphysical kind are, as noted above, vulnerable, and exalted as he was in his lifetime (cut short by something as prosaic as cholera) his reputation has suffered in retrospect[8]. Collingwood on the other hand takes Hegel seriously, in particular as a

[5] This ties obviously up with Kants notion that we cannot know 'Das Ding an sich selbst', by this Kant only means scientific knowledge, according to Collingwood, and thus does not preclude other kinds of knowledge

[6] the knowledgable reader cannot but help to refer to Newtons image of himself as the little boy on the seashore picking up the intermittent pebble, while the big unknown ocean washed at his footsteps

[7] The true notion of Solipsism lies in there only being one mind - your own, and hence it is a kind of Mind monotheism. Less radical forms do of course acknowledge multiple minds, but can still be subjective in the sense that ideas only exists in minds, and thus have no objective existence, at least in the material sense.

[8] William James quips that we tend to impute meaning to well articulated sentences, even if there is none to be had, and as an example he refers to Hegel

successor of Aristotle. What are the position of Hegel on Nature? First that it exists outside and independant of us, thus a stand against the more radical forms of idealism. In fact by the naive notion of 'real' nature is the totality of all real things. But of course it all depends on what you really mean by 'real' and as Hegel is aware there are many possible shades of 'reality'. As an example a fake of a Rembrandt is not supposed to be real. It is a fake after all. But of course as a picture it is a thing, and as a thing it is real. It exists. But a picture is more than a thing, it also tries to embody an idea. A fake does not embody what it professes to embody. It lacks not *realitas* but *veritas*. Hegel accepts the old idea of 'nisus', in fact the whole point of Hegelian philosophy is to identify this general 'nisus' be it of Nature as well as History (both writ large). But this strife is frustrated. According to the Greeks (i.e. Plato and Aristotle) this is because matter is recalcitrant, but here, according to Collingwood, Hegel is deeply original (although I do not see exactly how). Hegel claims that this friction is inevitable, forms are abstract, and cannot be realized by matter, although they 'want' to. Thus any realization is by nature, so to speak, tenative and imperfect, forms being Utopian. To Hegel Nature is characterized by externality. Everything is external to everything else (space) and also external to itself (time). Delving further Hegel is bound to say that matter, a body, cannot be localized in space, just as a living organism cannot be pinpointed in time. Thus, in a sense Hegel is unwittingly anticipating modern Quantum Physics, although such comparison are of course more amusing and rhetorical than imbued with any definite content, except of course to point at a common metaphysical landscape.

When it comes to Modern Science, especially Modern Physics, Collingwood has not much more to say, knowing well his technical limitations. So what he does is to offer a sympathetic reading of Whiteheads philosophical synthesis, pointing out (with no little gratification) how well Whiteheads ideas mesh with those of Aristotle, although the former probably never studied the latter.

In summary. A book on the idea of nature is forced to be metaphysical. But it can be metaphyiscs as its best, not technically articulated, nor systematically developed, but merely evoked in brief glimpses, revealing hidden assumptions and pointing out connections of thoughts and ideas, usually never recognised. What modern scientist would study Aristotle seriously? Meaning studying him with appropriate sympathy and thus reaping the understanding, which is its reward.

May 23-25, 2007 **Ulf Persson:** *Prof.em, Chalmers U.of Tech., Göteborg Sweden* ulfp@chalmers.se