

## **LIFE RESPONSIBILITY VERSUS MECHANICAL REDUCTIONISM: WESTERN WORLD-VIEWS OF NATURE FROM PANTHEISM TO POSITIVISM**

**Richard Allen**

*Formerly of the University of the West Indies, St Augustine, Trinidad*

**Giorgio Baruchello**

*Faculty of Law and Social Sciences, University of Akureyri, Iceland*

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### **Summary**

All modern Western world-views incorporate the idea of the natural world, distinct from both the artificial world of human creation and the trans-natural creative activity of God. That view of the natural world comprises the presuppositions of modern natural science, distinct from ‘magical’, polytheistic and world-denying cosmologies. It is the idea of a contingent yet rationally ordered universe, which the human mind can understand by way of observation and experiment, and which is good for the human mind to know and understand. Its origins are twofold, both of which are breaks with the old inclusive and polytheistic cosmologies: the Biblical idea of creation, and Greek natural philosophy and science. They were brought together in the new Christian civilization of Europe. The scientific revolution of the 16th and 17th centuries replaced the specifically Greek elements in the mediaeval picture of the world with a mechanistic picture of the world, largely adequate for physics and later chemistry, but lacking provision for living beings and biology. It gave rise to ‘reductionism’, the belief that the methods of physics and chemistry should be applied to all knowledge or that higher levels of existence are ‘nothing but’ lower ones. The world in this perspective was held to lack meaning and purpose, whilst its life-support systems were being either underplayed, silently presupposed, or obliterated from view. This modern mechanistic picture made it possible

for novel forms of world- and life-negation to emerge. Its emphasis on the abstract, synchronic and immutable representation by means of physical-mathematical expressions led to ‘otherness’ from the represented living world, which is embodied, diachronic and mutable. Revealingly, the idea of mastery over the natural world, to be aided by new technologies, replaced that of stewardship, a mastery often unconstrained by any law. Reductionism also provoked reactions such as Romanticism, pantheism, and rejections of science and technology. Today significant changes in natural science itself offer prospects for more adequate pictures of the natural world, while the rise of ‘environmental ethics’ manifests a new sense of human responsibility and a lessening of the idea of unconstrained mastery over nature, as the environmental damages caused by humankind’s life-blindness can no longer be ignored.

### **1. The Modern Western Idea of ‘The Natural World’**

Over recent decades questions concerning environmental degradation, pollution, extinction of species, global-warming and the like, have forced themselves into the news, because of the great and rapid increase in the world’s population, the demands thus made upon natural resources, and the power of modern technology. In great part this has been the result of their world-and-life-views. A world-and-life-view includes a picture of the world, its structure, fundamental constituents, origin and destiny, and a view of the place, origins, destiny, duties and meaning of human life within it. The idea of the ‘natural world’ is itself a product of world-views, as may be seen by a brief comparison with the other principal types of world-view. The defining features of the Western idea of the natural world is one of:

1. a real system of things and events, which exist in their own right and are neither an ‘illusion’ (with ourselves included) nor a projection or creation of our own minds;
2. a coherent system of things and events in space and time, such that it exhibits laws and patterns, the same laws and patterns apply throughout it, therefore it is a universe and one that the human mind can aspire to understand;
3. a differentiated universe of distinct and increasingly complex orders of existence – primarily, merely physical things, plants, animals and persons – for which correspondingly more complex categories, concepts and modes of understanding are required;
4. a contingent system of things and events that the human mind can grasp and understand but only by discovery by both observation and experiment, on the one hand, and, on the other, the creation and imaginative application of hypotheses, models and mathematics, and not by any simply deductive thinking as if it and its constituents existed necessarily and could not be otherwise;
5. a genuinely temporal system of irreversible changes and not of one continuing state nor of an endlessly repeating cycle;
6. that system is itself independent of management or action on it from outside by God or supernatural forces and by ‘artificial’ human action.

Almost every part of this has been disputed by rival outlooks within the modern Western world, yet those disputed parts continue in them precisely because they are opposed or radically re-interpreted and are not simply ignored or forgotten.

The principal difference between this Western world-view and the mythologizing ones of earlier civilizations is that water, sky and earth are understood in the former only as physical substances while the latter use the language of ‘generation’, of processes of vegetative and animal reproduction, to narrate these events by which the present order of the cosmos came into existence. To refer to this as ‘animation’ and ‘personification’, as if it were a literary device, would be misleading, since it would presuppose that a clear differentiation, in modern Western terms, had already been made among merely physical beings, plants, animals and persons. On the contrary, the language of these cosmologies should be interpreted as embodying only inchoate, vague and fluctuating distinctions among different orders of existence. These have only a limited coherence in the cosmos because of the very plurality of gods, their struggles with each other and with other forces, and their dependence upon the one cosmos that they inhabit.

## **2. Other Cosmological Patterns**

One development from polytheism, and often continuing with it when the individual gods are regarded as manifestations of one divinity, has been to view the cosmos as an organic unity, a single organism, with one or more streams of life or other forces flowing through it, and so to regard all things as divine to some degree. The proper conduct of human life is therefore to immerse oneself in this flow of life, which can only be lived and felt. Therefore there is little scope for a natural science that would look for definite and law-like connections among events, specific examples and patterns of ascertainable causes and events. Indeed, the same also applies to human events, so that what matters in politics and social life is a symbolic manifestation of cosmic forces and patterns, to attune society to them, rather than the formulation and execution of policies to achieve specific outcomes.

An almost constant feature of both pantheist and polytheist cosmologies is that time is conceived as the recurrence of cosmic cycles of different ages, generalized from the familiar and all-important cycles of day and night, the seasons of the year, and birth and death. Therefore speculation upon these cosmic cycles, rather than scientific investigation of specific causes and effects, is the way to understand what is happening in the world, human and non-human, by locating the present period in the appropriate stage of the cosmic cycle. Moreover, the prospect of endless recurrence can give rise to a sense of purposeless and pointlessness in life, and thus for a desire to be released from it, as happened in India where the doctrine of individual reincarnation became universal.

These world-views have broken with the all-inclusive cosmos of polytheism and pantheism, and place the supreme and unchanging reality beyond it. But they regard the world and all within it as something from which to escape, because its eternal recurrence is meaningless, or it is ultimately ‘illusion’ and unreal, or it is only too real and evil. For example, the Advaita Vedanta (‘Non-dualist’) school in Hinduism, held that only Brahman, ‘Ultimate Reality’, is real and all finite things, ourselves included, are ‘illusion’ (*mithya* or *maya*). And the Gnostic movements that arose in the Middle East at the same

time as Christianity held that human beings are sparks of the one Light, fallen or seduced into, and now trapped within, the physical and therefore evil universe, from which their aim should be to find their way back to the Light. In none of these world-and-life-views is there any real or lasting interest in the world, for the aim is to free oneself from it.

### 3. The Biblical View of the World

Paradoxically, the decisive break with the all-inclusive cosmos of the polytheistic systems occurred among a people, the ancient Hebrews, who showed no evidence of an interest in natural science and mathematics.

Traces of the old cosmologies do remain in the Jewish scriptures, and it was not until much later that it was first explicitly stated that God created the world from nothing and not from any pre-existing chaos (2 Maccabees 7:28; c. 180 BC). Likewise, the existence of other gods was not formally denied until Second Isaiah declared that Yahweh was the only God and the God of all mankind (44:6, 8; 45:5-6, 14, 21, 22; c. 539 BC). In the meantime the attitude of the Hebrew prophets, such as Elijah (1 Kings 18:25-9), was a 'practical monotheism': the other gods were declared to be powerless and hence to be ignored.

Although the world is still pictured as consisting of the three planes of sky and water above the earth, the earth, and the waters under the earth, into which the original water of Middle-Eastern cosmologies, divided itself, this division was the work of God who is implicitly outside and above it the watery chaos from which he creates the world purely by his word: "Let there be light", and there was light', etc. (Gen. 1:1 - 2:4, composed c. 950 BC, but clearly using much older materials). Furthermore, when creation is complete, 'God saw everything that he had made, and, behold, it was very good' (Gen. 1. 31; cf. Ps ): there is nothing in the world opposed to, let alone threatening, God. The second story (Gen. 2:4-24, c. 900-750 BC) simply begins, 'In the day that the Lord God made the earth and the heavens [or waters] . . . ', and continues with the creation of man.

In neither version are there any kaleidoscopic transformations from primeval elements to individual deities nor any use of physical, vegetative or sexual processes that are to be found in the old, polytheistic cosmologies. The all-inclusive cosmos has been clearly broken and differentiated into the one God, who reveals himself to Moses as 'I am that I am' (Exodus 3:14), and who is distinct from and sovereign over the world which he creates, and the created world in space and time. Without capricious deities within it, and instead subject to the one God who has created it and whose nature is 'steadfast love' (Psalms 5:7, 13:5, etc.), the world has, implicitly, a rational and constant order, a body of laws that can be discovered by careful enquiry.

As for mankind and his place in the world, God creates them in his own image (Gen. 1:26): that is, as well as being an animated body like the animals (Gen. 2:7), each human being has a moral and spiritual nature. Man is given dominion over the rest of the earth, and all that is on it, and told to multiply and subdue the earth (Gen. 1:26, 28, 2:15, 19-20; Ps. 8:5-8). Indeed, the earth has been prepared for him or is then made for him (Gen. 2:8ff). Men, therefore, are not masters of the earth in their own right but as the servants of God. Mankind is placed between God and the earth, responsible *to* God and *for* the earth.

Disobedience of God, symbolized by eating of the fruit of the tree of the knowledge of good and evil, and thus reaching for equality with God (Gen. 3:1-7), brings the punishment of ejection from the garden of Eden, that is, from fellowship with God, and to a life of toil and not just work (Gen. 3:19). Later, the prophets warn of the ‘Day of the Lord’, not a day or reckoning solely for Israel’s enemies but also for Israel, when God will judge his people who are accountable for him for their treatment of each of other. Yet by implication or extension their treatment of the world around them could be included in their responsibilities.

The Hebrew Scriptures are therefore concerned with the whole sweep of history as the dealing of God with his people, from creation through the distant past to chronicles of the recent past, and to prophetic warnings and hopes about the future. Thus history, and the whole world in which it occurs, have a direction and a purpose, viz. the self-revealing, saving and redeeming acts of God, most importantly the call to Abraham, the revelation to Moses, and the rescue of the Israelites at the Red (or Reed) Sea. It is a conception that remains part of the Western consciousness today, though often filling the general scheme with very different contents.

This view of the world, as created by God and thus good and having a rational order, and of the place of humanity within it, is taken for granted and not explicitly restated in the New Testament of Christianity. Additionally, in the New Testament, the place of God in the universe is characterized as more explicitly transcendent than in the ancient Jewish scriptures; the consummation of God’s purposes in relation to the world and the destiny of humankind are decisively placed beyond this world and this life. Several of the parables, such as that of the vineyard (Mark 12:1-11), relate God to his people in rather clear terms of a landlord who has rented his property to tenants or who has given it to the care of a steward, and then calls the tenants or steward to account for what they have done. Thus they repeat and intensify the imagery of Genesis: humanity has rule over the earth and the things on it, but is subject and responsible to God who, in turn, is superior to all both humanity and the earth. This has been expressed in the idea of ‘stewardship’: cultivation and care for a world which we do not own outright and cannot treat just as we please. Whereas in the Old Testament God’s love and purpose are focused upon Israel, his particular people in history, in the New Testament Christ died and was raised for all mankind, to whom the apostles preached the good news of the redemption of humanity and the world and the life to come with God.

#### **4. Ancient Greek Science and Philosophy**

In contrast with the people of Israel, the ancient Greeks, inheriting a polytheistic cosmology and cosmogony, did engage widely in increasingly non-mythological speculations about the universe and in empirical studies of particular features of it, and also created an impressive system of geometry. The Greeks also established continuing centers of learning, such as the schools of philosophy, including other studies, in Athens and the great library and ‘museum’ at Alexandria in Egypt. It will have to suffice here to mention some principal features of Greek thought concerning the universe and to note how far they departed from the old cosmologies.

Greek science and philosophy, not distinguished at the time, began with the Ionian natural philosophers of the 6th BC: Thales, Anaximander and Anaximenes. They speculated about *phusis* or *physis* ('nature'), a term deriving from an old Indo-European word meaning 'growth', and used to refer to the world around us. The use of one word, *phusis*, already suggests an incipient idea of a universe, and not of two or three distinct regions (Sky and Earth, or Sky, Earth and the waters under the Earth). What they produced was later termed a *logos*, an 'account', more particularly a rational account, one that is reasoned. They could aspire to give a *logos* of *phusis* because the universe is a *kosmos*, an 'order'.

Greek thinkers were principally concerned with two connected problems: how to account for the interplay of permanence and change, how one thing can change into another; and how many different things can yet be one sort of thing. Hence early answers in terms of a single 'world-stuff' or element – water, air, fire – and then a combination of all three plus earth, which accounted for them being ultimately one sort of thing, and for each being the same thing through its manifest changes.

Of Thales we know little. He is reported as saying that the principle (*arché*) of all things is water, although in fact he may have meant the original water of Mesopotamian and Egyptian cosmogonic mythology, out of which everything else emerged (*arché* can mean both 'principle' and 'origin' or 'beginning'). Whatever may have been Thales' intentions, his successors did seek more and more to understand the world by looking for progressively more abstract and comprehensive principles in it to explain how the world operates and not by a myth about its origins. Beginning with Anaximander, who held the *arché* must be 'the infinite', *to apeiron*, for any finite substance would be long exhausted, and it must be without sensible qualities if it is to be the unchanging ground of all changes, they adduced reasons for their own hypotheses and for rejecting former ones, and thus founded a tradition of intellectual speculation, criticism and revision.

The results of this new way of thinking were remarkable, as can be seen in the history of Greek astronomy. They not only continued the astronomy of the Babylonians, the observation and charting of the paths of the sun, moon and stars, but went beyond what could be observed. Anaximander broke with the three-leveled cosmos of the myth, which had provoked the question of what supported the earth, to imagine it as a ball floating in space with sun, moon and stars circling around it on spokes radiating from it. And in the 3rd C. BC, Aristarchus of Samos calculated the sizes of the moon and sun and their distances from the earth (but not with modern accuracy), and Eratosthenes of Cyrene calculated the circumference of the earth with surprising accuracy. Aristarchus also suggested that the sun was at the center of the universe, but the older, geocentric, view prevailed. These results were possible also because of the Greek development of geometry as a systematic science and as a paradigm for certitude, stringent demonstration and theoretical activity.

#### **4.1. Organism and 'Mechanism'**

One possible outcome of these developments was what would be called, centuries later, a 'mechanistic' picture of the universe, one in which all events are, or result from, the transmission of motion or forces from one physical body to another. Such a possibility

was realized already in the Atomism of Leucippus (5th C. BC) and Democritus (c. 460 - c. 370 BC), according to which the universe consists of atoms moving in an infinite and otherwise empty space. Atoms, ‘indivisibles’, are eternal, invisible, absolutely small and incompressible, devoid of qualities, differing only in size and shape. All the things that we experience, their qualities and changes (the ‘macroscopic’ world) consist of different and changing amounts, arrangements and positions of these atoms. Atoms and motion are uncaused. In the beginning a whirling movement brought atoms together to form larger bodies and worlds, but this happened by ‘necessity’ and not by design nor for any purpose.

In contrast, Anaxagoras (5th C. BC) introduced *nous*, ‘mind’, the ‘finest and purest of all things’, and probably possibly taken to be a special kind of matter. In the beginning, *nous* intentionally put the randomly moving atoms into the whirling motion precisely in order to bring about the present state of the world. Plato (427-347 BC) recorded Socrates (469-399 BC) as being delighted when he first heard Anaxagoras’ doctrine and its implication that things, *all* things, are as they are because it is good that they should be so, but as then becoming disappointed when he learned that Anaxagoras gave only ‘mechanical’ explanations of specific events, including human actions.

Dissatisfied with the limitations of Anaxagoras’ understanding of reality, Socrates gave up the study of nature and turned to that of the human being alone. But the requirement for explanation in terms of ‘final causes’, ends aimed at, was generalized and systematized only in the metaphysics of Aristotle (384-322 BC), which made explicit what had been more implicitly present in much Greek thinking about nature: that it is an organism, a whole of parts which mutually function to serve the whole. Hence the earlier conceptions of a common material substrate have been termed ‘hylozoism’, a doctrine of ‘living matter’, that everything is alive to some degree, although just how this was understood is not clear. Aristotle (384-322 BC), who created systematic biology, required four ‘causes’ or ‘reasons’ (*aitia*) for a proper and complete explanation of anything: the ‘efficient’ cause which brings it into being (approximately the modern sense of ‘cause’); the ‘material’ cause, that of which it is composed; the ‘formal’ cause which makes it a specimen of its sort, *what* it is; and a ‘final cause’, the goal immanent in the process. Before Aristotle, Plato had given an account of the universe as an organism with a soul, *psuché* (or *psyche*). Because it is the universe, there is nothing physical apart from it: it is an organism without an environment, and so it has no sense organs, no digestion and no limbs. Yet because it is alive it moves, and moves with a uniform circular motion on its axis – it is a perfect sphere. He also argued that ‘soul’ is the only cause of motion. Hence in both Plato’s and Aristotle’s cosmologies, the heavenly bodies are moved by intelligences within them. The implications of the presence of such intelligence were very different for them. Aristotle was not eager to suggest that any other type of being exists outside this ordered universe, although some elements in this direction can be retrieved in his work (see next section). Plato, on the contrary, addressed repeatedly and most explicitly the possibility of the existence of a transcendent realm, which is the philosopher’s goal to become worthy of. Indeed, to this end, Plato even recovered the use of myth for philosophy when no claim could be made to definite knowledge

## 4.2. Beings and Being

The mythological cosmologies, although they narrated how the present world-order came into existence, also pictured that order as both limited and fragile because of the multiplicity of the gods, who emerge with and within it as much as they help to make it. Hence they also depend upon it, and are often in conflict with each other or with destructive forces not subject to them.

Though polytheist cults continued among the general populace and formed the official cults of the Greek city-states and then the Hellenistic empires, Greek thinkers – poets, sages, the early natural philosophers, later and more systematic philosophers – were searching for a greater degree of order in the world, which would make the world intelligible. But only Plato made any clear distinction between the one, necessary and unchanging ground or principle of the world, and the many, contingent and changing beings in it. Even then he divided it between, on the one hand, the Forms or eternal paradigms, themselves organized into a system by the supreme Form of the Good, and, on the other, the Demiurge who creates the world as a spatial and temporal copy of them. The Neo-Platonists of the Hellenistic period, although they united, in a way, the Demiurge and the Forms, made the status of the world ambiguous because it comes into being by the seemingly necessary process of ‘emanation’ whereby everything produces an inferior version of itself. This same process both holds among and unites the three eternal ‘hypostases’ of the One, Nous (both Mind and the Forms which it contemplates) and Soul. Each of these three, respectively, emanates the next, and then Soul emanates the world, which would then appear necessarily to exist.

Otherwise Greek philosophers tended to make the world itself an all-inclusive and necessary whole (e.g. Xenophon, the Stoics of the Hellenistic period, and Parmenides on one interpretation), or thus to regard its fundamental constituents (e.g. Leucippus and Democritus and their atoms-plus-void). On another interpretation of Parmenides, only Being – one, eternal, unchanging, homogenous – exists, and everything else is ‘not being’ which cannot be thought. Aristotle, though he distinguished God, as the First and Final cause of the world (but not in any temporal sense), nevertheless isolated him from it as engaged only in thinking about thinking, while the world is moved by its desire for him and not by his activity. If the universe is supposed to exist necessarily, such that it could not exist and could not be other than it is, then it is logical also to suppose that the human mind may be able to deduce its structure from some self-evident first principles, and so not to need to engage in observation and experiment. And that is what Aristotle did, in respect of cosmology, in a short passage in *On the Heavens* despite his careful empirical studies in biology and politics.

## 4.3. Cyclical Cosmology

From Anaximander, through Pythagoras and his school (who taught a doctrine of individual reincarnation), Heraclitus (probably drawing upon Babylonian and Indian sources), Plato (to a limited extent), Aristotle and into the Stoicism and Epicureanism of the Hellenistic period, Greek thought, and then the Roman continuers of Stoicism and Epicureanism, were dominated by cyclical conceptions of the cosmic process: those of Aristotle and the Stoics included the perpetual recurrence of the very same events, even

though the Stoics sought for one destiny, purpose and providential government of the universe.

#### 4.4 Attitudes towards the Universe

Like the vast bulk of mankind throughout the ages, the Greeks appear to have taken for granted the reality of the world and the use of what they found in it to sustain and improve human life, and they produced a tradition of scientific interest in the universe. This was also notable in Socrates (except for physical science) and Plato, for whom the purpose of this life was to prepare for the true life to come in the vision of the Forms and the supreme Form of the Good.

A very different development was the contrast drawn by the Sophists (professional teachers of ‘wisdom’) between *phusis* (‘nature’, the non-human world) and *nomos* (‘customary law’) as constituting the human world and which they regard as ‘mere convention’ (in modern terminology) and so without foundation and justification. Against this Plato and Aristotle argued that the ‘nature’ of something, and especially of human beings, is not what they are born as or just happen to be, but an immanent and ideal ‘form’ to be achieved. Human beings are to achieve their true nature by following a ‘right’, unwritten, universal and eternal law, discernible by human reason. The Stoics termed this ‘Natural Law’, and advocated ‘following Nature’, that is, Reason (*logos*) as embedded in, and governing the universe.

During the Hellenistic period, men’s minds turned further away from the natural world, and, with the exception of the Stoics, also from the public world, to the inner world. What was sought by all the schools of philosophy, including the Stoics, was *apatheia*, equanimity, emotional detachment from the world, so as not to be disturbed by its turns of fortune. Epicureanism, alone in this venture, understood this search as the individual’s obtaining of the basic necessities of life, to which the latter school added friendship.

More radically, the various Gnostic movements, arising in the 1st C. AD, taught that the physical world was evil and a prison for the souls who had fallen or been seduced into it, and claimed to have the saving knowledge (*gnósis*) of how this had come about and how to escape, at death, from it and back to the Light from which they had come. Plotinus (204 - 269 AD), the greatest of the Neo-Platonists, defended the goodness of the universe against the Gnostics, but showed little of Plato’s own interest in the natural and public worlds.

Also after about 200 BC, Greek science, natural philosophy and mathematics began to decline to eventually little more than compilations and summaries of, and commentaries upon, existing texts, and were used as the prelude to ethics, to show what, in general, could be done or not done and hoped for or feared. The Romans, primarily a practical and not a speculative people, translated and appropriated Greek science and philosophy, especially Stoicism, but added little to them. The one science which they continued to develop was jurisprudence, and with it the idea of Natural Law, with its climax in the codification of Roman Law in Constantinople (528-34 AD). Natural science and mathematics were not to be revived for several centuries.

## 5. The Mediaeval World-view

Christianity immediately appropriated the common Greek, used throughout the eastern provinces of the Roman empire, for its scriptures, and then the concepts and terminology of Greek philosophy for the articulation and defense of its theology, as had the Jewish philosopher, Philo of Alexandria (c. 15 BC - c. 50 AD). In the New Testament itself, St Paul engages with Epicurean and Stoic philosophers and quotes Greek authors (Acts 17:16-34). The Christian view of the world is that of Judaism, of which it sees itself as the fulfillment. Thus Christian theologians defended the creation, contingency, directedness, order and goodness of the universe against both contrary elements in Greek philosophy and against the new magical, astrological and Gnostic cults and systems. Against beliefs in perpetual cosmic cycles, they reiterated the once-for-all nature of creation and God's saving acts, above all the Crucifixion and Resurrection. The spread of Christianity throughout the Roman Empire, into the kingdoms in the west that replaced it, and into lands in northern and eastern Europe that were never part of it, made these beliefs the firm convictions of the new civilization that replaced the Graeco-Roman one.

But the collapse of the Roman empire in the west resulted in a great loss in respect of knowledge of Greek and of the transmission of Greek texts. What remained were Boethius' translations of Aristotle's works on logic and his own elementary textbooks on arithmetic, geometry, astronomy and music, the first two-thirds of Plato's *Timaeus*, compilations of scientific and other knowledge, and quotations in the works of the Fathers of the Church. In Western Europe, the monasteries and cathedral schools passed on this heritage. In the 12th C., a time of rising prosperity in Western Europe, they were joined by the universities as scholars came together to form new centers to cultivate learning. Soon after this, Aristotle's own writings began to circulate in Latin translations from Arabic and Syriac translations, along with Islamic developments of Greek medicine and mathematics to which had been added the Hindu system of numerals, with the all-important conceptions of place-value and zero. In the universities, the study of Aristotle's natural philosophy and science, with Ptolemy's cosmology, formed a central part of the curriculum. Hence some knowledge of natural philosophy and science was acquired by philosophers, theologians and others alike. But this was confined to physics and cosmology, along with the specialist study of medicine. Aristotle's biology was neglected and medieval 'beastaries' were not scientific studies of animals but fanciful interpretations of them as symbols of human and divine attributes. Also, the focus of mainstream research in philosophy remained on theological issues and the paramount ethical concern of the medieval scholar was eschatological in nature i.e. upon preparation for the life to come and inter-personal conduct, in accordance with the teachings of Christianity, and with little, if anything, upon duties in respect of the natural world. Revealingly, the medieval discussion of cosmology revisits Greek wisdom in ways that are meant to generate a picture of the universe consistent with the Biblical tradition of the contingency and goodness of the world.

Though highly esteemed by such as Albertus Magnus and Thomas Aquinas, Aristotle's doctrines were not uncritically accepted and transmitted. A particular focus of debate was his account of motion, which was based on many common experiences, in particular the effort often required to keep something moving. Hence Aristotle's doctrines that a body in motion requires a constantly acting force to keep it in motion, and so there could be no

motion in a vacuum. As against Aristotle's denial of the possibility of a vacuum, it was argued that God could make this possible. An alternative theory of motion had already been proposed by John Philoponus (6th C.), a lecturer on Aristotle at Alexandria who converted to Christianity: that a body put into motion acquired an 'impetus' which kept it moving until that impetus weakened and exhausted itself. That theory was revived and, also like Philoponus, Jean Buridan drew the inference that this explanation removed the need for intelligences to move the sun, moon and stars, ideas which, he said, were a product of Greek thinking and not of the Bible. The conception of closed universe was also questioned, and that of it floating in infinite space proposed instead. Nicholas of Oresme (d. 1382) suggested that the theory of impetus made it conceivable that God could have created a clock-like universe, set it running and then left it to itself. These suggestions foreshadowed the picture of the universe embodied in the new science of the 16th and 17th Centuries.

## 6. The Impact of the 'Mechanistic' Universe of Newtonian Science

In the latter part of the 17th C. the new picture of the universe, as outlined in Section 1, finally displaced the mediaeval one, and removed any lingering elements of evaluative categories, such as circles being the most perfect form of motion and thus as the paths taken by heavenly bodies, and the use of 'final causes' in the explanation of motion. The universe was now pictured as a 'mechanism', of a system of interacting physical things transmitting and transforming energy from one to another. Indeed, Aristotle's four causes were replaced by but one, that of 'efficient causation', which itself was radically re-interpreted. In the Aristotelian system, efficient causes are individual beings that bring about changes in other individual beings. But in the new science, causes are *events* and likewise their effects, and specifically they are links in chains of causes and effects of motion, just as the movements of a sequence of cogs or levers transmit and transform forces within a machine. Thus the place of purposes or 'final causes', either immanent or transcendent, is simply erased by this world-view. Only chains of events remain. Furthermore causes and events are events to be understood as manifesting patterns or laws, themselves to be put in the form of equations. These conceptions were applied, with manifest success, in cosmology, astronomy, and physics, especially theories of motion and the study of optics, the sciences that led the way in the scientific revolution. Sir Isaac Newton's *Philosophiæ Naturalis Principia Mathematica* (1687) unified these studies and laid down laws of motion governing the whole universe. It and his name epitomized the new science, which had, and still has, impacts upon all intellectual life and the whole course of European and Western civilization, and now upon the whole world.

But the great achievements of the new science were thought also carried with them, directly or indirectly, implications adverse to the proper understanding of and attitudes towards the natural world, and especially in respect of life and life-supporting systems. These implications can be summed up as 'Reductionism' and as inappropriate reactions against it. It is these which, combined with the effects of the revolutions in agriculture, industry, medicine and technology, have led to the current sense of environmental and ecological crisis.

## 6.1. Reductionism

Because of the great success and thence prestige of the new mathematicized physics, it was concluded by an influential body of opinion that all the other sciences of nature should adopt its assumptions and methods, and, indeed, that those of the human world should also do likewise. This movement of thought is known as ‘scientism’ and ‘reductionism’. ‘Scientism’ means, more or less, the same as ‘methodological reductionism’, that a given realm of being may have something distinctive about it but that nonetheless it should be investigated by use of the same methods as those employed by the natural sciences. ‘Ontological reductionism’ denies that there is any distinctiveness in a given level or realm, and asserts that it is ‘nothing but’ a lower one. Both forms can each be more or less radical. For example, methodological reductionism is more radical when only the methods of physics and chemistry, the ‘exact sciences’, are allowed to count, so that biology, as well as history and psychology are to use the same methods as chemistry and physics. Likewise ontological reductionism becomes progressively more radical as human beings are said to be ‘nothing but’ animals, animals ‘nothing but’ organisms, and organisms ‘nothing but’ atoms in motion or patterns of mass-energy.

The ultimate implication of this movement of thought was given by Laplace, who asserted that, given the initial positions and velocities of all the atoms in the universe, a universal mind could compute the whole future course of the world and there know everything about it. Today the same idea is sometimes expressed in terms of a theory that would unite all the fundamental forces in the universe and therefore would be literally ‘a theory of everything’. In other words, beyond complete knowledge of the physical structure (or physical and chemical structure) of the universe, there would be no need, and no possibility, of any other knowledge. Hence there would be no distinctive and separate biological knowledge, nothing else to be known about plants and animals save their physical and chemical composition, and the laws common to them and to all other matter and motion or mass-energy.

In addition, the general ‘mechanistic’ picture of the natural world has been thought to have other implications for human life, some of which have had further and indirect effects upon people’s conceptions of and attitudes towards the natural world and thus towards living beings and life-support systems within it.

## 6.2. Direct Implications of Reductionism.

### 6.2.1. The Missing Third Realm

The mechanistic picture of the world immediately raised the question of how the knowing mind is related to it, a question that became central to modern philosophy. But the very terms of that question meant that the whole sphere of life – of organisms, their organs and their distinctive environments – was completely ignored or denied. A clear example of this is to be found in Descartes. Today he is usually criticized for his ‘dualism’, his division of reality into two types of substance, mental, distinguished by thinking, and physical, distinguished by extension, instead of holding only to physical existence. What is rarely noticed is that *this dualism of mind and matter omits the intermediate realm of*

*life*. Descartes himself declared that animals are, or can be regarded as, mere ‘automata’. Consequently since the time of Hobbes and Descartes, life and organisms have often been omitted, whether people believed both matter and mind to be real (‘dualists’, like Descartes), only mind to be real (‘idealists’ in the strict sense), or only matter to be real (‘materialists’).

### **6.2.2. Quantification**

‘The Book of Nature’, said Galileo ‘is written in the language of mathematics’. This has been taken to mean, not only that the scientific study of nature should be a mathematical and hence quantitative and computable one, but that all genuine knowledge of nature is mathematical, that what cannot be quantified is either unknowable or not worth knowing. Hence all the everyday and practical knowledge that we have of the world about us is written off as false and worthless. (As for our knowledge of our fellows, that is often dismissed as ‘folk-psychology’.) The only knowledge that should count is that of the natural sciences: that which is explicitly stated in quantified, and hence exact, universal laws, formulae and equations. In respect of physics and chemistry, this attitude was justified to some extent, because, as the debates about the Aristotelian account of motion had shown, what was needed was a radical shift away from everyday experience to imagining bodies, as Galileo was to do, freely moving in empty space or on frictionless surfaces, and to drawing out the consequences of such conceptions. Later in the 18th C., John Dalton revived and reinterpreted the old theory of atoms, at that time objects only of theory and not of observation. In contrast, ordinary people – as gardeners, farmers, herders, hunters, fishermen – often had a rich but implicit and practical knowledge of plants and animals, but, in the perspective of methodological reductionism, such knowledge could not count as ‘scientific’ and therefore could have no value.

### **6.2.3. Teleology and Functions**

The rejection of ‘final causes’ was appropriate as regards physics and chemistry and what they study. It was necessary for a proper and progressive study of the natural world that a global and compacted apprehension of it, as seen in the old cosmologies mentioned above, be differentiated into distinct but overlapping personal, animal, vegetative and simply physical regions and levels, perhaps with intermediary ones among them, such as that of bacteria. But then to single out one such region and level, the merely physical, and to deny the reality or distinctiveness of the others, is itself to stultify and distort the study of the latter.

The focus for debate about this in relation to living beings has usually been the question of ‘teleology’. This term can and has been applied in different ways, and failure to distinguish them has led to confusion. What matters for biology is ‘teleonomy’, the idea that organs have functions within the organism, that the organism itself has goals such as maintaining and reproducing itself, and that the study of organisms and organs needs to be conducted with reference to these goals. For example, a heart is essentially a mechanism for pumping blood and what it carries, such as oxygen, around the body of animal, and it, its operations and its parts can be understood only by continual reference to this function. Paradoxically, the model of a mechanism, which was chosen for the new way of understanding the universe, itself includes reference to functions, the human use

for which the mechanism has been designed and made, and the functions of each of its parts in contributing to that goal. But that aspect was ignored, and attention given only to the transfer and transformation of energy from one part to another.

Kant, for whom Newtonian natural science and Euclidian geometry were the models of all science, attempted to settle this question by calling teleology a ‘regulative principle’. By this term he acknowledged that biologists do have to refer to functions and purposes but they need not assume them to be real: they are to be adopted to guide investigation without assuming them to be true of the world. Yet to use them in the conduct of enquiry is to take them to be true and to be instantiated in what is being investigated, for scientists would not use principles they held to be false and not to apply to the things which they study.

### **6.3. Indirect Implications**

The general picture of the world which the new natural science was widely assumed to entail has also indirectly affected attitudes towards the natural world and life-supporting systems within it, usually along with other changes of world-and-life-view.

The new picture of the world, stripped of final causes, could appear to present a meaningless world, alien to humanity, especially when thought to be ‘nothing but’ matter in motion. The reign of universal causal laws appeared to be absolute. One theological reaction was Deism, the doctrine that God, having designed the universe and set it in motion, then left it to continue by itself, just as a clock-maker winds up a clock and leaves to carry on ticking. But, being perfect God, has made a perfect world and so does not need to return to it and interfere with it. Hence Deism was a self-consciously ‘rationalist’ doctrine that sought to dispense with revelation, miracles and ‘priestcraft’, though it held that God did act as judge and assign human beings to eternal rewards or punishments after death, a doctrine needed for the good of society in order to constrain those whom the law could not punish. As Voltaire cynically said, ‘If God did not exist, it would be necessary to invent him’. Yet, even this tenuous theology was not needed by Laplace, who, in answer to Napoleon, said that he had no need of that hypothesis. For, explicitly or implicitly, he, like many others then and since, held that the laws of nature to be necessary and all-sufficient explanations of everything, even though he had to engage in observation and experiment in order to discover them. Devoid of any meaning or purpose beyond themselves, the universe and human life within it came increasingly to be seen without any meaning or purpose whatsoever. Even whilst asserting a complete secularism in the name of the scientific investigation of material reality, Laplace lost sight of the living creatures that belong to that reality and of their needs. The ‘other’ world of human representation of natural laws operated like a screen between himself and the third realm.

At the same, time an emphasis in later mediaeval theology upon the sheer will of God, who simply decides what is to count as good and evil and lays down arbitrary laws for humanity to follow, was secularized by Hobbes into the state, ‘a mortal god’, as legislating what men should do in order to preserve their lives. The ancient idea of Natural Law, that there is a law for humankind to obey which that all can discern, did continue to be held and developed. But ‘advanced’ opinion held that we create our own laws, whether each for himself, all together in groups, or some for the rest. The will of

man, individually or collectively, replaced that of the voluntarist God. The human person thus came widely to be seen as a conscious being that has to define itself and its own way in a world without purpose or meaning.

These movements of thought come together in the 'Enlightenment', the self-given label for this period, the 18th Century. Kant, a representative figure, defined it as '*man's emergence from his self-imposed immaturity. Immaturity is the inability to use one's understanding without guidance from another*'. A later version was 'man come of age', that is, wholly autonomous and without any superior in the form of God or a Natural Law to tell him what to do and what to become. The most thorough-going statement of this new conception of man was given by Sartre: we are each, 'a fold in being', a 'nothingness', existence 'for itself' and without 'essence', and 'condemned only to choose', that is, to have to choose everything we do, are and believe, including the very principles that we choose and live by. Yet how could humanity define itself without guidance? Attempts were made to answer that question. For example, Kant sought to derive the generally accepted moral principles from a principle, the Categorical Imperative, which defines the form of a rational will (not an arbitrary will) that legislates for itself: 'Act only on that maxim through which you can at the same time will that it be universal law'. But that has been found to require a 'matter', specific principles of good and evil, right and wrong, which it cannot supply for itself and which Kant had simply assumed. Others filled that gap with 'obvious' human desires or 'drives', such as Hobbes' 'restless desire of power after power that ceaseth only in death', or pleasure, material comfort and the like, which also usually provide the substance of the Utilitarian goal of 'the greatest happiness of the greatest number'.

Meaning could be restored by secularizing Christian hopes for the vision of God beyond death into an endless political, material and economic progress, or, more radically, into a final kingdom of man upon earth – of a fully rational and 'unalienated' life, of freedom from oppression of all kinds, and, usually, of the 'conquest of nature' and with it disease and poverty by means of technology based upon modern science, so strong had become the belief in a uni-directional universe and not in cyclical one. Yet another immanent purpose for humanity was derived from the theory of evolution. Humanity, it was inferred, has been given the task of consciously continuing the process of evolution. But the advocates of 'evolutionary ethics' were unclear or disagreed about specific directions and means – eugenics, for example, or a political and economic 'struggle of the fittest' ('social Darwinism').

Though traditional moral and political philosophy has continued and developed, and the idea of Natural Law has been explicitly revived, the greater trend has been that of the autonomous will making up its own laws in one way or another, and thus, as Sartre explicitly stated, for no reason at all. The result of these tendencies has been to view mankind, not as stewards, but as *masters* over the earth, with total sovereignty over it and everything in it, to use as they see fit for purposes which they wholly set for themselves. And that mastery has become an actual power because of modern technology and the natural science on which it is both increasingly based and which it also assists.

These aspirations have been paradoxically strengthened by a counter view of mankind, not as a self-defining center of consciousness over and against the natural world, but as

simply another part of it. Such a view began to be articulated by Hobbes, and has been continued by many others such as. In one way or another, what were taken to be the distinctive attributes of human existence – self-consciousness, self-responsibility, free will, conscience and moral insight – have been denied or explained away as *nothing but* ‘drives’, ‘instincts’, the effects of ‘environment’ such as upbringing or social class, the effects of ‘heredity’ via genes and evolution, or of some combination of environment and heredity. Hence new sciences of man, to be constructed upon the model of the exact sciences of nature, would provide knowledge, a technology, for mankind to change itself by changing either its ‘environment’ – physical conditions, social organization, upbringing and schooling – or inherited characteristics by means of ‘eugenics’, in order to progress more rapidly to a brighter future. That is, some persons, somehow not subject to the impersonal forces that control others, would manipulate those forces and thus the rest of mankind. But, again, in a meaningless world, such unconditioned conditioners of the rest would have nothing to guide or restrain them except ‘obvious’ goals such as material comfort or the imperious demands of a future state of perfection.

These are large and serious themes. It will have to suffice for the present to note the great dangers to life and life-support systems, human and non-human, posed by many of these views of human life and the universe. Today they are compounded by the vast physical forces at humanity’s disposal, themselves a result of the application of the discoveries of natural science, beginning with chemistry and then the physics of electricity in the latter part of the 19th Century, to technology, medicine, industry and agriculture.

#### **6.4. Reactions against the New View of Nature and its Alleged Implications**

A further consequence of the new picture of the world, and of what it is supposed to imply or to result in, has been movements of thought that reject it or seek to replace it. Most notable of these was the Romantic movement, which usually inspired a new love of nature, especially wild nature, untamed by mankind, notably mountains and the sea. Particularly in Germany, it also inspired new philosophical systems that sought to restore life, meaning and value to the world, against what was taken to be wholly mechanistic and impersonal views of the world deriving from modern science. For example, the various systems of Idealism, in the 19th and early 20th Centuries, either denied outright the reality of the physical world or argued that it was not really real but mere ‘phenomena’ or ‘appearance’.

Again, Kant provides an example of this strategy. Holding that Newtonian science with Euclidian geometry, as he understood them, were the model for all science, he sought to show that their fundamental presuppositions were the categories without which we could not know anything at all about the world, including ourselves. But what we know is therefore ‘phenomena’, what *appears* to us and to all of us, and not necessarily what really exists, ‘noumena’, ‘things in themselves’. They always remain behind the screen of perception as structured by the schema of the categories plus the Ideas of space and time. Hence, he concluded, we do not know that we are *not* free to obey the moral law, although as ‘phenomena’ we are subject to universal laws of causality. But the problem with this strategy was that it simply left the interpretation of the natural (and human) sciences and their methods to proponents of the various reductionisms, and the general public was far

more impressed by the achievements of natural science and thus by those who claimed to speak for it, than by the abstruse arguments of Idealist philosophers.

Another Romantic reaction against the mechanistic picture of the world was a movement, also in philosophy (often accompanying Idealism), but mainly in theology, art and literature, towards pantheism and ‘nature mysticism’. This movement saw the world as an organic whole which is God or in which God resides, and thus of feeling oneself at one with the universe and the life flowing through it. While in moments of contemplating nature, among the fields or in the mountains, one may feel with Wordsworth that there is a spirit that ‘rolls through all things’ (*Tintern Abbey*), this is not so easily sustained when recalling the sheer vastness and lifelessness of the rest of the universe as revealed by modern astronomy: then Pascal’s ‘The silence of those infinite spaces frightens me’, seems more appropriate. Again, this movement had little effect on the fundamental beliefs of the general public, though via literature, music and visual art it often invokes a ‘holiday’ mood, an escape from everyday life.

A third set of reactions, also often as a part of Romanticism, was anti-intellectualism, outright irrationalism, and rejection of modern technologies. If scientific thinking, indeed, thinking of any sort, produces a dead and inhuman world, then better not to think at all. Wordsworth again provides an example:

Our meddling intellect  
Mis-shapes the beauteous forms of things:–  
We murder to dissect.  
(*The Tables Turned*)

Whereas Alexander Pope wrote, ‘God said, *Let Newton be!* and all was *Light*’, William Blake wanted to be delivered from ‘Newton’s night’ and ‘two-dimensional sleep’. But the rejection of natural science and technology because of misinterpretation and abuse, closes off any attempt to achieve a better interpretation and a proper use which would yield genuine improvements in understanding and dealing with the natural world.

## 6.5. Positivism

One further consequence of reductionism should be noted: positivism, a result of the exaltation of scientific knowledge. Coined by Auguste Comte (1798-1857), the term signified the third and final stage in the intellectual development of mankind, the first being that of theology in which events are explained as the work of gods and spirits, and the second that of metaphysics in which events are explained in terms of abstract principles, such as force, as essences behind phenomena. But in the final ‘positive’ stage, phenomena are explained only as proceeding from previous ones by universal laws, as in natural science. Since Comte, the term has been applied to any supposition that scientific knowledge is the sole form of genuine knowledge. Hence, there can be no philosophical or theological knowledge about anything, and so questions and answers about the world as a whole, its meaning, and the destiny and duty of mankind within it, are meaningless. It follows that either we do not have any comprehensive world-and-life views or that we can and should live without them. Its radical error, in all its versions, is that it is itself a philosophical statement about the whole of knowledge, and by implication about the

whole of reality, and is not a scientific one drawn from one of the sciences dealing with a specific region or aspect of the world, such as physics, biology or sociology. Hence, according to itself it cannot count as knowledge. Nevertheless it has been influential in stunting serious and philosophical thinking about themes such as the general nature of universe and what is real and what is unreal. It would discredit from the outset the subject matter of any such survey as this, which it would regard as ‘all nonsense’. But scientific knowledge does not tell us what to do with it – whether, for example, to use nuclear energy for generating electricity or in bombs, or not to use it at all. It can help to tell us how to produce and harness it, and what the physical consequences of using it are likely to be. But it cannot tell us if it may or may not be used in the first place, and, if it may be used, just what it may be used for and if it is worth using given the costs and potential negative consequences. Consequently, positivists themselves have to fall back upon other, non-scientific beliefs and attitudes, which they explicitly disavow. Hence these unexamined extra-scientific assumptions can be incorporated in proposals said to be based solely upon science, and thus, given the prestige of natural science in the modern world, go on to be accepted without question. A standard error of conclusion therefore often follows – that because developments in scientific technology give us powers, it is rational and desirable to use them.

## **7. The Distinctiveness of Life and Some Recent Developments**

### **7.1 Some Distinctive Features of Life**

The versions of reductionism have sometimes stunted, distorted and trivialized psychology, sociology and other studies of human life. But biology and environmental studies have been less affected. Whatever may have been said, even by biologists themselves, about what they should do in imitation of the ‘exact sciences’, they have continued to use the distinctive concepts and methods of biology. Especially in English-speaking philosophy, the specific features of the biological sciences, evolution apart, have not, until recently, attracted as much treatment as those of physics and the centuries-long dispute about the relation of body and mind, now transposed into one about brain and consciousness, although more recently other questions in the philosophy of biology have attracted some attention. Whatever may be the difficulties of giving exact definitions of the terms, living beings have distinctive features which are not found in inanimate matter: life itself, with growth (not mere aggregation) and reproduction; goal-directed processes and behavior; mutually supporting functions; self-definition via the membrane, skin or shell that clearly separates the organism from its surroundings; self-maintenance by ingesting nutrients which are transformed into the living substance of the organism itself – the process of metabolism, and excreting waste products. Living beings exhibit flexible adaptivity. In all respects of their growth and self-maintenance, organisms and the organs within them manifest direction towards goals, such as reaching towards light and water or maintaining a stable body-temperature; continuously adapt themselves to their external surroundings or to the condition of the whole organism; and do so with a flexibility that cannot be captured in anything like the laws and formulae that are formulated in physics and chemistry. This peculiarity of life, captured by biology, says nothing of the extra-scientific manifestations of life that make this phenomenon even less likely to be fully comprehended by scientific categories alone (e.g. ethical deliberation, aesthetic taste, intellectual commitment to scientific investigation, religious

fervor). Still, it is most pertinent to the present inquiry to underlie how, even at the very basic level of understanding of ‘life’ at which biology operates, such a gulf between inanimate and animate matter can be envisioned.

Because of their goal-directedness, living beings either succeed or fail in achieving their goals. Hence the study of living beings has also to employ categories of value and disvalue to recognize organisms and organs as successful or unsuccessful: that is, as alive or dead, whole or impaired, healthy or diseased, functioning or malfunctioning, immature or mature or senescent, fertile or sterile; and likewise to recognize their distinctive ‘environments’ marked out by what is required for, or inimical to, their life-processes – nutrients or sources of them in other plants or animals, light and heat, and all of these in sufficient, insufficient or excessive amounts; toxins, predators, likely causes of physical injury. Again, organisms in proximity to each other in a shared physical and chemical setting, form an eco-system in which each becomes, directly or indirectly, as beneficial or harmful or perhaps neutral, a part of the others’ particular environments. These are life-supporting systems, which can turn into non-supporting or directly destructive ones. Typically with human beings there is a decision or choice of which turn to take, and this decision process depends on which value steer it. Biology and natural science cannot provide answers to these questions of value and choice. Positivist dogma, by disallowing the raising of questions about value, has reduced restraints upon human activities that damage life-supporting systems, and so has increased our problems.

## 7.2. Prospects for more adequate Pictures of the World

Any adequate picture of the world must be able to include these distinctive features of living beings and their distinctive relations to each other and to inanimate existence, and so it must reject the demands of reductionism. The exact sciences have themselves been revolutionized again by the theories of relativity and quantum mechanics, incorporating but adding to and re-interpreting Newtonian physics. The universe is not quite the rigidly determined mechanism that it was held to be. This has led scientists and philosophers to question the general validity of reductionism even in respect of the exact sciences themselves, although reductionist assumptions are still held and frequently expressed (e.g., orthodox economics as explained in *Economic Reason and the Crisis of the Global System*).

Although the positivist taboo on metaphysics in English-speaking philosophy has been broken, philosophers mostly concern themselves with particular metaphysical questions and topics, and mainly those arising within modern physics. Consequently there have been only a few attempts in recent decades at interpreting and combining the fundamental discoveries and conceptions of modern science into a general and comprehensive picture of the universe. Those that have been attempted have accommodated the distinctive features of living beings, especially their flexible adaptability in growth and maintaining themselves, within a wider picture of the universe, e.g. by reference to:

1. hierarchical systems of levels;
2. conceptions of ‘top-down’ as well as ‘bottom-up’ causation;
3. conceptions of ‘a pull from the future’, that is, processes in which what does not yet exist determines what happens.

### 7.3. Human Responsibility Today

As well as a comprehensive picture of the universe which does justice to living beings, the future of life on earth also requires a view of ourselves which does justice to our responsibility for ourselves and which incorporates guidance for our exercise of it. Hence it requires both non-reductionist accounts of human existence, activities and history, and also the recognition of values and principles of action which create obligations for us and which we do not create, values that we ought to seek to realize, corresponding disvalues that we ought to seek to avoid, diminish or remove, and obligations that command us to fulfill them, whether we like them or not. Modern philosophy, has too often called into question the very possibilities of genuine knowledge of the world and especially of values and duties, and has tended to articulate and underwrite varieties of skepticism, reductionism and positivism. Similarly, in recent decades ‘post-modernism’ and ‘deconstructionism’ have affected philosophy, and literary and social studies. Whereas modern philosophy, from Descartes and Locke onwards, sought secure ‘foundations’ for knowledge either in indubitable truths or pure perceptions, ‘post-modernism’, rightly realizing that that aim had the converse result of resulting in skepticism, declares that there can be no secure knowledge at all and revels in that situation. Likewise, ‘deconstructionism’ holds that all interpretations of texts, and of other human creations, are free constructions because there are no meanings, nor even texts themselves, independent of readers which the latter could discover. Consequently, modern thought has frequently been unable, and unwilling, to give any meaning to human responsibility, whilst losing sight of the living world by the substitution of another world i.e. the world of purely abstract intellectual representation. When, like Sartre, it has acknowledged that persons are free and responsible for what they do, it has nevertheless often denied that there are any genuine values, standards and laws which could guide our choices and decisions. Hence human freedom has become an irresponsible and arbitrary one. Nevertheless, solid, ‘old-fashioned’ ethics has survived and been recently re-invigorated in the form of ‘virtue-ethics’, which interestingly restores to human life in the world the ideas of function and ideal forms to be achieved. Outside the philosophical establishment which has tended to strip moral philosophy of all issues of deep-structural values at the collective level (see *The Global Crisis of Values and the Poverty of Moral Philosophy*), there is a profound rethinking of humanity’s ultimately regulating norms which a number of essays of the Theme develop in new ways.

There is now also a growing literature on environmental ethics which obviously reflects a revival of the idea of human responsibility *for* ourselves and what is placed in our care. It clearly entails a rejection of man as unconstrained master of the earth, and, indeed, some interpretations seem to be saying that we have great responsibilities for the natural world yet have no greater rights than anything else, that is, if the notion of ‘the rights of’, rather than ‘persons’ duties towards’, can be applied to beings other than persons. That aside, the great question that the modern age has yet to answer is that of humanity’s responsibility *to*: is there something, not of human creation or choice, which can guide us as to what to do in carrying out our responsibilities *for* ourselves and the natural world? Environmental ethics, and the general world-and-life views within which it is conducted, clearly need some point of reference that embraces and balances all three dimensions of human existence – past, present and future – without abolishing them in making time unreal or circular, so as to avoid sacrificing the present to the future or vice-versa, as has

happened all too often in the modern age with disastrous results. With such a point of reference, they could once more employ in relation to the natural world the notions of stewardship and holding in trust as alternatives to that of unconstrained mastery over it. What sort of convergence in that respect can be achieved, if any, remains to be seen.

## Glossary

<b>A posteriori:</b>	knowledge, understanding or justification derived from experience.
<b>A priori:</b>	knowledge, understanding or justification derived independently of experience.
<b>Agnosticism:</b>	doctrine according to which human reason is incapable of demonstrating either the existence of divinity or the non-existence of divinity.
<b>Animism:</b>	belief in the existence of souls or spirits inhabiting individual and/or collective objects, including the universe as a whole.
<b>Atheism:</b>	doctrine according to which God does not exist.
<b>Atomism:</b>	doctrine according to which material objects are aggregates of simpler elements or atoms.
<b>Bioethics:</b>	philosophy of the ethical and moral implications of biological discoveries and medical advances.
<b>Biology:</b>	scientific study of living beings and related phenomena.
<b>Categories:</b>	classes of ideas, terms, or things that mark divisions of meaning and reference within a conceptual scheme or system.
<b>Consciousness:</b>	state or quality of being aware.
<b>Cosmology:</b>	study of the physical universe as a unified totality of phenomena.
<b>Deism:</b>	doctrine according to which God, having designed the universe and set it in motion, then left it to continue by itself.
<b>Dualism:</b>	doctrine according to which the world consists of, or is explicable in terms of, two fundamental substances.
<b>Ecology:</b>	relationships among, and science of, organisms and their environments.
<b>Enlightenment:</b>	social, political and philosophical movement of the 17 <sup>th</sup> and 18 <sup>th</sup> centuries emphasizing the free use of reason in the scrutiny of doctrines for the progress of humanity.
<b>Ensoulment:</b>	coming into being or insertion of a soul into a corporeal entity.
<b>Ethics:</b>	the critical study of the grounds and directive principles of good and bad, right and wrong.
<b>Existentialism:</b>	literary and philosophical movement rooted in the analysis of individual human choice and experience.
<b>Fact/value distinction:</b>	a conventional distinction between that which is and that which ought to be which is rendered dubious by the 'is' itself typically conforming to habituated ought-prescriptions.
<b>Free will:</b>	ability to choose autonomously i.e. non-heteronomously.
<b>Hedonism:</b>	doctrine according to which what leads to pleasure is the only or paramount good.
<b>Hermeneutics:</b>	theory, methodology or philosophy of interpretation of texts.
<b>Hierarchy:</b>	series in which each element is ranked or classified.

<b>Hylozoism:</b>	doctrine according to which matter is alive.
<b>Idealism:</b>	doctrine according to which the objects of external perception ultimately consist of or express ideas, or minds and their ideas
<b>Immanence:</b>	metaphysical notion according to which the divine spirit or soul is inherent in corporeal beings.
<b>Materialism:</b>	doctrine according to which matter is the sole ultimate ground of being.
<b>Mechanism:</b>	doctrine according to which all phenomena are governed and predictable by physical laws in the manner of a machine, whether at micro (organic) or macro (cosmic) levels.
<b>Metaphysics:</b>	philosophy of the ultimately regulating principles of reality.
<b>Mind-body problem:</b>	the problem of the distinction between mind and body and their interrelationship.
<b>Moral insight:</b>	ability to discern the moral relevance of a person, group or situation.
<b>Mysticism:</b>	experience and ideas of vision of, and union with, the divine or the cosmic whole.
<b>Ontology:</b>	philosophy of being, its nature and logic of relations among entities or fields.
<b>Organism:</b>	body or system composed by organs or other parts that cooperate in order to perform the various processes required for biological existence.
<b>Pantheism:</b>	doctrine according to which divinity is inherent in the cosmos and its life forms.
<b>Pessimism:</b>	doctrine according to which pain or evil outweighs pleasure or good in the universe.
<b>Phenomenology:</b>	diverse movement adopting consciousness or lived experience as its object of philosophical study.
<b>Polytheism:</b>	doctrine according to which many distinct gods exist.
<b>Positivism:</b>	doctrine according to which true knowledge is achieved only through modern empirical science.
<b>Progress:</b>	belief in the steady improvement of civilisation through time.
<b>Reductionism:</b>	doctrine according to which complex phenomena are merely the sum of simpler constituents, thereby implying an elimination of subjective experience or choice.
<b>Secularism:</b>	indifference to religion or wilful exclusion of it from civil, political and/or cultural and scientific life.
<b>Self-consciousness:</b>	state or quality of being aware of one's own self <i>qua</i> self
<b>Self-responsibility:</b>	acknowledgment to oneself and to society of one's own ability to choose autonomously.
<b>Skepticism:</b>	doctrine according to which no knowledge can be obtained either generally or within a particular sphere, e.g., moral skepticism.
<b>Soul:</b>	the immaterial core of a person or community, often synonymous with "spirit", which typically refers to that principle of organization which unifies its plurality of aspects as one and/or animates its life and agency.
<b>Teleology:</b>	either (a) teleonomy, see below, or (b) the idea that natural phenomena are caused by an end or purpose which they serve.

- Teleonomy:** the idea that organs have functions within the organism, that the organism itself has goals, and that the study of organisms and organs needs to be conducted with reference to these goals.
- Understanding:** ability to relate given elements of knowledge or cognition to other elements of knowledge or cognition so that they cohere in a meaningful whole from which explanations can be developed.
- Utilitarianism:** social, political and philosophical movement claiming the good to be that which brings forth the greater utility or happiness for the greater number.
- Virtue:** praiseworthy trait of character or habit of action or inaction.
- Vitalism:** doctrine according to which life processes express a non-material energy or force.
- World-view:** overall perspective upon and interpretation of the world.

### Bibliography

There are many histories of philosophy, theology, religion, mythology and science, plus entries in encyclopedias, relevant to each section of the above.

#### Books relevant to several sections:

Barbour, I. G. (ed.), (1973) *Western Man and Environmental Ethics: Attitudes toward nature and technology*, Reading [Mass.], London, Addison-Wesley. [It includes articles that debate and compare the roles of different world-views.]

Black, J., (1970) *The Dominion of Man: The search for ecological responsibility*, Edinburgh, Edinburgh University Press. [In particular it develops the theme of ‘stewardship’.]

Marshall, P., (1992) *Nature’s Web: An exploration of ecological thinking*, London, Simon and Schuster. [It contains historical background and recent thought.]

#### Books relevant to particular sections:

### Section 3

Aristotle, Many editions and translations. Individual books are often referred to by their Latin titles. *Metaphysics* [This contains his accounts of the four causes (also in the *Physics*) and his theology.]

Black, J., *The Dominion of Man* [This gives more details of the Biblical view of the world and the role of humanity with it.]

Fackre, G., ‘Ecology and theology’, in Barbour, I. G. (ed.), *Western Man and Environmental Ethics*. [This also gives more details of the Biblical view of the world and the role of humanity with it.]

*On Generation (De Generatione)* [It contains his cyclical view of the universe, and the exact recurrence of all events, all due to ‘necessity’, with the conclusion that because in circles, and thus cycles, there is no beginning nor end, nothing is really before or after anything else.]

*On the Heavens (De Caelo)* [This contains his brief deduction of the structure of the cosmos, and also uses biological analogies and arguments, likewise in the *Meteorologica*.]

Plato, Many editions and translations. Standard references are by page and paragraph to the Stephanus edition.

*Phaedo* [97b-98c, on Socrates’ reaction to Anaxagoras];

*Laws* [892b-896d, on soul as the cause of motion];

*Timaeus* [28a-34c, on the Demiurge's creation of the cosmos in the likeness of the Forms and as an organism].

#### Section 4

Grant, E., (1996) *The Foundations of Modern Science in the Middle Ages*, Cambridge, Cambridge University Press [A study of the role of medieval universities and natural philosophy as necessary preconditions for the scientific revolution.]

Lewis, C. S., (1964) *The Discarded Image*, Cambridge, Cambridge University Press [A detailed description of the medieval picture of the universe.]

#### Section 5

Burt, E.A., (1964) *The Metaphysical Foundations of Modern Science*, London, Routledge, 2nd ed. [It focuses upon the reductionist tendencies in the scientific revolution].

Dawkins, R., (1976,1989) *The Selfish Gene*, Oxford, Oxford University Press., [A recent example of a reductionist view of human existence, this time as simply a function of one's genes.]

Descartes, R., *Discourse de la Methode* (1637), many translations and editions. [It contains Descartes' remark that animals can be regarded as mere automata, like so many machines.] *Meditationes de Prima Philosophia* (1641), many translations and editions. [In it Descartes doubts everything and discovers that he cannot doubt his own existence, 'cogito, sum'. He then divides reality into the mental and the physical.]

Galileo, G., *The Assayer* (1623) [Probably Galileo's most famous polemical book, in which he spells out the fundamental tenets of his new science].

*Grundlegung zur Metaphysik der Sitten* (1785); trans. H.J. Paton, *The Moral Law*, London, Hutchinson, 1948. [Kant's theory of the Categorical Imperative.]

Hobbes, T., *Leviathan*, (1651), ed. M. Oakeshott, Oxford, Basil Blackwell, 1960. [Hobbes' best known book. It contains his account of human existence, and then sets out a political theory based upon it.]

Kant, I., *Beantwortung der Frage: Was ist Aufklärung?*, (1784); 'What is Enlightenment?', in trans. L. W. Beck, R. E. Anchor and E. L. Fackenheim, *On History: Immanuel Kant*, Indianapolis, Bobbs-Merrill, 1963. [It expresses the Enlightenment's rejection of human and divine authority, tradition, etc., in favor of its own idea of reason.]

*Kritik der Praktischen Vernunft* (1781); *Critique of Practical Reason, and other writings in moral philosophy*, trans. L. W. Beck, New York, Garland Pub., 1976. [It contains Kant's Categorical Imperative and also his argument that we do not know that as 'noumena' we are not free.]

*Kritik der Urteilskraft* (1790); trans. J.C. Meredith, *Critique of Judgment*, Oxford, Clarendon Press. [It includes his account of functions, etc., as 'regulative principles'.]

Lametrie, *L'Homme Machine* (1748). [An example of the reduction of human existence to that of matter in motion.]

Laplace, P.S., *Traité de Probabilité*, trans. *A Philosophical Essay on Probabilities*, London, Dover, 1951. [A thorough-going account of the universe as a determinist system of matter in motion.]

Sartre, J-P., (1943) *L'Être et l'Néant*, Paris, Galimard; trans. H.E. Barnes, *Being and Nothingness*, London, Methuen, 1958. [An extended account of human being as a totally free subject, *pour soi*, in a meaningless world of mere things, *en soi*.]

Skinner, B.F., (1972) *Beyond Freedom and Dignity*, New York, Bantam Books. [An example of a human science, behaviorist psychology, as a technology for shaping human beings and society.]

#### Section 6.

Elliot, R. (ed.), (1995) *Environmental Ethics*, Oxford, Oxford University Press [Several of the items

included refer to the wider backgrounds of environmental ethics in general and of particular positions within the field.]

Harris, E.E., *The Foundations of Metaphysics in Science*, London, Allen and Unwin, 1965; Lanham, MD, University press of America, 1983; Atlantic Highlands, NJ, Humanities Press, 1993. [It presents a comprehensive world-picture, incorporating the findings of modern science, using holistic categories to integrate the different levels of existence – physical, biotic and noetic.]

Harris, E.E., (2000) *The Restitution of Metaphysics*, New York, Humanity Books [Parts 2-4 are similar to the previous work, and notable for a general teleological orientation, each lower level requiring completion by the next higher.]

Hartmann, N., (1953) *New Ways of Ontology*, trans. Kuhn, Chicago, Henry Regnery [A detailed account of a hierarchy of levels in the universe.]

Hull, D.L., and Ruse, M. (eds), (1998) *The Philosophy of Biology*, Oxford, Oxford University Press. [A useful collection of papers on contemporary accounts, both reductionist and non-reductionist, of central concepts in biology.]

Jonas, H., (2001) *The Phenomenon of Life: Toward a Philosophical Biology* (1966), Evanston, Ill.: Northwestern University Press. [Motivated by ecological concerns, it attempts to overcome the *de facto* life-blindness of the science that is *de iure* devoted to the study of life i.e. biology. He criticizes its exclusive reliance on analysis i.e. reduction to simpler components and scrutinizes the consequences for biology arising from the assumption of the responsibility imperative: “Act so that the effects of your action are compatible with the permanence of genuine human life”.]

Jonas, H., (1984) *The Imperative of Responsibility: In Search of an Ethics for the Technological Age*, Chicago and London, Chicago UP. [Centered upon the notion of human ‘responsibility’, it extends it to the relationship between the human being and the natural world and, whilst avoiding Utopianism, it argues for a proper balance of present and future.]

Jonas, H., (1996) *Mortality and Morality, A Search for the Good after Auschwitz*, Evanston, Ill.: Northwestern University Press. [Moving from the ethical breakdown experienced by the Western civilization with the institution of extermination camps, it elaborates Jonas’ argument for human responsibility, including that for the natural world.]

MacIntyre, A.C., (1981) *After Virtue: A study in moral theory*, London, Duckworth [A ‘post-post-modern’ revival of an Aristotelian approach, which has inspired debate and further studies.]

Mayr, E., (2004) *What Makes Biology Unique?*, Cambridge, Cambridge University Press. [A defense by a biologist of the distinctiveness and autonomy of biology, that clarifies the concepts used, but which reapplies teleological concepts, such as ‘program’ and ‘information’, in giving what is supposed to be a purely physical location and explanation, in DNA, for goal-directed processes.]

Polanyi, M., (1958) *Personal Knowledge*, London, Routledge, and Chicago, University of Chicago Press. [It contains detailed arguments against reductionism in most of its forms, with examples from all the natural sciences, and an alternative account of the distinctive features of living beings.]

Polanyi, M., (1983) *The Tacit Dimension*, London, Routledge; New York, Doubleday; 1966; reprinted Gloucester, Mass., Peter Smith, 1983;

Polanyi, M., (1969) *Knowing and Being*, London, Routledge; Chicago, University of Chicago Press; 1969. [These, and Polanyi’s other publications after 1958, develop the themes of *Personal Knowledge*, and present a hierarchical universe wherein each lower level leaves open its boundary conditions to be determined by the autonomous operational principles of the next higher level.]

### **Typographical Note:**

In the transliteration of Greek words, ‘é’ and ‘ó’ have been used, respectively for long ‘e’ (*éta*) and long ‘o’ (*ómega*), because the Extended ANSII Set does not include ‘e’ and ‘o’ with bar accents as are customarily used and which should replace them.

### **Biographical Sketches**

**Richard Allen** taught philosophy of education at colleges of education in England and Nigeria, at The University of The West Indies, St Augustine, Trinidad. Having studied philosophy at the University of Nottingham, he also obtained an external BD and Ph.D from the University of London. He now edits the philosophical journal, *Appraisal*.

**Giorgio Baruchello** is Associate Professor at the Faculty of Law and Social Sciences of the University of Akureyri. He holds a doctorate in philosophy from the University of Guelph (2002) and an Italian *laurea* degree in philosophy from the University of Genoa (1998). His research interests focus on the understanding of cruelty in the history of the Western civilization. He has published in several international journals, including *Symposium*, *Appraisal* and *Philosophy and Social Criticism*. He currently edits the Icelandic electronic journal in Nordic and Mediterranean studies *Nordicum-Mediterraneum* <<http://www.nome.unak.is>>.