

# **Agriculture & Philosophy**

**Agricultural Science in Philosophy**

**Lindsay Falvey**

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**TSU Press**

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**Summary:** Agriculture and philosophy have been integrally linked across history and remain so. Philosophy, defined as wise means of humans being at ease in nature, has been fundamental to humans from pre-historical times and expressed in various forms. Those philosophical forms have included myths and legends that explained unfathomable matters to our forebears, and which informed the later development of written philosophy in the form of religious scriptures. Scriptures have thereby been the major written vehicle of philosophy for most of history and across cultures. The language employed in such philosophy relied on agricultural metaphor and used agriculture itself as the means of understanding humans as part of nature, rather than an element standing apart and observing or manipulating. With the development of natural philosophy, which became known as science, it became a major modern contribution to useful knowledge - knowledge that increased contentment and wellbeing, or philosophy. Combining myth, religion, and other knowledge from the world's major cultures, philosophy is discussed using examples from the longest and most widespread human interaction with nature, agriculture. The Enlightenment's philosophical product of agricultural science thus unifies the theme, and supports the ancient conclusion that humans' thoughts and actions form part of nature, and may even be components of a wider interaction than can be comprehended from current approaches.

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## Author's Preface

A number of questions have stayed with me over the decades, which has led me to both dead-ends and bountiful paths. The book, which I hope you are about to read, is an output of one of those latter fruitful journeys. This journey began with wide reading around themes that piqued my interest in combination with my continuing involvement in what I see as the most important human innovation – agriculture and its sciences. This means that the book contains some matters on which I am well informed, and others in which I am an amateur. Over the past 20 years I have always had a major writing project – something that has provided me with intellectual continuity among the otherwise disparate demands of life, and which is portable enough to suit my peripatetic profession.

I am no philosopher in the academic sense, and only marginally so in the popular sense. Yet I have boldly, and possibly foolishly, sought to revive the intent of philosophy itself and to show it as the proper home of agricultural science and all useful learned pursuits. 'Useful' in this sense means knowledge that increases human wellbeing and assists in self-understanding within incomprehensibly complex nature. I imagined I could do this by reading the great and not-so-great philosophers and noting their references to agriculture and science. How naïve was I?

As it transpired, my naivety allowed me to avoid that slough of despond that is mired by academic philosophy's classifications – and this proved to be advantageous to my quest. By treating philosophy as the human search for comfort beginning in prehistory and proceeding through myth and folklore to religion to natural philosophy and to modern science, I found continuums that might have eluded me if I had focussed my view through the lenses of modern schools. Is this hubris? Perhaps – but in any case, it has allowed me to challenge Western worldviews that have been projected onto interpretations of other cultures. Secondly, it has permitted an objective inclusion of religion in both its profound and folk forms to be treated with respect as a cultural expression of applied philosophy. Thirdly, by focusing on the nexus between agriculture, its sciences and philosophy, the exceptional innovations that now feed billions serve to highlight that human genius takes a wide perspective.

Bringing subjects uncommon to agricultural science into discussion is hardly a great career move these days. I am fortunate, at this late stage,

to be unconcerned and even disdainful of such criticisms – not the least because one message of the book is that agricultural science impoverishes itself when it operates as technology separated from context. I can claim some experience in integrating fields of knowledge and experience through previous books, including ‘Religion and Agriculture’, ‘Beliefs that Bias Food & Agriculture’, broad discussions of ‘sustainability’ and even others that integrate religio-cultural themes. But this book stands apart in its approach potentially spanning all human experience and knowledge. Of course, this means that I could only hope to capture a few points, and I think those presented are sufficient to substantiate my argument.

Two decades ago, I was contacted by a prospective doctoral candidate from the Netherlands who had read some of my work to that time, and felt I could supervise a PhD on ‘agricultural philosophy’. I was unable to accede to the request at that time, but the theme stayed with me and has played a part in this project. However, in the intervening period it has become clear that the term ‘agricultural philosophy’ has a popular meaning that is distant from the learned approach expected by that prospective doctoral candidate. Popular ascription of unscientific beliefs to practices that claim to be agricultural philosophies are cursorily dismissed in the book as not qualifying as an objective pursuit of learning for enhanced wellbeing and living Socrates’ examined life.

Agriculture and agricultural science are discussed here as part of philosophy – with philosophy understood as spanning the full breadth of useful knowledge. This may not be its current description for what has become somewhat an academic subject, but that is a recent change. For 99 percent of history, philosophy has been the pursuit or love of wisdom, which I interpret herein as knowledge that enhances our wellbeing and ease of living within all other elements of nature. From this wide interpretation of philosophy, I deal with the indissoluble link between agriculture, science and the narrowed field that philosophy has become and seek to restore philosophy as the useful embracing of knowledge. To do this requires the agricultural scientist to accept that agriculture, and in particular cereal grains, defined civilization and allowed state governance structures to arise. States then enforced their authority through the annual cereal production calendar and its religious rituals, many of which obviously continue today. It is thus hardly coincidental that states have traditionally taxed grain and aligned religions to the state. The next step for a state was to allow private land ownership and

to classify land according to productive potential to facilitate forward estimates in refined taxation systems. Thus pre-historical, historical and recent knowledge surrounding these themes are considered in the book.

The first chapter traces civilization from secure food production that underpinned codified philosophy. Philosophy is then defined broadly to include myth, folklore, religion, natural philosophy, science and the humanities. The integral role of agriculture is evidenced in philosophy's descriptive terminology, metaphors and parables, and in its supporting social role. Religion as the primary cultural purveyor of philosophy for most of history is then adumbrated as the main means by which we have begun to understand our place within nature and natural flows, which is the basis of agricultural practice. Common insights within myth, legend and folklore then introduce non-Western philosophies that have leavened the Western tradition in past times and increasingly today. The development of the Western tradition from Mesopotamian times through the European Enlightenment to the present day is then summarised across two chapters, noting the significant invention of the integrated field of modern agricultural science. A European agrarian philosophy with beliefs that did not always accord with objective natural philosophy is then presented to stress the need to integrate knowledge across disciplines. Next, ethics as the most evident interaction between the artificially separated fields of agricultural science and philosophy, is discussed using such examples as genetic techniques, animal welfare and global food equity. The final two chapters continue the theme of integrating knowledge such that agricultural science is understood as part of philosophy and much more than technology, and philosophy is understood to be far wider than its academic departments. All this is bracketed between summaries in a Prologue and an Epilogue.

Authors of books on obtuse and cross-disciplinary subjects like this are commonly asked why they have exposed themselves to criticism by straying beyond their field. Then they are asked 'who is the market?'. In this case, as for most books, there is an element of the author writing for himself to clarify his own understanding. At a late stage in an agricultural science career of senior involvements in academia, commerce, research and international development it is important to me to consider what good has resulted, and to understand how agricultural science has meshed with other elements of my life. Hence the work addresses the neglected people of the world and their cultural traditions, which are considered alongside those of privileged peoples as co-equal

contributors to philosophy. Therefore, I would like to think that the market for the book is openminded educated persons including students who can transcend the distractions of less important matters in life and attend to the imperative of ensuring nutritious food for all while developing their own self-understanding – and thus become philosophers in the full sense of the word. To this end, in addition to the hardcover version, the full book is accessible through multiple online sites.

A subtext of the book that emerged as it progressed is the need to redress the technologizing of agricultural science educators and gifted students. This refers to the enchantment of scientifically-trained experts, as well as the public, with technology at the expense of understanding the wider philosophical-scientific context. The argument falls neatly into the overall theme of philosophy's objective being to relieve anxiety in life by recognizing that we cannot stand apart from nature, even intellectually.

Much of the book collates the thoughts of others expert in their fields; I have not created new knowledge per se, rather I have integrated knowledge that has been unproductively separated. I have described the structure of discussion earlier; its layout also needs to be introduced. The hundreds of endnotes aim to meet the dual objectives of referencing quoted text and assertions, and directing readers to sources for further reading. The latter may be most useful to serious readers. I have not read all of the endnoted texts, although I have consulted them and have read the majority. The endnotes also have allowed me to dispense with the modern literary style of introducing an author's name and title of a work in the main text, thereby saving some 3,000 words.

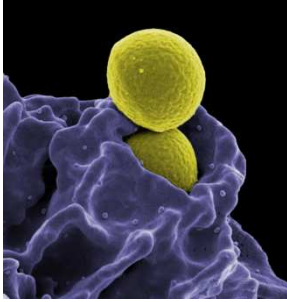
To those who kindly read the draft manuscript I here record my gratitude – to Julian Cribb, Simone Falvey-Behr, Trevor Gibson, John Leake, Tony Loquet, Jerry Murray, your forthright comments have improved the text markedly from your different perspectives – Thank You. Wide-ranging subjects such as this inevitably introduce facile explications; I am grateful for those that have been pointed out, and accept that those that remain indicate my own poor understanding. As one reader noted, in dealing with integration within incomprehensible complexity, I may try too hard at times to arrive at neat outcomes. For that and other reasons, my contribution can be seen as a work-in-progress within the neglected yet critically important integration of learning as a step toward wisdom. In following that path, I owe a debt of

gratitude to friends and professional colleagues, particularly Charan Chantalakhana, for his advice, encouragement and company in understanding more of the Eastern traditions, and to John Leake who decades ago introduced me to the benefits of reading great books in the original environments of their authors. Thus I could study Spinoza and Descartes in The Netherlands, Maimonides in Morocco, Montaigne in France, the Enlightenment Scots in Scotland, the emergent Protestants in the regions surrounding Strasbourg, Schumacher and Tagore in India, and Buddhadasa and Payutto in Thailand, among scores of other authors and places.

I am indebted once again to the Baillieu Library of the University of Melbourne and its ability to obtain diverse and often remote works from around the world. I have also benefitted from both Cambridge University Press and Springer providing multiple books on philosophy in return for commenting on book proposals, and from my Asian colleagues who have guided my reading of Eastern works over four decades. In wandering over such a wide terrain, I have inevitably committed errors of omission and fact, for which I apologize and welcome correction.

Whether it is read from cover to cover, or is used as a reference from its index, and whether it is used as an academic textbook or as general reading by concerned professionals and intellectuals, I hope that the book stimulates some increased responsibility in agricultural science within philosophy.

Lindsay Falvey  
September 2019  
Strasbourg



An analogy of rational thought, experience, contrition and so on (purple) acting to counter actions that harm natural functions (yellow) is represented in the image of the pathogenic bacterium methicillin-resistant staphylococcus aureus (MRSA - yellow) being ingested by a white blood cell neutrophil (purple) in a functioning mammalian immune response.

Refer to Page 260.

Source: National Institute of Allergy and Infectious Diseases.

*Is not fear made fly  
When pure actions inform philosophy?  
That wondrous rainbow that still spans heaven  
Is known for the dynamic role she's given  
With us in interacting with all things.  
Philosophy sets free an Angel's wings,  
Reveals nature's actions her rules of thumb  
That guide us to live within her as one  
with apologies to Keats' 'Lamia'*

# Prologue

This book deals with the transition from knowledge to wisdom. Wisdom justifies the use of the word philosophy throughout the text from its etymology of 'the love of wisdom', which across millennia has been interpreted as understanding of life. Such understanding is more than knowledge and in order to avoid more esoteric approaches to wisdom philosophy is discussed as integrating all knowledge including the sciences and experiential learning. I acknowledge at the outset that this may be at odds with modern academic approaches to philosophy.

To advance the thesis that this embracing definition of philosophy is essential to all worthwhile human endeavour, agriculture and science are used as two major historical developments that unite learning. For that reason, some facts about food and agriculture are first introduced and are then related to a re-defined philosophy. In this wide sense, philosophy requires criticism of modern culturally illiterate prejudices against religion and myth and an open-minded consideration of non-Western philosophies.

With that foundation, Western philosophy from Babylonian times until the present is then summarized, acknowledging that for much of that history, religion has housed learning and understanding. In relying on agriculture as a basis to explain the wider role of philosophy the limited agrarian philosophies are contextualized in a manner similar to literalistic religion. To unify the theme it is then acknowledged that all forms of agriculture spawn applied philosophical and especially ethical issues that can only be reconciled by a broad and integrated philosophy of the central matters of life.

That overall approach necessarily corrects the modern separation of science from its home in philosophy, especially in terms of its contextual subject of agriculture and agricultural science. To do this, the philosophical insight that humans are part of nature and cannot be holistically discussed separate from nature pervades each line of

thought. As the major human interaction with nature, agriculture provides countless examples to illustrate the wisdom in maintaining this integrated view.

Once well established, agriculture supported the emergence of a class of philosophers that integrated and codified past myths, beliefs and folklore. This breakthrough of around 500 BCE seems to have occurred around the globe and to have produced the major world religions. Reason and personality became components of understanding humans, and the religions applied rational interpretations to the myths, beliefs and folklore that had earlier evolved to explain life and humans in nature. Religious explanations – often termed philosophies for non-theistic traditions – employed metaphors from everyday interactions in nature, which in that period led to the pervasive use of agricultural analogies.

Philosophy later developed through the major intellectuals who operated within religions, particularly in the Western world. However, when the pace of philosophical advances in the form of science increased, the quest to understand life required an accelerated accommodation of new knowledge. Such a period was the European Enlightenment, which enhanced understanding in a manner that downgraded deistic assumptions and belief. Science and philosophy had been one until that point.

We are still in this period but are removed from its history, which has led the philosophical context of millennia within religion to be neglected. Neglect is exacerbated by the academic response of disciplinary separations in order to master the complexity of burgeoning new knowledge. Our present day knowledge is thus poorly applied to the primary philosophical quest for understanding life through awareness of humans existing only as interactions in nature.

For at least the past two millennia, philosophers around the globe have communicated to advance understanding. In recent centuries, those conversations have increased and today's globalized ideas are informing a more profound understanding of life. These subjects are discussed through this book with a constant reference to agriculture

and its sciences. As the first rung on the ladder to philosophical understanding, securing the regular supply of healthy food relies on agriculture; the discussion that follows builds on that fact to introduce other interactions that render agricultural science part of genuine philosophy. Done well, modern agricultural science integrates the arts, humanities, social sciences, and the technological or applied and pure sciences. In safely feeding billions more than was ever thought possible, forestalling zoonotic epidemics and continuously improving its interactions with the wider environment, agricultural science also generates multiple philosophical dilemmas. Those ethical and other dilemmas are discussed within the overall quest for understanding life – for living Socrates examined life.

The thesis is not new; its lineage stretches back into pre-historical times. That modern secularism and moral relativism are on the rise does not affect that heritage, and its insights. And the insights inform all useful learning, including the agricultural sciences.

# Chapter 1

## History, Agriculture and Philosophy

*In introducing the overall theme of agricultural science within philosophy, this chapter traverses the invention of agriculture and its knowledge as part of wider learning, which is embraced under the term philosophy. An historical overview oriented to the Western tradition traces the roots of civilization in secure food production, sound governance and trade, and notes that cultures decline when either of the first two matters are neglected. Modern successes of applied philosophy that feed and provide comfort to billions more than ever before are contrasted with neglect of civil traditions that may distract the continuous effort to understand the natural processes for food production. Located within the expanding philosophical knowledge across all fields, agricultural scientists are posited to rely on philosophers, and philosophers on agricultural scientists – and for each to recognize they are part of the other.*

### **Where to Begin?**

Who was the first philosopher?<sup>1</sup> Thales is often cited in Western culture, which forgets that most earlier writings elsewhere in the world did not assign authorship. So if a ‘first’ is to be sought, it can only be anonymous. Even claiming that it was the first homo sapiens might be challenged by evidence emerging about Neanderthal rock drawings and burial customs. The ‘first’ philosopher might more easily be seen in the logic that humans seek comfort that reduces their fears of harm and death; we invent psychological means of reinforcing such assurance, which for some may develop into a wonder about nature, meaning and existence.

Once humans had settled in large communities, a philosophical class that could concentrate on esoteric thought arose. This relied on the sustained food supply that was eventually secured by agriculture and its governance. What is called philosophy today dates from that pre-historical period – as Aristotle observed, “man first begins to

philosophize when the necessities of life are supplied”, which occurs “in the places where men first started to have leisure”.<sup>2</sup> In the end, it makes no difference who was the first philosopher since it seems that the early thinkers around the world sooner or later absorbed each other’s insights to inform their own culture’s traditions. By the same logic, it makes no difference who was the first agriculturist. However, it is important to recall that agriculture underpins civilization and its ability to continuously develop philosophy, and it is also important to realize that philosophy did not begin with writing.

What are commonly called myths and cultural stories are a critical component of philosophy that obviously separates philosophy from the need to write. Furthermore, writing seems to have been applied to more practical purposes than philosophy in its initial millennia, and to have served purposes contrary to the objectives of philosophy. As Levi-Strauss observed, “the one phenomenon which has invariably accompanied [writing] is the formation of cities ... it seems to favour rather the exploitation than the enlightenment of mankind. ... the primary function of writing, as a means of communication, is to facilitate the enslavement of other human beings. The use of writing for disinterested ends, and with a view to satisfactions of the mind in the fields either of science or the arts, is a secondary result of its invention and may even be no more than a way of reinforcing, justifying, or dissimulating its primary function.”<sup>3</sup>

Rather than being intended for philosophical advancement when it arose in agricultural settlements, the initial function of writing was for basic accounting. This role continued for thousands of years before it was employed to record exploits, stories and scriptures.<sup>4</sup> It developed slowly without a connection to oral communication, and seems to have expanded markedly as powerful states grew large enough for a sizeable elite to codify beliefs and rituals that had hitherto been orally transmitted. This change occurred around the world in a climatically favourable period for larger-scale grain production, which coincided as the Axial Age of the major philosophical and religious figures of China, Greece, Palestine, India and Persia.

Even the association of agriculture with the urban settlements that define civilization where writing arose should not be understood as an essential progression. Agriculture seems to have been periodically adopted and abandoned to return to nomadism, shifting cultivation or other moveable lifestyles. When cities with their scripts disappeared so did historical records, yet those cultures continued in oral traditions. In ancient Greece, a decline in the centuries before 800 BCE led to the loss of its writing, and the later resurgent culture began with a different script based on the trading Phoenician system. During this illiterate interval, oral traditions carried forward the great works that were later transcribed and attributed to Homer.<sup>5</sup> Similarly, Latin almost disappeared with the collapse of the Roman state, continuing mainly within monasteries.<sup>6</sup>

Writing might thus be seen as less a medium of intellectual communication and more as a tool of trade and state control for taxation of urban populations. By the same logic, cereal agriculture was another tool of the state, and the two tools became interlinked to communicate improved agricultural techniques to ensure stability of the state's income base and security. Beliefs and rituals might then be seen as having been written down with a state's imprimatur to become formal expressions of a culture's philosophy to contribute to social stability. If this procession sounds like progress to modern ears, it is apposite to also note that some peoples actively rejected the adoption of writing just as some shied away from settled agriculture as means of escaping the onerous cost of tax and labour that came with state overmasters and agriculture.<sup>7</sup>

Agriculture probably began its episodic role in several areas of the world around 10-12 millennia ago. Agricultural settlements grew and most declined due to such factors as: climate change; epidemics; emigration; population exceeding resources; resource depletion; salination; soil fertility decline; war, and water shortages. Where sizeable cities developed, they relied on annual cereal crop production that was tenuous in the face of drought, flood and plant diseases. In addition, the livestock that lived with the people in cities were a source of zoonotic diseases. When cities failed, people dispersed from the agricultural state and some may have spread

agriculture to other areas where climate was suitable, while others elected to return to nomadic pastoralism and related lifestyles.

In Europe after Rome declined, cities shrank and small agricultural communities developed,<sup>8</sup> and as they in turn grew with improved local governance through the Dark Ages they formed new cities that eventually became new city-states. Those states then followed the same pattern of expanding written philosophy from their urban settings, one expression of which is labelled as the Renaissance. However, in contrast to the tomes written by such states, most agricultural settlements were small. As Scott notes: “the vast majority ... (arguably up until at least 1600 CE) were still nonstate peoples: hunters and gatherers, marine collectors, horticulturalists, swiddeners, pastoralists, and a good many farmers who were not effectively governed or taxed by any state. The frontier, even in the Old World, was still sufficiently capacious to beckon those who wished to keep the state at arm’s length.”<sup>9</sup>

The cities that arose from agriculture are well known, such as those in Iraq, which like others developed in a period of favourable rainfall six to eight millennia after the first appearance of agriculture. Once stable, cities traded and their customs were adopted by their smaller trading partners and over time class differentiations emerged between artisans, entrepreneur-traders, farmers, nobles, priests, slaves, soldiers – and learned persons known as ‘philosophers’. Excessive behaviour and climate change that undermined sustained food and governance led the demise of successive cities. Despite the warnings of philosophers and informed farmers, neglect of the centrality of food security, as well as soil erosion, salination and nutrient depletion, led to the demise of civilizations.

New cities emerged elsewhere on fertile lands and accumulated wealth from trade until regular food surpluses became insecure. Thus the Euphrates civilization waned, as did those of Indus, Nile and Yellow rivers. Partner-trading cities that had grown in the good times and imported some food products also declined. Other civilizations followed the same patterns, and in those few with secure food, good governance and a favourable climate, cities became more sophisticated attracting climate and food refugees who further

expanded innovation and commerce. Food remained central as populations rose and thus the fostering of new agricultural technologies became a critical role of good governance – and where the balance was maintained, a sustainable civilization and cities became a possibility. The general concept is illustrated in Figure 1. In the West, the same factors of neglecting food supply were to later contribute to the Roman Empire’s decline, notwithstanding the Flavian corrective governance that temporarily staved it off.<sup>10</sup>

### **The West’s Emergence**

Developments in the Eastern world were significant and are discussed in Chapter 6. Continuing for the moment to follow the West’s agricultural and philosophical history, it is usual to discuss the Dark Ages that succeeded Rome’s final demise and set Europe back to a state of agricultural self-sufficiency characterized by home-milling of grain and sheep shearing. Surpluses were minimal and hence trade was limited. Some cooperative division of labour occurred in monasteries, which were also repositories of philosophy, but no large towns emerged. Trade slowly developed with reliance on the Middle East, which became more cohesive after the time of the Prophet. Trade then relied on domesticated camels for the overland conduits that delivered glass, metals, preserved foods, slaves, spices and textiles. It also re-introduced ideas such as the Indian philosophy with which the ancient Greeks had been familiar. Another exchange of ideas led to Chinese knowledge improving Arab ships such that trade expanded across Africa and Asia. Philosophy including agricultural knowledge was now being exchanged around the globe. Trade, food availability and openness to knowledge allowed expansion until urban sophistication distracted governance, which led to food supply being neglected and trade declining.

As the Muslim empire declined, Europe with its favourable agricultural land and climate had an opportunity to redevelop. Muslim and Jewish scholars influenced learning in the Iberian and Italian peninsulas where trading towns soon established their own governments. Interaction with the Maghreb had introduced decimals, fractions and the ability to calculate interest to Florence, Genoa and Venice. Traders and products from these expanding cities spread across Europe and stimulated local producers to trade

regionally and internationally and so the commercial empire of Europe grew on the back of reliable agricultural surpluses. By the 17<sup>th</sup> century, the centre of philosophy and innovation had moved north to the Netherlands when the Dutch merchant marine trade exceeded that of France, England, Scotland, the Holy Roman Empire, Spain and Portugal combined.<sup>11</sup>

Wars intervened and Britain emerged in the dominant trading role and promulgated novel philosophies of open markets, free trade and tariff removal. The approach spread through Europe and the philosophical Enlightenment blossomed with its particularly practical orientation in northern Britain stimulating the Industrial Revolution. Despite its favourable agricultural environment, food supply in Europe had become problematic as a result of wars, diseases and climate change until the applied philosophy of agricultural science arose in the 18<sup>th</sup> century. Chemical fertilizers, steam water pumps, traction engines, canals, hydraulic presses, power looms and other innovations were developed to mimic natural processes. Food production was thus set on its exponential rise.

Innovation in the Eastern world followed a different schedule producing philosophical, including agricultural, advances that are elaborated in a later chapter. For modern considerations of the subject it is convenient, if parochial, to incorporate Eastern developments in terms of their chronological interactions with the West. Ancient Greek contact with India spread philosophical ideas in diverse fields including agriculture. Later integration occurred after the Muslim influences in southern Europe were refined in the subsequent Renaissance and Enlightenment periods. Thereafter, some Western philosophers took an interest in Eastern philosophy to inform Western dilemmas. In the modern era, Eastern philosophy has expanded into the public sphere and morphed into folk versions that in some cases confuse the intent of those traditions. Nevertheless, the integrated intent of Eastern approaches serve to clarify the sometimes divisive outcomes of pragmatic Western approaches, and in this work serve to emphasize the futility of ignoring extraneous factors in formulating theories, models and worldviews.

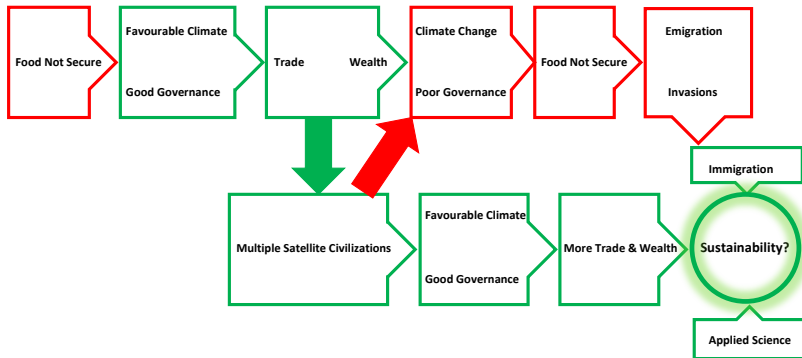


Figure 1. The Hazardous Path from Food Insecurity to Sustainability

The above summary, while incomplete, suffices to highlight that agriculture has been humans’ major innovation and requires respect if a civilization is to sustain itself. Agricultural science blossomed under sound governments across wealthy nations and has today produced secure food for billions – a situation that would have been inconceivable though most of history. Stability has facilitated broadly-based urban cultures to enhance wider philosophical skills in research, management and governance. These developments have allowed most Westerners to spend far less on food purchases than, for example, the 75 percent of wages expended on food by an English farm labourer in the 1790s.<sup>12</sup> And yet the increased leisure time available in a rich society, which philosophical insight suggested was a step to increased self-awareness, has not dissipated what Kierkegaard labelled ‘angst’.<sup>13</sup> As argued throughout this work, this disconnection may be partly related to philosophy having become separated from its sciences, just as modern secular beliefs have eschewed cultural histories. Do such chronic dissatisfaction and imbalanced education breed indulgence in moralistic stances about environmental decline among other fears? The answer might be ‘yes’ if philosophy is relegated to an academic backwater, agriculture is neglected and false gods are invoked as panaceas.

### Panaceas

In the absence of the ‘consolations of philosophy’,<sup>14</sup> fears once assuaged by applied scholarship, beliefs systems or moral codes

morph into partially comprehended actions that aim to alleviate angst by superficial acts of atonement for society-wide issues such as pollution, climate change and environmental degradation. In the agricultural sector, sentiment of an urban segment claims to believe in panacea, such as food-miles<sup>15</sup> and Western definitions of organic food. Although both may be based on worthy ideals, ardently arguing for such simplistic conclusions about complex interactions can divert from more integrated actions. For example, food-miles is such a crude measure that it can value a local product over one transported from a distant site that is environmentally suited to its production – such as claims for local greenhouse off-season fruits and feedlot beef. Fruit produced from natural rainfall in season or irrigated from fishpond effluent can show a lower carbon footprint than a heated greenhouse using formulated nutrients. Without intending to unreasonably extrapolate, the point has been expressed by Ridley in these terms: “the price of wheat trebled in 2006-8, just as it did in Europe in 1315-18. At the earlier date Europe was less densely populated, farming was entirely organic and food miles were short. Yet in 2008, nobody ate a baby or pulled a corpse from a gibbet for food. Right up until the railways came, it was cheaper for people to turn into refugees than to pay the exorbitant costs of importing food into a hungry district.”<sup>16</sup> Agricultural export, transport and trade made that difference.

The system today depends on a form of free trade that also brings inherent risks to those without the power to resist exploitation, which continues albeit less than in earlier times. Today’s immensely higher population makes the absolute figures seem large compared to the past. A fairly consistent figure of 800,000 to one million persons undernourished at any one time<sup>17</sup> can be argued to indicate an unaddressed issue, or it can be used to indicate a declining percentage of hungry persons in the world. I prefer the latter optimistic viewpoint because it acknowledges the continuing great strides made by disciplined applied scientists meeting their philosophical objective to improve wellbeing. A popular alternative of predicting apocalypse from food shortages following Malthus’ philosophy<sup>18</sup> ignores the fact that his analysis applied to 19<sup>th</sup> century Ireland before our era of constant technological developments.<sup>19</sup>

In the East, integration of humans within nature appears to have reduced the individualistic notions that have arisen in the West since the Enlightenment, particularly in recent times – a theme developed in Chapter 6. A slower pace of industrialization in the non-Western world has meant that agriculture retained a small-holder backbone that has all but disappeared from the West. It is now under threat in the East, but as I have elaborated elsewhere, there are distinct advantages to a two-tiered agricultural system that includes both small-holders and agribusiness.<sup>20</sup> Far from an academic curiosity, Eastern ideas and practices amplify an embracing philosophical view, which argues for an awareness of both Eastern and Western knowledge in agriculture as in all other fields.

Early philosophy communicated through stories conceived nature as something to be carefully observed for human benefit. Over time, the trade that accompanied or possibly preceded agriculture introduced metallurgical developments that facilitated agriculture as a wealth producer that in turn encouraged ownership, not just of grain but of the land itself. Rehearsing history in this manner allows ready understanding of narratives otherwise discounted as unintelligible myth. For example, an early Buddhist story relates agriculture to the hoarding of grain as the source of materialism that fed invidious comparisons and dissatisfaction – otherwise translated as ‘suffering’ in Buddhist philosophy.<sup>21</sup> The Greek story of Cadmus’ ploughing marking the end of a ‘golden age’ may be similar.<sup>22</sup> From such stories human interactions as we understand them today arose in other early philosophies and included agriculture and trade as routine behaviour.

Recognizing trade and agriculture as basic actions of all societies throughout history<sup>23</sup> and pre-history clarifies otherwise romantic interpretations of ‘primitive’ societies being based on reciprocity.<sup>24</sup> It is not necessary to view such reciprocity as different from monetized exchanges or even profit-seeking. Exchange values always vary with relationships – family and friends get better deals than strangers. In a similar vein there are philosophical interpretations that rely on romanticising non-agricultural societies and suggesting that agriculture was “the worst mistake in the history of the human race”.<sup>25</sup> The supporting arguments include: the drudgery of farming;

reduced leisure time; intensive settlements; encouragement of acquisitiveness; zoonotic diseases, and hierarchical societies that spawn inequality. Each of these factors was possibly worse than its counterpart among hunter-gatherers.

The factors are not, however, arguments against agriculture as an environmental impost. For most of its 10-12,000 year history, agriculture has been limited to isolated patches within the buffering capacity of the wider natural biodiversity. Availability of new land and the slow pace of technological change allowed increased production and hence human population growth without widespread ecosystem impact. Agriculturally-based societies were largely self-sufficient and limited by the capacity of soils, climate and skills. It is only since the late 18<sup>th</sup> century that more intensive agriculture has emerged to feed growing urban populations. Today's increasingly industrial agriculture with its reliance on fossil fuels and mined and manufactured fertiliser and pesticides, and constant technological innovation has removed the past limitations that self-sufficiency ensured.<sup>26</sup> It is a new dynamic, but not one that is automatically negative if technology is well-informed and constantly addressing ecosystem impacts. The unproductive penchant to assume the worst of modern science is discussed in various contexts through subsequent chapters.

The above arguments are factual,<sup>27</sup> but some others seem futile when they rely on matters that are unknowable, and when 'evidence' is from texts written by ancient agriculturists that were intended as didactic stories rather than historical records, or anthropological projections of extant non-agricultural communities having decided to reject agriculture when it may not have been an option, or archaeological studies that again project modern worldviews onto remnant artefacts. Viewed philosophically through the continuing human need to make sense of life, such interpretations might be seen as modern myths supporting a new belief system devoid of contact with nature. In that sense, these modern myths serve a purpose when believers eventually confront reality. I prefer to rely on the myths of religions around the world that have endured for millennia as explanations of humans within nature.<sup>28</sup>

## **Innovation & Nature**

Food surpluses underpinning stability allowed civilization to become more sustainable in recent millennia, and writing eventually codified knowledge for wider learning and innovation and became a tool of philosophy. Where agriculture was well governed, periodic interruptions by wars and immigration seldom forced major civilizations to return to the extremely low-population density lifestyles of hunter-gatherers because some of the accumulated knowledge could now be retained. Knowledge supplemented by innovation mollified the effects of climate change and depletion of soil nutrients and thus supported continued expansion. Innovation continues to drive agriculture today; for example, in plant nutrient requirements being supplemented by adding fertiliser based on knowledge of the active fractions in manure leading to the application of readily available phosphorus to deficient soils.<sup>29</sup> Similarly, understanding of the operation of the millennia-old practice of using legumes on nitrogen-deficient soils led to mechanisms to harness nitrogen from its abundance in the atmosphere for targeted application to the growth needs of plants.<sup>30</sup> Genetic improvement follows a similar path through history.<sup>31</sup> Modern critics of such innovations – genetic manipulation and manufactured phosphorus and nitrogen fertilizers – forget that they rely on the same logic practiced across centuries in natural philosophy.

We are all fed from an agriculture that relies on scientific insight into natural operations – the ‘natura naturans’ that centres the philosophical insights of Spinoza.<sup>32</sup> Resting on a common philosophical base from before Spinoza’s time until today, agricultural science has consistently found that its most durable innovations are those that are closest to natural processes. This is why the philosophical context is critical to agricultural scientists, and why an understanding of agriculture and science is important to academic philosophers who comment on environmental matters. Where this does not occur, bias can affect even elite philosophers and scientists, such as Ehrlich’s famine predictions<sup>33</sup> published a decade after the creation of FAO<sup>34</sup> and around the same time as agricultural scientists were beginning to discuss what became the Green Revolution and raised the efficiency of Asian cereal production and

fed a billion more people than before.<sup>35</sup> The Green Revolution was one of the great advances of human history, and in common with all change incurred some drawbacks. Drawbacks are invariably identified by those involved, yet in today's age of constant communication and political opportunism, they are easily exaggerated as unreasonable risks. Within that narrow logic, the fertilizer production on which intensive agriculture relies is easily linked to fossil fuel fears, for example.

Obviously the expansion of agriculture currently relies on fossil fuels, just as it once relied on war and slavery. The ancient approach of taking over others' lands has been employed by Western civilization more recently than it usually cares to acknowledge – as part of WWII.<sup>36</sup> In place of such expansion, increasing production per unit of land has been a research focus that has continually improved the efficiency of fertilizer use even as yields increased. Rather than an impost on nature as is sometimes claimed, this knowledge represents an understanding of nature and means of working more closely within it while feeding rapidly increasing numbers of people from smaller areas of land. Now we are beginning to produce viable quantities of food without the need for land at all. Innovations that consistently work are invariably those that accord with natural mechanisms as evidenced in global cereal grain production in 2015 being double that of 1968 without any increase in production area.<sup>37</sup> Animal science has made similar gains at the same time as containing zoonotic disease risks and improving animal welfare by understanding and working within natural processes. Continuing these advances of agricultural science leads to the constant discovery and application of knowledge that improves the overall wellbeing of humans. And as argued throughout this work, real wellbeing and contentment in life requires agricultural science to understand and work within nature – that is wise interaction with other parts of nature, which is philosophy's *raison d'être*.

It is possible to oppose these arguments, and where done with understanding and respect for learning, deeper understanding may arise through convergence.<sup>38</sup> On the other hand, opinion informed by sentiment more than reason can blaspheme science, and it must be acknowledged that even scientists succumb to common human

foibles as at least one philosopher has noted: “For some of them it is clear that rationality leads to truth highly valued in itself. For others it is the best way to gain control over nature (or over fellow people). For a few of them it is a means of improving the human condition. In all of these viewpoints values are involved.”<sup>39</sup> Anecdotally rather than scientifically, I observe that the actual weightings would be in the reverse order with most agricultural scientists seeking to improve the human condition through basic and applied research.

Agricultural science is an applied science informed by the basic sciences conducted within it and across other fields. In this respect it is similar to all other fields and rests upon three forms of ‘truth’. Applied science deals in objective ‘truth’ that seeks to minimize incursions from subjective ‘truth’. Contextual ‘truth’ refers to the underlying assumptions of research. All three assist science to improve knowledge of nature. In agricultural science, the relationship between the subjective and objective, as in Figure 2, reveals observations of the community as a basis for reflective observation to inform research, which in turn interacts with a wider perspective of philosophy in such forms as value systems and ethics. Nevertheless, narrowness within a discipline can overlook the need to “query unquestioned presuppositions” when “looking for new principles”. Yet it was such deviations that assisted “Einstein on space-time, Heisenberg on causality, Darwin on purpose and essentialism, Bernard on life”.<sup>40</sup> Objectivity is but part of the challenge.

The challenge grows but does not detract from the fact that broadly defined philosophy should advance understanding of the environment, our place in the cosmos and of our own nature. Emotive reactions to genetically modified organisms are but one of the misunderstood innovations that accord with natural processes to improve productive efficiency. Among those who object to it, the essential innovation has been acceptable for decades in the use of sprays of the natural insecticidal *Bacillus thuringiensis* (bt) on organic crops. However, incorporation of the active mechanism of bt into cotton to make a plant naturally resistant to insect attack was vilified. This was a strange reaction insofar as the innovation was the logical extension of Rachel Carson’s natural philosophical work,<sup>41</sup>

which is not only ranked one of the greatest scientific works of all time<sup>42</sup> but is also sacred to many who eschew modern technologies. Huge reductions in pesticide use with environmental and human health benefits accrued from the bt crops, yet activists still felt justified in vandalizing crops and farms. The scientific awakening of the leading vandal and his subsequent encouragement of the use of genetically modified organisms is a modern secular conversion story akin to the pre-industrial philosophical stories of psychological awakenings.<sup>43</sup>

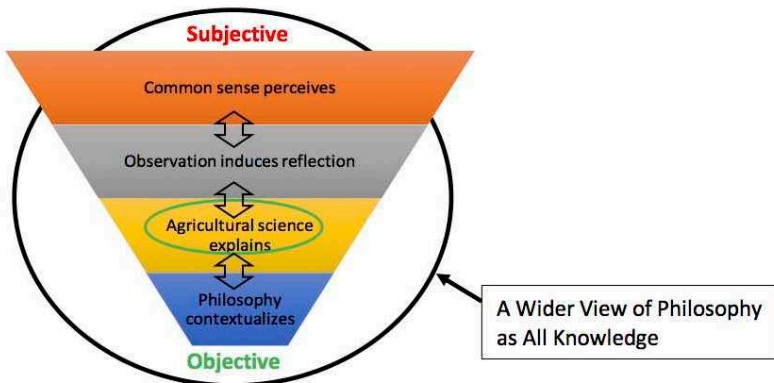


Figure 2. Interactions between Agricultural Science and Philosophy<sup>44</sup>

### Genetics, Climate & Change

Formerly head of Greenpeace and its destruction of genetic research plots, Lynas' changed his views after he checked the science.<sup>45</sup> He then realized that the processes of genetic modification had occurred naturally for millennia and had furnished all major foods consumed today. Suitable mutants had been selectively bred to produce fleshier fruits, meatier animals and more wholesome foods. For example, wheat, the most world's common cereal is an unusual combination of three genomes, which means it is a genetic combination from three different wild grasses. From its initial use as an edible grain, it has been successively selected to produce the range of today's large-grained wheats based on detailed observation of subsequent mutations. Lynas understood that the first-wave of modern genetic modification was the same natural process, with key genetic information from other species being incorporated into a desirable

product. Since then, the continuous philosophical task of living beneficially within natural processes has led to today's editing of the genes within a species. This is even closer to the most common natural process of species adaptation to changing environments, and to co-evolution.<sup>46</sup>

Whether it is genetic modification, inorganic fertilizer or land-levelled irrigation, objections to applying knowledge about nature rest on emotion more than rationality. To be practical, we must acknowledge the philosopher Hume's observation that emotion is master to reason. Nevertheless, risk today can be exaggerated by evangelical emotion that forces minority views onto others to their detriment, as occurred when European anti-genetic modification lobbies kept food aid from hungry mouths in Africa and loaded more debt onto governments of food-deficit nations. Meanwhile, genetically modified crops expanded to 200 million hectares by 2017<sup>47</sup> outside the restricted parts of Europe, and have been served in trillions of meals.<sup>48</sup> Having said all this, it is also possible that part of the concern about GMOs may derive from their ownership accruing to a small number of corporations, which marginalizes individual choice over food. However that may be, a much more significant philosophical issue is the acceleration of climate change.

Agriculture's ten millennia existence has been more successful since seven millennia ago, coinciding with, and probably as a product of, the most stable climatic period suited to this form of existence in the past 100 millennia. We still live in that era. Civilization and commerce produced the wealth that is today considered normal and which is said to be valued at \$500 trillion.<sup>49</sup> In the 2018 Nobel Prize awards the question was raised about the ability to further increase wealth in the face of the costs caused by rising global temperatures.<sup>50</sup> The recent IPCC report estimates that a 1.5°C increase in temperature would incur a cost of \$54 trillion; for a 2.0°C increase \$69 trillion and for a 3.7°C \$551 trillion. Where would that wealth come from? Agriculture, an undervalued yet major component of that wealth, is estimated to incur a 13% reduction in crop yields before 2100 from climate change and to put three billion people at risk. A carbon tax is said to be a logical response, but is only part of the answer albeit one that attempts to realign perverse incentives. While recognizing that

such financial expressions of risk are the language of our era, it is a very narrow philosophical lens through which to view an existential issue.

Philosophy operating from its premise of enhancing human wellbeing might diagnose excessive wealth as a constraint. A society-wide perspective of overall wellbeing may also be able to rationally consider a reduction in human populations, although this actually seems possible only through the delayed action of declining birth rates. Such matters are difficult to discuss, and in most forms arrive at compromised environmental objectives and the favouring of one group over another. This narrows objective philosophy through implicit assumptions about matters that are 'sacrosanct' – a term chosen deliberately to invoke the belief-based dogma that the philosopher of science Popper clarified as follows:

“A limited amount of dogmatism is necessary for progress. Without a serious struggle for survival in which the old theories are tenaciously defended, none of the competing theories can show their mettle – that is, their explanatory power and their truth content. Intolerant dogmatism, however, is one of the main obstacles to science. Indeed, we should not only keep alternative theories alive by discussing them, but we should systematically look for new alternatives. And we should be worried whenever there are no alternatives – whenever a dominant theory becomes too exclusive. The danger to progress in science is much increased if the theory in question obtains something like a monopoly. ... But there is an even greater danger: a theory, even a scientific theory, may become an intellectual fashion, a substitute for religion, an entrenched ideology.”<sup>51</sup>

This warning was oriented to scientists who are specialists in their fields and applies to the philosophy underpinning models employed across the social, physical and biological specialties. It is also applicable to the modern public that influences policy on such matters as climate change, which is based on models. Those models rely on highly specific knowledge from specialists across disciplines based on mutual trust in long and demanding investigations by educated minds. No one person understands the detail behind all elements of the complex models. Public opinion on the models

therefore remains uninformed opinion in most cases. Climate change is measurably real; anthropogenic contributions are considered probable by the vast majority of thinking persons. The philosophical questions centre neither on the reality of climate change nor on its causes, but on means of enhancing our overall wellbeing to maintain food production.

### **Adaptive Food Production**

Climate change has already affected food production and availability although it is often camouflaged by shorter term imperatives. For example, Western nations were largely unaffected by the 2007-8 global food crisis, but the subsequent 2008 global financial crisis captured their attention. In agricultural terms, the two crises together provided an indication of global shifts in food, oil and finance<sup>52</sup> as the influence of China, Brazil, India and Russia rise. The so-called free-trade approach was challenged by “the competing philosophical tradition” of overt involvement of the state in markets supported by the apparent inability of the free market to provide food security for many states, including some wealthy states,<sup>53</sup> despite WTO claims to the contrary. As states are fundamentally responsible for ensuring adequate nutrition for their citizens before most other responsibilities, investment by a food-deficit state in a food-surplus state’s agriculture is an ethical action, if that is the sole motivation. This is the same reasoning I have elsewhere employed about unethical actions that interfere with subsistence small farmers in poor nations unless clear improvements in food availability at low risk are assured.<sup>54,55</sup>

On average, the availability of food in the world is probably adequate at present, mainly as a result of technology having continuously reduced food production costs. However, the decline in Western public sector investment in the research that has driven such successes in the past, and the absence of new lands that can be easily converted to agriculture, are probably already increasing global food prices at the same time that global grain reserves have been reduced.<sup>56</sup> This plays into the repetitive existential risk of civilization. In philosophical terms our past actions have been motivated by innate assumptions of scarcity, and now that we have belatedly become comfortable with food being abundant, we may be ignoring

the rise of factors that will reintroduce scarcity. Factors creating the scenario include; populations continuing to increase, the rise in wealth inducing higher consumption, yield impacts of climate change and ever rising demand from Asia and Africa. Food is big business – estimates of annual food trade exceeding USD one trillion are probably underestimates, and when in short supply, the value of food rises quickly. Acting pragmatically, China has formed direct relationships with food-surplus states in Latin America. Middle Eastern states invest in stable food-surplus nations, which are mainly classified as being in the West including Australia.<sup>57</sup> This rising direct trade now represents more than 25 percent of global food trade.<sup>58</sup> In terms of overall food availability, food production in China and India are the largest influencers; however, some developments in the Western world also suggest possible approaches future food production, although this does not apply to all choices.

Trends in the West do not necessarily affect the rest of the world in agriculture. Thus veganism, for example, can be readily contextualized globally by simple arithmetic. The number of vegans is conjectural but statistics for vegetarianism can set a probably ceiling on the various guesstimates. A dated (2010) study concluded that “75 million are vegetarians of choice ... [another] 1,450 million are vegetarians of necessity [who] will start to eat meat as soon as they can afford it.”<sup>59</sup> Veganism is a small subset of vegetarianism, which has increased in the West while animal product consumption has increased rapidly elsewhere. The relativity of the two figures for vegetarianism provides a means of highlighting that about 1.5 billion people are at risk of not developing full mental and physical capacities because they lack access to animal food products.<sup>60</sup> In applied philosophical terms, the Western trend of veganism is largely irrelevant to global ethical discussions about wellbeing.

On the other hand, the West’s large-scale hydroponic farms that have been stimulated by wealthy demand for clean, uniform and aesthetically pleasing produce have proven viable. While it would be naïve to suggest that soilless production will quickly become a major food source, some commercial processes already serve niche markets. Such developments stimulate some consumers to reconnect to the source of their foods, and to value natural production systems.

What has been termed Europe's 'theme-park agriculture'<sup>61</sup> suggests a possible link between urban yearning for re-connection to food production, which may be part of the philosophical project to understand life and ourselves. Yet that yearning contrasts with the uneasiness fuelled by misinformation about the applications of science that currently allow the world to feed itself.

Uneasiness with some products of science may be an expression of our existential quest to feel secure. Security from hunger and other life-threatening events is fundamental to addressing that quest whether or not an individual recognizes it. Beyond addressing such fundamentals as food, the means by which anxiety has been addressed has always been through widely-based philosophy. Philosophy accomplishes its task through knowledge of our interrelations with all other aspects of nature expressed through myth and religion for much of history. Where the myths and religion are rejected, our role within nature is easily forgotten and somewhat ironically leads to both narrow technological control of natural processes<sup>62</sup> and impractical psychological projections about nature. Those two groups that are often depicted as opposing forces ironically share a common fault – they each misconceive nature in their own way.

The processes described in the preceding paragraphs assume that technological approaches do not become narrowly isolated but remain contextualized by philosophy's modern expression of science. The philosopher Whitehead summarized the point by stating that living organisms should be studied as integral units.<sup>63</sup> With that insight it is possible to clarify the claim that: "civilisation, like life, is a Sisyphean flight from chaos ... chaos will prevail in the end, but it is our mission to postpone that day for as long as we can and to push things in the opposite direction with all the ingenuity and determination we can muster".<sup>64</sup> While accepting that it all ends eventually, I do not take Whitehead to mean that we must work against nature; rather, I take his statement to mean that by understanding the nature of life, death and energy flows we can organize ourselves into civilizations that endure for long periods in accord with nature. That philosophical insight is the basis of sound science, and is especially important in the agricultural and other

biological sciences. It is the way that I conceive life. Nevertheless, I know that I must also discipline myself to consider that the philosophy and worldview of civilization based on agriculture could be incorrect; in this respect it is worth noting in closing that modern interpretations of ancient peoples are only hypotheses based on received histories.

As there is little choice except using the received history written by our agricultural cultures, I accept it as a useful framework that defines the majority worldview. However, at the same time I am aware that received stories are ipso facto unchallenged, and unchallenged information is not true knowledge. As philosophy relies on knowledge that is as close to the 'truth' as possible, it is appropriate to at least consider that our basic assumptions about agriculture may be wrong. In elaborating the matter, Scott describes our potential error in believing that agriculture "replaced the savage, wild, primitive, lawless, and violent world of hunter-gatherers and nomads. Fixed-field crops, on the other hand, were the origin and guarantor of the settled life, of formal religion, of society, and of government by laws. Those who refused to take up agriculture did so out of ignorance or a refusal to adapt. In virtually all early agricultural settings the superiority of farming was underwritten by an elaborate mythology recounting how a powerful god or goddess entrusted the sacred grain to a chosen people."<sup>65</sup> If our fundamental belief is wrong, does it affect my overview of the relationship of agriculture and philosophy? My conclusion is 'not much', because it forms the basis of our communication, and it is overwhelmingly the way humans survive today. Yet there is that nagging feeling that our settled lifestyles of leisure may not really be the 'good life' – it may be that we are simply adjusting psychologically to our co-evolution with the changing ecosystem. It could also be something else, and that causes me to remain alert to the possibility that our grandiose self-image may rest on feet of clay.

*While this discussion has focussed on agriculture within summarized versions of philosophy, the breadth of philosophy is discussed further in the following chapter. Discussions of the emergence of the Western tradition and its distractions, and the role of agricultural innovations*

*based on knowledge of nature that have been alluded to here are also amplified in subsequent chapters. These range from some obvious philosophical aspects of agricultural science such as management of genetics and adaptations to climate change to such less appreciated issues as the ongoing debilitation of millions as a result of malnutrition. In amplifying the role of philosophy as it is conceived in this work as an all embracing quest for knowledge that wisely informs and improves wellbeing, the following chapter includes science and the arts, diverse cultural traditions and both ancient and modern versions of philosophy. It also touches on academic philosophy in the background for the interrelationships that are integral to the agricultural and related sciences.*

## Chapter 2

### Pan-disciplinary Philosophy

*The thesis pursued in this work is that agriculture and in particular agricultural science cannot be properly understood separate from philosophy, and vice versa. Many in these fields may challenge the thesis, yet the project is justified by today's complacent assumption of food security, and the marginalization of philosophy in modern society. The thesis is developed by taking a broad definition of philosophy that embraces all knowledge in its quest to improve wellbeing and contentment. In its wide canvas it therefore considers folklore that may predate written works, religious writings that share the philosophical objective for much of history, and what is today called science and was once more aptly known as natural philosophy.*

#### **Confusion in Language**

Nomenclature is a special tool of modern philosophy. A more flexible approach to span all knowledge is required in this work, which relies on an openminded tolerance to the varied use of such terms as natural philosophy, philosophy and science. Science is therefore discussed as an instrument of philosophy in eliciting knowledge that improves life, and philosophy is discussed as extending well beyond the academy. The terms are interchangeable such as when it was said that “not only the Egyptians who had reached the stage of composing mathematical and medical treatises, but simpler men, living perhaps thousands of years earlier, were already pure scientists, that is, men moved by such an intense curiosity that the practical results and immediate fruits of their research became of secondary importance to them”.<sup>66</sup> Philosophy in this sense embraces agriculture and its sciences through the myths, beliefs and attempts at comprehending the cosmos even in pre-agricultural times. A ready example of this conceptual approach may be found in consideration of what we refer to as creation myths for earlier cultures being seen to share the same motivation as cosmology and Darwinian theory today.

Except for creationists, the common understanding today is that the simplest life forms appeared on earth hundreds of million years ago and slowly increased in complexity and diversity, and by about 600 million years ago included animals. One line of animals evolved into hominids then eventually into homo sapiens some 300,000 years ago. The benefit of science's creation story is its constant correction as more knowledge is generated from all disciplines.<sup>67</sup> Such an integrated understanding might be expected to inform a worldview to which belief systems adapt, as they have always adapted to changing environments and knowledge across history and before. If today's religious belief does not follow that tradition of adaptation, it may be for two reasons – the separation of modern philosophy from theology and religion, and the separation between disciplines in the modern academy and their consequent narrow foci. In part these separations result from huge expansions in knowledge, and the increasing need for specialist terms over the past century or so, including in philosophical terminology.

Philosophy relies on defined language to express complexities that are often opaque to the uninitiated. While each discipline has its jargon, this can be particularly confusing when assimilating global knowledge through the imperfections of translation, cultural nuances of meaning, and diverse modes of communication across traditions. Without engaging in philology, it is important to illustrate the need for open-minded understanding when dealing across cultures and traditions. For example, the Chinese philosopher Lao Tzu's admonition to "abandon learning so you will be free from trouble and distress",<sup>68</sup> or "the master leads by emptying people's minds, filling their bellies"<sup>69</sup> appears to conflict with the Judeo-Christian tradition's "get wisdom: and with all thy getting get understanding".<sup>70</sup> The word 'understanding' in the latter passage is variously translated as; knowledge, revelation, insight, discernment, comprehension, interpretation, good sense, common sense, intelligence, prudence, good judgement.<sup>71</sup> Comprehension relies on study and reflection to probe deeper meanings. Deeper meaning might lead us to the attractive philosophy of deep ecology in which humans are no more important than other animate and inanimate forms; however, while I can see this as an idealistic 'omega point' in

philosophy,<sup>72</sup> its limited immediate practicality for this discussion means that I will not dwell on it here.

To suggest a deeper mode of reading will appear religious to those familiar with the practice of 'lectio divina', equivalents of which exist in many traditions. Insofar as it implies open-minded and reflective concentration, it provides a means of reconciling superficially conflicting statements across cultures and translations. Such an approach allows Lao Zhu's statement to be contextualized in the times of his China; 'filling bellies' may have been advice to a leader in a similar vein to the Roman 'panem et circenses'.<sup>73</sup> References to 'learning' may have been made in an environment where intellectualism could breed an arrogance that hindered further understanding. In effect it can be read as a call to the wisdom of remaining open to new insights, and in that way would accord with the above Proverbial statement. So it is that language is both a key and a stumbling block to knowledge. When it comes to the representation of abstract concepts it is little wonder that Lao Tzu's philosophical tradition of The Tao or The Way claims that 'the Way that is told is not The Way'. The same difference has been made in modern explications of Buddhism translated as 'dhamma language' as distinct from 'everyday language' that produces divergent meanings from the same terms.<sup>74</sup>

The limitations of cross-cultural philosophical discourse are paralleled by the confusions that can arise in cross-disciplinary discussions, in this case relating to agriculture and philosophy. Approaching the subject with this caution aims to 'get understanding' from sometimes conflicting arguments by seeing through differences and capturing deeper commonalities. It is an approach I have beneficially employed in another book.<sup>75</sup> Commonalities do not necessarily lead to neat points of agreement, but can uncover shared understanding beneath conflicting philosophical details. To do this, however, we need at least some common understanding of terminologies.

### **Some Terminology**

Common language and that of specialists differ in their use of words. Examples include the art of agriculture, the hazards of chemicals, and

definitions of agriculture, agricultural science and philosophy. Agricultural science was known as an art before the words 'art' and 'science' morphed into their modern meanings. An art in those times was any specialist area, and science referred to constructive knowledge. Yet even in those times it was noted that "ars sine scientia nihil est" – art without structured knowledge is nothing – according to a 14<sup>th</sup> century philosopher architect.<sup>76</sup> Everyday terms in today's world are burdened with uninformed opinion that conflicts with specialist knowledge. For example, 90 percent of those surveyed in the USA believed that 'chemicals' were uniformly unhealthy. It is difficult to reconcile the terminology of educated persons with those who do not understand that everything is chemicals. Likewise, we might argue that it is logical to say that "to be pro-technology is to be pro-people"<sup>77</sup> but this has limited credibility if public opinion segregates technologies into those that are acceptable such as a magnetic resonance scanners, and those that are suspect despite evidence to the contrary, such as poultry raised in sheds.

Philosophy itself struggles with the same issues, with public usage of the word 'philosophy' being closer to a statement of preferences than to a pursuit of human betterment. In fact, both philosophy and agricultural science suffer in the public perception, being misunderstood for different reasons but to similar effect in terms of their reduced attraction to very bright students. Being more familiar with the public perception of agricultural science, I can see that prejudices may be culturally ingrained from views that Greek and Roman craftsmen were of higher status than slave agricultural labourers. Likewise in ancient China, artisans' products were considered inferior to art. In philosophy attempts to break down the dualism between thought and action<sup>78</sup> may in fact have exacerbated such differences. The point need not be elaborated here because this work aims to transcend such arbitrary differences. Nevertheless, to advance the discussion it is important to briefly explain its three major terms.

Agriculture in this book refers to all knowledge about agriculture, including technological innovations, but more particularly the knowledge that contributes to the search for understanding of, and comfort in, the world that derives from feeling food secure. In this

way knowledge and science have the same meaning as they have had for most of history – as in ‘agricultural science’.

Agricultural science operates as a branch of philosophy in the sense that “science, in the modern conception, is of a piece with philosophy and with reason itself”.<sup>79</sup> Agricultural knowledge, in the sense of the knowledge that allowed societies to feed themselves reliably, also midwifed the birth of the philosophy we comprehend today. No one can say when this occurred, and dwelling on such matters may well be as pointless as debating how many philosophers can dance on a prion. As there was no ‘revolution’ that marked the beginning of philosophizing, our broad definition of philosophy extends to the understanding developed by pre- and non-agricultural societies and the myths and legends they produced to explain the nature of being.

Philosophy in this book is thus treated as broadly as possible to include the diverse expressions of humans’ search for understanding and comfort in the world as an expression of wisdom. While that rests on an untestable hypothesis, it aims to include all useful knowledge. However, contrary to modern perceptions of what is useful, this definition may relegate many technological innovations to be but passing contributions to useful knowledge; in the words of one philosopher, “major contributions to minor needs”.<sup>80</sup> It also includes diverse cultural traditions that more commonly might be referred to as folklore. This approach renders such indulgences as historic searches for the first philosopher to be pointless unless they advance understanding. It also renders parochial adjectival nouns of ‘philosophy’ – to paraphrase Chekov, ‘there is no national philosophy, just as there is no national multiplication table; what is national is no longer philosophy’.<sup>81</sup>

Philosophy conceived in this way might be defined as knowledge derived by observation, experimentation and rational analysis based on the premise that humans are an integral part of nature resulting from unguided evolution. It derives ethics from experience of what suits human interests while providing individual fulfilment by participating with others in humane ideals. The definition includes science and all other empirical and experiential learning, and by coincidence is remarkably close to the definition of humanism.<sup>82</sup> The

definition may appear to exclude religion, but that is a misconception; Eastern religions as described in Chapter 6 have similarly based ethics on human needs, and do not differ markedly in this respect from such Christian interpretations as that of the Quakers' and other modern Uniting values.

### **Integrated Philosophy**

Thales (c. 624-546 BCE) was named by Aristotle as the first philosopher,<sup>83</sup> which although spurious assists in focusing discussion because Thales sought to understand the natural world through theories and deductive reasoning. He "thought all things are full of gods",<sup>84</sup> while also postulating the unity of nature and calculating the occurrence of a solar eclipse. As the first person known to have integrated astronomy, mathematics and medicine, Thales might also be seen as a symbol of more ancient philosophies, such as those of Babylon (Sumeria), China, Egypt and India where individuals' names were not always attached to writings. So while Thales is the first to be named in the European tradition, he is neither the first philosopher to be named in the world nor is his the first philosophy. More than a thousand years before the time of Thales, the Rigveda of the early 2<sup>nd</sup> millennium BCE may well be considered the first philosophical writing, elements of which probably influenced early Greek quests to comprehend nature and humans actions within it, including agriculture.<sup>85</sup>

Philosophy involves all who read, create or think. The word 'philosophy' that entered the English language around 1300 from Old French via Latin copied from the Greek 'philosophia' means; love of knowledge, pursuit of wisdom, and 'systematic investigation to inform one's conduct of life'. Such investigations have produced millions of volumes, many of which have added to our understanding. Yet according to Wittgenstein, the search is best conducted "not through the contribution of new knowledge, rather through the arrangement of things long familiar".<sup>86</sup> This explains the perennialism of some ancient texts and the repetition of early discoveries; I consider it more than serendipitous that such perennialism supports this work's broad definition of philosophy including the treatment of humans as an agglomeration of many life forms. However, modern use of the term has confused its intent.

Modern philosophy is said to be an increasingly narrow academic discipline,<sup>87</sup> yet at the same time the academy uses it as an embracing term for all branches of learning when universities award the degree of ‘Doctor of Philosopher’ (PhD). The PhD is awarded for sustained investigations that have significantly added to knowledge. Its modern usage across most of the world builds on developments of 19<sup>th</sup> century Germany; however, in the current era the PhD may be awarded for research with a narrow focus on, for example, a technological development that does not obviously link to a ‘systematic investigation to inform one’s conduct of life’. The embracing symbolism is further eroded by the awarding of ‘higher doctorates’ within major disciplines. For example, my PhD is seemingly ranked below my ‘higher doctorate’, the ‘Doctor of Agricultural Science’.

Such confusion is restricted to a microcosm and need not lead to the superficial understanding of Stephen Hawking’s statement that “Philosophy is dead ... Philosophers have not kept up with modern developments in science. Particularly physics.”<sup>88</sup> Hawking was speaking of modern academic philosophers, and indeed not all of them. He might equally have levelled criticism at scientists who focus on technology without considering a wider philosophical context. The problem of disciplinary fragmentation pervades all fields. One attempt to associate the diversity of disciplines that make up knowledge has been proposed as a ‘Tree of Knowledge’ comprised of four levels of complexity from matter, through life and mind, to culture – these accord with the physical sciences, the biological sciences, the psychological sciences and the social sciences.<sup>89</sup> The psychological sciences are listed separately because the model described in Figure 3 was initially developed to address the lack of a clear definition of that field. Various disciplines span two or more of the ‘cones’ in the diagram; in the case for agricultural science, all four cones are involved through the social, psychological, biological and physical sciences.

Figure 3 is also a useful means of describing approaches to philosophy, and in fact may be more directly applicable to modern interpretations of philosophy than to psychology. Be that as it may,

the model is limited insofar as it depicts cones emanating from 'lower' forms across time. This presentation omits the non-hierarchical interactions between all levels and disciplines. Also, the model is embedded in a paradigm that assumes that "scientists have not done what is possible toward integrating bodies of knowledge created by science into a unified interpretation of man, his place in nature, and his potentialities for creating the good society".<sup>90</sup> That statement may be acceptable in general but is itself limited by seeking a 'place in nature' for humans rather than studying nature including humans. Living within nature is not an abstract ideal – it is a description of all life, and has been the approach of natural philosophy until recent decades. It has also been a fundamental assumption of many religions, which might otherwise be called philosophies.

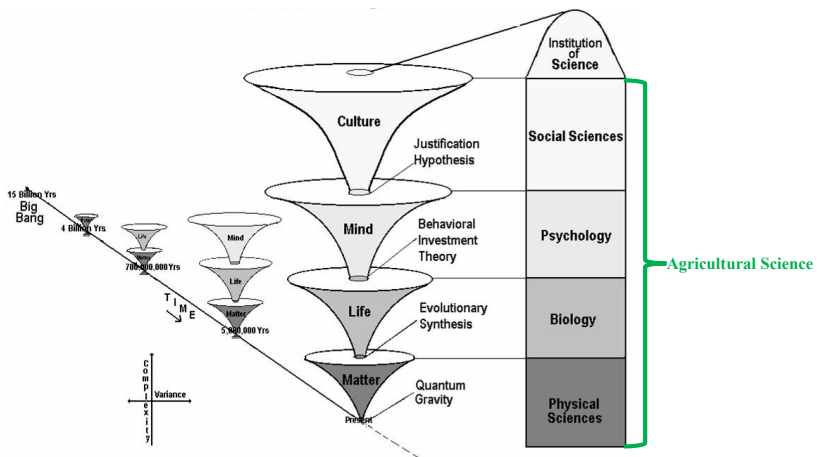


Figure 3. The Tree of Knowledge (main)<sup>91</sup> linked to Agricultural Science

Our embracing definition of philosophy spanning research with the purpose of improving mental and physical comfort and contentment necessarily includes religion. Historically, religion and philosophy have been integrated; recent neglect of religion is unfortunate when it rejects this history of human learning. As Hegel noted, "religion has a content in common with philosophy",<sup>92</sup> in which he was referring

to learned understanding and experience-informed development rather than to the credo of the masses. He described his embracing vision as “the spirit’s consciousness of its own freedom and of the consequent realization of this freedom”<sup>93</sup> across all traditions and history. I therefore include in early philosophy the 29 BCE Greek writings of Virgil about agriculture,<sup>94</sup> the Indian Rigveda with its agricultural references and all other works unencumbered by artificial boundaries between agriculture, folklore, myth, philosophy, religion, science and cultures. With 200 years of increased globalization linking the West to other philosophies of ancient and non-European traditions, we might expect to be able to build on Hegel’s insights to re-integrate the knowledge and wisdom implied in the etymology of the words ‘science’ and ‘philosophy’.

### **Scientific Philosophy**

With the increasing pace and complexity of scientific understanding of nature it is unsurprising that modern academic philosophy may not always seem relevant to scientists. Yet it should provide the context for all learning. This means that those practitioners who are more technologists than scientists are further alienated from the philosophical context of their work. It might even be argued that technologists can be as distant from philosophy as some academic philosophers are from the embracing definition of philosophy used herein. It has indeed been observed that this distance is similar to reading the scientific ideas of Lucretius separate from the metaphysics in his ‘De rerum natura’.<sup>95</sup> Following that analogy Romero comments that it “is very regrettable since current science is in desperate need of philosophical work to clarify the ultimate meaning of its theories and to yield a coherent view of the world”, and that “a scientist ... who despises philosophy is at risk of falling inadvertently into some bad or obsolete philosophy that might hinder further research”.<sup>96</sup>

Done well, modern science and philosophy share approaches when science is understood as a product of philosophy. Semantics define systems and theories, ontology describes space and time, epistemology informs methodology and ethics and so pervades values in science and the application of its outputs. Philosophy relies on the objectivity of science to remain above speculation and tricks

played by the senses. When the two modern fields are brought together as scientific philosophy, then the process familiar to science of hypothesis formulation and testing can be applied in philosophy albeit often in a less empirical manner. Thus modern philosophy can be based on science’s methods by generalizing from the outputs of science to propose a wider theory, and it can also explore other methodologies of science and apply them where possible.<sup>97</sup> Within this wide view, the principle branches of philosophy become those of scientific philosophy and include; aesthetics, epistemology, ethics, logic, metaphysics, and various specialist focus areas. Other lists exist, but this is sufficient for the current discussion, for which purpose it is represented in Figure 4.

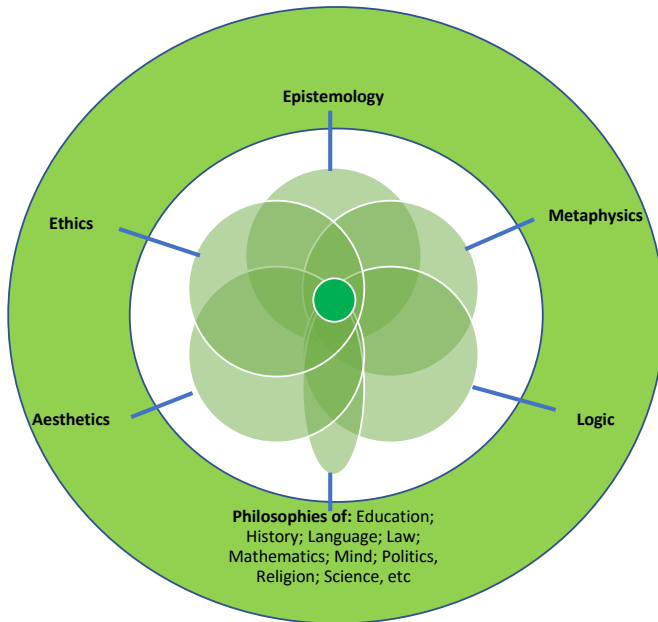


Figure 4. Components of Academic Philosophy (inner set)

Figure 4 is one approach to displaying the interrelationships that would ideally exist in academic philosophy. That ideal, as noted, is seldom realised – and in any case does not represent the full

integration of knowledge to which this text refers. In the model as illustrated, philosophy is the sum of the set of circles and a minor ellipse that includes agriculture and agricultural science in the 'philosophies of' set at the bottom of the diagram. By contrast, the embracing approach of this work considers all that knowledge and more in the outer green ring, which is knowledge that conduces to improved understanding and wellbeing and is thus philosophy.

Philosophy, sometimes unwittingly, relies on assumptions for its scenarios. Science relies on the assumption that reality is knowable; even though most recognise the utility of the assumption at the same time as realising that it is false. The practical value of both philosophy and its science, rather than searching for absolute truth, is that the theories postulated and tested can yield one theory being more correct than another. No theory is final; in physics, quantum theory has inconsistencies with the theory of relativity, which is why physicists pursue an integrated theory-of-everything (TOE) – but that too would remain a theory even if there was a general consensus because “final theories belong to the realm of dreams.”<sup>98</sup>

Dreams or fancies result from our limited means of perception, which have often led us into theories of life that have subsequently been shown to be wrong. For example, a long-held conception of the solar system was overturned by Copernicus' insights. Such error is to be expected from the assigning of meaning to objects or ideas based on our perceptions. Swift somewhat satirically noted this: “if certain ermines and furs be placed in a certain position, we style them a judge, and so an apt conjunction of lawn and black satin we entitle a Bishop”.<sup>99</sup> The ancient Greco-Buddhist story of the Milindapanha<sup>100</sup> illustrates the same insight. A philosophical approach requires that nothing is considered final, real or even knowable, which is the constant challenge to most scientific approaches. By extension, such conceptions as ethics should also be understood as arbitrary values assigned to specific situations. Ethics is a major consideration in modern interactions of agriculture with equity, health and the environment.

Ethics are claimed to be absolute by some literalists. On the other hand, philosophical insights show the illogicality of thinking that

ethics exist “independently of the human beings that codify and follow them”.<sup>101</sup> Through much of the history of Western philosophy it has been assumed that God prescribed ethics; today ethics are seen as a social construct that aims to guide behaviour for the common good. This is seen to accord with Plato and Heraclitus’ observations that everything exists in a state of flux. It is possible that this realization distracted Western philosophy from observing that prior events and conditions affect subsequent outcomes in a natural process. By contrast, Eastern philosophy developed its ethics within the concept of cause-and-effect in its approach to enhancing contentment, as expressed in the insights of ‘*paticca-samuppada*’ (dependent origination)<sup>102</sup> and ‘*anicca*’ (impermanence).<sup>103</sup>

The universality of change that affects everything is fertile ground for a discussion about agricultural science within philosophy. While both agriculture and philosophy are aware of change and causation, considerations are often restricted within disciplines. So, to further introduce some of the concepts mentioned later in this work, the rest of this chapter outlines some reasons why philosophy is the critically important context of agricultural science, and why agriculture and science are critically important to philosophy.

### **Why Philosophize**

Why attempt this task? It is not a task that conforms with what an agricultural scientist does, nor does it enhance one’s reputation among technologists. My motivation is a continuation of a search for understanding that has shown a convergence between diverse branches of knowledge and experience across the ages. Previous books present the trend under the rubric of sustainability for agriculture, and in more esoteric terms for other approaches.<sup>104</sup>

A second question is: what is the point of philosophy in agriculture? The point is this: we have wondered about how to live well since pre-historical times, and we have not stopped wondering. If such wondering seems absent at times, it may be that distractions have diverted our wonder, and perhaps that in itself conduces to anxiety or in the words that define philosophy, does not provide for ‘systematic investigation to inform one’s conduct of life’. Expressed

simply, the search for contentment today can be seen as the main point of philosophy, and contentment begins with a secure food supply.

If the search for contentment is the point of philosophy, consider how modern society has been described, for example by Dorothy Sayers. "That human society is corrupt everybody will readily agree. And since we are today fairly well convinced that society is in a bad way and not necessarily evolving in the right direction, we find it easy enough to recognise the various stages by which the deep of corruption is reached. Futility; lack of a living faith; the drift into loose morality, greedy consumption, financial irresponsibility, and uncontrolled bad temper; a self-opinionated and obstinate individualism; violence, sterility, and lack of reverence for life and property including one's own; the exploitation of sex, the debasing of language by advertisement and propaganda, the commercialising of religion, the pandering to superstition and the conditioning of people's minds by mass-hysteria and 'spell-binding' of all kinds, venality and string-pulling in public affairs, hypocrisy, dishonesty in material things, intellectual dishonesty, the fomenting of discord (class against class, nation against nation) for what one can get out of it, the falsification and destruction of all the means of communication; the exploitation of the lowest and stupidest mass-emotions; treachery even to the fundamentals of kinship, country, the chosen friend, and the sworn allegiance: these are the all-too-recognisable stages that lead to the cold death of society and the extinguishing of all civilised relations."<sup>105</sup>

That statement of discontent accords with the views of many thinkers. What is even more interesting is that those words were written 65 years ago by a great interpreter of a philosophical classic dealing with the human search for understanding, Dante's 'Divine Comedy'.<sup>106</sup> That classic describes the common human quest for understanding of the real meaning of contentment. Dante's work influenced many subsequent philosophers who expressed themselves in poetry, literature and art, but he himself was a product of the Dark Ages that maintained an elite schooled in the

philosophical traditions of its culture and thus his thoughts were expressed in Christian terms. This same central theme of philosophy can be traced back nine centuries before Dante to Augustine.

When Augustine observed that “man has no reason to philosophise except with a view to happiness (contentment)”,<sup>107</sup> he encapsulated the breadth of human intellectual endeavour before and after his era. Freud again pointed this out candidly when he wrote “this alone I know with certainty, namely that man's value judgments are guided absolutely by their desire for happiness”.<sup>108</sup> ‘Happiness’ is often mistaken to mean getting what one desires without having engaged in reflective thought; that is why, even though it is often called ‘utility’ in academic philosophy, I use ‘contentment’ where possible. The words are translations of the Greek ‘eudaimonia’, which is also rendered as; the highest human state, wellbeing, and human flourishing. In literal terms, it can be interpreted to mean being looked after by a deity, but without supernatural connotations. It is the objective of philosophy.

The philosophical objective can be lost if academic philosophy seeks to limit discussion of past debates to the viewpoint of a particular school of thought while omitting insights from elsewhere. Hegel sought to address this, and more recently the unconventional philosopher Schumacher argued that matters that are in doubt should be the focus of study more than those that are agreed.<sup>109</sup> Aquinas, with the benefit of his introduction to Aristotle through the Islamic philosopher Averröes, had earlier expressed the same insight differently: “the slenderest knowledge that may be obtained of the highest things is more desirable than the most certain knowledge obtained of lesser things”.<sup>110</sup>

Aquinas was referring to knowledge and understanding that does not readily yield to rational deductive or inductive reasoning, and which is too easily dismissed as ‘religious’ in academic philosophical discourse. As this work maintains that any separation of religious insights from philosophy is as artificial as that made between humans and nature, it should also be clear that both separations limit the integrated understanding that they purport to seek. One does not

have to be religious at all to see that agriculture's secure food supply led to civilization and city-states that eventually codified philosophies within religions, or that before that time humans developed myths and folklore that embodied their understanding of their world using stories from agriculture. However, such integration is not common, possibly because it is difficult to align intuitively.

Neglect of matters that we cannot easily 'intuit' may be traced to Descartes' rule: "If in the matters to be examined we come to a step in the series of which our understanding is not sufficiently well able to have an intuitive cognition, we must stop short there. We must make no attempt to examine what follows; thus we shall spare ourselves superfluous labour".<sup>111</sup> Descartes does this expressly in his quest for humans to be "masters and possessors of nature", and while that phrase offends many today I am mindful that this Cartesian mindset has produced some exceptional discoveries of science of the past three centuries. But in narrowing the quest to what can be quantified, science loses its embracing definition of all knowledge and cedes this ground to other insular disciplines, including academic philosophy that in turn has failed to embrace non-secular understanding.

When agriculture is conceived from a narrow perspective it becomes dogmatic and technologically sterile, which is a very strange outcome for a field that is integral to nature and life. We rely on empirical techniques, not because they contain whole truths, but because they are our feeble means of trying to understanding separated parts of a whole that is too complex for our comprehension. Misunderstanding of this point is the essential difference between science and technology; as illustrated in the Box below about science and technology, science seeks to understand nature and as a vocation it is a means of uncovering the workings of nature in order to improve human wellbeing. There are inevitable side-tracks and dead-ends, but the quest continues as it has from pre-scientific times and in the process clarifies some matters thought to be incomprehensible. The consideration of matters beyond our comprehension has been urged by sages from diverse cultures across millennia, but we should not become distracted by the tools. A Chinese Buddhist Sutra expresses it in a famous parable of a fool mistaking the pointing finger for the

moon,<sup>112</sup> which equates to Descartes being comfortable with using mathematics to “symbolise with the spirit”;<sup>113</sup> but mathematics was the symbol, not the essence.

### **Science ≠ Technology**

In the 1950s Rachel Carson stated that we were in the “Neanderthal age of biology and philosophy, when it was supposed that nature exists for the convenience of man”.<sup>114</sup> Science is philosophy’s modern tool for understanding nature and means of working within it in order to, among other essentials, ensure food security. Maintaining food for all people is the knife-edge on which agricultural science perches, tempting it to value technology above science. Yet we know that “feeding the world’s hungry people requires huge social, political, economic and cultural changes, not a simple technological fix.”<sup>115</sup> As the convert from anti- to pro-GMOs quotes “nothing human beings do is values-free”, and therefore “we cannot leave science to the scientists alone”.<sup>116</sup> With critical food production inputs concentrated in a few multinational corporations and the expectation that “it is inevitable that the farm machinery companies will step in to merge their Big Data machinery with Big Data genomics”,<sup>117</sup> philosophy relies on its agricultural scientists and a range of other knowledge-producing disciplines to avoid our tribal mind’s tendency to group-think.<sup>118</sup>

Philosophy that denies ‘spirit’ cuts itself off from the world’s intellectual history. This is compatible with Russell’s conclusion that we must acknowledge the impermanence of everything we do, think, create or even perceive, and that we must live with the “unyielding despair”<sup>119</sup> that it induces. He thus implies that resting with that despair is the foundation of all philosophy including science. In a similar vein, the angst that Kierkegaard described as endemic in modern civilization<sup>120</sup> becomes a starting point for our understanding. Agricultural science deals with the essential philosophical foundation of securing adequate nutrition, which today we demand be ‘sustained’. ‘Sustainability’ can be a valid philosophical approach if it is understood to mean living in accordance with the ever-changing environment, including our own mental environment. As this is more than we can comprehend in toto,

the neglected spiritual component of life is again implicated. To be clear, this does not mean unquestioned belief but rather its opposite, which is achieved by questioning all about oneself within nature to understand as much as possible and so be comfortable in one's existence. 'Comfort' here means acceptance of Russell's "unyielding despair".<sup>121</sup> The questioning of self is the same as the self-examination of psychology and neurology and such open-minded questioning about nature relies on the natural sciences, both pure and applied.

Science has sometimes been divided for the sake of discussion into 'science for manipulation', which seeks to understand nature in order to manipulate it as in aspects of agricultural science, and 'science for understanding' used as a synonym for wisdom.<sup>122</sup> Both forms of science exist, and the first type provides sustained benefits if it remains subordinate to second. However, in the absence of the wisdom from philosophy's quest – knowledge of what is true, good and beautiful leading to contentment – voids the benefit of manipulative sciences.<sup>123</sup> In agricultural science, this means that much technologically-driven problem-based research leads to further problems unless developed with integrated understanding. In psychology, it is the difference between modern secular approaches and the great philosophical works of the past in which life is depicted as an internal journey to a mountain atop which is found enlightenment, liberation, the way, paradise, salvation, heaven and a range of names given to a higher level of understanding.

A higher level of understanding may sound arrogant and esoteric, or it can be interpreted as that which is sought in the quest for knowledge that is generally defined as research and scholarship. I take the latter meaning, and consider it to be the basis of useful science as part of philosophy; there may be an esoteric component as well but that is not the current subject. In terms of today's scientific terminologies, there is a popular tendency to view physics, chemistry and even astronomy as complex and at the forefront of knowledge. However, the uncertainties of the biological sciences including their social science connections make them equally complex, and immediately relevant to the human quest for understanding. All use the mechanistic tools of Cartesian thinking, which are oriented to

inanimate matter; however, knowledge about and relevant to human understanding necessarily involves animate life forms such as humans. This is why the empirical biological sciences maintain an active dialogue with such traditionally descriptive fields as botany, zoology and geography. And this helps stimulate the descriptive sciences to find means of empirically testing their descriptions, such as DNA tools in botanical taxonomy and its incidental benefits of making knowable new sources of natural medications and other desirable products of nature.

Philosophy questions what is justifiably knowable – epistemology, and what really exists – ontology. The approach makes it difficult to accommodate the myths, folklore and even some of the descriptive models of cooperative scientific research. Yet agricultural science is informed by understanding across ten millennia that include myth, folklore and models. Myths and folklore, and to a lesser extent models, allow the transcending of dualistic intellectual approaches that rely on opposites and thus acceptance of simultaneously conflicting options. This is described as an aspect of wisdom, and has served agriculture well – it has also served philosophy in its primary function of enhancing contentment.<sup>124</sup>

Such a wide definition of philosophy implies a sound society as has been a preoccupation of various utopians, as well as such analysts of human nature as Machiavelli. It is therefore of interest to note that one of the few facts known of Machiavelli's youth is that he translated Lucretius' 'On the Nature of Things', which deals with aspects of agriculture, plants and animals.<sup>125</sup> It also places humans clearly as subject to nature – as part of nature rather than as its master. Machiavelli also wrote a eulogy of the philosophers who could only find their utopias in writing rather than reality, but he is dismissed from most lists of philosophers on the basis of his apparently contradictory statements. This seems unreasonably modest as his rhetorical approach and diverse appetite was the means that he used to advance what he saw as a moral virtue. In agricultural metaphor, it might be said that such an omnivore finds a nutritious diet more readily than the specialist vegetarian.

*This chapter has downplayed language and definition in academic philosophy in favour of an overarching meaning of philosophy that covers all knowledge. No specific branch of modern philosophy is invoked in this approach although it does assume that our minds do not stand outside nature and thus our conceptions are only analogues of reality. This approach encompasses other fields of philosophy that are more commonly studied as different disciplines, including agricultural science. As the task of this work is to introduce the reciprocity between philosophy and agricultural science, the following chapter briefly expands the historical overview of agriculture while also introducing further philosophical issues.*

## Chapter 3

### Agriculture, Science & Philosophy

*Agriculture and philosophy have been integrally linked since before human history. If that link is not evident today, it might be seen as a sign of the success of agriculture in sustaining civilizations that have developed philosophy. The association may be even deeper according to the hypothesis that agriculture, after dubious beginnings, eventually improved health and wellbeing that in turn fostered broader intellectual thought. Before and in parallel with such developments, diverse cultural speculations about the place of humans in the world produced the foundations of philosophy in myth and legend. Some of the longer lasting forms of such philosophy were codified into religions as theology, which almost universally has relied on agricultural examples to illustrate abstract and esoteric concepts. As the quest for knowledge that enhances human wellbeing and contentment, philosophy has also relied on agriculture and science to feed growing cities – questions around which are entertained in this chapter.*

#### **Feeding Civilization**

Philosophy in the West might be seen as having inherited its link to earlier knowledge from the myths of Prometheus<sup>126</sup> who stole fire from the gods and the seductive Pandora<sup>127</sup> who opened a jar not knowing its contents and released diverse evils.<sup>128</sup> Agricultural knowledge that accelerates genetic modification has been described in these same terms of ‘stealing from the gods’ and ‘unleashing untold evils’. In modern times, philosophy expressed through institutional economics has related the adoption of technological knowledge to the behaviour of ancient tribal societies in which shamans developed laws for the incorporation of new ideas and inventions.<sup>129</sup> By the same means, modern agricultural technologies – with their promethean potential – are the subject of philosophy updated to modern demands and fears.

As one of human's first major innovations that has variably continued to recent scientific developments, agriculture has modified the natural environment. At the same time it has improved human wellbeing and contentment. We do not know if agriculture started as flood plain opportunism or in small forest clearings, or if shifting cultivation was an adaptation to population pressure, or why hunter-gatherers first adopted agriculture despite its demanding labour inputs. On the other hand, we can reasonably suggest that folklore and religion guided agriculture and morals as a precursor to historical philosophy. Worldviews shaped by the association are thus intertwined with agricultural development through the domestication of plants and animals, the propagation of selected mutants and management of the environment. Until about 1700, wellbeing and contentment for most people relied on non-industrial innovations for food security, after which cities grew and were fed from natural philosophy's technologies of nutrient management, selected chromosomal combinations and agricultural machinery. Yet Prometheus and Pandora can still reprimand us when we stray from the way the elements of nature interact.

Contrary to our self-image of knowledge, control and technology, we may be less informed about ourselves than were most of our forebears. We do not readily accept the likelihood that the skills required of a hunter-gatherer were more diverse than those of a nomadic pastoralist, which in turn exceeded those of a farmer. Yet it seems that a focus on farmed grain production reduced the breadth of nature with which humans interacted, the ecosystems they traversed and the diversity of their diet. Modern times have removed humans even further from other elements of nature as they relegate agriculture to the small non-urban populations. The urban-derived philosophy that has emerged from such successive steps away from interaction with other elements of nature became ever more narrow. It might even be questioned whether the broader foundations courses in the best universities go much beyond matters related to a disciplinary field. Widening our learning to what I am calling philosophy in this book implies returning it to its pre-agricultural and non-literate breadth, which means considering myths and stories, and is presented in Chapter 5.

The accelerated pace of change and increased separation of cities from farming widened ignorance of the exigencies of food production among urban-based philosophers. Philosophies emerged that viewed peasants romantically in a manner not unlike today's idealized ethics about food production and agricultural environments. Meanwhile, agricultural science became ever more complex in its role of increasing production efficiency and reducing environmental impact in a market system. This has required much more than the sophistry of small-scale 'organics' or 'biodynamics' to feed the world. Yet those ideologies, despite their misconceptions, can be useful: they may have contributed to research into precision fertilizer and pesticide application, recycling of crop stubbles and use of urban waste. And it should always be recalled that the majority of world farmers are smallholders who are 'organic' producers through lack of access to fertilizer and pesticides. As with all philosophical matters, there are no black-and-whites in the natural sciences – just a continuous learning process that defines today's indissoluble interrelationship between philosophy and agricultural science. That relationship has developed from a shared agricultural history.

### **Agricultural History**

The French natural philosopher Fabre observed that “history lures people to the deadly battlefield with praises, but disdains the farmland on which people depend for survival; history knows clearly the names of emperors' illegitimate children, but cannot tell us where wheat comes. This is human folly!”<sup>130</sup> Today's luxurious lifestyles also allow modern follies based on uninformed projections onto history such as faddish diets, as illustrated in the following Box about cereal grains. To that folly might be added discussion of agriculture in mere technical terms. The history of agriculture is more than a series of technological innovations – it is complex and demands insightful observation. One philosophically convenient means to discuss it is through Vavilov's<sup>131</sup> pioneering hypothesis.

Vavilov postulated that the widest genetic diversity of a species indicated its geographical centre of origin, which pointed to agriculture having emerged separately in eleven regions, as illustrated in Figure 5. While more recent work has downgraded the eastern Mediterranean region (3),<sup>132</sup> the overlap between regions

that provided today's global staples with those regions where writing, and later written philosophy, originated indicates a common historical basis with agriculture. This is a humbling realization for modern agricultural scientists as no such sites exist in the regions where most of them live – the so-called 'north'. The regions of major interest, and the progenitors of agricultural science, are those where agricultural pioneers arose with myths and folklore that morphed into the written philosophies of Babylonian (Sumerian), Chinese and Indian cultures. Accordingly, the myths and folklore of these cultures before colonialization are mentioned in Chapter 5. Other early cultures' philosophies have not continued in the same detailed forms although we may speculate that their knowledge has been partly absorbed into the mainstream versions of our embracing view of philosophy.

### **Grain Brain**

Wealth and comfort seem to spawn false beliefs about grains, meat, vitamins, supplements and other dietary matters. It seems that 17 percent of the US population follows rationed diets at any one time,<sup>133</sup> some of which benightedly state that grains reduce physical and mental health<sup>134</sup> and that more natural diets existed in pre-agricultural times when humans supposedly enjoyed greater wellbeing. But in fact those lifetimes were short and lifestyles were onerous – and when our ancestors began to consume much grain life seems to have improved. Why? Because grains are more nutrient-dense than the roots and most fruits that had previously been gathered in attempts at settling in one place, and grains are easy to gather, measure, transport, store and cook. Life improved, but still settled existence remained less healthy than the hunting and gathering lifestyles that continued in parallel with early agriculture. The point is that grains played a part in the creation of civilization when they were consumed in a balanced diet with animal products from the livestock domestication that preceded grain cultivation.

Before agriculture, hunters and gatherers of the wild grains that formed diets for more than 40,000 years must have wondered about the world and nature's profundity. Oral traditions deliver such philosophy to us from remnant cultures such as the Australian

aborigines, as well as in surviving folk stories linked to local wisdom traditions of climate migrants absorbed into other cultures as they sought better agricultural lands.<sup>135</sup> Where climate change favoured agriculture, animals and plants were domesticated in the Neolithic Age by about 12,000 BCE.<sup>136</sup> Agriculture was tried and rejected in multiple sites until favourable climate change combined with developments in irrigation, crop rotation and manuring in the Bronze Age. Thereafter, agricultural intensification supported civilizations in Mesopotamia, Egypt, India, and China from around 3,000 BCE.<sup>137</sup> Each of these civilizations relied on major rivers – the Tigris and Euphrates, the Nile, Indus and Pearl rivers respectively – and each produced codified philosophies.

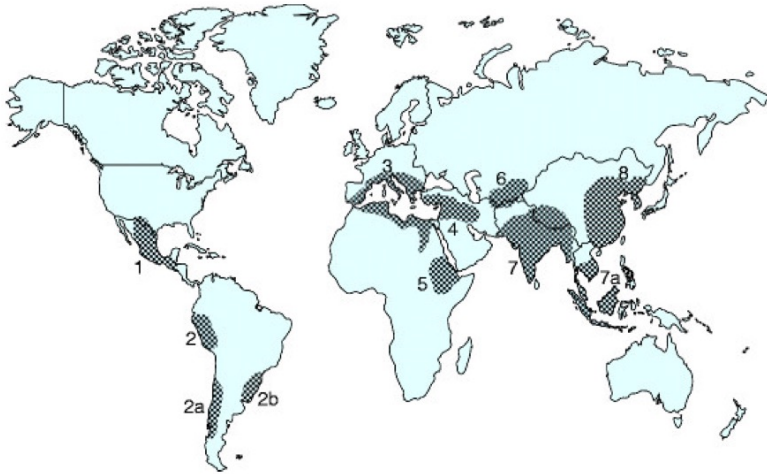


Figure 5. Centres of Origin Identified by Vavilov<sup>138</sup>

Agricultural progress in China, India and Persia was significant. However, to illustrate the development of agricultural knowledge, the rest of this section follows the European example, which sees itself as a successor to Egypt and Greece. And of course, Greece is the bedrock of philosophy on which most European worldviews have built. It is therefore relevant to note that, contrary to some historical treatises, agriculture did not provide a reliable food supply in ancient Greece where only about one-tenth of the land was cultivable for

grain production. Ancient Greece was a series of separate diversely governed groups that produced olive oil and wine that they traded for grains until Greece assumed control of Egypt and its grain.<sup>139</sup>

Importing grain and exporting other agricultural products provided the conduit for exchange of philosophical ideas, which continued into the classical Roman world. Thus both Babylonian (Sumerian) agriculture and philosophy found their way into Roman worldviews that extended across southern Europe where a form of Roman farm management continued for centuries as feudalism. The Iron Age introduced improved ploughs and other tools, and after about 900 CE when the Chinese mouldboard plough was introduced to northern Europe, new lands were opened and population grew. By this time, Europe's Babylonian and Greek influenced worldview had been supplemented by Indian and Chinese philosophy including agricultural knowledge through Arab traders. Arab and related Islamic influence continued later through governance of large parts of Spain and southern France.<sup>140</sup>

With continued intensification agricultural productivity rose, especially after the 16<sup>th</sup> century in Britain, resulting in accelerated population growth. Labour that was surplus to food production served the Industrial Revolution, technological products of which in turn further increased agricultural productivity.<sup>141</sup> Philosophers also blossomed in this environment of assured food supply and, by the 19<sup>th</sup> century, led to the field thereafter known as agricultural science.

The integrated European philosophy of the Middle Ages was largely centred in the Church, whose monks produced such insightful philosophical outputs as Mendel's plant genetics and Okham's logic that informed the scientific research method.<sup>142</sup> Intensification soon highlighted the need for improved plant nutritional knowledge, and after the observations of Boussingault in Alsace,<sup>143</sup> long-term experiments with various fertilizers were initiated at Rothamsted in Britain in 1843.<sup>144</sup> Much of this technical innovation overlapped with the Scottish and English Enlightenment periods of philosophy.<sup>145</sup> Through the 19<sup>th</sup> and early 20<sup>th</sup> century Germany also became a major centre of philosophy,<sup>146</sup> which not coincidentally produced the most important modern development on which most of the world

population remains reliant today – the Haber-Bosch synthesis of nitrogen fertilizer.<sup>147</sup>

Agricultural science had begun within the monastic academy and was thus integrally embedded within natural philosophy. With technological development it progressively became more removed from that base in the same manner as other applied sciences such as engineering and medicine. Each of these three applied sciences maintained more mutual overlap than they did with academic philosophy. By the time of the Green Revolution around the 1960s, agricultural science included both highly technological science and the so-called basic sciences. The Green Revolution is a linguistic convenience for a major triumph in knowledge development – human understanding of nature built on sciences born within philosophy. It produced high-yielding varieties of cereals, intensive irrigation, and informed inorganic fertilizer usage that further intensified agriculture leading to increasingly sophisticated pest, water and land management. It nourished a hitherto unforeseen rise in population and was the leader in minimizing environmental impacts. These are the same themes that give rise to the philosophical issues raised about agriculture today.

### **Philosophical Issues in Agriculture**

Agriculture has developed throughout its ten or so millennia to arrive at the modern global diet, which now relies on less than 200 cropped plant species out of the thousands that are edible. Only six crops provide most of the world's major nutrients. Three of those six are closely related Gramineae (grasses) – rice, wheat and maize; another grass species, sugarcane, is also a major nutrient source. Soybeans and oil palm are the other two of those six crops. Even livestock are largely fed on cultivated plants, at least in the developed world. Accompanying this amazing development in the present era is an acceleration of knowledge that has reduced the proportion of population associated with food production to a tiny minority.<sup>148</sup> As introduced above, this separation of consumers of food from its production has been accompanied by urban-based philosophy being less informed about food production and its primary role in enhancing wellbeing. These factors can lead to confused discussion of controversial issues concerning agriculture.

It is true that the pressure of costs on farmers can orient some to profit motives, and today's agricultural science serves both that interest and its far larger moral imperative to ensure equitable nutrition globally. This is effectively a continuation of the philosophical recognition that food security has been a central pillar of governance throughout history.<sup>149</sup> In modern times, the philosophical link might be seen, for example, in aspects of British responses to the late 1800s Indian famines.<sup>150</sup> Later the moral imperative to ensure adequate calories was refined to include nutritional balance. Food supply and improved public health led to a population boom and economic progress produced widespread wealth. With such developments accompanied by knowledge that produced labour-saving technologies in agriculture, urban lifestyles have become the majority for the whole world in the recent decade for the first time in history. The reliable agriculture that allowed cities where philosophers flourished had been so successful that the cities grew to become more remote from agriculture and academic philosophical discourse turned its focus to urban values.

Rural values have built on the philosophies of those involved in agriculture, which for most matters probably do not vary markedly from those in cities. Notable exceptions concern food production and the natural environment. Some specific areas of differing views include; land use, climate change, plant and animal breeding, and animal welfare. Philosophical differences also occur between cultures according to agricultural history. Wheat, which arose in the Middle East and spread to most of the suitable temperate regions<sup>151</sup> is largely a rainfed crop. It is associated with the Abrahamic philosophies of settled communities that blended with those of ancient Greece to produce the Western tradition. By contrast, rice probably arose in southern China and adapted to tropical areas in a period of climate change and migration.<sup>152</sup> It is produced primarily in Asia under sophisticated irrigated conditions that rely on communal action long codified into folk beliefs. The communal actions of rice production have been observed to distinguish it from the individualism that characterizes wheat cultures.<sup>153</sup> Eastern and Western philosophies reflect aspects of these different social characteristics. On the other hand, maize spread widely from Central

America in the modern era and was not accompanied by its Mayan belief system.

Another major philosophical issue within agriculture is the existential question raised by Malthus' 1798 thesis that population increases faster than food production.<sup>154</sup> A feasible idea in his time, his prophecy has been forestalled by unprecedented yield increases through plant breeding, soil nutrition and other innovations. It may be said that his philosophical musings were actually a spur to agricultural innovation. These scientific advances were extended to Asia as the Green Revolution, which led to rice-based cultures coming under increased influence from the ideas of wheat-based cultures. As part of the Green Revolution and with a distinct New World background, improved maize in this instance was also accompanied by the individualistic worldviews of wheat-based cultures. Thus Eastern and Western philosophies interacted without direct contact between traditional philosophers.

The Malthusian question recurs where foreign philosophies are misunderstood and the balancing factors that moderate Western science are overlooked. For example, excesses in Western food production were balanced by Carson's 'Silent Spring', which stimulated changes that eventually led to such mollifiers as zero tillage, integrated pest management and a return to legume crop rotations. Likewise, non-Western cultures each have their own philosophical traditions about environmental interactions, although these have not always been fully assimilated with introduced knowledge. This lack of integration is a corollary to the rural-urban philosophical gap that is evident in the separation in Asia and Africa between Western-influenced urbanites and smallholder farmers. A simple illustration is presented in the following Box about 'organic' agriculture; what appears to be ethically simple in advocating 'organics' within a narrow perspective can prove to be unethical on a global scale.

To round off this introduction to some philosophical issues in agriculture, it is appropriate to mention three other matters, viz; agriculture's impact on reduced biodiversity, the concentration of genetic ownership by a small number of large groups,<sup>155</sup> and farm

size. The first is an issue that agricultural science addresses so far as is practicable while the second issue is caught up in shifts in world power and corporate science. Farm size, on the other hand, can illustrate a philosophical blind spot when debate focuses on the broad-scale agriculture common to wealthy nations and thereby omits the most common type of farms in the world. Globally, small family farms dominate food production, usually interlinked with cultural traditions that accord values to land and work within an egalitarian ethic. Most farms and farmers are in the developing world, 500 millions of whom produce most of the world's food.<sup>156</sup> By contrast, food manufacturing and service industries have moved from family businesses to large corporations. As with many issues, the nexus of agriculture and philosophy can easily overlook small farms if philosophy and agricultural science are contextualized solely within a Western worldview.

### **'Organic' Agriculture**

'Organic' agriculture, to use the lay misnomer, is beneficial when it leads to reduced nutrient run-off and decreased use of pesticides. However, just as Hamlet criticized Horatio's philosophy<sup>157</sup> for failing to account for the widest perspective of knowledge and experience, so 'organic' agriculture is inappropriate when it is hailed as supporting food security<sup>158</sup> – unless that is extended to include the majority of the world's farmers who are major contributors to food security by ensuring their own family's food and who are 'organic' through lack of financial choice. What is called 'organic' agriculture in Western settings eschews the use of manufactured fertilizers such as nitrogen that is critical to non-legume grains, which are the world's major foodstuff. Legume rotations, intercropping with legumes, application of high quantities of natural manures and minerals can produce these crops, but not in the quantities consumed today. Learned calculations indicate that perhaps half of the current world population could be fed if all agriculture became 'organic'.<sup>159</sup> Advocacy to globalise 'organic' agriculture thus implies sacrificing some people for the sake of others' beliefs, which subverts philosophy's objective.

## **Contextualizing Issues**

With the acceleration of knowledge, the principles and applications that must be mastered in all applied fields widened the artificial separation of agricultural science from its base in philosophy. This has created anomalies, which include; fractured ethical debates, fewer practitioners considering philosophy or agricultural science as life-fulfilling vocations, and uninformed beliefs that hamper the primary ethical imperative of nourishing all people. The last ethical point is currently evident in vocal veganism that affects political decision-making and impacts international livestock research – and thereby risks blindness, reduced mental capacity and stunting of millions of people in poor nations.<sup>160</sup> It is also expressed by both some proponents of ‘organic’ agriculture that often invoke rituals derived from misunderstood hypotheses, and by emotive objections to genetic manipulations that have been practiced for thousands of years and feed us all today.

Other issues popularly seen as modern have long been the foci of agriculture and agricultural science including; climate change, environmental and welfare ethics, and sustainability. This coincidence is due to the continuous interactions of agriculture within the natural environment. Contrary to intentions, such issues are exacerbated whenever philosophical discussion treats human actions as external to nature. Unfortunately, the same tendency to see humans as outside nature is not unknown among agricultural scientists, which this work seeks to rectify by embedding agricultural science within philosophy. Tracing this quest through the post ice-age climate changes that created conditions suitable for agriculture demonstrates how food became more secure and provided the foundation for permanent settlement. Such an understanding of continuous climate change informs the constant role of agriculture in choosing adapted plants and suitable environments for food production as part of living within the dynamics of nature. Our own adaptive mechanisms are one expression of that natural dynamic. Such an awareness does not discount the possibility of anthropogenic influence on climate, but it could temper the arrogance of assuming that we know how to alter global and cosmic conditions to suit ourselves. We remain subject to complex and incomprehensible forces, an insight that underpinned philosophy

until the 18<sup>th</sup> century and within that worldview agriculture “shaped philosophy and vice versa”.<sup>161</sup>

Another way of expressing this is in terms of thermodynamics as a central foci of philosophy. An economic history of human progress could be written – it probably has been – around the subject of energy transfer, and the biological and other means that have been invented to improve its efficiency of conversion in the unavoidable entropic process. In sustaining civilization and as the longest history among our inventions notwithstanding its false starts and drudgery, agriculture produced the additional energy that led to human flourishing about 10 millennia ago. The great philosophical expansion of the Axial Age of about 500 BCE produced an advanced commonality of understanding possibly as a result of climate change that was even more favourable to agriculture. This led to increased availability of food energy – calories or kilojoules – that fuelled population growth and larger cities that included the philosopher class that gave us the great scriptures of the world, among other advances.

Advances in knowledge have accelerated the millennia-old spread of intensive agriculture across ever more modified landscapes and fed a previously unimaginable number of people. With this existential success, the knowledge of the general public about food production has become increasingly scant. As mentioned, few people seem to realize that, of the world’s some 570 million farms, more than 70 percent are one hectare or less in area with the vast majority in densely populated regions. As wealth rises in Asia and Africa, it is expected that farm sizes will increase and farmer numbers decrease with national economic diversification.<sup>162</sup> Each of these changes – technological, terrestrial spread, farm size, wealth distribution and farm populations – raise philosophical questions about ecosystem function, sustainability, social equity, access to nutritious food, animal welfare and more. Contextualizing these changes, which are each labelled issues from one perspective or another, requires appreciation of the interactions between all of them. The successes of global food production have similarly involved diverse biological and social interactions. Expressed otherwise, this means that single issue philosophical discussions seldom produce practical outcomes.

The miracle of feeding billions since the industrial revolution has been achieved through enhanced plant and animal management, fertilizers and nutritional knowledge, genetic manipulation, and food safety. Following the successes of the 1960s Green Revolution's high-yielding crop varieties,<sup>163</sup> agricultural science research aims to meet future food demands. It uses modern innovations that follow the age-old applied philosophy of agriculture, viz;

- adapt animals or plants to an environment,
- adapt an environment to animals or plants,
- continuously manage animals, plants and the growth environment.

Greater control over each of these factors can be independent of land through such means as hydroponics, fish-tanks and laboratory-grown meat and dairy products.<sup>164</sup> While claimed as innovations, such technological tweaks apply the same basic philosophy. Sustainability of all types of food production – and hence civilization and human existence – is a combination of the above trinitarian philosophy that has always underpinned agriculture. Done well, agricultural science reduces the external impacts of agriculture, principally its leaking of nutrients and hydrocarbon into the wider environment, and continuing to do so may be as close to 'sustainability' as farming-based food production can come.

Sustainability itself is also considered by some as a philosophical subject, albeit one that is overly simplified in popular discussion. The idea was probably first propounded by von Carlowitz<sup>165</sup> and has since developed into an interaction of economic and social components. The major foci of sustainability in agricultural science relate to; land and soil degradation, biodiversity decline, water use, nutrient runoff, animal and plant health, gaseous emissions and costs of production. However, no matter how successful such a broad approach to agricultural science might be, it relies on an overall political context that supports these and other factors for reliable production of healthy food. Within current knowledge, this might be addressed through an approach that is "embedded in a bio-economy which draws on biomass, industrial biotechnology, utilization of carbon, and biological processes".<sup>166</sup> As opposed to single-minded technological changes, this would maintain agricultural science

within nature in the same manner that was once termed 'sacred nature', which for millennia required all human actions to be approached as part of an integrated whole. This has been the conception of human actions since the earliest philosophers, and in the West was expressed practically by Spinoza,<sup>167</sup> the philosopher to which great scientists have paid most tribute.<sup>168</sup> With sustainability, ethics and human rights as philosophical concerns of our time, we might hope that the separation of academic philosophy from the applied/natural sciences in recent times is a short-lived anomaly in the history of agriculture, civilization and philosophy.

Current commentators strongly implicate agriculture in a philosophical viewpoint of humans influencing a geological era – as is conjectured in discussions about the Anthropocene.<sup>169</sup> Added to this conception, or perhaps inducing it, is the claim that humans have exceeded mechanisms of planetary homeostasis – which according to such thinking is unsustainable.<sup>170</sup> Such theories cannot yet be fully validated;<sup>171</sup> nevertheless, the conclusion of such concerns is the same as that of philosophers across the eons – that is, the non-materialistic virtuous life of contentment derives from simplicity and awareness. From all perspectives, it is logical to reduce unnecessary consumption.

*This sample of philosophical issues related to agriculture serves to indicate that we require more than 'practical business ethics' formulae. Such issues relate widely across philosophy in terms of understanding ourselves and our place in the world and how we 'pursue the wisdom to inform our conduct of life'. It would be arrogant and foolish to disregard the lessons of ten millennia during which philosophy and agriculture were considered as one in cultural beliefs and religions. The following chapter therefore traces those relevant origins of philosophy in belief systems so far as they relate to agriculture.*

## Chapter 4

### Belief, Religion and Philosophy

*The integrity of history, philosophy and agricultural science has been introduced in previous chapters that have emphasized the complexity underlying all such deliberations across millennia. Knowledge about our complex interactions within nature has been carried forward through myth and stories, as considered in the following chapter, and further philosophical development has also been brought to us through religion. In discussing the perennial desire for sustainability from agricultural and religious perspectives in a previous book,<sup>172</sup> I observed that “religion is perhaps our most powerful expression of culture and nowhere is it more obviously expressed than in our relationships with nature”. That work noted the pervasive use of agriculture in religious metaphors and traced philosophical and religious aspects of sustainability in agriculture from primeval motivations to their modern expressions. There is no need to paraphrase that work here; however, it is important in this chapter to further elaborate the criticality of cultural context in philosophy and agriculture, which necessarily begins with one’s own culture.*

#### **Cultural Literacy**

Cultural literacy is as essential to understanding any philosophy as it is to adapting an agricultural innovation to a culture and environment. It explains at least part of all major social change, although our age seems to be neglecting critical parts of what constituted Western culture’s Enlightenment. Culture may be defined as “a set of beliefs, values, and preferences, capable of affecting behaviour, that are socially (not genetically) transmitted and that are shared by some subset of society”.<sup>173</sup> Sets of beliefs, values and preferences evolve and affect motivations and so induce behavioural change. For example, while capital and labour costs played a part in the Industrial Revolution so did the culture of Europe, which was in flux at that time as knowledge expanded from empirical investigations of nature. Such ideas from natural

philosophy trickled down through the society feeding a cultural change that continues today in, sometimes unfounded, beliefs in technology to solve problems. Appreciating such history is a foundation of philosophy, which requires cultural literacy.

It seems axiomatic that cultural literacy cannot begin without a sound understanding of one's own culture; however, such understanding is said to be in decline in Western nations. In Australia, for example, only some ten percent of the population claimed familiarity with the Bible in 2002 compared to 60 percent in 1960. Similar trends apply for other indicators.<sup>174</sup> In such an environment, it becomes routine to argue that cultural literacy does not rely on understanding of such traditions and history. I do not agree. It is necessary to have some biblical knowledge to understand Shakespeare, T.S. Elliot, Martin Luther King, Patrick White, Tim Winton, Leonard Cohen, Nick Cave, Gurrumul, and current interpretations of our humanist experiment.

The history of European culture in Western philosophy, literature, the arts and the origins of modern science is all enmeshed with Christianity. This cultural milieu has provided the language for the overall philosophical context in which the dissected disciplines of modern academia operate. These statements are not a reflection of religious belief or of fundamental literalism, but of basic education that contextualizes both human angst and contentment. To lose a connection to that heritage poses a risk, especially when the apparent decline of religious knowledge in the West is compared to its resilience elsewhere. Ironically this might suggest that rising ex-colonies have accrued a potential cultural advantage in understanding not only their own cultures, but also Western culture.

To be clear: none of the above is an argument for traditional religious adherence, but rather for the acceptance of religion as the major purveyor of cultural norms and philosophy for most of the world and most of history. To appreciate diverse philosophical approaches to explaining life is to be culturally informed. This has been evidenced in a practical manner in reviews of international development aid that indicated greater success in agricultural and other projects that were culturally informed.<sup>175</sup>

Cultural illiteracy might be illustrated by a current local example that is known globally – the perceived miscommunication between aboriginal and other Australians. The forgotten cultural elements include biblical interpretations by which European settlement assumed an ethic to “replenish the earth, and subdue” what seemed to their eyes to be an unused asset.<sup>176</sup> Europeans came from an agricultural culture par excellence that perceived aboriginal cultures to be non-agricultural. No widespread attempt was therefore made to understand local culture – it was not belief in narrow biblical literalism but more an absence of accepting native traditions. Christianization of native populations led to later generations being literate in European culture and employing biblical invocations such as “do not move an everlasting boundary stone, set up by your ancestors” when the successful Mabo land claim case reached the High Court of Australia.<sup>177</sup> Myriad other parts of the Bible could have been allegorically invoked in the case, including references to the aggressive agriculturalist Cain slaying the passive God-pleasing herder Abel.<sup>178</sup> Such an integrated philosophical understanding might even ease the confused state of discourse today.

In another expansionist religious tradition, Buddhism, agriculture is seen as the source of human greed that motivates acts that lead to the pain of existence. A myth appropriated by early Buddhism invokes a golden age in which humans lived as part of nature until they discovered agriculture and began to store its produce. This created the desire to control lands and hoard grain.<sup>179</sup> The point of such stories is not to denigrate agriculture, but to explain that the source of mental suffering is within thoughts and actions, and thus able to be resolved by removing the source. In that case, the folksy story is one of hundreds that summarily point to the essence of Buddhism. Curiously, Western tradition often insists that Buddhism is more a philosophy than a religion, yet similar stories existed in the ancient Greek world.<sup>180</sup> These examples are sufficient to illustrate the point that religion was the carrier of philosophy for most of human history.

### **Philosophy's Emergence**

Hegel explains the development of philosophy as an ongoing process through “universal history”, which traces “consciousness of Freedom

on the part of Spirit, and of the consequent realization of that Freedom". This "Idea" "assumes successive forms which it successively transcends" to define a culture through "its religion, its polity, its ethics, its legislation, and even its science, art, and mechanical skill", which is recorded as history. History in this context is wider than the academic discipline and includes understanding motivations and conceptions of individuals and societies; he explains this through the example of Kepler needing to have had a conception of astronomical movements to develop his empirical principles for the celestial movements. Those without the same conception because their "training has been narrow and merely subjective" cannot appreciate the principles of another field – in these terms Hegel mentions the limitations of philosophy that does not understand the empirical sciences. His logic also implies the limitations of scientists, especially those in biological fields such as agricultural science, who do not understand the context of their knowledge. Such understanding he calls "the Consciousness of Freedom".<sup>181</sup>

By linking consciousness to an ongoing understanding of reality, Hegel integrates the cultural understanding of his 19<sup>th</sup> century Germany by allowing that God "presides over the events of the World" in a supremely rational manner that is the "Wisdom" that humans seek to discern in their search for knowledge. He goes on to equate knowledge with religion insofar as it "is the sphere in which a nation gives itself the definition of that which it regards as the True". Within his conception that the human search is for the "Universal", Hegel saw that "man becomes conscious first in Religion, then in Science", which together approach the "absolutely Universal" that is "God". He then traces the quest for contentment that defines humans from early religions and their associated agriculture such as in ancient Egypt.<sup>182</sup>

The religion of the Nile and its delta emerged from its water in combination with the sun and gods that waxed and waned with the seasons; the seasonal dependence of agriculture was thus ascribed to the gods. Isis created agriculture and invented its implements, and the mystery of soil fertility was the realm of Osiris from which sprang laws and ritual as part of the human duty of labour. The resulting

food production represented a unification of spiritual and natural understanding. For the ancient Greeks, mythology united humans and gods and held that agriculture was introduced by Triptolemus under instructions from Ceres.

Hegel presents these as early attempts of civilization to understand the world and humans place in it, which could be expressed as the foundations of philosophy. A more recent example is in the religious milieu of Hegel himself – the Protestant Reformation of Europe – which he saw as a philosophical watershed that extended beyond religious beliefs to licence individuality. From that insight he distinguished city states from agricultural nations with the former being subject to authorities that shored up the urban lifestyles and encouraged individuality while feudal agriculture depended on a hierarchy.<sup>183</sup>

Hegel's insights might be summarized in many ways, one of which is that our perception of reality is, in Plato's allegoric terms, only a shadow of reality<sup>184</sup> that leads our minds to limited dualistic interpretations. To overcome this limitation of our being, integration of dualistic notions is prescribed as a mental action that addresses the spirit's need for wholeness. This makes it logical to maintain opposing perceptions of reality without compromising either. From this realization a methodology emerges of a thesis challenged by an antithesis being jointly considered in the synthesis of a new thesis.<sup>185</sup> The process is presented as a cycle in Figure 6 in order to emphasise the iterative process of deepening understanding. The whole process is a description of philosophy according to Hegel, which necessarily included cultural knowledge, religion and all of the learned disciplines. This embracing description is of particular importance to the biological sciences and is often seen as a product of Protestantism because it allows individuals to further their understanding of esoteric knowledge.

Other sources may be referenced to describe the emergence of philosophy through religion in an integrated quest for knowledge. The Protestant Reformation's legacy of individualism that has drifted away from the culture's origins might be seen as a cause of the oft-criticised 'silo' nature of the modern academy, which is exemplified

in the artificial gap between the humanities and the sciences in Snow's question: he asked "highly educated [persons] who have with considerable gusto been expressing their incredulity at the illiteracy of scientists [to] describe the Second Law of Thermodynamics. The response was cold: it was also negative. Yet I was asking something which is about the scientific equivalent of 'have you read a work of Shakespeare's?' "186

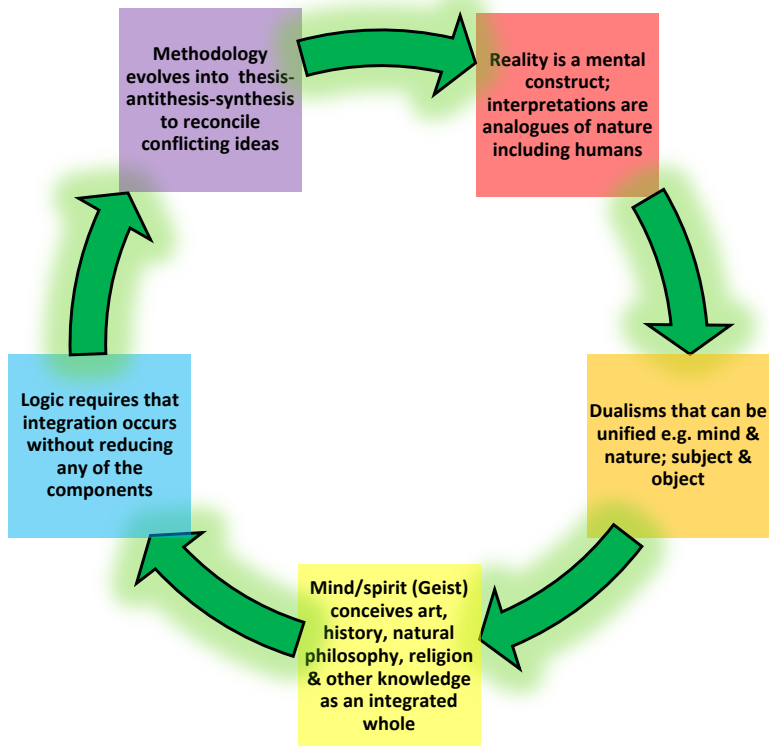


Figure 6. Hegelian Insights Simplified as a Cycle

Rather than add to that criticism, we can equally see such silos as a logical response to reductionism as the means of advancing knowledge of incomprehensibly complex systems. Such silos carry with them the responsibility to remain aware of the context of research. This means that the complex issues dealt with by academic

philosophy, agricultural science or any other field require a similar integrated approach, as has been expressed for the arts. “The perspective of the humanities and social sciences is not an adjunct to these hard questions. This is their bread and butter. They need to lead as well as fill in the human gaps. The insights from philosophy, history, literature are inextricably tied to questions arising from innovations in technology, medical research and economics.”<sup>187</sup> This integrated approach takes each field back to historic approaches in the creation of knowledge, and these are replete with religious and theological references.

### **Integrating Theology**

As Einstein noted, “those individuals to whom we owe the great creative achievements of science were all of them imbued with the truly religious conviction that this universe of ours is something perfect and susceptible to the rational striving of knowledge”.<sup>188</sup> I take Einstein’s meaning to extend to all those who seek knowledge in all traditions, for it is upon their foundations that our current level of awareness has been developed. The deep philosophical examinations that produced our science with its basis of causality arose from Judeo-Christian thought, leavened with insights from other great civilizations, and not as popularly claimed in opposition to the religion. Humans have always sought to understand causes, and today we see apparently random events as an indication of our limited current knowledge of causal relations and interactions. Thus we can define chance as “an interference between, or an intersection of, two lines of natural causality not determined, by nature of either, to interfere with one another”.<sup>189</sup> These insights of Western philosophy arise from our culture’s religious history, which as it was primarily influenced by Greek thought makes it useful to turn to its major extant source, Aristotle.

Aristotle defined nature as “the principle of movement and rest in those things to which it belongs properly (per se) and not as a concomitant attribute (per accidens)”.<sup>190</sup> This concept of imminence in one form or another has flowed through philosophy and theology in the Western world ever since. Around the time of Galileo the methodology developed for rational enquiry into nature evolved into the familiar steps of observation, hypothesis, deduction

and verification. Galileo described what we call science and he called philosophy as being “written in the grand book, the universe, which stands continually open to our gaze. But the book cannot be understood unless one first learns to comprehend the language ... of mathematics”.<sup>191</sup> This came to be defined as the basis of causality that underpins the assumptions and conduct of science. However, the philosophy that embodied science through Galileo’s period was imbued with the notion of an ultimate cause of all things – usually represented as a creator God. As ‘science’ through its success in explaining nature became known by the term once used for all knowledge, its omission of metaphysical causes that could not be studied methodologically led to those causes being excluded. This occurred as science moved from mechanics to biological examinations and the investigation of ever smaller components of nature to become the approach we know today as reductionism. Reductionism is an important tool of science that has yielded many of the insights and innovations of today’s age. It has also produced a generation of less philosophically aware scientists, some of whom unwittingly assume that assembling information from reductionist research into models can describe whole systems.<sup>192</sup>

A reliance on describing nature or agriculture in mechanistic and mathematical terms led many philosophically-poor scientists into a deterministic interpretation of life to an extent that might even have surprised Descartes. Only that which could be quantified could be studied and only that which could be studied was real. Expressed in that way, the behaviour and belief of such scientists is not dissimilar to religious ritual and faith.<sup>193</sup> In observing the decline in Western appreciation of religion that has paralleled the rise of science, it has even been claimed that the belief in science has given today’s world its ‘soul’,<sup>194</sup> which is another way of limiting openness to other experiences.

Philosophers seeking to accommodate science based on cause-and-effect postulated that the approach relies on habitual thought processes rather than being an explanation of the actions of nature. This was an output of Hume<sup>195</sup> in the Scottish Enlightenment period of the 18<sup>th</sup> century and is in apparent contrast to, for example, the insights of Buddhism of two millennia earlier.<sup>196</sup> It is claimed that the

habitual thinking identified by Hume has become common among both scientists and society, albeit in different balances between knowledge and 'faith'. The issue to Christian philosophers seems to be based on the absence in science of a purpose in nature that leaves no room for 'faith' and teleology.<sup>197</sup> Such arguments are limited by the same reductionist logic that they criticize. In other words, why should evidence of teleology be observable piecemeal when the whole of human actions may be one small part of an overall teleological process that could not be expected to be discerned at a microscopic level or in human timeframes – or by humans? The nexus of philosophy, religion and science is better served by an appreciation across all fields of knowledge, including disciplines, specializations, theology and more. Apart from rare geniuses, it seems even intelligent persons are unable to handle the complexities arising from modern knowledge, which means that there is a need for both specialists and integrators who communicate with each other.

Integration, or holism, arrived to Europe when Aristotlian philosophy was reintroduced via Averröes through Aquinas, but was limited in its integration of theology and philosophy. In attempting to bridge the gaps, the creation of atoms rather than beings was ascribed to God – an argument that reduces itself to absurdity as smaller and smaller elements of existence are postulated. When Einstein considered the subject, he concluded that “the more man is imbued with ordered regularity of all events the firmer becomes his conviction that there is no room left by the side of this ordered regularity for the causes of a different nature. For him neither the rule of human nor the rule of divine will exists as an independent cause of natural events”.<sup>198</sup>

While this would seem sufficient, it is understood by many in deistic terms in which God creates the world and then sits back; Stephen Hawking put it in conditional terms – the laws of science “may have originally been decreed by God, but it appears he has since left the universe to evolve according to them and does not want to intervene in it”.<sup>199</sup> Multiple theological formulations have developed to handle the rationally possible variations, of which process theology seems the most compatible with modern values informed by science.

It is necessary here only to allude to theological arguments that inform philosophy related to science in the broad definition that applies to agriculture. Process theology allows for a God within nature, which while appearing to limit the God of traditional terms, maintains that God is an eternal, immutably good and unchanging presence within nature.<sup>200</sup> This allows for science to be a means of understanding God's action. It brings the artificial separation of human knowledge into disciplinary studies back towards unity in what is usually denigrated as pantheism. However, pantheism accommodates most arguments and accords more closely with modern Western thought. It might also be seen to be an interpretation of Aquinas', and later Teilhard de Chardin's,<sup>201</sup> discussion of all nature working together towards God.<sup>202</sup> In this context, it can be claimed that even if God sets the laws of nature that science aims to discover, the details of what happens after that is effectively the same as chance.<sup>203</sup> It also incidentally favours the modern Western predilection for a belief in free will and through that accords with the early philosophy of Augustine whose words seem to account for modern existential angst resulting from acting against the flow of nature and thus "our hearts are restless, until they can find rest in [God]".<sup>204</sup>

Religion and theology sometimes substitute for open-mindedness, and can consume many words, neither of which is warranted in this work. It is sufficient here to suggest that not only is religion the early social carrier of philosophy, it has also been expressed in various forms across the ages and continues today. Much of the above considers the reflective outputs of religion rather than the blind belief type of religion. However, if the latter is considered in a modern context, similar expression of beliefs can be found in 'religious' approaches to 'the environment' and a range of poorly informed understandings of philosophy and science.

### **Beliefs and -isms**

Beliefs are wider than those ascribed to religions. Perhaps this was less so in the past, but today with religion defined more narrowly than it used to be, it behoves us to consider modern beliefs that would otherwise be omitted from a traditional review of religions.

One pervasive modern belief system has been described as the type of 'environmentalism' that harbours beliefs uncritically.<sup>205</sup> Environmental science arose as a university subject a couple of decades ago and it might be thought that this would inform environmental opinion more widely than it apparently has. Agricultural science sees itself as both a forerunner and a major part of environmental science that integrates the physical, chemical, biological and social sciences. Issues raised by this approach, which range from pollution to resource exploitation to global warming, have defined research foci. Insofar as the *raison d'être* of agriculture is to work within natural environments to optimize outputs, it is exposed to assaults from those who seem to believe that humans exist apart from the environment. It is as if there are three religious categories – humans, other beings, and the 'environment' itself with each defined by its own '-ism'.

The first of those three '-isms' or beliefs is usually called anthropocentrism, which tends to see non-human aspects of nature as an instrument for human wellbeing. This extends to popular calls to sustain the earth for grandchildren and similar expressions of continuity. It values humans as rational beings above other beings. The second category is sentientism, which can be a useful mindset for addressing practical animal welfare science that clarifies erroneous human perceptions of what non-human animals find comfortable; this is especially relevant for livestock that have been selectively bred to suit human-made environments over millennia. However, sentientism is a partial understanding when it excludes plants, invertebrates and microorganisms in most of its conceptions. Hence a third category, ecologism considers that nature has its own intrinsic value. Ecologism also serves agricultural science, for example in soil science, where soil is understood as complex interrelationships of microorganisms, minerals, moisture and diverse chemicals that are further complicated by interactions with plants, animals and the atmosphere. Academic philosophy might divide its approaches further into; normative theory, consequentialism, utilitarianism, deontology and other fields. Such beliefs or '-isms' may well serve as useful tools for discussion, and separations can assist understanding of parts of a system, but as mentioned earlier the

nexus of agricultural science and philosophy rests on objectively integrated worldviews.

Agricultural science, in common with other fields, has suffered from separations between disciplines, which has encouraged some to see it solely as a technological field. Technologies are often claimed to be morally neutral, which means it is their application that determines their ethical appropriateness. Insofar as morality has been and continues to be for some a product of religion, it is the application of technology that can offend religion. This can be seen to be a peculiarly Western argument when the essence of Eastern philosophies rests on subconscious motivation rather than after-the-fact-rationalization defining ethical behaviour. In that case, developing a technology that is potentially dangerous carries the responsibilities associated with its application. However, “the relation between religion and science has been the subject of extended philosophical discussions, [while] that between religion and technology much less so”.<sup>206</sup> The hiatus might be traced to the coincident acceleration of technology and a shift in religious interpretations with the rise of Protestantism in northern Europe,<sup>207</sup> which informed many of the philosophers to whom we refer today, such as Nietzsche.

Nietzsche’s depiction of industrialized lifestyles as emanating from Christian morality contrasted with the existing philosophies of Buddhism, Christianity, Judaism and Taoism. It probably also differed from other scriptures that saw enchantment with technologies as a diversion from the more important life purpose of self-transcendence. Stories supporting this include that of Abel the herder being contrasted with Cain the agriculturalist who began the city-building that then led to the Tower of Babel that challenged God.<sup>208</sup> Another is of Chuang Tzu (4<sup>th</sup> century BCE, China) who suggested shadoof-style<sup>209</sup> irrigation technology only to be rebuffed with the words “where there are ingenious machines, there are sure to be crafty actions [and] a scheming mind [that undermines] simplicity. . . . The unsettled spirit is not the proper residence of the Dao”.<sup>210</sup> Such views are rejected by most technologists who see their ‘ingenious machines’ as furthering wellbeing. However, to reject ancient wisdom on such a basis is to miss its point, which remains

that of being aware of the overall context of an innovation. In judging techniques within such an holistic context, a consistency can be divined that works towards increased contentment, which is the goal of philosophy.

Accompanying modern developments, the separation of religion, humanities and sciences into disciplines has encouraged our judgements to be rational but limited in context. This is the basis of modern environmental arguments, advocates of which compound their philosophical isolation by rejecting their cultures' traditions expressed through religion.<sup>211</sup> Some Christian-influenced objections to belief-based environmentalism leave open the responsible role of stewardship of all within nature including human actions<sup>212</sup> and thus appears to accord with a rational morality. In social terms, these modern interpretations of Christianity argue that technologies alleviate much of the misery of human existence and allow time for self-reflection. That worldview is probably what is behind the philosophy of Schumacher in which he lauds alternative technologies as being those that are suited to a society's morality,<sup>213</sup> even though the Buddhism that he invokes may not be intending such a technological or social message. The same style of moral sentiment applies to agriculture and its science.

### **Moral Agriculture**

The underlying assumption that the universe is comprehensible is a foundation of science, philosophy and religion, albeit from different approaches. This includes the agriculture of pre-modern cultures that acted rationally within the understanding of their world, as studied today under such titles as traditional or folk wisdom. Modern rediscoveries of such practices in the West have been beneficially promoted as, for example, permaculture and the more insightful versions of Steiner agriculture. These claim ethical superiority over other production systems – as does an issue at the time of writing that concerns cultured meats as illustrated in the following Box about relative ethics. Among broadly-based philosophers the understanding that accords with natural flows has been defined by James in the religious terms: “If this be a moral universe, all acts I make on that assumption will fit with the phenomena, and ... the

more I live, the more satisfactory the consensus will grow. If not, experience will produce even more impediments.”<sup>214</sup>

### **Relative Ethics**

The rising trend of eschewing animal products in wealthy centres is overwhelmed numerically by increased consumption in rising economies. Arguments in favour of reductions in livestock products include: methane emissions,<sup>215</sup> uncomfortable intensive production facilities, and the killing of animals.<sup>216</sup> The latter two factors are the most emotive and ethically fraught – and are possibly addressed by cultured animal products providing a separation of the issues from livestock product consumption, albeit without necessarily reducing persistent atmospheric CO<sub>2</sub> equivalents.<sup>217</sup> Based on nurturing muscle cells that can be 3D printed into familiar forms for cooking, cultured meat is supported by animal rights organisations. Businesses have emerged, for example: “Heritage Culture offers premium cuts of Kobe and wagyu beef, all grown through cellular agriculture, while Faux Fin allows for guilt-free consumption of shark fin soup, since the shark meat has been cultured”; “Perfect Day Foods... makes animal-free dairy products; Clara Foods ... is working on an animal-free egg white”.<sup>218</sup> Sea urchins and foie gras are also being worked on. Ethics change with technologies.

In explicating this understanding, James examines religion according to the same methodology followed by science, which begins with hypothesis followed by observation to determine validity. Where found to be invalid, the hypothesis is rejected in favour of another until an overall thesis for living is developed. Some articles of faith are discarded while others are strengthened from such observation and experience in this “science of religions” that produces the understanding of life that is most fit to survive. James’ use of evolutionary terminology is deliberate in this description of the role of religion. At the personal level, he places experience above theology in discerning the “moral order” of the universe, which is his term for the opposite of a purely materialistic conception of life. Such language can be confusing today when religious terminology is uncommon within the narrowed disciplines that make up philosophy and its sciences. However, it is directly relevant to the discussion of

agriculture and its sciences insofar as it embraces an ecological context of all that is practiced and studied. It might even be seen as a corrective influence when imbalances occur between technological development and application in the absence of understanding of the overall context of a technology's effects.

James' is a useful approach to re-unifying science, philosophy and religion. Some of his other conclusions may not be as clearly practical or even viable, and following his own reasoning can be rejected. Without discussing the subject in detail, one of his conclusion in this category is belief in an afterlife as a response to the existential angst of life. We may understand this as a response of his time to the rise of nihilism in the face of life's "irredeemable sense of precariousness".<sup>219</sup> In those arguments, the drift towards hedonistic denialism is considered to be a waste of life. Beliefs such as that of an afterlife that cannot be tested fall outside the areas of empiricism and are treated in psychological terms, such that acting on the belief is considered to be justifiable unless subsequent experience proves it wrong.<sup>220</sup> On the other hand, this may simply be a case of moral behaviour being encouraged by unjustified faith.

Faith could become reasoning based on experience in James' analysis; for example, "the belief that there is an unseen order and that our supreme good lies in harmoniously adjusting ourselves thereto".<sup>221</sup> This is close to the worldview of most scientists who endeavour to maintain a contextual focus to their experimentation and thinking. However, beliefs can focus on details within the overall whole, and can easily be erroneous or illogically arrived at. Three familiar examples suffice to show this: beliefs about climate change, organic food and food security might be based on acceptance of hearsay simply because the available evidence is too complex for the uninitiated to comprehend. In some academic streams philosophers might argue that unjustified beliefs are morally wrong, viz: "it is wrong always, everywhere and for anyone, to believe anything upon insufficient evidence".<sup>222</sup> Whether this is morally wrong or is just lazy or deliberate ignorance, this has produced the debatable observation that the only opinion that should be given credence is that of a moral person, defined in this case as a scientist who relies solely on repeatable evidence.<sup>223</sup>

The opinions of morally reliable scientists about the three examples mentioned above lead me to accept the evidence of climate change and the probability that it contains an anthropogenic element. It does not lead me to accept that so-called 'organic' food has an overriding health benefit, or that either the global food supply is secure or that all persons in the world are food secure. These matters lend themselves to information and facts; however, for matters that do not lend themselves to such checks, for example many religious beliefs, James is clear: "our passionate nature not only lawfully may, but must, decide an option between propositions, whenever it is a genuine option that cannot by its nature be decided on intellectual grounds".<sup>224</sup> However, it is not only religious beliefs that fall into that category for it embraces all unknowns including those that science seeks to make known. The bridge between the 'passionate belief' and the objective enquiry of science is the scientific methodology that provides a check on biases and beliefs. And where no testable methodology is yet known, it makes more sense to accept some matters than to remain inactively sceptical or unthinking – such a matter of great concern to agriculture is climate change itself.

Climate change discussions are based on complex models that relate data from diverse disciplines culminating in a complexity too great for any one scientist to be fully conversant with. For those with scientific backgrounds most of the principles are intelligible but not all of them, including those concerning the relative anthropogenic influence. On the other hand, the general public does not have the same understanding when they are constantly confronted with both informed and uninformed opinion. In their cases, the option is 'passionate belief', which according to James' argument is justified because the implications of scepticism preclude actions that could be beneficial in ways beyond climate. While climate change seems more real than the subject of Pascal's Wager, the consequences of non-belief are analogous insofar as they are much greater than those of belief even if the belief proves erroneous.<sup>225</sup>

James' contributions to philosophy may sometimes be undervalued because they are either seen as overtly religious, or they are not considered in toto. The last criticism has been attributed to an

observation reminiscent of Smith's opus,<sup>226</sup> that most who have considered James have read only one or the other of 'The Will to Believe' and 'The Varieties of Religious Experience', but not both.<sup>227</sup> The embracing approach that James took in his examinations of belief and experience followed, as far as he was able, a methodology similar to those of science. They may be read as a reason for avoiding overreliance on reductionist science unless it is consciously conducted within a known context. This scientific approach has been developed further to apply evolutionary theory to philosophy.

### **Evolutionary Philosophy**

Evolutionary philosophy can be explained as social actions to adapt to an environment that affords the best chance to survive. Dawkin's misunderstood 'selfish gene' description of life takes this to the genetic level and thereby makes species per se less relevant.<sup>228</sup> Thus genes that favour communal warning sounds in other animals might be seen as akin to humans' creation of acceptable social behaviour guided by morality and laws.<sup>229</sup> Such moral behaviours were embedded in religions, which contrary to Dawkin's negative assertions about religion,<sup>230</sup> renders religion as a purveyor of actions supporting the perpetuation of genes within the species. Anthropologists working with hunting-and-gathering societies record examples of such religious behaviours in groups sharing meat regardless of who was the successful hunter, while only about half of the plant products gathered communally were shared.<sup>231</sup> Meat offered micronutrients that were not otherwise abundant in diets and so the behaviour supported species survival. In another example, the Chewong tribe of Malaysia in earlier times maintained food sharing practices through their myths about gods.<sup>232</sup> Similarly, in the 1970s I saw the Meo group in the highlands of northern Thailand practicing large animal sacrifice and sharing meat with all in the group, usually at times when improved nutrition was necessary to sustain their marginal lifestyles.<sup>233</sup> In today's parlance, we might see a shared worldview as the basis of such a group philosophy, which across history has focussed on food security for survival, and is today referred to as government policy. The process can be seen as an expression of philosophy in this evolutionary biological way of seeking contentment and wellbeing through social mores.

Our natural tendency to “form into functional groups unified by moral systems” might be thought to dissipate as groups become larger and form into cities. However, it would be more correct to say specialized differentiation of roles and governance carry the principle forward. Philosophers have described this process of adaptation to changing environments across generations as a type of evolution.<sup>234</sup> By now, some purists may well claim that I have stretched Darwinian selection too far, so it is apposite to refer back to Darwin’s own observation: “There can be no doubt that a tribe including many members who, from possessing in a high degree the spirit of patriotism, fidelity, obedience, courage, and sympathy, were always ready to aid one another, and to sacrifice themselves for the common good would be victorious over most other tribes, and this would be natural selection”.<sup>235</sup> Knowledge embedded within cultures and religions supports the same characteristics.

Within this broad philosophical perspective of evolution, terms otherwise related to religions may be comprehended in pragmatic, and often pejorative, terms as ‘animism’. Animism sees a spiritual nature in all things and is argued to provide secular utility<sup>236</sup> through its integrated view, which contrasts with the reductionist studies of nature in modern science and philosophy. As one philosopher observes: “If there is now a received view among philosophers of minds and philosophers of biology about reductionism, it is that reductionism is mistaken”.<sup>237</sup> In fact, I am arguing that reductionism has its place in science for delving into life matters that are too complex for holistic study; the problem is not the approach but rather unthoughtful assumptions that the studied parts can be reassembled to speak authoritatively of the whole. In agricultural science, I have illustrated this personally<sup>238</sup> arriving at a conclusion that, for example, all of life is interactions between molecular, subcellular organelles and other beings. Worldviews that acknowledge the interdependence of all animate and inanimate things, whether they are labelled as animism,<sup>239</sup> evolutionary philosophy or the Gaia hypothesis,<sup>240</sup> assist in returning philosophy to be the integration of all learning in the quest to enhance wellbeing.

The Gaia hypothesis is perhaps a clearer example than animism for developing this theme, for the hypothesis was not meant to be taken

literally despite some having made it into a religion. Rather, it was developed as a means by which philosophical thinking could advance in a technological setting. The Gaia hypothesis is discussed in Chapter 11 and need not be rehearsed here except to acknowledge that it is a continuation of disciplined learning and thinking of earlier natural philosophers. For example, Calvin's Christianity was founded on his classical learning, objective reading of scriptures and reflective discipline.<sup>241</sup> The reformer, Martin Bucer of Strasbourg paraphrased the aspect of discipline as follows: "where there is no discipline and excommunication there is no Christianity",<sup>242</sup> thereby mimicking the arrangement of organisms, tribes and larger groups that reject actions that do not favour the body corporate. In Calvin's case, cohesion of the group provided a greater impetus for civil cooperation than had been possible under civic authority alone; it facilitated construction of Geneva's city wall that its civic power had been unable to effect. Thus religion serves society and its security.<sup>243</sup> The same logic may be applied to interactions between agriculture, religion and philosophy.

An interaction of a culture's agriculture and philosophy served the Balinese irrigation system for centuries through its protective temples and rules governing the interlinked rainfed canals that fed mountainside rice paddies.<sup>244</sup> The same is evident in the T'ai ethnic group's animism and governance system that endured for a millennium in Thailand based on porous weirs that serviced successive small villages down a valley.<sup>245</sup> It is also a possible explanation for traditional water systems in Switzerland.<sup>246</sup> The lesson that communal actions embedded within a belief system are more sustainable than those resting on secular logic alone also suggests that the wise few who see the benefits have, at least in the past, engaged the masses by promoting principles as beliefs within religion. Scholars who reject religion risk throwing out such babies of philosophy with the bathwater of ancient rituals.

The moral actions of groups explained in the above religious and evolutionary terms suggest that "they must be studied together ... even from a purely biological standpoint morality is part of the essence of what it means to be human".<sup>247</sup> Specialists may argue that their explanations are more rational than philosophies transmitted

through religion, such as in: the misattributed Rousseau noble savage corrupted by progressive society; Hobbes' brute civilized by society; Freud's guilty being relieved by confession, or by individualistic economic models. However, that narrow view would also omit the philosophical antecedents of each of those examples that can be found in myths and religion. For example, individualistic selfishness had been considered by Maimonides<sup>248</sup> in his 12<sup>th</sup> century philosophy of generosity, which rises from the crass level of begrudging giving through eight levels up to anonymously and unknowingly helping a person become self-reliant. His embracing philosophy is usually classified as religion or theology, but was also a significant advance in philosophical understanding.

*The cultural literacy essential for understanding agricultural science within philosophy is necessarily intertwined with belief and religion. Conjectures have been posed by myths and religions across the eons to explain natural phenomena, and gradually gave way to the rational understanding that improved hypotheses that ultimately became scientific hypotheses in the Enlightenment, as discussed in Chapter 8. The examples and arguments of this chapter illustrate the reason for this holistic approach to constructing such an embracing philosophy. By invoking these arguments, against which multiple objections might be made by purists, I engage Darwin's approach of garnering diverse streams of evidence to test the philosophy.<sup>249</sup> Following the same approach, the role of myth in agriculture and philosophy is next considered.*

## Chapter 5

### Myth, Folklore & Tradition

*In addition to religion being a major carrier of early philosophy as described in the previous chapter, the realms of myth, legend and folklore have also informed philosophy for millennia – and continue to do so. Accordingly, the utility of myths and legend, their commonalities across cultures and their agricultural content warrant consideration in this embracing examination of agriculture within philosophy. In addition to the myths and legends that folklore builds on, folklore can also represent an agglomeration of experience packaged for ready communication of a culture's applied philosophy. This chapter therefore introduces aspects of myth, legend and folklore, and also examines the story of Aeneas as an example of a myth that has persisted in Western culture.*

#### **The Utility of Myth**

Myths, whether within religions or not, are too often glossed over as primitive superstitions irrelevant to life today. However at their origin, myths represented the best theories to explain natural events and actions, which is remarkably similar to the approach taken today in the advancement of knowledge. Myths were also vehicles for allegorically transmitting esoteric spiritual meanings for the initiated. After examining many such myths in their original forms, Lewis concluded that myths are not only religion or philosophy but “the summing up in actuality of them all”.<sup>250</sup> Expressed differently in philosophical terms, the mythologist Campbell observed that “myths are stories of our search through the ages for truth, for meaning, for significance”.<sup>251</sup>

Many myths use agricultural stories because that was the major occupation at a time of their transmission.<sup>252</sup> They were not fantasies that sought to avoid reality, but were “about enabling us to live more intensely within it”,<sup>253</sup> which is another way of expressing the purpose of philosophy and its perennialism. Apart from myth, this is

also indicated in the existential poetry of Ecclesiastes – “what has been is what will be, and what has been done is what will be done, and there is nothing new under the sun. Is there a thing of which it is said, ‘See, this is new’? It has been already in the ages before us.”<sup>254</sup> My poetic interpretation portrayed these lines as “craving diversions we never can see / how things are, were always, will always be”.<sup>255</sup> Myths that endure relate how things are and will always be, and so underpin education, technology and culture as a means of pointing towards ‘truths’,<sup>256</sup> which might otherwise be called seeking improved wellbeing. In social terms, utopian histories alluded to in the myths of diverse cultures use similar terminologies.

Myth commonly employs a vision of a lost golden age, and might be said to continue today in entertainment media. While a similar ‘return to a golden age’ might be seen in imagined forms of sustainability resulting from virtuous agriculture, such utopic desires ignore natural actions; they are better understood as ideals.<sup>257</sup> Utopian ideals may be useful as aspirational motivators, but seldom lead to positive outcomes when implemented literally. Folk tales, myths and religions’ stories are not intended to be interpreted literally; for example, the Greek Arcadia, the Hebrew Eden, the Hindu Krita Yuga, and so on are all lost golden age myths employed to inspire social continuity and cohesion. A Western example in a more modern era is the 17<sup>th</sup> century Cervantes’ work of ‘Don Quixote’, which recaptured this enduring golden age myth as follows:

“Fortunate the age and fortunate the times called golden by the ancients ... because those who lived in that time did not know the two words *thine* and *mine*. In that blessed age all things were owned in common; no one, for his daily sustenance, needed to do more than lift his hand and pluck it from the sturdy oaks that so liberally invited him to share their sweet and flavorsome fruit. ... Noble cork trees, moved only by their own courtesy, shed the wide, light bark with which houses, supported on rough posts, were covered as a protection, but only against the rain that fell from heaven. In that time all was at peace, friendship, and harmony; the heavy curve of the plowshare had not yet dared to open or violate the merciful womb of our first mother, for she, without being forced, offered up,

everywhere across her broad and fertile bosom, whatever would satisfy, sustain, and delight the children who then possessed her.”<sup>258</sup>

Similar myths may be found in oral traditions and scriptures of all religions, and all serve to inspire actions within natural bounds while offering individuals means to improve their wellbeing through self-understanding. The philosophical search for improved wellbeing continues to characterize today’s societies. However, denigration of inherited myths and modern reticence to transmit them within a religious code leads to uninitiated generations creating their own stories, rites and moralities. Film and electronic games present new versions of myths, just as ideologies have periodically filled such cultural voids, as did 20<sup>th</sup> century socialism. In addition to their social actions in explaining the nature of life and the universe, myths also serve as psychological means to “carry a person through the inevitable stages of a lifetime.”<sup>259</sup>

### **Myths Across Culture**

Distinctions between hunting and gathering societies and agricultural civilizations<sup>260</sup> become blurred when the purposes behind myths are considered. Following a common theme across cultures, a master-myth may be discerned in which an ordinary person ventures into a supernatural environment and returns victorious and able to help others. It is a metaphor for understanding and being at ease with life and nature, which is the function of philosophy.

Across civilized groups myths have often adopted the agricultural language of nurture to explain this psychological development in the life-cycle terminology of birth, growth, maturation, fruiting, propagation, death and regrowth/rebirth. The commonality with religion is obvious, and the writing that codified religions possibly also reduced the earlier oral flexibility of myths to be varied to suit environmental, social and technological circumstance and change.

With writing, the capacity of memory became less critical, as expressed in an attribution to Socrates about the Egyptian god Ammon in the form of Theuth who offered writing to the king Thamus: “ ‘This’, said Theuth, ‘will make the Egyptians wiser and give

them better memories; it is a specific both for the memory and for the wit.' Thamus replied: 'O most ingenious Theuth, the parent or inventor of an art is not always the best judge of the utility or inutility of his own inventions to the users of them. And in this instance, you who are the father of letters, from a paternal love of your own children have been led to attribute to them a quality which they cannot have; for this discovery of yours will create forgetfulness in the learners' souls, because they will not use their memories; they will trust to the external written characters and not remember of themselves. The specific which you have discovered is an aid not to memory, but to reminiscence, and you give your disciples not truth, but only the semblance of truth; they will be hearers of many things and will have learned nothing; they will appear to be omniscient and will generally know nothing; they will be tiresome company, having the show of wisdom without the reality'."<sup>261</sup>

While accepting such drawbacks in the written philosophy of scriptures and myths we are still able to consider both the early hunter-gatherer and the agricultural cosmologies. Both reveal the same fundamental understandings of life, although it is to be expected that we might feel more at home with those of the agricultural world since that is our heritage; this means all who are likely to read such words as these for we have grown up with those metaphors. Such realization obviates the need for us to here consider arguments that seek to distinguish between myth and philosophy, as Campbell observed: "whether the myth was originally an illustration of the philosophical formula, or the latter a distillation out of the myth, it is today impossible to say. ... Very often, during the analysis and penetration of the secrets of archaic symbol, one can only feel that our generally accepted notion of the history of philosophy is founded on a completely false assumption, namely that abstract and metaphysical thought begins where it first appears in our extant records."<sup>262</sup>

Interpreting myths through agricultural, scientific or historical mindsets can too easily become the equivalent of fundamentalists' literal interpretations of biblical stories that miss their deeper intent. Just as a physicist might interpret the dynamic nature of the universe within a concept of energy, so perhaps does the universal mythical

theme known “to the Melanesians as ‘mana’, to the Sioux Indians as ‘ivakonda’, the Hindus as ‘sliakti’, and the Christians as the power of God. Its manifestation in the psyche is termed, by the psychoanalysts, ‘libido’. And its manifestation in the cosmos is the structure and flux of the universe itself.”<sup>263</sup> It is the essence of the search for meaning embedded in those terms that is critical, not their literal or material appearance, as in the following example.

Australian aboriginal traditions from which the incoming European civilization showed little inclination to learn has slowly imbued later generations with some level of awareness of the philosophy of those ancient cultures. With that awareness, the artificiality of the separation of Europeans as farmers and Aboriginals as hunter-gatherers becomes clearer, such as indigenous landscape management being described as an ‘estate’,<sup>264</sup> and aboriginal agricultural activities being revealed.<sup>265</sup> Partial stone dwellings, harvesting of cereals and construction of complex aquacultural systems further blur distinctions about settlements and farming, as does yam planting,<sup>266</sup> dam and well construction, irrigation, tree thinning, fire management, food preservation and storage of surpluses. Such awareness is not a revival of the romantic misattributions to Rousseau about such ‘primitive’ societies,<sup>267</sup> but could be understood in Montaigne’s words that “one calls ‘barbarism’ whatever he is not accustomed to”.<sup>268</sup> Today’s more informed views can thus accept the intent of describing aboriginal Australia as having been “a farm without fences”,<sup>269</sup> which was supported by a philosophy grouped by anthropologists as ‘The Dreamtime’.

Representing “a complex of meanings”,<sup>270</sup> the Dreamtime cosmology includes reverence of spirits within the landscape and assumes a sustained balance of life within natural forces. Assigning words such as myth and philosophy to the Dreamtime is fraught with translational error. For example, the terms used in Figure 7 do not correspond directly to the classifications of academic philosophy – ‘stories’ cannot be simply viewed as myths, and ‘rules of behaviour’ cannot be viewed as just ethics. The interrelationship of the human, physical and sacred worlds is similarly a conception based in discipline-compartmentalized Western thought, whereas the intent of the diagram is to illustrate the inseparability of those imagined

‘worlds’. In that way, the whole diagram can be interpreted as philosophy, which is essentially the same as the intent of this work. As a philosophy that has served people who have adapted to climate change over tens of millennia, it is the longest enduring example of myth and folklore informing the philosophy of living well.

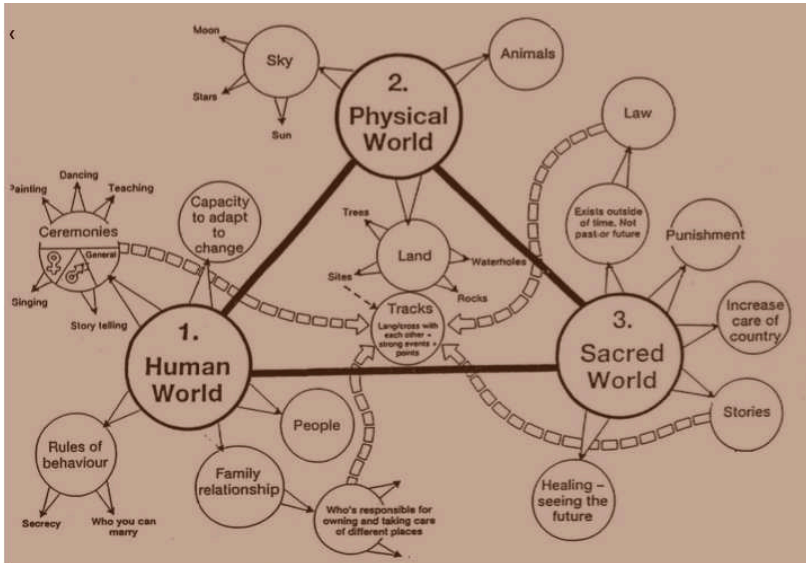


Figure 7. One Representation of the Dreamtime<sup>271</sup>

Attaining the well-lived life is described by diverse terms across traditions – including, enlightenment, atonement, liberation, paradise and salvation. Each tradition and all meta-myths describe the need for individuals to pursue their own development rather than seek it in the mundane material life based on fear, group-think and self-advancement. This seems the same philosophical development process as that portrayed in Nietzsche’s ‘live as though the day were here’. The lesson to modern philosophy is that, rather than an ideal society perfecting the individual, the process works the other way round as was probably the intent of Protestant revolution. Freud expressed it thus: “the truths contained in religious doctrines are after all so distorted and systematically disguised that the mass of humanity cannot recognize them as truth”.<sup>272</sup> Elsewhere he unites the symbolism of religion with that of folklore, myths, legends,

linguistic idioms, proverbial wisdom and current jokes.<sup>273</sup> Myths relating this age-old insight characterize life as angst and despair until resolved through metaphorical death and rebirth to a wise and compassionate state of equanimity, often termed 'wisdom'.

The development of wisdom in many traditions is the understanding of life that leads to contentment achieved by separating oneself from superficial unreality, often through a life-changing event. Myths commonly portray this as conquering a demonic giant, which some associate with mature separation from the mother. Thus the Cosmic Mother of Hinduism is depicted "in her two aspects simultaneously, the terrible and the benign. Her four arms exhibited the symbols of her universal power: the upper left hand brandishing a bloody saber, the lower gripping by the hair a severed human head; the upper right was lifted in the 'fear not' gesture, the lower extended in bestowal of boons. As necklace she wore a garland of human heads; her kilt was a girdle of human arms; her long tongue was out to lick blood. She was Cosmic Power, the totality of the universe, the harmonization of all the pairs of opposites, combining wonderfully the terror of absolute destruction with an impersonal yet motherly reassurance. As change, the river of time, the fluidity of life, the goddess at once creates, preserves, and destroys. Her name is Kali, the Black One; her title: The Ferry across the Ocean of Existence."<sup>274</sup>

The Shastras – the copious scriptures of Hinduism – intertwine what in a Western tradition might be called; psalms, traditional philosophy, life lessons, myths, cosmology, theology, astronomy and agricultural advice. Transcending the illusory routine life is variously presented through each vehicle, with the agricultural vehicle following or dictating the same cyclic formula.<sup>275</sup> In the Babylonian tradition, the epic of Gilgamesh includes reference to youth-giving plants. A lasting story of early philosophy, the myth symbolizes humans being tamed when Enkidu takes his first meal with shepherds and thereby becoming a contented social being. When he is dying, the philosopher in the myth is a woman who is a beer maker. The three components that define Enkidu's humanity are all parts of agriculture – the shepherds, their food and the beer maker.<sup>276</sup>

Fountains-of-youth allegories also occur across diverse cultures,

from the myths of Herodotus,<sup>277</sup> Alexander<sup>278</sup> and Prester John<sup>279</sup> to places such as Bethesda<sup>280</sup> and potions variously called ambrosia or nectar in ancient Greek,<sup>281</sup> amrita or soma in ancient India, as the water of life in the New Testament<sup>282</sup> and perhaps even the mead of Old Norse poetry. All these myths refer to transformational rites of passage rather than any literal quests to regain lost vigour. Whether they use waters, plants or other means to relay the concept, their philosophical intent is an immortality defined as freedom from angst and abiding in wisdom. This is a recognition of the end and the beginning being the same as presented in creation, in resurrection, in genderless images and in agricultural seeds dying in order to grow and produce new seeds.<sup>283</sup> It is the same insight as Aquinas' "the name of being wise is reserved to him alone whose consideration is about the end of the universe, which end is also the beginning of the universe".<sup>284</sup>

The mythical biography of the Buddha provides a further example. A pampered young man protected from confrontation with aging, sickness and death indulges himself in pleasures until he becomes jaded and is then in a state ready for the life-changing experience that can illuminate others. The story has cultural variants, from Jason's Golden Fleece<sup>285</sup> to sleeping princesses<sup>286</sup> that depict the quest for deeper understanding or awakening from the everyday world. Perhaps the best known Western story of personal development is that of the Homeric epics.<sup>287</sup> Less well known agricultural stories and sayings abound across different cultures, for example that summarized with my colleagues from Thai folklore<sup>288</sup> to elicit 'traditional wisdom'.

### **Agricultural Folklore**

The insights of folklore and local cosmologies can appear naïve in modern times, but lend themselves to scholarly analysis, one of which is prefaced by the admonition: "to look for consistency in barbaric philosophy is to disqualify ourselves for understanding it ... Yet that philosophy, within its own irregular confines, works not illogically".<sup>289</sup> Parts of such lore are carried today in, for example; discussions of souls, in fairies with such persisting Celtic names as pixey and fey, and even rebirth symbolized in the naming a grandchild after a grandparent. In noting that "the druids, like

Pythagoras, believed in the transmigration of souls, including that from the human to an animal form and the reverse”, it has been suggested that similar origins were shared across philosophies.<sup>290</sup> Agriculture has traditionally engaged with such beliefs, and invented its own rituals in service to spirits in the environment, including fertility associations between the feminine ploughed furrows and the masculine rain and plough.<sup>291</sup>

In ancient Greece, knowledge of animals, plants, agriculture and medicine informed the first understanding that became known as philosophy. Theophrastus, a 4<sup>th</sup> century BCE student of Aristotle, wrote his ‘Historia Plantarum’ using folklore as a major source. It was a tradition based on the assumption that persons closest to a subject have the most experience and the most workable explanations for natural occurrences, even if the explanations might later be corrected. Aristotle’s works include medical knowledge gained from his father, and his interest in defining the characteristics of animals extended to notes on different cheeses and rennet including their benefits in curing diarrhoea. Folklore about plant and animal products in human medicine was derived from drug vendors and those that gathered herbs. Thus Theophrastus made a separation between pharmacological and nutritional efficacy by giving credence to “things that are called fairy tales by earlier thinkers”.<sup>292</sup>

Fairy tales, magic and other terms are used to denigrate folklore and myth, yet a comprehensive study of the conjunction of magic and science finds significant overlap. Tracing developments through such thinkers as Peter Abelard, Hildegard of Bingen, Daniel of Morley, Maimonides, Bartholomew of England, and Aquinas,<sup>293</sup> agriculture and medicine are considered as human activities conducted within nature as a branch of natural philosophy. In the early Middle Ages natural philosophy was divided into “alchemy, medicine, agriculture, navigation, the science of mirrors, and the sciences of images and of judgments” ... an Arabic classification, probably from Al-Farabi’s ‘De Ortu Scientiarum’.<sup>294</sup> Arabic sources that reintroduced Greek thought to Europe centuries after the fall of Rome were moving towards a separation of astronomy from astrology even though Bartholomew of England’s 13<sup>th</sup> century works appear to rely on both; he suggested for example, that: “Saturn produces agriculturists and porters of

heavy weights, and Jupiter on the contrary turns out men adapted to lighter pursuits such as orators and money-changers". A step forward was the classification of agriculture as the practical art of botany; the equivalent for mineralogy was still considered to be alchemy.<sup>295</sup>

Folkloric beliefs are persistent, even after major world religions have been adopted, and such beliefs can represent a unifying cultural element that is easily overlooked; I have discussed such commonalities across Southeast Asian nations in another work.<sup>296</sup> Spirits of place persist in diverse modern belief systems sometimes in anthropomorphised forms, but can be missed if observers are not culturally literate. Mistakes include Mary's depiction on a water source being assumed to be simple Christian piety when in fact the image is a persisting water god in local minds. Hume expressed it in these terms: "There is an universal tendency among mankind to conceive all beings like themselves, and to transfer to every object, those qualities, with which they are familiarly acquainted, and of which they are intimately conscious. We find human faces in the moon, armies in the clouds; and by a natural propensity, if not corrected by experience and reflection, ascribe malice or good-will to everything, that hurts or pleases us."<sup>297</sup>

In agriculture practiced within the context of natural actions nurturing actions are routinely ascribed a feminine aspect, which has been called the Mother Goddess. The Mother Goddess "wherever she is found, is an image that inspires and focuses a perception of the universe as an organic, alive and sacred whole, in which humanity, the Earth and all life on Earth participate as 'her children'. Everything is woven together in one cosmic web, where all orders of manifest and unmanifest life are related, because all share in the sanctity of the original source."<sup>298</sup> While Western philosophy has spent centuries wrestling with inconsistencies of such views brought to it through pre-Christian and then Christian theology, those beliefs have informed the thinkers that continue to see the interrelatedness of all things in nature that extends beyond the earth and our current imagination. In practical terms, diverse examples of learning from nature have arisen from assumptions of interrelatedness, as implied in the following Box entitled 'food for thought'.

### Food for Thought

Study of nature reveals humans lack of distinction among life forms. Of course, consciousness seems unique, but current investigations have already blurred humans sacrosanct position in a manner reminiscent of Darwin's and Freud's insights into natural functions, as described in myth. Observations of the symbioses of the hermit crab sharing its food with a sea anemone that in turn protects the crab with its tentacles, and the *L. stumosa* beetle consuming the larvae of *F. sanguines* ants that raise the beetle for its secretions have been likened to Masai cattle raisers consuming blood taken from their live animals. Such associations introduced a discussion of draught animals in human service in my early years. Examples abound: *Rhododendron ponticum* produces a nectar that is toxic to bees that have pollinated other plants as has been described "as 'the world's first chemical weapon'. In 65BCE, Mithridates VI left tempting hives along the road for Pompey the Great's army. The 'mad honey' produced by the bees who fed on the masses of rhododendrons and their toxic nectar in Turkey left the soldiers in a stupor: easy prey for Mithridates."<sup>299</sup> In ancient Egypt unique large-scale egg hatcheries were invented by mimicking natural processes.<sup>300</sup> Knowledge of nature's actions has always informed human actions even when wrapped in myths, and in today's situation means that research to understand natural actions aims to facilitate means of working within them.

I am aware that this discussion might appear unscientific in conventional academic discourse, and so I permit myself to go a step further and venture four minor examples from experience. The first concerns the Asian Agri-History Foundation, with which I have been associated since its early days, and which with some leniency is largely objective in its consideration of ancient writings related to agriculture.<sup>301</sup> This includes the world's most ancient writings, the Vedas, which include practical advice about agriculture as well as life expressed in agricultural metaphor. Metaphorical association has also been widely employed in the writings of all major religions, one small part of which I analysed in terms of sustainability in Buddhism

and Christianity in the book 'Religion and Agriculture'.<sup>302</sup> Third, my attempts at integrated explanations in 'Thai Agriculture'<sup>303</sup> alluded to the inseparability of popular beliefs from interpretations of modern agricultural science in Thailand. Last and to a lesser extent, my small contribution with learned friends to document modern-day Thai folkloric sayings derived from agriculture<sup>304</sup> aimed to educate a generation that is losing its cultural heritage.

Myth and folklore blend with the philosophical contributions from religion that have been introduced in the preceding chapter. The bridge between these didactic beliefs and stories can be observed in their commonalities, which include the essential search to understand nature and humans within it, and the ascription of important attributes of nature to spirits or divinities.

### **Agricultural Divinities**

It is not possible to list the various gods related to agriculture across cultures and eras. Most lists contain 50 to 75 names but omit African and Asian traditions. Omissions of the latter is curious when it is recalled that the word 'deity' comes from 'deus', which originates from the same Proto-Indo-European source as the ancient Indian word 'deva' and the old Persian 'daiva'. Insofar as deities provide an indication of the worldview of a culture, the roles assigned to agricultural deities points to the philosophical content of agriculture. Such deities were embraced by the cities that agriculture supported where they morphed into civil theologies.<sup>305</sup>

Agricultural deities share such common elements as: soil fertility; crop and livestock fecundity; warding off aberrant harvests; protection from unfavourable climatic events; ensuring timely rainfall and river heights, and preserving of stored foodstuffs, among countless others. Each form of agriculture functions in accord with its culture's philosophy, as continues today for many groups. The clearest form in popular Western beliefs is the projection of a caring mother or protective father figure, and their intermediaries. The intermediaries, saints and other 'beings' used as aids to self-awareness derive from animistic religions and their deities and are deeply embedded in the popular versions of world religions today.<sup>306</sup> However, such links seem to be opaque to many who view religions

as self-contained or others who reject inclusion of beliefs and religions in philosophy.

The separation of Western philosophy from theology, a product of the Enlightenment<sup>307</sup> as discussed in Chapter 8, can isolate psychology from the study of nature including humans when it is reduced to context-free techniques. It also separates academic philosophy from the philosophical experience of the East,<sup>308</sup> and indeed from some parts in the West such as Spinoza's<sup>309</sup> insights, and many of Leopold's.<sup>310</sup> These latter two examples are valuable parts of Western philosophical development, and so it is fitting for the remainder of this chapter to consider one of the myths on which our culture is said to be built.

### **A Myth of Our Culture**

From the Latin 'colo' and 'cultum', the word 'culture' spans religion, art, knowledge and the tilling of soil. It is a product of settled agricultural communities that is distinct from life in the forests – 'silvi' and 'silvestris'. Cybele, the Great Mother, protected both agriculture and urban life and was depicted with a crown atop a walled city. The legend from which this Roman vision arises, according to one treatise, is Virgil's 'Aeneid' whose hero transformed forests into the gardens to resurrect the city of Troy. As a 'golden age' perfect civilization encircled by field crops, vines, olive groves and livestock, Troy is claimed to be the model recreated through Europe, the New World, the colonial era and the continued expansion of Western influence.<sup>311</sup> Cities supported by reliable harvests and governed through institutions of religion, knowledge, law, craftsmanship and art extended their worldview as they overran uncivilized nomads, pastoralists and hunters and gatherers. It is a version of the saying that "in the order of nature, the plough must bury the hunter".<sup>312</sup>

In the legend Aeneas brings from the doomed city of Troy its household gods – 'penates' in Latin, a word related to food stores and granaries<sup>313</sup> that became associated with ancestors worshiped in forms such as Ceres. Ceres ensured agricultural fecundity, and was depicted alongside Venus, the mother of the warrior Aeneas.<sup>314</sup> Thus agricultural fertility and the invader-cultivator are philosophically

united in Virgil's story. This is the same Virgil that codified farming techniques in his poetic 'Georgics'.

Aeneas' story derives from Homer's epics, which follow the allegorical myth of the cycle of self-transformation through overcoming adversity. It is the same story repeated in diverse forms across all cultures, labelled as the monomyth by Campbell,<sup>315</sup> as is shown in the inner circle of Figure 8. However, the Aeneas story has been used to explain expansion of one group into the lands of others by bringing civilization – that is, establishing large cities supported by agriculture. In discussing the use of myth as early philosophy, the Aeneas story brings two aspects together – the first being the self-development that brings an individual to the state of understanding, contentment and wellbeing that is the objective of philosophy. The second is the political aspect to which much philosophy has been applied to justify, or alternatively derived to explain, the promulgation of a worldview to other communities. Thus in the Aeneas' story, agriculture serves a different philosophical purpose than it does in its metaphorical roles for cultivation of the individual traits that conduce to contentment.

According to Waswo's thesis,<sup>316</sup> the Aeneid is a story employed for political purposes that relied on agricultural expansionism in the classical world and still does today, as indicated outside the cycle shown in Figure 8. This is an example of the political philosophy debate about whether an ideal society creates the environment in which individuals maximize contentment and wellbeing, or whether individuals cultivating contentment and wellbeing would make an ideal society. While I see the latter as the real intent of philosophy including its scriptural insights across history, the discussion here concerns the roles for which philosophy is used regardless of that intent. In this case, the Aeneid is said to promote the spread of an agricultural and colonial worldview.

Whether or not the Aeneid is the founding legend of late classical antiquity, its essence is said to have been absorbed into Christianity through Constantine's Council of Nicaea in 325. The legend is then said to have been revived with Europe's later rise in agricultural productivity as climate changed, new technologies were

introduced<sup>317</sup> and peasants began to cultivate their own land. Local rulers from such cities as Boulogne, Flanders, Orléans, Paris, Rheims, Tours, Metz, Nîmes, Narbonne, Troyes, Toulouse and Clermont created genealogies linking them to that mythic past, and even Norse mythology identified its gods with Troy. The image of an independent virtuous yeoman farmer informed the model citizen of the US republic, again claiming heritage from the Trojan myth. Even with urban sophistication, the rustic farmer was regarded as the ‘salt of the earth’.

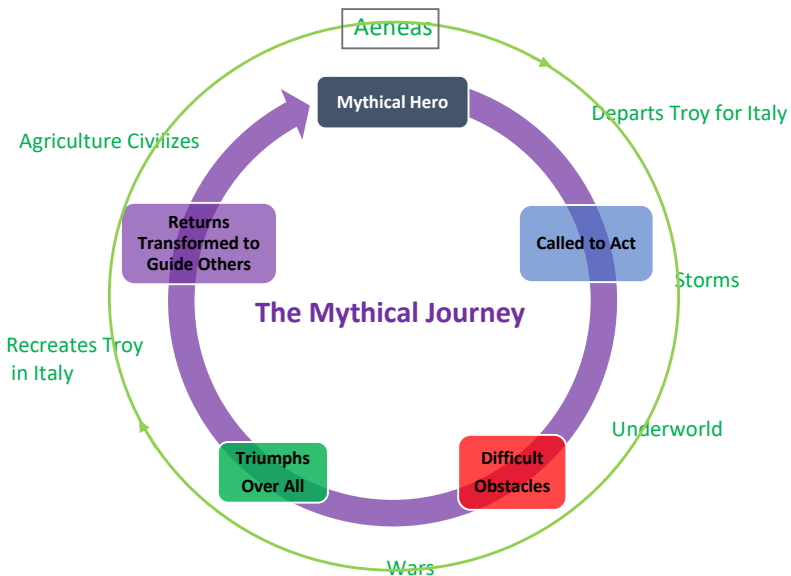


Figure 8. The Individual’s Metamorphosis (inner circle) & the Aeneas Story

After the 12<sup>th</sup> century, universities expanded knowledge of Latin and so reinforced Virgil’s myth as an explanation of rising from the Dark Ages and then extended the approach to an unquestioned justification for spreading the Western worldview. Thus the voyages of Columbus and Vasco da Gama were depicted in Virgil’s heroic terms, and native populations from Ireland to the New World were seen as inferior. Agriculture was seen as the proper use of land, and where it was small-scale or subsistence it was seen as primitive compared to the agriculture that supported cities and therefore in need of the benefit of Trojan myth. Protestantism exemplified the

ethic, and the poet Dean of St. Paul's London, John Donne, invoked the scripture, "ye shall be witnesses unto me ... unto the uttermost part of the earth"<sup>318</sup> to justify merchants acting as emissaries of the capitalist religion in America. Waswo claims that "Donne's contribution to the ideology of empire is one of the most skillful of innumerable such efforts, made by both clergy and laity, to identify commerce and piety, to give Christian consecration to the Renaissance motive and means for transmitting dominion and culture".<sup>319</sup>

Various other Biblical stories were pressed to the same service, such as the military takeover of Canaan and the land of milk and honey – a term later re-invoked in settling North America. Milton cast the Briton as the progeny of Troy at the time when Neoclassicism was taking root, which licensed new variations of the myth such as the controversial interpretation of terra nullius policy invented for settling Australia.<sup>320</sup> Locke's linking of governance and property ownership relied on a similar non sequitur of a few acres in England being a thousand-fold more valuable than the "uncultivated waste of America".<sup>321</sup> According to beliefs of the myth, such 'wastes' were to be farmed, and failure to do so indicated no right to ownership. "The founding legend has empowered our agrarian civilization with a definition of the savage that permits anything to be done to him; confinement [of indigenes] is gracious, compared to extermination."<sup>322</sup>

This Western worldview was advanced furthest with the founding of the US as influenced by philosophers including Reid, Hutcheson, Ferguson, Millar, Stewart, Robertson, Hume and Smith<sup>323</sup> with commerce assuming the dominant role from agriculture. Civilized life produced its own ethics, which advanced through Protestantism's anti-slavery awakening and the promotion of commercial agriculture to other cultures as the 'white man's burden'. The Virgil legend was well embedded within Western philosophy and religion, which explains why the attitude might also be discerned in Hegel's derision of Indian religion and art.<sup>324</sup> In relating the ploughshare to the sword in an inverse manner to the biblical prophecy,<sup>325</sup> force is justified, which Waswo sees continued in the image of the cowboy hero riding off into the sunset to found another settlement and civilize the

lawless. He also claims modern applications of the legend motivate international development agencies.

I find the above thesis to be personally challenging as I have spent 50 years in the advancement of agricultural science, much of it in international development. I have advocated, and indeed feel that I have contributed to improving the lot of many in marginalized parts of the world. However, that could still be interpreted as having ignorantly followed the naïve Trojan ethic. In any case it is an ethic that has fed the world. It is possible that Waswo's thesis could simply be a description of an aspect of human nature in a similar manner to the hypothesized rejection of onerous agricultural governance by the hill peoples of Southeast Asia.<sup>326</sup> If that is true then the thesis could be an example of partial hypotheses that miss interactions beyond their fields of consideration. Interactions include environmental changes that become more evident in the social sciences when war is correlated with climate change and agricultural decline, for example.<sup>327</sup> And to state the obvious, all nation-states have sought to expand their lands and cultures,<sup>328</sup> and not always through agriculture.<sup>329</sup> Rather than extrapolate from such partial theses, it remains more consistent with the lessons and myths of millennia to maintain an embracing approach to philosophical discourse.

*Faced with modern tolerance of aggressive intolerance,<sup>330</sup> and some valid criticism of Western 'Orientalism',<sup>331</sup> I detect a positive Western trend of accepting some experientially researched conclusions<sup>332</sup> of Eastern philosophy. The learning is reciprocal and thus better seen as global, which quickly reveals that agriculture features ubiquitously. This is the long term trend of learning from everyday experience and such contact provides a means of contextualizing the "legend of perpetual colonisation".<sup>333</sup> Globally, it is myth, legend, folklore and religion, often using agricultural metaphor, that informs philosophy and assists in our understanding about alternative "ways of being-in-the-world".<sup>334</sup> Just as Greek philosophy built on earlier Sumerian and Egyptian versions and has subsequently been informed by insights from other cultures to create Western philosophy, so Eastern philosophy is increasingly informing our quest for wellbeing, as the next chapter observes.*

## Chapter 6

### Eastern Philosophy & Agriculture

*Eastern philosophy can be dated from 5,000 years ago and has produced several major schools and traditions that have often influenced Western philosophy. The earliest contact dates were the era of myth and legend, such as introduced in the previous chapter. In historical terms, Eastern and Western thought have informed each other in agriculture and understanding since at least the time of ancient Greece. More recently, the Aristotelian thinking from which much of the West's Enlightenment is developed was derived from an interpretation of Averröes' commentary in the Islamic philosophic tradition. With the West's recent secular policies, both non-Aristotelian and religious knowledge have been somewhat devalued while at the same time non-Western traditions have maintained the integral role of religion in philosophy. Some Eastern traditions continue to embed social philosophies in religions that cannot be separated from governance. The approach seems anathema to many schooled only in the Western tradition, and can cause misunderstanding of such traditions as Islam. The broad consideration of philosophy of this work considers such divisions to be antithetic to the 'love of wisdom' through 'systematic investigation to inform one's conduct of life' that defines philosophy. Accordingly this chapter introduces Eastern philosophy and in particular its links to agriculture.*

#### **The Axial Age**

The major world belief systems arose in diverse locations around the same time in the stratified and urbanized societies some seven or more millennia after the first agricultural settlements arose. No definitive reason can be offered for this coincident development known as the Axial Age, although it is relevant that it approximated to a period of climate favourable to agricultural expansion. As indicated in Figure 9, five major philosophical developments occurred within a few centuries of each other some 2,500 years ago. These locations and some of their personalities were: in Greece –

Homer, Parmenides, Heraclitus, Plato, Thucydides and Archimedes; in the Middle East – Elijah, Isaiah, Jeremiah and Deutero-Isaiah; in Persia – Zarathustra; in India – the Upanishads’ authors and Buddha, and in China – Confucius and Lao-Tse.<sup>335</sup> However, personal names have been less seldom applied in some Eastern traditions, such as for Chinese philosophy.

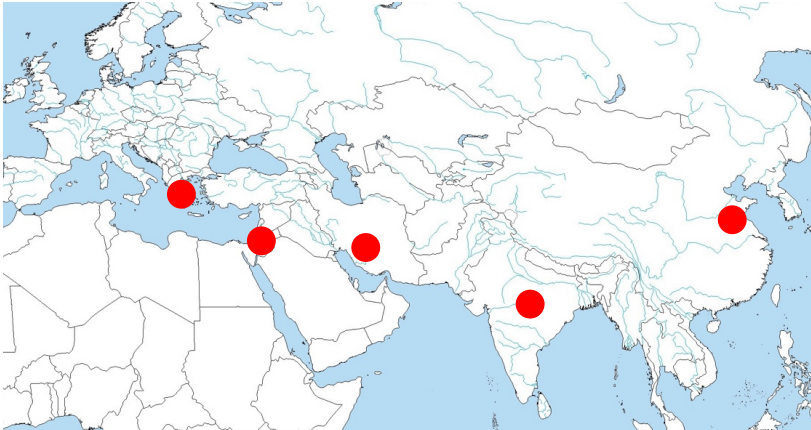


Figure 9. 'Axial Age' Centres of Philosophical Advance, c. 500 BCE

Western academic philosophers have at times questioned the legitimacy of Chinese philosophy. The argument was based on the observation that prior to the European modes of philosophy entering China in the 19<sup>th</sup> century, Chinese philosophy did not conform to an historical narrative. Similarly, the relatively few attempts to put Chinese and European philosophy onto a common basis may not have captured all the nuances of the Chinese intent. Some of these Western attempts are now even interpreted as hegemonic. The major difference between the two may be that European philosophy's progressive departure from serious religious philosophy has oriented its study to the nature of being. Chinese philosophy on the other hand has not suffered the same degree of confusion and has been able to remain focussed on self-cultivation and self-conduct. The subject remains a challenge in academic philosophy.

Neither Chinese nor Western philosophy arose within anything resembling modern academia – Socrates sought a life of truth and

wisdom in a manner somewhat similar to ancient Chinese philosophers. This distinction has become somewhat academic today with Chinese universities adopting a similar division of the disciplines as European universities. It seems more logical to note that Chinese and European philosophies emerged and developed in isolation from each other until relatively recently and that they should therefore be accepted as equally legitimate.<sup>336</sup>

Einstein offered a philosophical perspective on the matter: “The development of Western Science has been based on two great achievements, the invention of the formal logical system (in Euclidean geometry) by the Greek philosophers, and the discovery of the possibility of finding out causal relationships by systematic experiment (by the Renaissance). In my opinion one need not be astonished that the Chinese sages did not make these steps. The astonishing thing is that these discoveries were made at all.”<sup>337</sup> Far from representing Western triumphalism, Einstein is suggesting that the benefits of the relatively recent objectivity of science was uncommon across all cultures until the last few centuries.

In contrast to modern acceptance of objectivity as the basis for expanding knowledge, subjective approaches to understanding life provide individual and societal benefits that can in turn inform the products of objectivity. An example is the Indian-influenced searches for wellbeing through insight in Buddhism and Hinduism. From a European perspective this produces the almost imperious observation that the ‘Mahabharata’ and the ‘Ramayana’ are like a composite of European religious and secular philosophical works that exclude the science aspects of philosophy.<sup>338</sup> Chinese philosophy continuing through Confucianism focussed for the most part on practical means of maintaining harmony by acting in accordance with nature, which included one’s position in society. It saw society as being best served by governance that ensured “sufficient food, sufficient arms, and the confidence of the people”,<sup>339</sup> an approach that led to China having the world’s longest lasting governance system. Other Eastern traditions retain links to their pre-historic origins of folk religions and in particular fertility figures within sophisticated cosmologies. All can inform an overall understanding of philosophy, and all have associations with agriculture.

From a Western perspective, Eastern philosophy is often divided into four divisions – East Asian, Indian, Persian and Islamic. Each contains elements of other traditions, for example Islamic philosophical traditions contain Judaic influences through such great philosophers as Maimonides who in turn influenced the West. For the purposes of investigating agriculture, science and philosophy, the following paragraphs amplify some aspects of Indian and Chinese schools, and mention some others.

### **Indian Traditions**

Indian philosophy traces its origins to nearly 3,000 BCE in astrological texts that include classification of plants used in agriculture and medicine. Those scriptures were followed possibly around 2,500 BCE by the works containing the Bhagavad Gita<sup>340</sup> with its philosophical consideration of personal duty and mindful focus in a conflictual environment. In what was to develop into Hinduism, the Vedic period of about 1,500 BCE produced the three general schools; Vedic Philosophy and Yoga both with their disciplined meditative practices, and the ascetic school of Sramana. By around 550 BCE, three different groupings became evident, namely Carvaka, Jainism and Buddhism each with overlapping elements. Of these, Buddhism has been the most studied in the West. From about the fourth century BCE until 1000 CE India interacted with Greek and some Chinese knowledge, while Persian and Arabic influence arrived later.”<sup>341</sup> In recent millennia, subdivisions and interactions of sects has created multiple schools that cover the breadth of philosophical thought.

In common with Chinese philosophers, only a few of the names of great Indian philosophers have come down to us, including: Uddālaka; Yājñavalkya; Śaṅḍilya; Jina; Buddha; Payāsi; Gosāla; Ajita; Kesakambala; Kauṭilya; Patañjali; Kaṇāda; Nāgārjuna; Śabara; Patañjali; Īśvarakṛṣṇa; Bhartṛhari; Praśastapāda; Uddyotakara; Bhaṭṭa; Prabhākara; Śāṅkara, and Jayarāśi. Insight into the nature of self, as now captivates the West, has been a central theme of Indian philosophy for millennia. The Upanishads advise: to be “free from evil, old age and death, grief, hunger and thirst, its desire is for the true, its intention is the true – one should seek it, try to understand it. One who finds and understands that Self attains every world, every

desire”.<sup>342</sup> Later, the alternative type of life is described as the Gospel of the Demons: “they beg garments and ornaments to deck out a corpse and think thereby to attain the world beyond”.<sup>343</sup> Such ideas flowed into Greek philosophy in terms of the diminishing marginal utility of any repeated physical enjoyment.<sup>344</sup> A simplified history of Indian philosophy is presented in Figure 10.

Early Indian philosophy is documented in the Rig Veda as a cosmology considered in both intellectual and theological terms.<sup>345</sup> This is the earliest documentation in an Indo-European language, dating from 1700-1100 BCE. The Upanishads of the eighth to the sixth century BCE then documented rituals and practices that are today grouped as meditation as a means of probing mental depths; these were further developed in the philosophical traditions of the Jains and Buddhists. The unifying theme, as in the Western religions and secular philosophy, was one of psychological awakening beyond intellectual appreciation in order to live the best type of life – in Western terms this is taken to mean one liberated from ‘angst’.<sup>346</sup> Descriptions of these processes can appear naïve to other cultures as they are presented through anecdotes and repetition in contrast to the deductive logic preferred in modern European thought; however, they are profound even when dealing with folklore and agriculture.

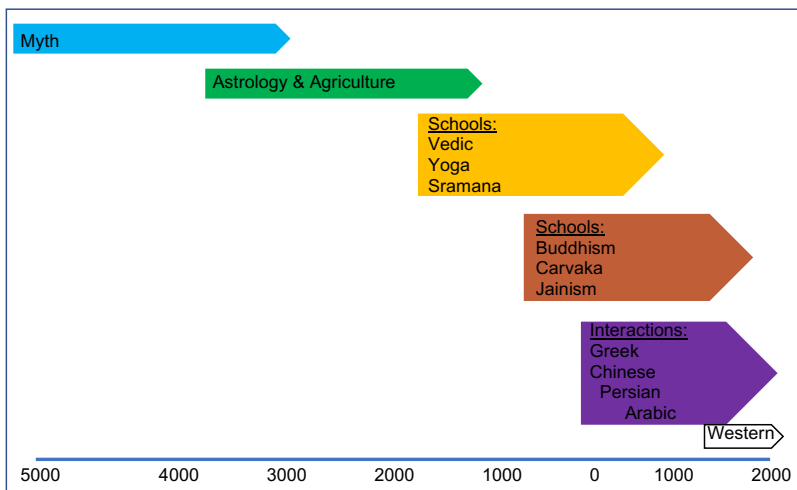


Figure 10. Summary Timeline of Indian Philosophy

The roles of what are labelled folklore and religion in philosophy are exemplified in the objectives of the Asian Agri-History Foundation (AAHF), which examines traditional practices recorded in ancient Indian texts in terms of agricultural science. The long and documented history of India and its colonial heritage make such ancient cultural understanding relatively accessible to Western minds. Indian philosophers literate in Western philosophical traditions readily accommodate and communicate dichotomous situations in which “farmers still plan and operate largely on the basis of tradition and ... farm scientists plan and operate on the basis of their ‘West’ oriented knowledge”. Agricultural scientists associated with the Foundation and who are familiar with the ancient scriptures of India aim to preserve valuable traditional knowledge, to present it in modern forms and to integrate ancient and modern knowledge.<sup>347</sup>

Examples of the AAHF’s work include: within the Ayurveda tradition, explication of branches concerned with non-human life forms that include the Mrigayurveda for animal science and the Vrikshayurveda for plant science. Following the ethos of health being a balance within nature, the latter scripture for example includes: seed collection, storage, germination and sowing; plant propagation and grafting; irrigation; soil classification; manuring, pest and disease management, and meteorological conditions.<sup>348</sup> Another scripture – the Agamashastra – describes soil characteristics, ploughing and animal husbandry in a manner associated with Shiva while the Vaishnava Agamas relates to Vishnu.<sup>349</sup>

Ancient Indian philosophy rests on an integrated understanding, expressed at least three millennia ago in the words: “the person who sees all living and inanimate creation in God and God pervading all objects does not fall prey to doubt”.<sup>350</sup> To a Westerner this may sound like religious faith; it can be, but it is also a statement of the interrelationships between all things as has evolved from philosophy universally. Indian philosophers investigated oneness and stated in various forms that “the metaphysical and the physical universe are one, and the name of the One is Brahman”.<sup>351</sup> Western conceptions of Indian traditions have tended to treat them as philosophies as

distinct from religions following the mistaken assumption that Indian approaches are poly- or else pan-theistic. Even when insights akin to those of India were revived in the West by Spinoza and others, they were suppressed by institutional religions as pantheistic. Nevertheless, the insight persists through folk interpretations that have risen in popularity in recent times, in India and elsewhere in Asia and Europe. Those same institutional limitations also led to links between agriculture, philosophy and religion being underappreciated.

A comparative study of scientific literature and the main ancient Hindu philosophical text, the Bhagavad Gita,<sup>352</sup> includes references to agriculture and science. Some of those common elements with scientific thinking include references to; life's functioning, emotional regulation, insight and the common good. Differences included the Gita's emphasis on; control of desire, renunciation of material pleasure and the integrity of all actions with every aspect of life.<sup>353</sup> This has been compared to Greek philosophy from Socrates to Aristotle in which such actions have been seen as components of the good life that nurtures what is good in oneself and good for others.<sup>354</sup>

Various schools of philosophy are united in the Gita through the story of unpleasant and seemingly immoral duty. The emphasis on work – yoga – as a spiritual action has been said to correlate with learning in the scientific tradition. The knowledge that develops, which allows discrimination between perishable material and imperishable things, is then clarified as the highest virtue. To Western minds seeking specific guidelines, these lessons from the Gita like other Eastern writings, present a challenge. This may be intentional; for example, the virtue of equanimity implies the absence of affective emotions yet, on the other hand, satisfaction with living according to the philosophy is not discouraged. Similarly, actions or 'karma' includes commitment to social duty and work for its own sake rather than for material reward, which has been enacted in the original intent of the Indian caste structure, and also in what may seem to some Western eyes as pointless tasks.

The Gita also includes references to; self-assurance, independence, compassion, sacrifice, ego-restraint and acceptance of mortality.

These are expressed at graduated levels with perfection being extremely rare, yet they are seen in the duty of all humans to pursue wisdom. Notwithstanding apparent differences, the philosophers of the study that inspired these paragraphs conclude that “it is remarkable that the basic concept of wisdom described thousands of years ago in one corner of the world resonates so well with modern conceptualization of wisdom”.<sup>355</sup> Presumably comparisons with other scriptures would yield similar conclusions for, after all, the Indo-European language group continues to link Western and Indian thought processes including logic.

Indian philosophy’s contributions to logic as a means of distinguishing good from bad reasoning and the circumstances to which it applies offered early insights into the nature of things. To examine nature, the testing of logic required agreed bases for debate, as indicated in the Upaniṣhads and Buddhist scriptures including the ‘Questions of King Milinda’.<sup>356</sup> As early as the fifth century BCE, such reasoning was being applied to agriculture alongside “architecture, astronomy, grammar, law, logic, mathematics, medicine, phonology and statecraft”.<sup>357</sup> Notable from this period is Kṛṣi-śāstra’s ‘Treatise on Agriculture’. Debate relied on the principle of contradictory statements being unacceptable, as later expressed by the Buddhist philosopher Nāgārjuna<sup>358</sup> in a manner similar to that of Aristotle;<sup>359</sup> however, acceptance of that principle did not disavow various other options being held in mind as possible. The Indian traditions have thus identified the possibility that, something between or other than the two contradictory extremes that are preferred in Western debate, could allow greater insight into mysteries ranging from mathematics to abstractions.

Rather than repeat quotations from the better known ancient Indian works, it is useful to use an example of the Tamil Sacred Couplets – Tirukkural – another philosophical text that includes agricultural advice. Written about 500 CE, the Tirukkural is usually seen as a secular ethical document concerning the virtues of individuals. In its Indian, particularly Jain and Hindu, context it is centred on concepts of no caste system, non-violence, vegetarianism and quashing of desire in the pursuit of individual virtue. These in turn dictate behaviour in public and domestic life. Widely translated, it has

influenced such philosophers as Gandhi, Schweitzer and Tolstoy. Ranging across such diverse subjects as rain, ascetics, grace, benevolence, compassion and administration, each couplet is both self-contained and reliant on the unified work.<sup>360</sup>

The importance of rain is expressed as the source of life, and this links to the agriculture that produces the food that provides stability, which makes agriculture the premier economic pursuit. Agricultural sections of the Tirukkural text are said to have influenced the Pallava Dynasty's (250 CE) resistance to the Kalabhra invasion and the Karikalan period when the Chola ruler reformed agriculture, reclaimed lands and built dams.<sup>361</sup> Agriculture is also mentioned in a specific section in the second book of the Tirukkural, which deals with wealth.

First alluded to in a section on the essentials of a sustainable kingdom having ideal lands where:

“Waters from rains and springs, a mountain near, and waters thence;

These make a land, with fortress' sure defence.”<sup>362</sup>

Later in the second book, ‘agriculture’ is a discrete section introduced by the couplet:

“Howe'er they roam, the world must follow still the plougher's team;

Though toilsome, culture of the ground as noblest toil esteem.”

It goes on to describe that all society relies on the farmer who in effect supports all other workers, which means that those who do not live by agriculture “lead a cringing, dependent life”. Contrary to some religious philosophical texts, although not the Hebrew scriptures, it goes so far as saying that if agriculture fails so will the benefits of the asceticism evaporate. It therefore exhorts the timely use of manure, ploughing, weeding and watering – and the constant attention of the farmer in the words:

“When master from the field aloof hath stood;

Then land will sulk, like wife in angry mood.”<sup>363</sup>

From such an integrated history in philosophy, the convergence that occurs through scientific enquiry led 19<sup>th</sup> century Indian scientists to approach their research on the assumption that the ‘fundamental unity of all existence’ worked at disciplinary interfaces. They

expected such boundaries would disappear as knowledge expanded in a manner that echoes the convergence invoked by Whewell<sup>364</sup> that is mentioned in Chapter 8. Thus communication between plants was studied, and intuitive rationalism was used in discovering new compounds and proposing the quantum particle, the boson.<sup>365</sup> Indian scientists commented on the excessive specialisation of modern science, and were unafraid to make statements such as: “the lines of physics, of physiology, and of psychology converge and meet”.<sup>366</sup> Buddhism had developed these themes millennia ago in its central philosophical tenet of ‘*paticca samuppada*’ or ‘dependent origination’, which has been described as wholly in accord with the integrated science of ecology.<sup>367</sup> These examples align with the worldviews of broadly-educated agricultural scientists; the ethos also pervades Indian NGOs that have, significantly, conspicuously distanced themselves from Western NGOs that have strayed from their own culture’s philosophical tradition.<sup>368</sup>

The Indian tradition is instructive for Western philosophy and its sciences as a related culture that developed further and somewhat separately from the West for much of its history. Its philosophy is its religions, which have developed from an understanding of “no principled distinction between ‘natural’ and ‘human’ sciences, or between science and religion. God (or gods or ‘The One’), humanity and nature flowed into one another to such an extent that science and religion – as considered today – were part and parcel of a single body of knowledge, the Veda (which means ‘knowledge’).”<sup>369</sup> Some aspects might be unappealing to Western minds, such as the Hindu ‘Brahma’ being said to be similar to the Koran’s Divine Name of ‘al-Haqq’ meaning truth and reality; similarly, it has been suggested that the consistency of the four consonants of ‘Brahma’ with those of ‘Abraham’ indicates a “major link between the three Abrahamic religions and the India tradition”.<sup>370</sup> I mention such speculation for completeness, noting that it is possible to suspend judgement on some suggestions without dismissing the whole. More than once matters that have been rejected have later been found to be useful when more knowledge arose and broadened the context of an insight.<sup>371</sup>

Indian definitions of philosophy accord with that being employed in this work. Thus interactions with Indian insights provides an additional perspective on the elements sought by philosophy inclusive of science. The Indian philosopher Tagore described science as “mysticism in the realm of material knowledge” that “brings our minds to the utmost limit of mind’s territory” while noting that science cannot transcend its own logic and methods. Higher knowledge than science rests in an undefinable spiritual realm.<sup>372</sup> Rather than dismissing such references to spiritual matters, we do well to accept that the Indian traditions may enlighten the wider human quest for understanding in philosophy including science.

Another perspective from Eastern philosophy that is less overt in its references to spiritual matters in philosophical discourse is offered by the long traditions of China.

### **Chinese Traditions**

Millennia of Chinese philosophy are commonly summarized as schools of Confucianism, Taoism, Legalism, Mohism and Buddhism; it also includes a specific philosophy of Agriculturalism as discussed later in this chapter. While perhaps less acknowledged in comprehensive compendiums, the names of some notable historic and semi-historic Chinese philosophers include: Confucius; Mencius; Xun Zi; Han Fei; Li Si; Zhu Xi; Wang Yangming; Lao Zi; Zhuangzi; Liezi; Mozi; Shang Yang; Han Fei; Li Si, and Huineng. The overall approach of Chinese philosophy differs from linear historical European approaches and assumes diurnal, lunar, seasonal, solar and longer natural cycles, which date from at least 1600 BCE. An indicative timeline of the main philosophies is presented in Figure 11.

Including sacrificial observances, philosophy developed its social application from at least 1122 BCE with the ‘Mandate of Heaven’ being associated with a ruler so long as he remained righteous. By the ninth century BCE the universe was conceived as being in continuous change with the balance of opposites being maintained by individuals and the State acting in accord with the natural

balance.<sup>373</sup> These understandings continued into a period when multiple schools evolved, the most notable of which is now known as Confucianism. Arising around 500 BCE, Confucianism is therefore inexplicably coincident with the emergence of Greek philosophy, Buddhism in India and other advances in understanding during the global 'Axial Age'.<sup>374</sup> It was around this time that 'The Book of Songs' was written, although its later translation in the continuing Confucian school is the main source today. The mythical origins of Chinese philosophy are even more ancient.

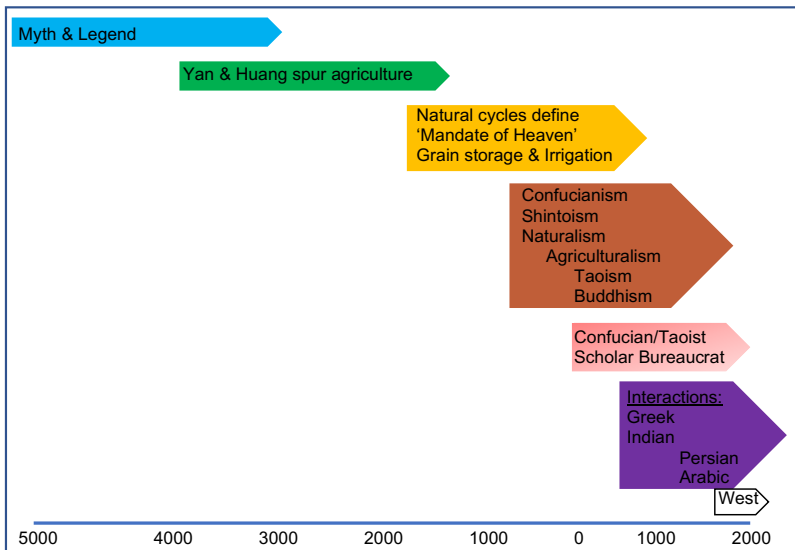


Figure 11. Summary Timeline of East Asia Philosophy

Dating from three millennia BCE, the legendary Yan consolidated agriculture sufficiently to be styled as Emperor, whose line was maintained until overtaken by the possibly legendary Yellow Emperor Huang, whose wife is acclaimed as the originator of sericulture. Historicity is less the point in these stories than reverence for the innovations in food and silk production that were soon supported by developments in water management, drainage and seed distribution. Writing appeared with the Shang Dynasty (1700-1027BCE), the centre of which shifted repeatedly, presumably as frequent cropping exhausted the agricultural lands essential to

maintaining the empire. By the time of the Zhou Dynasty – the longest lasting dynasty in Chinese history (1050-250 BCE) – governance followed a feudal production system with grain storage against poor years; emperors also instituted large-scale dam construction and river diversions for irrigation. As the centrality of power brought responsibility through fulfilling the Mandate of Heaven, rulers were reminded that “learning the difficulty of farming” was essential to appreciating the comforts of civilization.

This linkage of agriculture to governance remains evident in the Chinese 社稷 characters that denote a ‘State’, in which 社 is the god of the land and 稷 is the god of the five grains.<sup>375</sup> Concurrent with the latter part of the dynasty, what is conventionally referred to as Chinese philosophy was to later develop into Confucianism and Taoism, overlapping with the ritual encoding of manners, hierarchy and ethics as was to be regularized in the Book of Rites.

Around the same time that Confucianism arose with its ethics and rites defining a good life, two other schools emerged in the general region; Shintoism based on rituals and sacred essences in nature, and Naturalism that explained nature and life in terms of balance. Of the schools that developed subsequently, Taoism refined elements of Naturalism and incorporated further insights about simplicity, closeness to nature, and non-action as an active or reactive choice. Legalism arose separately in support of informed autocratic rule and political realism, and later absorbed elements of Confucianism. However despite some claims, Legalism is not to be confused with the recent Maoism, which might be better conceived as adapted loosely from the Western philosophy of Marx and Lenin.

From its 500 BCE origins Confucianism shared some characteristics with religion as a moral, social and political system with ritual observances. Central behavioural elements for individuals included humaneness, the rights of the ruler, loyalty, filial piety and ritual – all underpinned by the Golden Rule that was to be later evoked in Christianity<sup>376</sup> and other traditions. The context of such reciprocity was understood within the conflicting forces of Yin and Yang, which represent the continuous change that can be accommodated by a meritocratic approach to reconcile opposites and so enjoy the most

appropriate common ground. It might be seen as somewhat similar to Hegel's approach of some 23 centuries later in the method of thesis, antithesis and synthesis being employed to resolve common ground.<sup>377</sup> The same Confucian ideal coincided with an independent evocation of the summary of Buddhist philosophy known as the Middle Way.<sup>378</sup> The Confucian ideal was seen as essential for stable governance and all relationships, and to require broad education in personal and social ethics from family level to the Emperor. The Confucian code proved durably practical in East Asia for persons adhering to various other religions, notably Taoism, Buddhism, Shintoism, Judaism, Christianity and Islam. Taoism began as a philosophy seeking the way to live in accord with natural forces by knowing when to act, valuing all persons and cultivating personal flexibility; it later spawned a separate popular religion with multiple gods.<sup>379</sup>

As Confucianism evolved to promote an ideal political system supported by legends, its emphasis on harmony amidst constant change extended to all of life. Codified as a philosophical interpretation for everyday knowledge in the 'Book of Rites', it included references to land use and planting for agriculture and the actions of officials charged with overseeing food production in national technical departments. After Mohist Legalism merged into Confucianism, Chinese philosophy advanced further and Confucianism and Taoism intermingled into the holistic philosophy of life of the scholar bureaucrat. Later supplemented by concepts from Buddhism, a strong sense of duty and responsibility associated with privilege and learning defined scholarly life. Well known sayings reflecting the ethic include; "in obscurity scholars would maintain their own integrity – in times of success they would make perfect the whole empire", and "seek scholarly honour when young and recluse when old".<sup>380</sup> The unity of all fields of learning within this philosophy was maintained by scholars through varying political landscapes.

The Chinese history of knowledge has been traced through agriculture, astronomy, arithmetic and medicine, which are known as 'The Four Great Inventions'.<sup>381</sup> Agriculture featured strongly in early worldviews yet was soon assimilated into conceptions of nature after food supply seemed to have been made secure. An

introduction to an analysis of the history of agriculture in China notes that the ancient text ‘Thousand Character Classic’ states that “agriculture should be taken as the foundation for ruling a country”. Zeng concludes that “if the Chinese civilization is the only major civilization in the world without interruption and still flourishing splendidly over thousands of years, agriculture has played a vital role”. The vital role was expressed in literature and other art as much as technical treatises.<sup>382</sup>

The first collection of poems edited by Confucius was ‘The Book of Songs’, which has been dated to around the seventh century BCE and includes hundreds of references to plants and animals that are integral to human life. The status of the work ensured that it set the tone for subsequent scholars. While usually presented in a solely secular sense, the practical agricultural knowledge that was encouraged from such study was seen to be for the benefit of society through such morals as equality and fairness, and for developing the “wisdom of life”.<sup>383</sup> This practical philosophy was perhaps most refined in the fields of pharmacology, which relied almost exclusively on plants and their extracts. In a region that was the centre of origin of many of the domestic animal and plant species of today from its diverse microclimates,<sup>384</sup> China’s early cultivation of both knowledge and agriculture established much that continues today. The philosophy of these early periods was carried forward in the scholarly works of Taoist scholars in parallel with folk sayings and beliefs,<sup>385</sup> as has been the case in other cultures including the minor Chinese group that migrated two millennia later to what is now Thailand.<sup>386</sup>

Agriculture informed the ideological narrative that allowed China to unify and govern itself in an orderly manner. From before the Warring States period, which began about 475 BCE, agricultural life had been a metaphor for stability and maintenance of societal values, an understanding that has continued across three millennia. In this context, farming embraces agronomy, technology, productivity, honest work and acceptance of one’s role and duty.<sup>387</sup> In ancient China food was a concern of emperors, being first among the eight functions of governance,<sup>388</sup> otherwise expressed as, “for the king, the most valuable asset is his people; for the people, the most valuable

asset is food". This strong philosophical link with agriculture flowed into Confucian rituals of food types being associated with a person's rank, with philosophers only consuming foods in season and in moderation. Within these constraints, cooking became a sophisticated expression of philosophy.<sup>389</sup> Food production was codified in its own philosophical school, Agriculturalism.

Agriculturalism, or Nongjia (農家/农家), promoted an egalitarian society in which everyone worked agricultural fields and all decisions were made communally, which was believed to ensure that a society was stable and prosperous. Dating from around 500 BCE, the school was one among at least ten in a period that saw major intellectual advances. Minister, Hou Ji who was renowned for his agricultural innovations, and the legendary Shennong who was credited with inventing agriculture, embodied the developmental and social equity dimensions of Agriculturalism.<sup>390</sup> Remnant documents about Agriculturalism date to 315 BCE in the form of a conversation with a Confucian philosopher. Along with other non-Legalistic schools, Agriculturalism's texts were destroyed when they were outlawed after 221 BCE, although its ideas were absorbed into surviving philosophies and remained central to the Chinese cultural identity.<sup>391</sup>

Arguing that society began with agriculture, Agriculturalism assumed that individuals had an innate preference to be engaged in its practice. It observed that successful pre-historical societies maintained agriculture as the central pillar of government. A benevolent leader was one who worked in the fields with peasants and was rewarded from agricultural produce rather than from taxes. Echoes still exist in rituals in Asia today. Politically this was expressed in a period that was a contrast to a neglectful king: "A wise ruler tills the land together with his people to make his living. He governs while cooking his own meals. Now, that [the Emperor] has granaries and treasuries [he] inflicts hardship on the people to fatten himself".<sup>392</sup> Within its self-sufficiency ideal, prices for produce and labour were fixed, which offended the value systems of other schools. Nevertheless, the intent behind such policies was carried forward in various philosophies. Millennia later it was to influence the development of 18<sup>th</sup> century European Agrarianism through the

French Enlightenment agrarian philosophers Quesnay and Turgot<sup>393</sup> mentioned in Chapter 8.

Chinese agriculture was imbued with philosophy as the means of advancing knowledge in a manner that, despite differences in cosmology and terminology, shares much with the natural philosophy of the Western religious tradition. From the ancient pre-Qin period (before 220 BCE) philosophical formulations included; the three powers, the yin and yang, and the five elements – as mentioned in 'Master Lü's Spring and Autumn Annals'.<sup>394</sup> A common means of interpreting phenomena, the three powers applied to agriculture through humans planting, the earth nourishing and heaven nurturing. As the basis of agriculture, the approach is a practical interpretation of humans being part of nature. The five elements philosophy was based on the interactions between the fundamental elements of the universe – wood, fire, earth, metal, and water – and applying the same configuration to other situations, hence references to the 'five grains' in early documentation. Each element changes according to the generating or dominating characteristics of yin and yang, which was applied to explain the growth of crops and livestock. Some documents talk of six types of livestock rather than five. However, by comparison with Western documentation, livestock seem to have been of comparatively less concern in early China, perhaps due to dietary preferences, livestock-risks to crops, or even the traditions of consuming diverse wildlife sources of meat.

Among the Warring States, the Wei hosted the Confucian philosopher Meng Zi at their court until Legalist philosophy assumed dominance in the expanding Qin state and brought land privatization and agricultural incentives. Philosophers were integral as advisors to the contesting rulers on matters of diplomacy and tactics including maintenance of food surpluses. The times of incessant war had led to centuries of diverse philosophies known as the 'Hundred Schools of Thought'. The Warring States period ended around 221 BCE with the Qin state's victory. With philosophy as both a sign of power and its agent, contrasting advice ranged from acting morally to inspire support, to showing impartiality according to conditions, to aspiring to return to an imagined perfect state of innocence, to replacement

of religion and ritual by law. The last of these approaches led the Qin dynasty to create a meritocratic state supported by a legal system, which documented oral sayings known today as the 'Analects'<sup>395</sup> and 'The Art of War'.<sup>396</sup> With consolidation, the enlarged state required a larger reliable agricultural surplus and this led to, among other developments, the creation of the major irrigation system of Sichuan and completion of the Zhengguo Canal in 246 BCE to irrigate the Guanzhong Plain.<sup>397</sup>

While it is conventional to document the history as Confucian order and military dominance, it is more balanced to see the former as a philosophical means of informing governance because the "success of Qin in subduing the six other states [was] also largely due to agriculture".<sup>398</sup> The etymology of Qin 秦 is derived from 禾 and 春 for grain and dehusking as a testament to the dynasty's efficient paddy reformations, draft power for ploughing and grain transport by canals and rivers. Hence books on agriculture and medicine were exempted from burning during purges in this period. The alignment of agriculture with military ends in keeping with the philosophers' guidance about the Mandate of Heaven is also evident in the Qin's construction of The Great Wall, which follows the 400mm isohyet that divides the agricultural lands from the pastoral peoples. With the decline of the Qin, the Han Dynasty (206BCE – 220CE) arose and after conquests realized the importance of agriculture in balancing the factors that maintained the Mandate of Heaven. Thereafter, consolidation of power known from the 'Romance of the Three Kingdoms' united wet rice and dryland cereal production. Grain was then transported through the unified empire via the north-south canal system. The next dynasty, the Tang, ended with the empire fragmenting either side of the 800mm isohyet that separated dryland from rain-fed agriculture.

During the Tang Dynasty (618-906 CE), Indian and Greek philosophy refined the Chinese understanding and influenced astronomy, and thereafter Arab and Persian knowledge was integrated during the Yuan Dynasty (1279-1368). Although the Yuan had been pastoral nomads when they invaded and assumed dominance, they quickly became greater advocates of agriculture than preceding dynasties. They sponsored agricultural philosophy books but ultimately were

unable to unify the disparate worldviews of northern pastoralists with those of the agriculturists. When the Ming Dynasty (1368-1644) subsequently arose, agriculture benefitted from a wider philosophical quest to understand natural phenomena and practical innovations. The philosophical tradition included a geographical dictionary and a refinement compiled by Zhang Hua for scholars of all fields to have a sound understanding of nature. In this way appreciation of nature in fine art and literature was related to such fields as mathematics that informed the practical construction of dams and canals and the improvement of calendars while also revealing the functioning of nature. It has been said of the Ming Dynasty (1368-1644) scholar, "if Xu Guangqi was born in London in the sixteenth century, perhaps he would have become Bacon; if Bacon was born in Shanghai in the 16<sup>th</sup> century he would have inevitably become Xu Guangqi".<sup>399</sup>

Practical manuals were designed from the philosophical works so that agricultural officials could oversee the field operations of peasants. These were supported by rituals in which rulers, as the conduit to heaven, offered sacrifice to the legendary first farmer and gods of wind, rain, stars, land and grain. Ploughing ceremonies, just as in ancient India and as annually recreated in modern Thailand,<sup>400</sup> emphasised the harmony that was seen as the philosophical and practical ideal within the changes in nature. Knowledge served by ritual aimed to harmonize society by each person understanding their role in the society and the cosmos to whatever extent was sufficient for one's station in life.

As the 16<sup>th</sup> century ended, Jesuit missionaries had some success in insinuating Western philosophies by assuming the rank of scholars and introducing Western astronomy, mathematics, science and technology. Eschewing astrology and alchemy, the Jesuits enjoyed greater influence than other foreigners although they too were ultimately excluded when the Monarch's protective influence declined.<sup>401</sup> Chinese philosophy by this time was interacting with global understanding. After the Ming, the Quin Dynasty's (1644-1911) agriculture supported rapid population increases with the foreign introductions of maize, potatoes and sweet potatoes.<sup>402</sup> The integration of Taoism, Confucianism and Buddhism evolved in a

durable Neo-Confucianism until about the 18<sup>th</sup> century. Thereafter, European concepts began to be superimposed through Sun Yat-sen's challenges to governance and his subsequent quashing by Mao Zedong's interpretation of the European philosophy of Communism.<sup>403</sup>

The philosophical study of humans as part of nature that began in the pre-Qin era with abstract considerations drifted towards rationality across the millennia. Even while agriculture remained the central element of governance, mathematics served astronomy more than agriculture because weather and other natural variations were not then able to be expressed mathematically.<sup>404</sup> And as it did not accord with the Confucian moral structure, mathematics was a subject to be appreciated but not a practical specialization until the period of modernization in China.<sup>405</sup> After periods of having made great innovations, the Chinese humiliation in the mid 19<sup>th</sup> century Opium Wars made the benefits of Western mathematical developments evident and they became of interest to scholars. Ancient philosophy was invoked to blend with imported ideas in modern struggles for supremacy in China.

In Taoist philosophy, the central part of China had been referred to as the Divine Land and its surrounding provinces metaphorically separated from other regions by oceans that bordered the sky. This philosophy persisted into modern times as is evident in a poem by Mao Zedong, "The right way in the world is seas and fields" of which it is said that 'seas and fields' refers to turning what are provincial seas into mulberry fields.<sup>406</sup> Western views of Confucianism as a theory and system of social order, and Taoism as a philosophical tradition, can miss the folk belief systems that emerged from Taoism and share similarities with religious systems elsewhere. It is these systems that in recent times allowed the status of agriculture to be raised above commerce, culture and the military. While this created stability, it may have hampered technological development.

The ancient view of Confucians was that riches encouraged comfort at the expense of wisdom and generosity. This led to lauding of agriculture and reading as educated aspirations for harmony accompanied by reverence for economic self-sufficiency. The system

was entrenched in the Imperial Examinations System that proved useful for more than a millennium.<sup>407</sup> This governance system with its reliance on agriculture, centralization and bureaucracy was the long-standing practical expression of philosophy in China and allowed consistent progress compared to feudal Europe. However, the system was less suited to industrialization and agricultural science research because, in part, the practical focus of China undervalued both experimentation and theoretical ideas. The most enduring principle in Chinese philosophy and agriculture was the Mandate of Heaven.

The concept of the Mandate of Heaven is a philosophical approach that regards humans as an integral part of nature – ‘heaven’ meaning the whole of nature in this usage. Nature is conceived like a living being with a will and emotions that are never fully understood by humans whose role is to live within nature’s will. It shares conceptual aspects with some interpretations of Buddhism, pantheism and the Gaia hypothesis insofar as it precludes the simple objectivity of technological approaches to manipulating nature. It also maintains the inseparability of ethics from every aspect of life. In this sense, the function of philosophy is to understand and live within the will of heaven including both random boons and setbacks. Rulers were endowed with and constrained by the Mandate of Heaven, which required them to act righteously. For the common people this was indicated by the timely arrival of seasons and stability of the kingdom. Often misunderstood as a simple superstition, the Mandate of Heaven was a central pillar of Confucian politics made practical through divination and acceptance of changeability.<sup>408</sup>

The ruler’s critical role remains evident in the character 王 for king being a vertical stroke indicating the way of connecting the three horizontal strokes symbolizing sky, earth, and humans. Such an integrated individual cultivates knowledge to facilitate foresight – or in the more direct translation, by the study of Heaven. Divination spurred the study of astrological predictions about harvests, wars and natural disasters by learned persons who, in another culture, might have been called prophets. The role of prediction was to take lessons from natural events to remain faithful to living in accord with Heaven, and in difficult times to avoid the worst outcomes. This was

the application of philosophy, which far from being solely speculative, was informed by astronomical calculations that are often misnamed in Western projections as agricultural calendars. In fact, less than five percent of the content of the 'Great Derivative Calendar' is estimated to relate to agriculture, the rest being the mathematics of astronomical observations.<sup>409</sup> With such intellectual advances came practical interpretations that evolved into folk beliefs in the form of traditional approaches.

Traditional culture is a practical repository of ancient philosophy that is especially evident today in agriculture across transitional economies. To the technologically-focussed expert, traditions can be seen as hampering adoption of modern innovations. To scientists taking a philosophical view, tradition is seen as containing codified knowledge about the natural interactions that affect agriculture. China has forsaken much of this philosophical heritage in its modern quest to feed a billion persons and now to cater through trade for the fickle tastes that arrive with middle class wealth. In this way parts of China can be viewed as one with Western nations where agricultural science is sometimes downgraded to a technological tweak. Yet Chinese history suggests that this separation from integrated philosophy threatens the mandate of heaven, and that is a potential hazard to food security.

Agriculture and food security have been central to Chinese philosophy for millennia. It has even been the subject of a philosophical movement, but more commonly has been seen as an essential pillar of the stability required for governance and hence revered above most other pursuits. Even in esoteric Taoism, the integration of all things within nature and the ethics to live in accord with natural laws included approaches to agriculture. Recent advances in China, while not usually recognized as philosophy, indicate this long heritage blended with European approaches in scientific research, a synthesis that has led to China becoming a world leader in agricultural science.

### **Other Eastern Traditions**

India and China have absorbed much from groups that have assimilated into them, which includes much of Eastern traditions'

embodiment of agriculture, science and belief systems. To an extent, the two major traditions might be seen as representative of other Asian traditions and indeed they have influenced much of Southeast Asia. In addition, other Eastern philosophies, such as those of Persia and that of Islam, display integrated understandings and have informed Western philosophy over centuries. Also, some other Eastern traditions have had more recent influences on the West.

Iranian or Persian philosophy is traced to Zoroastrianism around 1800 BCE when a diversity of gods was resolved into a definition of life as two opposing forces of right and wrong. Around 200 CE, Manicheanism developed a cosmology of two spiritual forces expressed as light and dark, and Zurvanism arose as an offshoot of Zoroastrianism that wrestled with such questions as time and predestination. The Cordoba-based Avicenna (c.1000 CE), while usually grouped with Islamic scholars, was a Persian who made significant insights that would later flow into Western scientific thought as described in Chapter 8. Much later Theosophy and Baha'i emerged in Iran as syncretic philosophies that included Western ideas.

Islamic philosophy includes what are usually called sects of Sunni and Shia with their specific interpretations of texts, traditions and modes of discerning truth, and Sufism with its acceptance of a spiritual dimension within each person. Each considers that there is an inherent unity in the world, which is routinely expressed in theistic terms. As Islam spread across diverse cultures, it overlapped with Iranian philosophy through Avicenna, with Judaism through Maimonides and with ancient Greek texts via Averröes whose interpretations of Aristotle spawned a European philosophical school of Averroism that informed the Enlightenment.

Another Eastern tradition, that of the indigenous Japanese Shintoism, is highly integrated with nature in everyday activities. The Shinto myths and ritual derive from life as it is consciously experienced, and there is “not much awareness of, or even interest in, another world outside our own”.<sup>410</sup> By extension, the eating of food is a sacred action. These and other expressions of Asian philosophies related to agriculture have proven attractive to Western belief, however

popular invocation of them as solutions to concern about environmental change can become illogical when interpreted through a Western mindset. This applies particularly to approaches built on romantic projections about the Asian context that are evoked as means to mollify an angst uncritically attributed to environmental destruction.

Romantic projections that label Asian philosophies more caring of nature can be unhelpful, and I have challenged them in an earlier book.<sup>411</sup> To avoid this cul de sac here it can be simply stated that anthropological perspectives<sup>412</sup> suggest that environmental degradation in Asia is neither less severe than elsewhere nor new, and that there is no general Asian perception of nature. Asian philosophies range from Sinhalese Buddhism, which sees elements of nature as transient and illusory including human life, to folk interpretations in which variations of climate affecting agriculture become linked to morality, meaning that bad deeds incur bad seasons.

The integration of the early animism, Hindu-Buddhism and Chinese traditions across mainland Southeast Asia shows an adaptation of philosophy to the agricultural ecoregion. Symbols of rainfed agriculture including fish, cranes and deer are joined by irrigation's water spirit – 'naga' – to which kings pay obeisance. The indigenous rice goddess assumes the name of Indian gods across the Indianized cultures of Southeast Asia, and the abode of the gods becomes the mountains symbolizing Mount Meru. When irrigation works grew in scale to become the major occupation of realms now known as Myanmar, Thailand and Cambodia, kings became supreme water managers through their divine connections. The conception continues in monarchs' titles today as 'Lord of Waters' in modern Thai and 'Ruler of Land and Water' in Malay. Historically, coups and wars have been linked to volcanic activity, epidemics, droughts and floods, which were interpreted as symptoms of a divine king failing in his obligations and hence licensing rebellion.<sup>413</sup> Local reports of political events continue to echo this belief today. So while indigenous beliefs have blended with Indian and Chinese philosophies, underlying beliefs persist that do not form part of those philosophies.<sup>414</sup>

The indigenous animistic component of cosmology in Thailand, for example, includes female deities for the land, rice, water and forest representing an inherent fertility that requires the male sky spirit's rain for consummation. The male spirits are more capricious and require propitiatory sacrifices.<sup>415</sup> Gender specialists today see these as patterns of male attributes in Thai interpretations of Buddhism.<sup>416</sup> Across the region, regardless of modern foreign interpretations, local beliefs adhere to animism in village rituals that are seen as outside the purview of Buddhism, even when monks officiate at rituals. "The real test [of the] philosophy is, from the farmers' point of view, whether its practical implications inspire confidence with regard to [the] fundamental need ... [of] ... risk minimization and a good yield".<sup>417</sup>

In modern times, some other ancient philosophies are enjoying resurgence among folk beliefs; for example, the Chinese traditions of Fengshui. Fengshui embodied the same beliefs of integrity with nature, although it is much misunderstood in superstitious terms. Essentially its insights were based on the immanence of the human balance within nature, which maintained that 'when nature is abused, humans suffer'. Fengshui exemplifies syncretism in philosophy as it embodies a blend of animist, Buddhist and Taoist insights that has resulted in culture being inseparable from nature, as noted by anthropologists from Levi-Strauss to Foucault. Observations of such integration of philosophies inspired natural philosophers to seek a unity of understanding across cultures.<sup>418</sup>

Misunderstanding of the intent of Eastern traditions has fuelled various sects in the West, most notably in the recent rise of religious environmentalism. This is said to be a product of the 1967 article in 'Science'<sup>419</sup> that linked environmental 'crisis' to Christian teachings of a dualistic relationship between humans and nature, which is claimed to have licenced humans to act on nature by right. Zen Buddhism was possibly the first philosophy to be lauded as a remedial contrast to this interpretation of the Western approach.<sup>420</sup> Thereafter various indigenous philosophies were invoked as environmentally superior to the Western version, and this in turn has stimulated Islamic, Hindu and other scholars to find sustainability

philosophies in their scriptures. I have earlier explained the error in such claims by comparing Buddhism and Christianity;<sup>421</sup> a further dimension can be added by recognizing that neither scriptures nor anthropologists' documentation of what people say they believe need actually be the way they behave. This may simply be "a projection of modern conceptualizations and concerns onto the screen of tradition" that ignores the localized nature of all traditions when their words are interpreted in the globalized concept of ecological interactions.<sup>422</sup>

*The Eastern philosophies that have been traversed in this chapter through Indian, Chinese and some other philosophical and agricultural traditions evoke commonalities. The common thread through each tradition is an understanding of the integrity of nature including humans and their actions. The conception contrasts with modern Western understanding, and in a period of cultural-drifting has been said to have spurred superficial belief-based appropriations in the West of diverse Eastern traditions. However, such Western grasping after foreign salves might be better aligned with the disconnection of the Western populace, and indeed academic philosophy and technologically-focussed science, from the cultural base. For the purposes of this work, the central theme of Eastern philosophies and agriculture drawn from Eastern traditions is the fundamental essence of the interrelationships between all things. Having introduced these ancient insights, the following chapter delves further into the developments that produced the Western philosophical tradition.*

## Chapter 7

### Western Philosophy: Sumerians to Spinoza

*The role of agriculture within philosophy pervades myth and religion across all traditions as introduced in the preceding chapters. Myth, religion and Eastern philosophies have each influenced Western philosophy at some stage in its evolution, and today continue to provide a means of clarifying the higher aspiration of philosophy. A summary timeline of some influences is presented at Figure 12. This chapter and the next take this a step further by considering historical elements and ideas referenced in the Western tradition across 5,000 years. In this chapter, examples related to agriculture and its science from Mesopotamia to 17<sup>th</sup> century Europe are introduced.*

#### **Revolutionary Thought**

Western historical discussions favour a shorthand of revolutions – the ‘agricultural revolution’, the ‘industrial revolution’, the ‘digital revolution’, and so on. This device suits the encompassing definition of philosophy of this work through such terms as, for example, the ‘Copernican revolution’ to symbolize disruption of the philosophical belief that the earth was the centre of the universe. Next the ‘Darwinian revolution’ linked humans to other life forms in a continuum over time that promoted philosophers to revise assumptions that humans were the special creation of God. The ‘Freudian revolution’ that soon followed overturned notions of divinely ordained thought and suggested that our minds tend to create comforting objects to assuage existential fears.

Two points relevant to the present work arise from this revolution approach. First, a cosmology that does not rely on a creator God might appear to be an outcome of Western thought of recent centuries, but in fact had been arrived at in ancient times, to an extent in Greek philosophy, and more obviously in Eastern philosophies.

Second, contrary to what actually happened, the three ‘revolutions’ – Copernican, Darwinian and Freudian – might have been expected to unite the sciences and humanities in Western philosophy. These two points inform the current work, as it commences with the antecedents of ancient Greek philosophy in the Middle East.

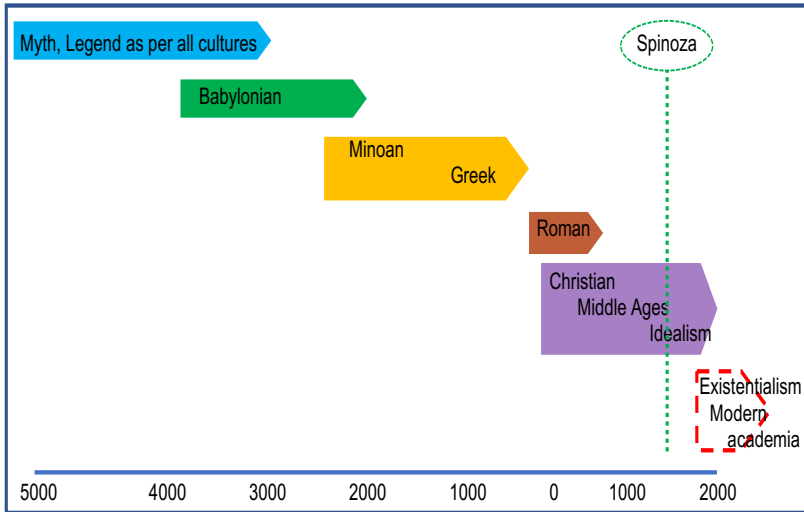


Figure 12. Summary timeline of the Western Tradition

### Sumeria to Greece

The Sumerian civilization in Mesopotamia and then that of Egypt arose from irrigated agriculture along the Tigris and Euphrates, and the Nile rivers respectively. Land and its cultivators were owned by a divine king challenged only by a priestly aristocracy within a cosmology based on judgement of souls that ultimately returned to mummified bodies. Supported by agricultural surpluses, Sumerian Babylonia advanced with its cuneiform writing until innovation slowed with religious conservatism and the kingdom succumbed to pastoral Semitic groups. Babylonian cuneiform possibly began in the late 4<sup>th</sup> millennium BCE to list omens and legal codes for merchants and builders while also possibly containing profound meanings for the educated. This is thought to have imparted a description of reality within a cosmology of gods that wrote the fate of each person. Lists of omens were thus a compendium of messages from the gods, which

made written legal codes a basis for governing.<sup>423</sup> This nexus between religion, personal fates and governance ensuring stable food supply was to be repeated throughout history.

In lauding these early philosophies, it has been explained that thousands of cuneiform tablets “disclose what Babylonians thought about reality; they reveal a Babylonian epistemology”.<sup>424</sup> These ideas flowed into Egyptian, Anatolian, Hebrew and Hittite thought that in turn informed Greek philosophy, which particularly built on Babylonian mathematics. Maritime commerce had brought the Minoan culture of Crete to prominence from 2500 to 1400 BCE supporting “an artistically advanced culture ... of cheerfulness and almost decadent luxury, very different from the terrifying gloom of Egyptian temples”.<sup>425</sup> By the first century BCE, the Greek Diodorus observed that in the past Babylonian Chaldeans included persons “assigned to the service of the gods [who] spend their entire life philosophizing, their greatest renown being in the field of astrology”.<sup>426</sup> It appears to have been an advanced understanding that, for example, recognized the senses as unreliable interpreters of reality. Conveying insights through symbolic writing for an elite schooled in more than functional literacy, the legacy arrived in a fractured form through oral poets and singers to the Greeks. These tales informed Plato’s description of the universe, which is similar to the early Babylonian ‘Epic of Creation’.<sup>427</sup>

Mainland Greece rose in importance despite its mountainous terrain by using small fertile valleys for agriculture close to the coast. Such civilizations without adequate agriculture, like the Minoans, relied on trade of luxury items to secure their food, and were thus vulnerable if trade faltered. Population increase encouraged migration around the Mediterranean where a few of the trading cities fostered philosophical discourse. The social systems of this Greek world were diverse, ranging from militaristic Sparta’s reliance on foreign serfs, to owner-cultivators of marginal land, to free citizens enjoying the fruits of war-captured slaves, to wealthy Corinth, and in later literature to the agricultural utopia of an imagined Arcadia. In centres that became rich through commerce, increased social sophistication led to periods of democracy punctuated by rich and powerful leaders. Rituals also became more sophisticated versions of tribal beliefs

associated with solstices, seasonal activities and agricultural and human fertility. Rites “were often such as to generate a great collective excitement, in which individuals lost their sense of separateness and felt themselves at one with the whole tribe”.<sup>428</sup> In poor areas, a god might be represented by a crude pillar that was berated when crops were poor, and a goat might substitute for a bull as a fertility symbol.

There were many gods. Pan, a shepherd god, was to later morph into an omni-god, as in the modern use of the word ‘pan’, while Bacchus from unsophisticated Thrace persisted as a symbol of alcohol and mysticism. However, such gods were not creators of the world, and while they behaved in a similar manner to humans, they were seldom concerned with onerous moral strictures. Sacrifices evolved away from the eating of humans while the integrated cosmology was generally maintained as an holistic conception of life in which rituals sought accord with favourable agricultural conditions. Poor harvests required appeasement of the gods. Hence the Greek Eleusinian mysteries were based on agricultural symbolism. Since even the gods in Homer’s works were subject to fate, Russell surmised that this may be seen as the beginning of science since it shows awareness of the operation of natural law.<sup>429</sup> As sophisticated urban culture developed, commercial centres became more multicultural following the Phoenician model and the Greek philosophical links to agriculture declined.

### **Greek Gods**

Although Greek gods are sometimes downgraded in discussions of Greek philosophy in favour of words attributed to Socrates, Plato and Aristotle, they represented the same philosophical quest to understand life and enhance contentment. The ancient Homeric epics illustrate a range of Olympian deities mixing with humans and their warfare. Even if this is an oratorical device more than a representation of everyday relations with the gods, it seems that individuals identified with specific gods to represent “every aspect of their world, natural and cultural, and their experiences in it”.<sup>430</sup> In an era where natural events were unfathomable, the invention of gods governing them was a psychological means of explaining life and of seeking to be well treated by the gods and hence nature. Homer’s line

in the Iliad expresses this sentiment, "if a man obeys the gods they're quick to hear his prayers".<sup>431</sup> The nexus between the gods and what is more commonly called Greek philosophy is a key feature of the trial of Socrates, which is informed by consideration of his predecessor, Thales.

Nietzsche suggested that Thales was interpreting myths while retaining the essence that "everything is one."<sup>432</sup> Thales saw the unity of all things through water, which although conflicting with modern understanding, was arrived at through reasoning processes that we continue to employ. Applying the same logic we can accept that the myths and the gods were means of understanding life and nature. In agricultural terms, the goddess of agriculture, Demeter, was the sister of the most powerful of the gods, Zeus, and the mother of Persephone whose abduction by Hades of the underworld caused a winter when crops could not grow. After Hades was persuaded to let Persephone return for what became the spring and summer seasons, crops produced again. Thus these intellectual ancestors practiced philosophy around natural agricultural cycles.

Plato's 'Republic' centred agriculture as a critical component of philosophy and life: "If [a ruler] has the capability of governing well in that he acquires wealth for [the people] and preserves it for them always, then he is suitable for being the lord over this city. Wealth is obtained first from all the necessary things, such as agriculture, grazing, and hunting; later on, from trading, hiring, and the rest."<sup>433</sup> Later Plato introduces agriculture as "the most natural" means by which necessities are to be obtained. This approach may be argued to have been a logical explanation for his age when agriculture was developed with well-designed irrigation systems that integrated mathematics and physics with biological knowledge in the search to understand life.

Sophisticated philosophies developed in other civilizations, each with cultural constraints on the way they conceived nature and existence. However, most other philosophies stopped short of the objective rationality that was to emerge in Greece<sup>434</sup> as suggested in Homer.<sup>435</sup> When Greek became the lingua franca of the educated, it was to influence interpretations of the philosophy developed by

tribal Israelites that had been written as laws for settling herders.<sup>436</sup> The law was held to come from God via prophets until the 6<sup>th</sup> century BCE destruction of the Jerusalem temple, a philosophical tradition that was to be revived a millennium later with the creation of Islam.<sup>437</sup> Rational objectivity is said to be less prevalent in cultures with God-given laws that do not favour peer contestation in the search for knowledge or employ gods as mirrors of human action and thought.

The millennium-long duration of the Greek world differed from its neighbours in various ways, including: challenging debates; openness to other cultures through widespread trade; adoption of its language by other groups; wealthy merchants hiring teachers, and a religion that did not rely on priests as intermediaries.<sup>438</sup> Greek abstract thinking enhanced mathematics built on Babylonian philosophy, which itself has been said to have been of a similar level to that of the early European Renaissance.<sup>439</sup> Euclid's 'Elements', the foremost extant Greek work,<sup>440</sup> relied heavily on abstract objectivity, which together with other insights oriented Greek philosophy to understanding life in order to live well.

Living well includes common elements across philosophies, including relief of angst or suffering in everyday life. Both Eastern and Western philosophy see such angst arising from attachment to ideas and material aspects of life.<sup>441</sup> Socrates' life is said to have exemplified material detachment while emphasizing ethical behaviour and intellectual debate. Plato then consolidated the abundant ideas of the era and merged them into an integrated theory for acquiring knowledge that was in turn broadened by Aristotle. Aristotle's system of deductive logic contested a thesis and its antithesis, which was reinforced in the 19<sup>th</sup> Century when Doctor of Philosophy degrees began to be standardized and agricultural science was formalized. Aristotle also recognized that ethics are affected by a social environment and that moderation conduces to contentment. Various schools of philosophers arose in ancient Greece, including; Sophism, Cynicism, Scepticism, Epicureanism, Hedonism, and the Stoicism that influenced Rome and informed the Neoplatonism of early Christianity known through bishop Augustine.

## **Greece to Rome**

The Romans overtook the Greeks and adopted their advanced philosophy. Language, myths and art converged as Roman gods were aligned with those of Greece; a Trojan origin was invented for the Romans from Greek Homeric myths via Virgil's 'Aeneid', which may still be unconsciously accepted today as is described in Chapter 5. Roads, legal codes and power expanded although agriculture, despite innovations, became more remote from urban thought, except for the wealthy elite's rural estates. Adopting Greek mannerisms as their estates grew "on which slave labour was employed to carry out new scientific kinds of agriculture",<sup>442</sup> olives, vines and vistas displaced wheat and increased Rome's reliance on imported grain. Periods of poor governance quickly reminded the elite of the need for food security.<sup>443</sup>

By the early centuries of the current era (CE), the Roman Empire had expanded by absorbing less sophisticated peoples who with skill could rise to higher ranks where they used Latin but seldom learned Greek language. Just as the Greek Alexandrian conquests had brought contacts with Babylonian, Persian and Egyptian worldviews in the past, so Roman expansionism brought new ideas from such groups as the Celts and Jews, while the numbers of Christians were slowly increasing within the empire. The Jews had evolved their own philosophy with their emergence from pastoralism and adoption of commerce from contact with the Babylonians and were already a significant commercial component of the Alexandrian Greek culture. Their urban elite had adopted Greek in place of Hebrew, which necessitated both the translation of the Tanakh as the Christian Old Testament scriptures and the writing of the New Testament books in Greek. Thus Greek was the learned lingua franca of the eastern and western European worlds for matters spanning all fields as knowledge expanded around the start of the CE.

Evagrius, the "philosophe au désert",<sup>444</sup> was an early writer of oral philosophies that came together in the Desert Fathers, the first of the Christian monk traditions in the late 300s CE. Listing actions that caused humans to work against their own wellbeing, he codified items that would be referred to as 'sin' in Christianity that were remarkably similar to the 'defilements' elicited in early Buddhism.

Rarely included in histories of philosophy, such thought was probably a significant means by which Greek learning was carried forward. However, as Rome expanded with the rise of skilled men who came from the margins of the Roman Empire and did not know Greek, Latin assumed an increasing role in learned discourse.

### **Roman Agriculture & Philosophy**

Roman agriculture underpinned the Empire with its granary in Egypt. When the granary was neglected and the Empire was poorly governed, it was re-established by the visionary Emperor Vespasian who used food as a lever to gain power.<sup>445</sup> It also introduced a number of advances that formed part of the philosophy of the era. For example, the Romans “realized that there are no short cuts in the processes of nature, and that the law of compensations is invariable. The foundation of their agriculture was the fallow and one finds them constantly using it as a simile – in the advice not to breed a mare every year, as in that not to exact too much tribute from a bee hive.”<sup>446</sup>

Such views of Roman agriculture are known from Cato’s writings, of whom Columella said “that it was Cato who taught Agriculture to speak Latin”<sup>447</sup> in the oldest extant Latin text concerning agriculture; Hesiod had apparently idealized farming half a century earlier in his poetics.<sup>448</sup> Cato’s work was soon followed by Varro’s important text and Virgil’s ‘Georgics’, and then by Pliny’s ‘Natural History’ and later by the Ireland-based monk Palladius around 400 CE. Each built on works of the earlier writers. Of these, Cato, Varro and Virgil span the philosophy derived from and applying to agriculture. Cato knew the work of agriculture from youth, and continued his interest in it even after achieving fame and comfort, writing ‘De re rustica’ in his old age, just as Varro wrote ‘Rerum Rusticarum’. While Varro had not grown up on a farm he had participated in the agrarian resettlement schemes of 59 BCE and his is the most practical of the extant works. Virgil does not seem to have had first-hand experience in agriculture, yet he is said to have steeped “his Celtic soul with the beauty and the melancholy poetry of the Lombard landscape”<sup>449</sup> to produce his poetic work with inspiration from Lucretius, Cato and others. The four books of Virgil’s ‘Georgics’ of around 29 BCE present

agriculture in semi-practical terms within a philosophy that embraces the gods; an example is presented in Box, *Georgics*.<sup>450</sup>

### **Georgics**

“They change their savage mind,  
Their wildness lose, and, quitting nature's part,  
Obey the rules and discipline of art.

Happy the man, who, studying nature's laws,  
Through known effects can trace the secret cause.”

*Virgil's Georgics*

Virgil's poem opens with a summary and prayer to the agricultural gods and Augustus. It includes such technical detail as the plough, the role of skilled labour and the effects of variable weather. Depicted in the cosmology of the time, agriculture is defined as an interaction with nature that relies on constant human intervention through such means as grafting, classification of species, planting times, livestock and plant breeding, animal husbandry and the effects of livestock diseases. Bees are also discussed as worthy of human society's emulation. Of particular note is the association of agriculture with poetic themes of love and death.

The poem draws on Aristotelian philosophy for zoology and botany, on Lucretius' 'De Rerum Natura' for both style and references to the plague, and overall reflects an Epicurean philosophy in the relationship between nature and man.<sup>451</sup> It underwent a revival in the 18<sup>th</sup> century when Dryden's poetic translation<sup>452</sup> appealed to the landed classes of England, notwithstanding the difference between the gentry's city life with country estates and Virgil's eulogized rural simplicity. This resurgence evolved into the contestable claim that only a farmer-poet could properly translate and understand the work, until the fashion of farming manuals based on Virgil's visions was overtaken by more philosophically-informed monographs from the emerging agricultural science of the 19<sup>th</sup> century.<sup>453</sup>

There were many other writers on agriculture – Varro lists tens of them in various languages. He “ventured to compress the subject into

the still smaller compass of three books, the first on the husbandry of agriculture, the second on the husbandry of livestock and the third on the husbandry of the farm steading".<sup>454</sup> Varro's work on agriculture<sup>455</sup> is part of a prolific output and it is the only complete extant work, being a "well digested system of an experienced and successful farmer who has seen and practised all that he records".<sup>456</sup> Setting out his work in a form like a modern table of contents, Varro introduced the plough, grafting, wine, olives, animal breeding, disease, apiculture, sacrifices, the appropriate approach to work and tens of other subjects within agriculture, and notes that all this art and science may come to nothing within the fickleness of seasons. He set the scene for agriculture to be interpreted as the human attempt to live with the elements of nature, which provided a life superior to that of the town in an unstable political period.

Also in the 1<sup>st</sup> century CE, Philo of Alexandria wrote about agriculture while seeking to integrate Greek thought and Hebrew scriptures.<sup>457</sup> This produced a somewhat forced analysis that nevertheless informed the developing philosophy of the region and provided stimulation for subsequent Arab and Jewish philosophers. However, it is Varro's that is the most readily allied with modern science in his definition of agriculture as "not only an art but an art which is as useful as it is important. It is furthermore a science [philosophy], which teaches how every kind of land should be planted and cultivated, and how to know what kind of land will produce the largest crops for the longest time".<sup>458</sup> On the other hand, Virgil, in Seneca's words, "aimed, not to teach the farmer, but to please the reader", which was one of the purposes of poetic themes in ancient philosophy.<sup>459</sup> As mentioned, the resurgence of Virgil that resulted from translations in pre-modern Europe,<sup>460</sup> eulogized Roman rural life compared to the uncertainties of urban politics.

Contrary to Virgil's resurgence in 19<sup>th</sup> century Europe, an early 20<sup>th</sup> century opinion of Roman agriculture postulates a narrowing of philosophy related to agriculture that reduced it to a technology. This fragmented the trinity of agriculture, urbanized society and war that had served cultural expansion. The assessment describes Roman agriculture as 'unintelligent' and superstitious, with frequent periods of food deficits during wars as implied by Columella and Pliny the

Younger; however, the discussion neglects the importance of the north African granary of ancient Rome, sophisticated food logistics and a constant refinement of technologies.<sup>461</sup> For example, it is claimed that “in the material development of cultivation we can hardly credit the Romans with notable advances as pioneers of an originative kind”, presumably because technologies associated with manuring, legume rotations, fodder cropping and stubble-ploughing were adaptations from others. If that is argued, then the odds of any innovation ever being acknowledged seem slim. Nevertheless, Bailey’s conclusion indicates the role of food production in Rome’s fall after it reached a stage when “agriculture deprived of hope, labour deprived of its reward, lost the breath of life, and undermined the empire that depended on their vigour”; a conclusion that again demonstrated the role of agriculture underpinning civilization, and in times of war.<sup>462</sup>

A more realistic view of Roman agriculture may be gained by observing that, as Rome expanded across other cultures, local food preferences were only marginally affected.<sup>463</sup> Similarly, the technological developments of the centre of the Roman realm were not emulated in northern Europe until some 14 centuries later.<sup>464</sup> Technologies spanning crop rotation, introduced fodder species, selective livestock breeding, vine management, crossbred fruits, grapes and vegetables, and fish farming informed through trade and immigration were most advanced near the centre of the Empire. Their practice was accompanied by a reasonably consistent philosophy of governance that maintained low and stable grain prices. As a result, fruit, livestock, nuts, olive oil, vegetables and wine production were more profitable than grain, and hence philosophical literature focussed on, for example, viticulture more than mainstream food production.<sup>465</sup> Production efficiencies benefitted from informed nutrient management from manure, compost, sewage, potash, wood ash, bone and calcium carbonate<sup>466</sup> as well as rhizobium inoculation, seed selection, soil management, weed control, metal tools, mechanical harvesters, legume fallows and ley farming. Improved forage for livestock integrated with ley farming produced a major intensification in agriculture that led to durable mixed grass and legume pastures that included lucerne (alfalfa) as well as drought-resistant species in some areas and irrigation in

others. Supporting this was organized veterinary care that included advanced surgery and disease treatment. This period of pragmatism at the centre of the Roman Empire brought philosophy, agriculture and its food together in a manner that has parallels in modern times.

### **Food & Philosophy**

Learned Greek and Roman attitudes to food also followed philosophical understanding through beliefs and traditions. The social functions of food included sacrificial rites, strengthening of group bonds and associations with philosophical discourse, poetry and entertainment. Traditions based on locally available foods produced cuisines specific to a culture and were thus underpinned by distinct types of agricultures and their philosophies. So while accepting that food “choices can be prescribed, within a scientific discourse, in a philosophical and religious tradition, but also through the channel of pleasure”,<sup>467</sup> it seems that earlier associations with beliefs emerged from the local more than distant traded foods. However, where trade and luxury allowed competing food philosophies, these ranged from gluttony, to near abstinence, to balanced health based on observation. For example, the ancient Roman philosopher Galen understood food as a culture’s complement to the natural processes of growth, nourishment and reproduction. His philosophy linked farming, food and medicine through his studies from autopsies, discussions with farmers and reading of Plato from whom he postulated emotion arising in the heart and desire in the liver, thereby initiating a durable poetic tradition. Such understanding was codified in philosophical guidelines that were often expressed in religious terminology.<sup>468</sup> Traditional local foods became a sign of authenticity and integrity after Rome’s sumptuary laws attempted to curb excessive indulgence,<sup>469</sup> and the ideal was then reinforced in philosophies incorporated into the Christian scriptures.<sup>470</sup>

Most enduring philosophies considered that a good life involved restraint from unnecessarily diverse foods and cuisines. Indulgence was seen as a moral failing similar to attachment to material wealth and other physical gratifications that cloud rational discernment.<sup>471</sup> This was same conclusion arrived at independently in early Buddhist philosophy,<sup>472</sup> by Socrates via Plato and by the Stoics, and as

expressed in Seneca's "food has nothing to do with virtue".<sup>473</sup> The Cynic philosophy went further in advocating a self-sufficiency wary of any social convention that conflicted with living in accord with nature. Aristotle suggested a middle path between an animal-like life of pleasure and asceticism in a manner akin to his arithmetical mean, which Buddhist philosophers see as similar to the Middle Path.<sup>474</sup>

Greek and Roman philosophers associated discriminate food choice with virtuous living following Plato's warning against sensuous indulgence of taste in favour of the morally superior mode of being.<sup>475</sup> Epicureanism defined pleasure as freedom from psychic disturbance and physical suffering, valuing "self-sufficiency as a great good, not with the aim of always living off little, but to enable us to live off little if we do not have much, in the genuine conviction that they derive the greatest pleasure from luxury who need it least, and that everything natural is easy to procure ... For what produces the pleasant life is ... sober reasoning which tracks down the causes of every choice and avoidance, and which banishes the opinions that beset souls with the greatest confusion".<sup>476</sup> Such philosophical insight is often mistaken as ascetic sacrifice of luxuries.

Sacrifice of comforts and luxuries in today's parlance tends to mean giving them up unnecessarily. However, that would be a misinterpretation of the Latin source of the word sacrifice, which comes from 'sacrum facere' and means 'to make sacred'. Greek words for the process include such meanings as burning, throat cutting and sprinkling salted barley as well as beseeching the gods. Ceremonies became rites of passage and contracts, but fundamentally grew from the Greek agricultural calendar that was continued through the Roman period as a bond between humans and gods that feasted on the sacrificial meal. Wellbeing and contentment of the society was thus ritually tied to the agriculture on which it depended.<sup>477</sup>

Agriculture and its requirement of hard work is portrayed in Hebrew writings as a curse put upon humans in the words, "in the sweat of thy face shalt thou eat bread, until thou return unto the ground".<sup>478</sup> Sacrifices were thus essential to maximize the chance of success and so to minimise the inevitable drudgery of agriculture. Greek and Roman sacrifices are thought to similarly refer to a mythical golden

age when food was provided without the need to farm.<sup>479</sup> Rituals can be seen today in the Christian eucharist and in kosher and halal rules. Pragmatic decisions to sacrifice smaller animals for common ceremonies in Europe<sup>480</sup> seem to follow the same logic as that of, for example, the hill dwellers of Southeast Asia where cattle sacrifices were reserved for major ceremonies while chickens, pigs or goats sufficed for other rites.<sup>481</sup>

These and other influences of Rome continued after the empire's demise in the period commonly referred to as the European Dark Ages, which notwithstanding its name, was a period of continued development that blended local and Latin learning beneath the umbrella of the Church.

### **Europe after Rome**

The so-called 'Dark Ages' seems to be retrospectively named in contrast to 'The Renaissance', a pejorative downgrading of the continuity of European cultural history. Better referred to as the early Middle Ages between the fall of Rome and the developments that led to the Renaissance, it was a period of great thirst to access additional classical literature within the cultural milieu of European Christianity.<sup>482</sup>

Imbued in Greek thought before Rome's final decline, the 1<sup>st</sup> century bishop Augustine had famously noted that, "Any statements by those who are called philosophers, especially the Platonists, which happen to be true and consistent with our faith should not cause alarm, but be claimed for our own use, as it were, from owners who have no right to them".<sup>483</sup> Proprietorial arrogance aside, Augustine demonstrates a clear willingness to integrate pagan into Christian thought from its earliest time. His writings later enlightened the misnamed 'Dark Ages' when such authorities as William of Conches (1085-1154) from Chartres sought to reconcile Plato's postulate of creation with that of the Bible. He said, "The authors of Truth are silent on matters of natural philosophy, not because these matters are against the faith, but because they have little to do with the upholding of such faith, which is what those authors were concerned with."<sup>484</sup> In fact around the same time, other scholar-monks paved the way for the natural philosophy that today we call science, for

example Hugh of St Victor's "the whole of the sensible world is like a kind of book written by the finger of God".<sup>485</sup> It was this worldview of great minds in the Church combined with influence from Arab Spain that gave rise to the first universities that translated rediscovered Greek texts into Europe's learned lingua franca of Latin.

Rediscovery of classical works via the Muslim reign in Andalusia re-introduced Aristotle among other works. One of the great scholars was Maimonides who in the 12<sup>th</sup> century sought to reconcile his Judaism and classic works within that Islamic realm, including a treatise on agriculture. He established rabbinical laws for such details as: planting seeds; propagating domestic animals; tithe taxes; subsistence rights; sabbatical and jubilee years for fallows and debt-forgiveness. Maimonides' well-known 'Eight Degrees of Charity', which continues to be regarded as an enlightened approach to charity, is included in his agricultural treatise (Figure 13).<sup>486</sup> Such knowledge was to widen monastic European scholarship through the emergence of universities.

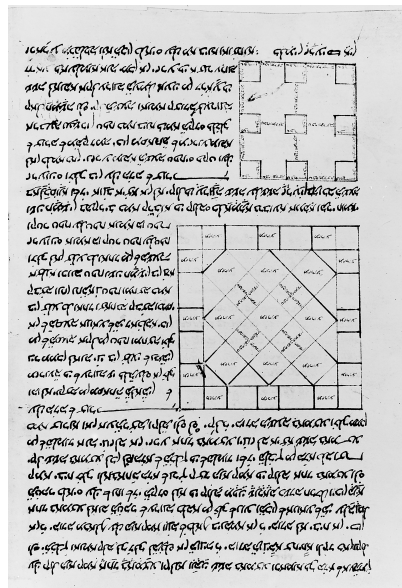


Figure 13. Extract from Maimonides "Treatise on Agriculture"<sup>487</sup>

Universities were legally incorporated based on laws continuing from Roman times, and so they proved more durable than the schools of Plato and Aristotle that had relied on individual professors, or those of Alexandria and Constantinople that had relied on royal patronage.<sup>488</sup> This legislative base was to later evolve into the corporate structures of modern capitalism. United in a quest to preserve independence, universities balanced secular and Church power, and accumulated privileges as their resources grew to the extent that their cities could rarely afford to offend them.<sup>489</sup> However, being subject to the usual human foibles they sometimes succumbed to 'group-think' when an established intellectual position was challenged. Such a case arose for Amaury of Bène (d.1207) who advanced an agriculturally-compatible pantheism without any belief in an afterlife. Interestingly, his demise was at the hands of his academic colleagues in the theology faculty, not the Church. It was such experiences that were to later lead academic philosophy to be wary of theology.

Theology had reigned as the supreme discipline and natural philosophy arose in its service, as its 'handmaiden' in the words of Aquinas.<sup>490</sup> This meant that natural philosophy was a prerequisite for those studying theology and thus it enjoyed a guaranteed position in universities. Natural philosophy not only informed but soon challenged theology, as the 13<sup>th</sup> century Albert the Great of Swabia wrote "it is the task of natural science not simply to accept what we are told but to enquire into the causes of things".<sup>491</sup> These advances took place in an environment of worrying over the relative utility of Plato whose ideas could be read to suit some Christian thought, and those of Aristotle whose works were interpreted through the Arab scholar Averroës.<sup>492</sup> Averroës' Latin speaking followers developed his ideas to exclude free will and by implication moral responsibility and also denied their being any life after death.<sup>493</sup> Academic theologians thus saw that Aristotle's interpretation of nature placed limits on God.

Reason and curiosity continued to inform European religion through natural philosophy, albeit with some backsliding on astrological matters that had been forsworn since Augustine's time. Superstitions arose with chemical knowhow in the form of alchemy's grail of

manufactured gold.<sup>494</sup> Aquinas brought rationality to the question surmising that “if genuine gold could be chemically produced, it would not be illicit to sell it as true gold, for there is no reason why science should not exploit natural causes to produce natural and true effects”.<sup>495</sup> Superstitious interpretations of the Greek texts about planetary influences as natural forces also prompted Aquinas to explain: “If anyone attempts from the stars to foretell future contingent or chance events, or to know with certitude future activities of men, he is acting under a false and groundless presumption, and opening himself to the intrusion of diabolic powers. Consequently, this kind of fortune telling is superstitious and wrong. But if someone uses astronomic observation to forecast future events which are actually determined by physical laws, for instance drought and rainfall, and so forth, then this is neither superstitious nor sinful”.<sup>496</sup> Some may see the incidental beginnings of modern agricultural meteorology in such words. Religion thus served the advancement of natural philosophy, although it is noteworthy that Aristotle’s’ legacy of separating disciplines continues to hamper integrated thinking in the West.<sup>497</sup>

By the 15<sup>th</sup> century, Bede’s seventh century works that had formed part of an earlier renaissance were published thanks to Gutenberg’s printing press. Drawing on the diverse literature available to him, he included those that mentioned agriculture, such as; Pliny the Elder, Virgil, Lucretius, Ovid and Horace. Although it is his historical works that are the more commonly referenced today, Bede’s breadth of scholarship showed an holistic philosophical approach. Informed by theology, this provided a means of advancing the worldview of his fellow monks coupled with natural observations and calculations, which produced such innovations as a reliable means of recording time. In his milieu it was logical to apply this practical approach to Church dates. Seasonal dates and rites had emerged from the ancient agricultural calendar, which for the beginning of the agricultural year carried such symbols of rising from the death that winter brought to the rebirth of life in spring. Bede not only created the basis of dating from Christianity, he defined a means to calculate the date that became Easter; this relied on much more than the simple edit that it is portrayed as today. His ‘*Historia Ecclesiastica*’ written seven centuries earlier was first printed around 1480 in Strasbourg and

thereafter defined Anglo-Saxon history – it is regarded as one of the few seminal enduring works from that Carolingian renaissance. His ‘On the Reckoning of Time/De temporum ratione’ defined the influence of the spherical earth on varying lengths of daylight and the effect of the moon on tides – both insights that were further developed in his ‘De natura rerum/On the Nature of Things’.<sup>498</sup>

The natural philosophers of Oxford of the 14<sup>th</sup> century made the logical observation that if stars followed geometry then using mathematics would advance knowledge. In integrating mathematics into natural philosophy they opined that: “Whoever, then, has the effrontery to pursue physics while neglecting mathematics should know from the start that he will never make his entry through the portals of wisdom”.<sup>499</sup> Such advances were slowed by the plague, which particularly devastated cities and thus universities. Universities later resumed in a period that Michelet retrospectively labelled ‘The Renaissance’. The Renaissance turned out to be at least as superstitious and violent as previous ages, even while it sprouted its new philosophical branch of ‘humanism’. Humanism bypassed accumulated learning as it attempted to uphold Aristotle above Pliny on the spurious grounds that Aristotle wrote four centuries earlier than Pliny. The great essayist Montaigne (1533–92) lampooned this humanist approach in the words: “the touchstone and measuring-scale of all sound ideas and each and every truth, lie in their conformity with the teaching of Aristotle”.<sup>500</sup>

Galileo was to later capture the same irony in an allegorical tale about an anatomist who after having been conclusively shown that Aristotle’s explanations of nerves was incorrect stated that: “You have shown me this so clearly that I would be forced to admit that you were right, if only Aristotle himself did not contradict you”.<sup>501</sup> Challenging humanist rhetoric through intellectual thought followed the style valued in philosophy’s modern form of science, and Galileo is the genius we use as shorthand for the advances up to his time. But a modern penchant for setting religion in opposition to science has led to inaccurate impugning of the Church as being against Galileo’s scientific discoveries.

In his own words, which did not offend the Church, Galileo maintained that “philosophy is written in this grand book, the universe, which stands continually open to our gaze. But the book cannot be understood unless one first learns to comprehend the language and read the letters in which it is composed. It is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures without which it is humanly impossible to understand a single word of it; without these, one wanders about in a dark labyrinth”.<sup>502</sup> Galileo’s insights built on the earlier foundation of the natural philosophy of the medieval period – the so-called ‘Dark Ages’. The protection of scientific quests within this environment that integrated such worldviews interpreted the creation of nature by God being the justification for its study. To that history we owe our calling as modern ‘scientists’, a word invented only in 1833<sup>503</sup> for the autonomous philosophical discipline that science had become. Science was thereafter to develop into a discipline linked to, yet independent from, theology and philosophy. This seems regrettable since theology was one of the foundations of science, without an historical appreciation of which today’s science and philosophy may find they rest on feet of clay.<sup>504</sup>

Galileo’s issues with Church were not that the institution denied his astronomical insights – it had even tolerated his quip that “the intention of the Holy Spirit is to teach us how one goes to heaven, not how the heavens go”.<sup>505</sup> Rather it seems that Galileo had offended his earlier protectors, the Jesuits, and then allegorically contradicted the Pope. The Church is more resilient than a pope or its periodic excesses, and has been the source of most European philosophical developments until quite recently; one Catholic source lists nearly 300 significant ordained scientists through the ages including those that underpin agricultural science such as Mendel, Boconne and Urzędów<sup>506</sup> and after the 16<sup>th</sup> century there were countless ordained Protestant scientists. However, there were of course others outside the ordained Christian ranks, perhaps the most significant of whom for the present discussion was Spinoza.

### **Spinozist Agriculture**

The 17<sup>th</sup> century Jew, Spinoza, remains attractive to many today because his apparently pantheistic approach appears to be a

comfortable compromise between conventional theistic religions and secular worldviews. However, his deductive philosophy is much more demanding than that. Naess, in developing his 'deep ecology' thesis, hailed Spinoza's insights as "Middle East wisdom par excellence".<sup>507</sup> Yet Naess' contributions are uncontroversial in many scientific and philosophical circles insofar as they deal with ecological interrelationships that are not centred on humans. Hegel, perhaps ironically, claimed that to be a philosopher, "one must be a Spinozist",<sup>508</sup> and Einstein identified with "the God of Spinoza".<sup>509</sup> These latter statements acknowledge Spinoza's search for a unified understanding of nature justified by the assumption that "the more we understand individual things, the more we understand God",<sup>510</sup> which necessarily involved a subsequent step in logic: the more we understand, the more we see that everything is integrated, and then we experience a unification with nature infused with 'God'. This is far from the superficial invocation of Spinoza as an alternative to establishment religion; it is in fact, the essence of the great religious traditions and teachings, which is also what Spinoza claimed.

Spinoza argued that incomplete understanding was a lower form of knowledge informed mainly by imagination. While his approach was rational and therefore did not rely on meditation, its insights are remarkably similar to the products of contemplation in Buddhism, Christianity, Hinduism, Islam, Shintoism, Taoism and presumably others.<sup>511</sup> Using a rational approach to arrive at such an understanding may be seen as an advance beyond the mechanistic philosophies of Descartes and Newton and one that perhaps even pre-empted the Gaia hypothesis. Again, this may be a step too far based on the fallacy of using today's knowledge to assess the context of past insights, since Spinoza's objective was human improvement expressed as 'perfection'. Spinoza's approach was hierarchical insofar as humans were assumed to be above other animals because they are more rational, and by corollary philosophers – meaning those seeking knowledge – were above unthinking humans.<sup>512</sup>

Spinozist Agriculture, a neologism here introduced, is one means of understanding how modern agricultural science operates. It does not mean that all the scientists involved in agriculture have an understanding of Spinoza's philosophy. However, the rationality and

the acceptance that all life interacts with all other life and indeed with inanimate objects as well, characterizes agricultural science. This is one of the ways that confusion arises between scientists working in the biological environment and those whose technological focus is derived from a Cartesian worldview.

The biological worldview is captured in a statement by Montaigne's contemporary, the broad-thinking potter-cum-chemical and hydraulic engineer Palissy, who integrated agriculture and philosophy in 16<sup>th</sup> century France; he wrote "no art in the world requires more philosophy than agriculture, and I say that if agriculture is carried on without philosophy it amounts to a daily violation of the earth".<sup>513</sup> It is not sufficient to claim that his use of the word 'philosophy' includes what was later termed 'science' because in some minds today, science is interpreted as just the technological aspects of science. Rather than reductive technology, it meant an embracing philosophical worldview of all things, which is Spinozist Agriculture.

*This selective overview of the development of Western philosophy relevant to agriculture from ancient Babylon and Egypt up to the period before the Enlightenment has necessarily skimmed over many important aspects. Nevertheless, it indicates a continuity of knowledge and learning. Infusions of foreign learning through Arab Spain and its links to the Middle East and India leavened that learning, which prepared Western philosophy and its science for the period that would be known as The Enlightenment, as introduced in the following chapter.*

## Chapter 8

### The Enlightenment & Agriculture Spinoza to Smith

*As the western and eastern parts of what was the Roman Empire separated, the Latin language used by the less-Hellenised Europeans of the West became the language base of its Western European realms. The Byzantine Empire arose to assume the eastern Roman Empire and continued the use of Greek language. These changes influenced thought related to philosophy and agriculture, which in the West emerged slowly through monasteries over more than a millennium. Meanwhile, as introduced in the previous chapter, Arabic scholarship built on the legacy of Rome and Persia and made advances in irrigation that spread with their rule of Spain. From Spain and southern France, more of the ancient world's learning was reintroduced through the Arabic al-Andalus Empire to Western Europe and served as a fillip to the Enlightenment, which is described in this chapter as leading to the emergence of modern agricultural science.*

#### **Reason**

'The Enlightenment' or 'The Age of Reason' is usually dated from the 17<sup>th</sup> century but might be better understood as a development building on the insights of Europe's monk scholars through the Dark Ages supplemented by reconnection to some additional ancient Greek knowledge. In summary, this might be symbolized by the works of the 11<sup>th</sup> century Muslim philosopher ('faylsuf') Avicenna, and other alignments of Christianity, Judaism and Islam with Aristotelian thought as interpreted through Averröes<sup>514</sup> and Maimonides.<sup>515</sup> By the 13<sup>th</sup> century, the friar Aquinas had integrated the new knowledge into the Church's theology and developments continued with such figures as William of Ockham defining efficient reasoning and sometime later, Bacon outlining empiricism.

By the late 15<sup>th</sup> century, the revived spirit of Greece inspired Shakespeare to write that “miracles are past; and we have our philosophical persons, to make modern and familiar, things supernatural and causeless”.<sup>516</sup> The Europe to which such knowledge arrived had benefitted from agricultural advances in shorter crop rotations, the horse collar and expanded trade in food products, which stimulated towns to grow and become self-governing. Merchants rose in prominence producing such 15<sup>th</sup> century advances as Gutenberg’s movable-type printing press. Capitalism and Protestantism spread through the 16<sup>th</sup> century revolutionizing parts of Europe, while Greek-inspired discoveries in other non-Protestant parts such as Copernicus’ Krakow were withheld secretively, or recanted as for Galileo. The scene was set thus for the 17<sup>th</sup> century insights of Newton written in the style of Euclid, which established natural philosophy as central to making Western society the exemplar of explaining observed facts in terms of logical abstract principles.<sup>517</sup> Around the same time as Newton, Spinoza was unifying wider knowledge.

Spinoza’s Sephardic Judaism followed by his Christian scholarship unified Descartes’ mind-body dichotomy within an imminent God. This conception leads to seeing all changes in nature, including human actions, as inevitable, which he described as nature naturing (‘natura naturans’). While not intended to be specific to the relationship between humans and agriculture, it provided a logic for past and extant understanding. The same logic led Leibniz to conclude that the world is the best possible world because a perfect God created it. The Protestant Locke then argued that thoughts are created by God in a mind that begins as a blank slate, as had been suggested earlier by the Muslim Avicenna. This example of circuitous history is presented as an introduction to illustrate the convergence of philosophy, mainly within the Abrahamic religions, that provided the springboard for the Enlightenment.

From the following description of agriculture before, through and beyond the Enlightenment, the rest of this chapter proceeds to position agriculture and agricultural science within Western advances in the 17<sup>th</sup> and 18<sup>th</sup> centuries.

## **Agriculture in The Enlightenment**

Over centuries as slavery gave way to feudalism and some urban centres in Europe fostered new learning and the Industrial Revolution, philosophers such as Locke consolidated knowledge, including that related to property ownership. This arose from observations of 17<sup>th</sup> century farming, which Locke argued was best based on peasant ownership.<sup>518</sup> Impractical without political upheaval, the process is seen to have been an influence on the French Revolution from which the ideas spread through Europe; however, peasant land ownership never became universal. The divide between such a philosophical ideal and agricultural practice over a long period is indicative of a separation between urban and rural sectors. In Locke's case, his writing appears to be an utopian ideal as he showed "no sign that he thought the system existing in his day unjust, or that he was aware of its being different from the system that he advocated".<sup>519</sup>

Valuing agriculture within economic philosophy was to be based on labour inputs, transportation and other specific functions, but to exclude middlemen who did not add value. Philosophical elements of Aquinas, Locke, Ricardo, Marx and others were invoked at different times, but pragmatic wealth creation led to, for example, Locke arguing that American Indians who did not cultivate their lands were not owners. This can be understood within his European milieu where small-scale agriculture was still the norm – as it is for much of the world today, a fact similarly forgotten from those imbued with a Western milieu. In any case, Locke's ideas were less suited to the rapidly arriving industrial society with its new forms of inequality.

Rousseau on the other hand, was to offer the philosophical ideal that "man is naturally good, and only by institutions is he made bad",<sup>520</sup> from which he argued land ownership and thereby agriculture was the foundation of civil society and the antithesis of natural man who was "at peace with all nature and the friend of all his fellow-creatures".<sup>521</sup> Voltaire found the theory absurd. These and other philosophical opinions that reflected on agriculture informed educated estate-owners such as the Oxford law graduate Tull, whose refinements to a horse-drawn seed-drill resulted from reading, experience and exposure to alternative practices in Montpellier. His

fast-paced seed drill made depth and spacing of planting more precise, even though his views on soil and plant nutrition appear naive today. In some ways Tull represented the application of philosophy to agriculture through technology, and this earned him unfair criticism by those following the romantic resurgence of Virgil's *Georgics*, as discussed in Chapter 7.<sup>522</sup> At this early stage of the Enlightenment, endeavours to understand the natural world and innovations that eased human interactions within it informed a terminological transition from natural philosophy to what we know as 'science' today.

### **Natural Philosophy to Science**

As natural philosophers sought to accommodate the role of God in new knowledge, the insights of Spinoza<sup>523</sup> introduced in Chapter 7 were realized by others who also expressed this within the rubric that laws discovered in nature were part of God's laws. The polymath Whewell promulgated this understanding, with an hierarchical view that ranked the integrating thinking of natural philosophers above those who made observations and conducted calculations. His theory of 'consilience' for discoveries that converged might be called 'laws' today and was based on his codification of the scientific method to maximize objectivity in experimentation and observation.<sup>524</sup> Such advances offended traditional philosophers including the poet Coleridge who argued against the term 'natural philosopher'. To him, the philosopher pondered life using only the mind and would not stoop to experimentation or digging in the earth.<sup>525</sup> Yet while Coleridge may have thought he was separating disciplines, he was indicating to future thinkers that philosophy included both poetry and science; Coleridge himself admitted attending the natural philosopher Humboldt's lectures in order to increase his stock of nature metaphors.<sup>526</sup> In 1833 Whewell responded by suggesting the replacement of the title 'natural philosopher' with that of 'scientist', meaning 'knowledge-ist', being analogous with 'artist'.<sup>527</sup> 'Scientist' gradually became the norm as specialization increased, thereby further fracturing knowledge into disciplines.

Whewell, Coleridge and many of their 19<sup>th</sup> century colleagues continued to rely on theology, which we need not interpret as a deficiency but rather the eternal human quest to be at ease in the

universe. Whewell was therefore convinced that although science and Christian beliefs had diverged in his lifetime, they would 'converge' in future generations – just as poetry and science may be seen as related, as in the following Box. The best known among those who took the next step from Whewell was Darwin who quoted him on the title page of his magnum opus that advanced that convergence even though his contemporaries saw it a challenge to traditional beliefs.<sup>528</sup>

### **Poetry and Science**

Complex philosophical questions in agriculture are not answered by technological presentations that do not ask “you to examine your values or your society’s underlying mythology”.<sup>529</sup> Asking such scientific questions can lead to useful ideals like sustainability being seen as a mechanism of applied philosophy; the ideal is known to be unattainable by definition, but it can inspire a direction for new knowledge quests. Ideals have been the realm of poets, including Keats who wrote that “Philosophy will clip an Angel’s wings”<sup>530</sup> when referring to the natural philosophy of his time. Wordsworth echoed the disconnection between nature and philosophy in his line, “We murder to dissect”,<sup>531</sup> again cautioning against single-minded technological foci. And, rather than interpret Plato literally about his exclusion of poets from “The Republic”, we may understand him to be referring to those who corrupted youth and so did not serve society’s interests. It might therefore be proposed that when Whewell inspired the term ‘scientist’, he unwittingly implied an embracing search for knowledge including poetry, the other arts and science.

Convergence is an approach evident in agricultural science, as well as in other fields such as neurology and psychology – and it incidentally reminds that each field was originally part of natural philosophy. The etymology of the term natural philosophy implies ‘loving the discovery of wisdom in nature’, or in practical terms, ‘wise application of knowledge within nature’ – this latter phrase defines agricultural sustainability. The observers and calculators referred to by Whewell are part of a larger whole comprising observer scientists that integrate the knowledge of their empirical colleagues. The

process in agricultural science can be seen in the models of the crop and climate sciences that involve both integrator scientists and technological scientists.

One early example of the integrated approach of natural philosophy is Wallace's 'Malay Archipelago' published by Macmillan in the same year that it launched what is seen as the world's premier peer-reviewed journal, *Nature*.<sup>532</sup> Describing geographical, historical, ethnographical, botanical, entomological, zoological, ecological, agricultural, oceanographic and meteorological instances around the Malay and Papuan lands, Wallace's descriptions were lauded by peers – except for the literally-minded, one of whom mentioned his “studied omission of references to the ... Christian faith”.<sup>533</sup> We may see such works as the beginning of rejecting ‘faith’ that did not accord with nature, yet being able to retain a spiritual element in observation; for example, Wallace observed that:

“It seems sad that on the one hand such exquisite creatures should live out their lives and exhibit their charms only in these wild inhospitable regions ... while, on the other hand, should civilized man ever reach these distant lands ... we may be sure that he will so disturb the nicely-balanced relations of organic and inorganic nature as to cause the disappearance, and finally the extinction, of these very beings ... This consideration must surely tell us that all living things were not made for man. Many of them have no relation to him. The cycle of their existence has gone on independently of his, and ... their vigorous life and early death, would seem to be immediately related to their own well-being and perpetuation alone, limited only by the equal well-being and perpetuation of the numberless other organisms with which each is more or less intimately connected.”<sup>534</sup>

Even in Wallace's integrated worldview, perhaps the seeds of our modern separation of science from the humanities is foreshadowed in his later words about the bird of paradise. He notes that the birds “excite the wonder and admiration of the most civilized and the most intellectual of mankind, and ... furnish inexhaustible materials for study to the naturalist, and for speculation to the philosopher”.<sup>535</sup>

With the natural philosopher's integrated worldview, Wallace's concluding thoughts in his magnum opus note that European advances have failed to lead to the "perfect social state" to which philosophy and civilization aspire while such a state exists "among peoples in a very low stage of development". He attributes Britain's "social barbarism" to an imbalance in moral understanding that has rewarded exploitation of others, which he illustrates with an agro-ecological example of land ownership conferring the right to exclude soil and food from others and to destroy other life forms.<sup>536</sup> His observations remain relevant to the inequities that agricultural science today seeks to redress through ensuring adequate nutrition for all persons while minimizing biodiversity and other losses.

Taking a broad integrated approach that has been appreciated by great minds from Galileo, Kepler and Boyle to Newton also invokes Bacon, Descartes, Locke and Spinoza in the nexus between agriculture and philosophy. By the same logic, this work accepts earlier philosophers and those outside the European tradition as all being part of natural philosophy.<sup>537</sup> This will appear to some as contravening Newton's concept of method in his 'Principia'<sup>538</sup> with its "rules of reasoning in philosophy" that limited science to the empirically testable. According to Descartes, this left philosophy separated from natural philosophy to deal only with the mind rather than with physical matter. By extension, modern scientists from Weinberg<sup>539</sup> to Hawking<sup>540</sup> have stated that they find no use for modern philosophy, which might be best understood as referring to rarified academic discussions. The applied philosophy of agricultural science such as genetic manipulation and animal welfare clearly continue the natural philosophy tradition. If the function of philosophy is to "help humanity acquire wisdom – wisdom being the capacity to realize (apprehend and create) what is of value in life, for oneself and others",<sup>541</sup> such natural philosophy conducted in an holistic context is more important than esoteric questions.

The applied sciences assume that nature is comprehensible, but they are largely unconcerned about the origins of nature despite the subject having captivated Christianity for millennia. The ancient Indian philosopher described as the Buddha effectively states that such pursuits are not important.<sup>542</sup> The British philosopher Russell

came to a similar conclusion in more recent times: “There is no reason to suppose that the world had a beginning at all. The idea that things must have a beginning is really due to the poverty of our thoughts”.<sup>543</sup> Notwithstanding the limitations of retaining God in philosophical thought, the advances in 18<sup>th</sup> century knowledge produced an awareness of human behaviour that elicited some practical approaches, such as ‘enlightened self-interest’.

### **Enlightened Self-Interest**

Eighteenth century French philosophers continued wrestling with the issue of God, which culminated in Determinism – a rational understanding of life that is remarkably similar to the intellectual components of an ancient Indian concept. Based on “the idea that every event is necessitated by antecedent events and conditions together with the laws of nature”,<sup>544</sup> the Western tradition also traces it to early Greek philosophers through successors including Spinoza, Holbach (Dietrich) and latterly Dennett. As a major meeting point of Eastern and Western philosophies, Determinism’s hard form does not accord with modern Western assumptions of free will. The insight can be seen in Taoism’s flows of conditions affecting outcomes and in India’s laws of karma and the cycle called samsara and its more explicated form in the Buddhist ‘pratīyasamutpāda’ or ‘dependent origination’. The confusion between freedom to choose and free will is informed by Determinism’s explanation that all effects result from the interaction of causes. The concept has been explained by, for example, Einstein’s argument that we cannot conceive of all possible causes<sup>545</sup> and hence we postulate laws about nature that we constantly test. This appears to be more readily comprehended in the life sciences.

It is convenient to discuss Determinism further through the above mentioned Holbach who maintained a Parisian salon for philosophers. Extremely controversial in 1770, his pseudonymous publication ‘The System of Nature’<sup>546</sup> claimed “no necessity to have recourse to supernatural powers to account for the formation of things”.<sup>547</sup> Religious institutions were a hindrance to social improvement in this conception because ultimately humans seek that which makes them feel content, an approach that can be summarised as enlightened self-interest.<sup>548</sup> Holbach therefore

defended private property, rights to the product of one's labour and laissez-faire commerce with some regulation to constrain greed, and to eliminate inheritance and state support for religious groups.<sup>549</sup> Many of his examples were necessarily agricultural.

The ethical philosophy of enlightened self-interest observes that acting in the interests of others ultimately serves one's own interests, as once eulogized about America's potential.<sup>550</sup> Various interpretations as an expression of the culturally ubiquitous Golden Rule and deferred gratification differ from altruism, which is itself confused by poorly understood motivations. Enlightened self-interest might therefore be seen as the opposite of greed. The social outcome of greed is summarised in philosophy by the agricultural example of "the tragedy of the commons". The tragedy, in the sense that unregulated grazing of common land leads to overstocking and ultimately destroys the common resource, is a philosophical observation from almost two centuries ago.<sup>551</sup> It has subsequently been observed for matters ranging from pollution to nuclear-weapon proliferation<sup>552</sup> that run counter to the essence of philosophy of enhancing human wellbeing and contentment.

Enlightened self-interest is recognized as the social mechanism that overcomes purely selfish behaviour and is sometimes seen as part of the invisible hand<sup>553</sup> of a market. Popularly termed "do well by doing good", enlightened self-interest has been eloquently employed in the philosophical argument for wealthy nations to support agricultural research in poor food-deficit countries.<sup>554</sup> In that case, the philosophy is applied by recognizing that support to such nations increases demand for other food products as a population rises from poverty and thus creates future markets for wealthy exporting nations.<sup>555</sup> While it sounds straightforward and has been observed in practice, the concept apparently remains misunderstood where the philosophical context of agricultural science and economics has not been appreciated, or where short-term political horizons constrain logic.

Enlightened self-interest is but one of many schools that might be elicited to illustrate the integral relationship between agriculture and philosophy during the Enlightenment period. It is not possible to

review all of those writings. However, the advances in understanding are relevant in arriving at contemporary worldviews; for that reason, the following section provides a condensed overview of the history of Western Enlightenment philosophy following Russell's approach.<sup>556</sup>

### **Enlightenment Ideas**

In gross summary, the Enlightenment gave rise to the idea that individuals have basic rights, which became a foundation for modern notions of democracy. Berkeley sought to include God, thought and materiality in a complex theory that was a stepping stone to Hume's assertion that experience was the nearest possible approach to truth, thereby marginalizing the concept of God. Hobbes was then stimulated to conclude that governance was an agreement by individuals to cede some rights in return for protection and peace. The social ideas were developed further in France with Pascal continuing to mention God. Developments favoured social action through Voltaire, Rousseau and others, which is often seen as a prelude to the French Revolution. Meanwhile, Adam Smith described both moral behaviour and the action of markets in human society including the notion of goods and bads being a proper focus of governance to maintain social stability.

The insights of the French and Scottish Enlightenments of rational thought and experience-based observation were unified by the German Kant who, observing the limitations of conceptual approaches, concluded that attempts to prove God's existence are pointless. German philosophy entered the 19<sup>th</sup> century integrating art, nature and spirit, which Schopenhauer, for example, considered the sole means of rising above ubiquitous angst. Peaking with Hegel, this line of philosophy included an integrated concept of mind being across all persons, while separately refining Aristotle's thesis versus antithesis into a synthesis. Karl Marx was to use Hegel's approach.

Marx was one the most important recent philosophers in the European tradition according to Russell. His contribution focused more on the nature and meaning of human history as a means of informing how humans can live together well. He saw individuals as able to create their own histories within the environment in which

they live, which propelled his social thinking to present an evolution of the economic modes of production. Dominant groups controlled the means of production and when their power declined new groups would arise, each enforcing laws that favoured their interests. Capitalism can be read as a positive expression of progress that produces new 'wants', which trade, exploration and science deliver. However, when those benefiting from such developments become dominant, human nature leads them to seek control over the means of production, which thus became central to Marx's understanding of social cohesion and progress. The Sovkhoz state farms of the USSR were a corruption of Marx's approach in agriculture, even though they purported to share the benefits with the people. Some compatibility can be seen between Marx's philosophy and that of John Stuart Mill.

Mill has been described as "the most influential English-speaking philosopher of the nineteenth century".<sup>557</sup> His commentary included limits on growth to avoid destroying the environment. In an agricultural milieu he explained the established factors of production of land, labour and capital in terms of capital being "a stock, previously accumulated of the products of former labour". Land and capital would ideally be used to increase labour productivity while unproductive labour was deemed to not produce wealth. He then reasoned that a limit was necessary to avoid environmental losses, and that this was feasible because profits decline with diminishing returns from agriculture and with population increase, which led to the suggestion of population limits.<sup>558</sup>

In France, Comte evolved a religious-style scientific method without reliance on God, while in Denmark Kierkegaard saw God as the creator of our impression of freedom, which was the source of "angst". Meanwhile in Germany, Nietzsche rejected any role for God in favour of a human 'will to power' to develop to a higher state. Partially integrated in the ideas of Bentham and Mill, a practical approach to social ethics evolved based on 'the greatest happiness of the greatest number' with an emphasis on intellectual and moral contentment. Thereafter, ideas were further integrated in the USA by such figures as Emerson and James who understood spiritual experience and rationality as different means of contributing to relief

from angst. Each philosopher mentioned agriculture in explaining his reasoning; for example, Mill referred to agricultural labour, and Emerson commented on dairy cow welfare.

Subsequent developments still treated logic and socio-cultural phenomena as different, which prompted Russell and Whitehead to focus on mathematical explanations that ultimately proved to be of limited application in states of flux. Chinese and Indian philosophies continued to filter into Western thought and Wittgenstein suggested that perception spawned thoughts expressed in language that indicates an underlying reality. Heidegger argued that meaning is a product of social context, and that acceptance of the way things are allows one to live 'authentically' without 'angst'. Sartre enlarged the theme to highlight the human ability to choose as the source of both angst and moral responsibility. This is argued to have led into today's philosophical discussions in which no particular chosen action is necessarily natural, and meaning is determined by culture. While that conclusion should accommodate reconsideration of ancient myth, legend and religion,<sup>559</sup> this has not widely occurred. With these recent developments, modern academic philosophy has had little interest in agriculture per se.

Another means of viewing the history of Enlightenment philosophy as it relates to agriculture is to see the Continental European contributions as tending to be more mind-based and theoretical, while those of Scotland were more pragmatic. Thus the former allows an understanding of the pathways leading to modern worldviews as a context for current agriculture science, and the latter provides specific social and material examples that warrant further discussion.

### **The Scottish Enlightenment**

The nexus between philosophy and agriculture can be examined from various perspectives: historically, as is scattered through this work; epistemologically, in the study of origins of early language associated with the growing of food and the development of psychological awareness; logically, not only in rationalism and scepticism but also in honing understanding of phenomena; ethically, in ancient and modern value systems and whether utilitarian

attitudes are justifiable; and even metaphysically when the underlying essence of the forces that interact in nature are considered in the embracing thought of agriculture. The following paragraphs consider the nexus in terms of the intellectual development known as the Scottish Enlightenment.

Through the 16<sup>th</sup> century, the influence of Calvinistic Protestantism typified in Knox's oratory, obstinacy and writing<sup>560</sup> established a different historical understanding that informed post-Reformation Scotland. The associated egalitarian approach to education led to the tiny country having twice as many universities as England with the most recent, the University of Edinburgh, created by its citizens in 1582. The influence of Knox and the Reformation led to the city replacing tradition and patronage with learning and knowledge. In 1560, Knox had called for a national education system; 80 years later it became law and was reinforced in 1696. Thereafter every Parish in Scotland had a school and a teacher, albeit of variable quality at first.<sup>561</sup> The influence of the Protestant ethic in education is indicated by the first compulsory schooling being that of the free city of Strasbourg in 1598,<sup>562</sup> and the first nation to enforce it being Scotland.<sup>563</sup>

Scotland gradually changed from its fundamental Christianity with the rising wealth that accrued from canny trading in the British colonial system. However, a venture aimed at creating Scotland's own colony in Central America around 1700, known as the Darien Scheme, nearly bankrupt Scotland. The same site was to again involve Scots effecting the Panama Canal much later. The colonial failure and the major social changes resulting from literacy and education produced a new culture, particularly in the cities. The Scottish universities, having made their contribution to the rise in general education, changed from open entrance to more rigorous courses in which science, medicine, mathematics and engineering were considered to be as important as literature, philosophy, history and the arts. The enlightened person understood the breadth of knowledge and it was from this platform that Scottish philosophy and its practical inventions developed. The universities were perhaps the first to forsake Latin for English and to admit women and all social classes. The influence spread, and in the US included

Witherspoon's modelling of Princeton on the University of Edinburgh.<sup>564</sup>

Informed by the European Enlightenment, the Scottish version was more integrally engaged with applied science. The poor social conditions of Scotland may have fuelled this emphasis and given rise to such practical thinkers as Cullen in soil chemistry, refrigeration and medicine, Watt in chemistry and mechanical engineering, and Black in chemistry and medicine, each of which were to have impacts in agriculture. Scientific concepts were applied across the spectrum including those about the nature of God within practical approaches that integrated the natural and social sciences. Advances in education, religious tolerance and morality thus accompanied economic improvement.

Building on the 16<sup>th</sup> century turmoil with England, the Scottish Enlightenment was a product of educated Scots such as the Professor of Theology at the University of Paris, Mair, who roomed with Erasmus and lectured Calvin and Rabelais. Known as "the prince of philosophers and theologians" at the University of Paris,<sup>565</sup> Mair later tutored Knox in Scotland.<sup>566</sup> The succeeding Scottish philosophers, including Hume, Smith, Ferguson and Turnbull, linked history and philosophy embracing the sciences; Hume observed that without historical knowledge we would all be "forever children in understanding", and that a "man acquainted with history may, in some respect, be said to have lived from the beginning of the world, and to have been making continual additions to his stock of knowledge in every century".<sup>567</sup> This perspective accompanied by increased tolerance compared to fundamental Calvinism and then coupled with newfound unity with England stimulated the Scots to an even wider search for new thought around Europe. Belief-based religion was challenged as intellectual slavery and immoral like physical slavery, and independent thought was encouraged, as captured by the poet Burns' "the man o' independent mind".<sup>568</sup>

As innovations in the natural sciences emerged, 18<sup>th</sup> century Scotland applied its philosophy to the country's poor agriculture. With less than ten per cent of its land arable and only another 13 percent suited to grazing and scattered across diverse altitudes,

topographies and soil types, philosophy sought practical means of; enhancing the resource base, using resources more efficiently, developing new technologies and reducing the population. The quest engaged politicians, intellectuals and entrepreneurs, which meant that education was further oriented to agricultural improvement.<sup>569</sup>

Universities changed and “between 1690 and 1720, new chairs were added in humanities (Edinburgh and Glasgow), Greek (Glasgow, Edinburgh), history (Edinburgh, Glasgow) and mathematics (Glasgow, Aberdeen) ... Professional education was strengthened by the addition of chairs of oriental languages (Glasgow, Edinburgh), ecclesiastical history (Glasgow, Edinburgh, St Andrews), law (two at Edinburgh, one at Glasgow), botany (Edinburgh, Glasgow), medicine and chemistry (Edinburgh) and medicine (Glasgow)”.<sup>570</sup> The ‘Honourable the Improvers in the Knowledge of Agriculture in Scotland’, a forum of some 300 landowners and intellectuals, became a club of major influence for increasing agricultural productivity and improved land leases.<sup>571</sup> The effects are discernible from the snapshot of a dynamic graph of cereal yields for the wider United Kingdom illustrated in Figure 14. Such a pragmatic approach stimulated the emergence of the Scottish common sense philosophy, which aimed to balance the non-materialism of the Irish philosopher Berkeley.<sup>572</sup>

The period saw philosophy, through its new scientific knowledge, enhancing agriculture, engineering and medicine among other sciences. As unlikely as this may seem today, such practicality was uncommon in neighbouring England at the time.<sup>573</sup> The sciences sought to discover “a history of naturally occurring events” using theoretical postulations and empirical tests in a manner still used today for complex models. The spirit of the Scottish Enlightenment kept this awareness in all who sought knowledge and was a contributing factor to the advance in agricultural science that occurred in the integrated agricultural education system<sup>574</sup> that originated in Scotland from the same period.

Practical philosophy related to agriculture by the ‘improvers’, such as the ‘Gordon’s Mill Farming Club’ from about 1758 or 1765, included agricultural experiments, land contracts, agricultural

engineering and marketing. This occurred within an environmental approach in the humanities that accorded with the utilitarian religious worldview that saw morality and science developing in tandem. Science and learning were embedded within religion for the intellectuals who accepted that there was a duty owed to God, a sentiment that Hume soon challenged. However, regardless of the relevance of God, the turn of the century saw Scotland sporting leading philosophers, economists, rhetoricians, theologians and scientists in agriculture, engineering and medicine.<sup>575</sup> The integrated approach to knowledge is exemplified in Stewart’s observation that “the sciences reflect light on each other”,<sup>576</sup> Hume went further and claimed that “all the sciences have a relation, greater or less, to human nature”,<sup>577</sup> which he saw as the unifying factor – and since his conclusion was derived from observation and experimentation, he saw these as the two elements that integrated all science.

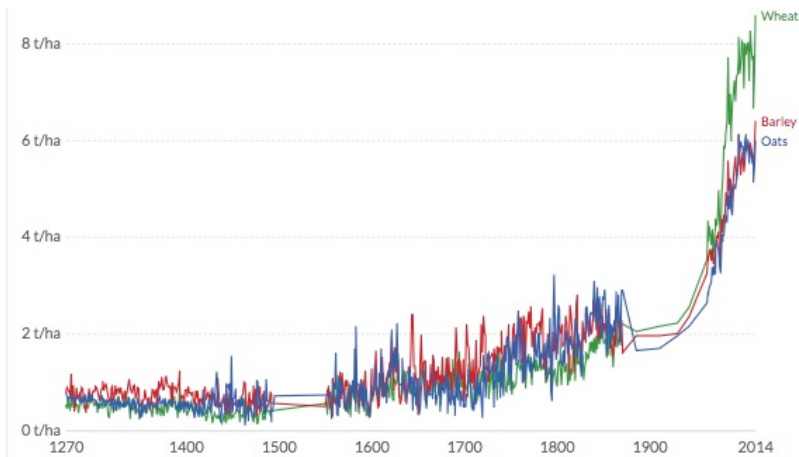


Figure 14. Cereal Yields in the United Kingdom<sup>578</sup>

Widened by Hume, philosophy moved away from theology and particularly from Calvinism’s strictures, producing Hume’s statement that the religious worldview was irrational. Fears of natural events ascribed to supernatural forces were thus understood as being exploited by human authorities as surrogates for the divine power.<sup>579</sup> Nevertheless, he considered that “there must be an ecclesiastical order, and a public establishment of religion in every

civilized community” if order is to be maintained. He attributed stability in England to a general tolerance promulgated through a civil religion and implied a similar middle-of-the-road role for the Scottish church.<sup>580</sup> Today, Hume is seen as a revolutionary, yet despite claims that his thought influenced the “young and volatile”,<sup>581</sup> he had no real contemporary following.<sup>582</sup>

Rather than being revolutionary ideas, the prevailing rationale continued to see the laws of nature as divinely created; therefore scientific investigation of those laws would bring humans closer to understanding divine intention.<sup>583</sup> However, the concepts of tolerance and independence of thought clashed with the conservative Church, as stated in Hume’s ‘Natural History of Religion’.<sup>584</sup> In that treatise, he acknowledges that reason cannot access all unseen matters, and counterintuitively states that sentiment governs rational thought: “reason is, and ought only to be the slave of the passions, and can never pretend to be any other office than to serve and obey them”.<sup>585</sup> The scientific method’s processes to reduce our own biases is an example of such recognition. To Hume, reason allowed humans to understand more of the mind of ‘God’.

Other Scottish Enlightenment figures, including Ferguson and Smith, developed ideas that produced the precursors of the social sciences, including anthropology, economics and sociology,<sup>586</sup> each of which would inform agricultural science. Ferguson sought a less fanciful basis for argument than Rousseau<sup>587</sup> and accepted the influence of Montesquieu<sup>588</sup> from the French thinkers. These all related to agriculture, as did Hume’s advancing of Hutcheson’s pioneering theory of animal rights by including them within natural law in a manner akin to conceptions of servants’ right to be spared unnecessary cruelty.<sup>589</sup>

Thus it was philosophy in its guise of science that fuelled intellectual culture both within universities and in public culture.<sup>590</sup> University chairs in medicine and chemistry had been created from the early 1700s and included medicinal gardens. Maclaurin, a member of the ‘Honourable the Society of Improvers in the Knowledge of Agriculture’,<sup>591</sup> founded the (later Royal) Edinburgh Philosophical Society in 1737. Agricultural practice became part of the Scottish

Enlightenment with its conversion to a rational applied science.<sup>592</sup> Such focus on the practical benefits of intellectual progress united the science and the humanities in natural philosophy and so became the foundation of agricultural science. However, with increased scientific knowledge came specialisation, initially evident in France with Lavoisier, which both served advancement of agricultural science and threatened to divide its integrated essence. The Scottish Enlightenment stands out as maintaining the integration in its quest for agricultural progress with the creation of a Chair of Agriculture at the University of Edinburgh in 1790. A Chair of Natural History was later established for related thought embracing Linnaeus' botany, Trembley's aquatic animals and the precursors of geology among others, as evidenced in Smellie's 'Philosophy of Natural History'.<sup>593</sup>

Such new thought eventually strained the emerging tolerance of the Scottish Enlightenment. Hutton's postulate of an ageless earth based on emerging geological understanding challenged conventional Genesis-based belief, yet his own worldview retained "a deistic belief in a benevolent Creator who had allotted humankind a privileged moral status in the natural order".<sup>594</sup> This worldview pervaded the 18<sup>th</sup> century for most thinkers and had fuelled Scottish universities to be first in admitting all comers to study natural philosophy and its sciences from at least 1740.

Scottish academics found their views challenged by this widening logic, which created the opportunity to integrate the French Descartes' doubt-based analysis of consciousness<sup>595</sup> and the English Locke's combination of probability and scepticism. From these, the empirical methodologies that remain essential to agricultural science developed. Hume suggested that "we should confine our enquiries to those subjects which are best suited to the narrow capacities of our understanding",<sup>596</sup> which in fact challenged dogmatism, assertion and authority in philosophy. Yet despite atheistic statements, Hume continued to hold that "to be a philosophical sceptic is, in a man of letters, the first and most essential step towards being a sound, believing Christian".<sup>597</sup> The concept of morality and responsibility within this holistic vision was then further advanced with Adam Smith, as elaborated below.<sup>598,599</sup> These ideas quickly spread across universities in other lands.

The concept of equality of opportunity also arose<sup>600</sup> influencing the constitutions of the New World and Continental Europe,<sup>601</sup> as well as the modern university's integrated agricultural science approaches. Scots in the USA<sup>602</sup> based the Land Grant College system on that of Scotland rather than the systems of England or Continental Europe, and after major contributions to the development of US agriculture some colleges went on to become world-leading comprehensive universities in agricultural science.<sup>603</sup> Complemented by other Enlightenment advances, agricultural science education adopted a wide disciplinary base, as we have summarized in another book:<sup>604</sup> "At universities, the Foundation Chair in Agriculture at Padua was quickly followed by a Chair at the University of Edinburgh in 1790 to which Andrew Coventry was appointed.<sup>605</sup> The Scottish universities were more attentive to practical knowledge than Oxford and Cambridge". It has been suggested that the English universities could not have produced Smith's 'Wealth of Nations' with its references to what became known as the Scottish Agricultural Revolution in 1776.<sup>606</sup> In the contested history of agricultural science education, "Coventry is hailed as the founder of the Scottish system of agricultural education that influenced the design of the Land Grant Colleges of the USA – and in part, the initial phase of Victoria's [Australia] agricultural colleges".<sup>607</sup>

The preceding discussion has introduced the Scottish Enlightenment as if it was a self-contained period of philosophical development. That has been useful as a device to indicate the impact of those philosophers on the New World and hence on advanced agricultural science and on modern worldviews. However, no ideas originate in isolation, and a major practical insight of that era, the moral and economic outputs of Smith, built on earlier thought emanating from Europe. In seeking means of relating social to productive pursuits, French enlightenment philosophers elaborated a philosophy of Physiocracy, or 'government of nature' as introduced in Chapter 6. Focussing wealth arising primarily from agricultural labour and justifying high prices for agricultural commodities, Quesnay and Turgot's<sup>608</sup> philosophy of Physiocracy possibly informed Smith's treatise.<sup>609</sup> Its rejection of capital and trading in favour of agricultural labour viewed urban lifestyles as unproductive exploitation. The

three social classes of the philosophy – landowners; productive agriculturists, and artisans and merchants – was effectively a romantic ideal that was a European interpretation of the Chinese ‘Way of the Tao’. The movement spawned various journals that popularised the ideal but perhaps its major advance was the seeking of harmony between governance and the natural order.<sup>610</sup>

The Scottish Enlightenment was a concentration of like-minded free-thinkers. While some of their references to agriculture<sup>611</sup> can be challenged in technical and economic terms, the overall philosophical thrust embraces the wide sciences of agriculture. And as one of the most successful Scottish exports, as Brodie puts it,<sup>612</sup> the Scottish Enlightenment informed the developments of the New World where the principle has been carried forward to such an extent that we hardly question many of the values that were novel in that era. If the Scottish Enlightenment was about tolerance and independence of thought, then it may be said that it continues among the tolerant intellectuals of all nations. Of the philosophers of the period, perhaps Smith has been the most influential, albeit often only partially understood when his ‘wealth’ treatise is read while his accompanying ‘morals’ one is neglected. His work is particularly relevant to agriculture.

### **Adam Smith & Agriculture**

Smith, like Hume, Robertson, Millar and Ferguson, was aware of political and social changes that included agriculture declining as a cohesive force as commerce rose and cities became more wealthy.<sup>613</sup> Stueart had linked “population, agriculture, trade, industry, money, coin, interest circulation, banks, exchange, public credit, and taxes” in a form that led to the applied economics that was to form an important part of the agricultural sciences.<sup>614</sup> That analysis treated subsistence agriculture differently to commercial forms to which modern science was oriented following successful application of technology in the commercialization of the textile industry.<sup>615</sup> It also argued for agricultural price stabilization through grain storages with the aim of securing sufficient farm incomes for continuous improvement.<sup>616</sup> Such an innovation was consistent with the ‘invisible hand’ of the market in Smith’s philosophy balanced by the morality that he strived to maintain within his overall theory.

The relative roles of land, labour and capital in production were matched by rent, wages and profit as different types of return on investment, thus providing the “first method ever devised in order to convey an explicit conception of the nature of economic equilibrium”.<sup>617</sup> Over time Smith’s theory was refined and codified mathematically and it lost his unity of practice between economics, ethics and jurisprudence,<sup>618</sup> which had been the norm maintained by such 18<sup>th</sup> century Scottish philosophers steeped in Protestantism.<sup>619</sup> Pragmatically rejecting the European ideals of Edenic natural states, the Scottish approach was aware of the inconstancy of rational action<sup>620</sup> and applied a type of cost-benefit approach for the assigning of natural rights to the State in return for protection. This informed Smith’s model for the rise of civilization from hunters through shepherds and agriculture to commerce within a peaceful state; an inattentive or aggressive state risked reversing the progress.

Smith’s insight into human nature, which contributed to our worldview today, is summarized in his four stage ‘stadial’ theory of development.<sup>621</sup> Beginning with hunter-gatherers who captured animals and gleaned food from plants but did not own property, the next stage of nomadic herders acquired property in the form of sheep, goats, cattle and so on. The subsequent farming stage led to settlements, land ownership, wealth accumulation and inequities. The fourth stage of property ownership and close living required a rule of law. While his intention was to introduce a history of jurisprudence, Smith’s hierarchy of development spawned a mindset that we largely carry to this day. He also weighed the notion of patriotism and concluded that it was not a viable sentiment until property became owned and hence defended; however, he also noted that educated persons would rise above patriotism because they would share knowledge across boundaries. Within this Scottish conception of civilization the need was recognized to guard against slipping back into ‘primitive’ states – an echo of this logic continues to inform agricultural sustainability.

Sustainability in agriculture is implicit within Smith’s philosophy, which while oriented to profits, private property and free markets,

also advocated restraints on self-interest in order to maintain environmental and social goods.<sup>622</sup> The usual interpretation that self-interest serves social interests is taken from such statements as “by directing that industry in such a manner as its produce may be of the greatest value, [every individual] intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it always the worse for the society that it was no part of it. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it”. It is important to recall that Smith wrote his ‘Wealth of Nations’ against policies that he saw prejudiced the welfare of nations, notably mercantilism. He also considered it detrimental that manufacturing and commerce were privileged over agriculture: “since the downfall of the Roman empire, the policy of Europe has been more favourable to arts, manufactures, and commerce, the industry of towns; than to agriculture, the industry of the country”. Figure 15 presents a simplified explanation of Smith’s conception of agriculture, which he balanced by noting that an overemphasis of agriculture would be irresponsible.<sup>623</sup>

Smith’s ‘Wealth of Nations’ cannot be understood separate from his ‘Theory of Moral Sentiments’, and both treatises sought social justice by acknowledging self-interest. In the latter text he notes that “there can be no incitement to do evil to another, which mankind will go along with, except just indignation for evil which that other has done to us. To disturb his happiness merely because it stands in the way of our own, to take from him what is of real use to him merely because it may be of equal or of more use to us, or to indulge, in this manner, at the expence [sic] of other people, the natural preference which every man has for his own happiness above that of other people, is what no impartial spectator can go along with ... [this] is a violation of fair play, which they cannot admit of.”<sup>624</sup> Such sentiment is not inconsistent with his ‘Wealth of Nations’ statement that both landowners’ and laborers’ interests are “strictly and inseparably connected with the general interest of the society”.<sup>625</sup> Together Smith’s major works comprise a full economic analysis rather than neglecting social and intangible benefits as is sometimes assumed in appropriating his ‘invisible hand’ term solely in modern market terms. His encompassing approach to economics is today found in the

social and resource factors that are considered alongside financial factors in agricultural science.

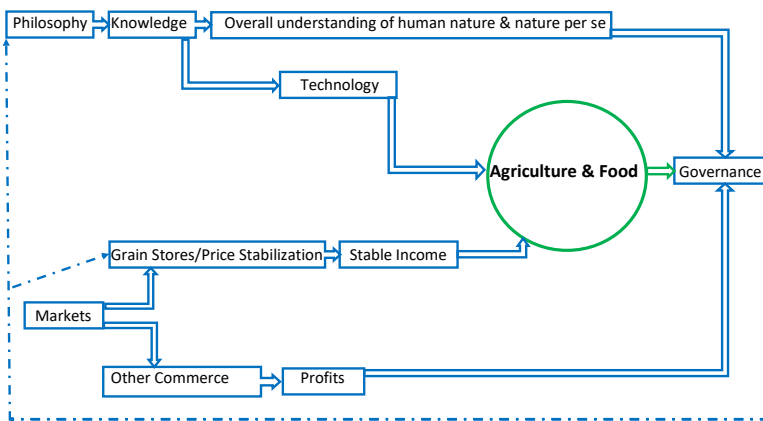


Figure 15. Smith's Philosophy and the Centrality of Agriculture

### Ongoing Enlightenment

Smith contributions are but one example of the intellectual developments of the European Enlightenment, which included a revolution in agricultural knowledge and innovations. From engaging an estimated 75 percent of the population, the agricultural innovations set in train the outcomes of today when perhaps five percent are employed in food production. Agricultural productivity was at least five times higher by 1900 compared to 1700 with accelerated gains after 1850 from the use of manufactured fertilizers and improved mechanization. Such boons arose across Germany, France and elsewhere and were rapidly adopted by advanced farmers across Western Europe.

Those and other innovations resulting from the quest to understand nature displaced romantic appropriations of Virgil's *Georgics* leading one philosopher to define the period as the Agricultural Enlightenment. He commented that: "The eighteenth century in Europe can therefore be described as the era which brought together for the first time the ingredients that would define the modern world. It is our contention that the Enlightenment played a key role in this

process. Knowledge and particularly useful knowledge had never before been made so widely or so freely available. Attitudes were forged in this century which released in men and women the urge to investigate nature and the confidence to try and improve upon it. This knowledge, in tandem with a cast of mind which valued experiment and entrepreneurship, laid the foundations for the innovative technological growth of the nineteenth century. Agriculture would benefit from this extraordinary growth trajectory no less than the extractive and the manufacturing industries.”<sup>626</sup>

We continue to live in the Enlightenment today. Labels such as the Anthropocene are not a successive stage, but our current expression of Enlightenment understanding. It has given us reason and its means of advancement through science simultaneous with humanist values derived from our deep emotions of love expressed through such less emotive terms as respect and compassion. Pinker calls the Enlightenment “perhaps the greatest story seldom told” in which, “the spirit of science is the spirit of the Enlightenment”.<sup>627</sup> The honing of reason across all fields of knowledge has led to reason pointing us to re-integrate those fields under what I call philosophy. Such appreciation of psychology, history, economics, science, technology and so on has produced the happy state of life today. Yes there are some who do not enjoy basic rights, but a much lower proportion than ever before. Such progress should be lauded, but it should not be withheld from those without nutritious food, for example. To withhold genetic modifications that address nutritional deficiencies or to impose a dietary regime on children whose development will be compromised is anti-Enlightenment, as enlarged upon in Chapter 10. Its corollary has been expressed as: “to delay by 1 year the development of a treatment that cures a lethal disease that kills 100,000 people per year is to be responsible for the deaths of those 100,000 people, even if you never see them”.<sup>628</sup>

Life today is better than it has ever been. We who are well-fed accept that life is better than death, health than sickness, abundance than poverty, peace than war, safety than danger, freedom than tyranny, equal rights than discrimination, literacy than illiteracy, knowledge than ignorance, intelligence than dull-wittedness, happiness than misery, leisure than drudgery.<sup>629</sup> These products of natural

philosophy are examples of the ongoing period of the Enlightenment. Otherwise called progress, some of its current agricultural examples include waste recycling into fertilizer, intelligent irrigation systems, and breeding GM rice with higher C4 photosynthetic efficiency. These are means of working more closely within natural systems for higher levels of output to sustain our population while also maintaining the other great advances of civilization. Of course there are contingent effects, but the Enlightenment has produced our society's identification of the negative aspects of progress as a product of Enlightenment reason – once an issue is recognized we set about adjusting our actions. Failure to see this natural cycle of which we are part and to focus on humans as independent agents that can permanently modify nature is to misunderstand philosophy.

*Philosophy during the Enlightenment gradually shifted away from the practice of agriculture yet continued to refer to it, sometimes nostalgically. As agricultural labour gave way to industrial processes and employment, new ways of thinking emerged that further fractured the integrity of knowledge. Gulfs widened between rural and urban worldviews, and between philosophy and its sciences as wealth became associated with technologically-supported power. Thus Russell commented that framing “a philosophy capable of coping with men intoxicated with the prospect of almost unlimited power and also with the apathy of the powerless is the most pressing task of our time”. He also asked “are there really laws of nature, or do we believe in them only because of our innate love of order?”<sup>630</sup> While theoretical physics may seek a Theory for Everything, agricultural science interprets such a motivation by seeking to understand natural laws and to act within them. And while philosophy during the Enlightenment drifted away from agriculture, it gave rise to agricultural science as an integrated applied philosophy. This chapter has spanned a dense period of Western thought during which agriculture has been variously mentioned in both practical and idyllic terms. Stimulated by stability, food security and intellectual freedom, Western philosophy has absorbed diverse influences that have produced modern agricultural science, and in some cases has spawned aberrations in ‘agricultural philosophy’ as discussed in the following chapter.*

## Chapter 9

### Agrarian Philosophy

*The Enlightenment and its advances in agricultural knowledge have been introduced in the previous chapter. As part of that general explosion of learning, the observation by Hume that “reason is ... the slave of the passions”<sup>631</sup> serves to explain some alternative understanding about nature that has been adopted within a religious context. A specific example of this form of philosophy – hailed by its advocates as agricultural philosophy – is that otherwise known as agrarianism, which is the subject of this chapter. As a Western approach it has been adopted within a Christian context as an attempt to integrate intellectual, emotional and biblical aspects of agriculture. Noble in intention, its occasional tendency to literal interpretation of scriptures places limits on its widespread utility. Nevertheless, it provides a further useful philosophical conception of agriculture as a human interaction within nature.*

#### **Literalism’s Limitations**

As religious references can be unattractive to some scholars the following simply seeks to provide a glimpse of the agricultural ethic that pervades the older books of the Bible. This is not intended as a statement of faith, but is rather an acknowledgement of what has become a neglected foundation of Western culture and philosophy. The link between agriculture and philosophy in Christian terms is much more than the tritely quoted end of war hopes expressed as: “They shall beat their swords into ploughshares, and their spears into pruning-hooks; nation shall not lift up sword against nation, neither shall they learn war anymore.”<sup>632</sup> Yet such biblical verses are often seen as part of a belief-system by agrarianism’s followers. In the following discussion, a wider perspective is employed to include the narrative that both explains older notions of God and the use of agricultural metaphor to communicate difficult psycho-spiritual matters.

The association of agriculture and philosophy in Christianity, as introduced in Chapter 4, is more than the existential need for sustained food production. The association is embedded in the historical practice of agriculture, which “depends upon knowledge that is at one and the same time chemical and biological, economic, cultural, philosophical, and ... religious. Agriculture involves questions of value and therefore of moral choice, whether or not we care to admit it.”<sup>633</sup> Agricultural science overtly integrates the first four of these elements yet may not always be cognizant of its simultaneous integrity with philosophy and religion. The omission results from the separation of sciences from the humanities in general, which is usually traced to Descartes’ mechanistic contributions to philosophy. However, Descartes himself strenuously incorporated the Christian God into his philosophical explanations.<sup>634</sup>

Discourse on religious matters is easily misinterpreted by literal interpretations, as I learned from an earlier work about sustainability in Buddhist and Christian scriptures.<sup>635</sup> Some literal approaches sound bizarre, almost suicidal; for example, Davis mentions a modern instance of eschewing sustainable actions in order to hasten “the coming of the Lord and the New Creation”.<sup>636</sup> Such masochistic beliefs are always with us and would remain relatively harmless if they did not find political bedfellows. Regardless of such anomalies, the foundations of Western culture lie in the amalgam that is today referred to as Christianity, or to be more correct Western Christianity. To argue that we now understand God as a mental construct is common and reasonable provided it does not ignore our centuries-old heritage of theology within philosophy. The same applies within other cultures’ interpretations, and indeed for many in the West it appears that the culture’s foundations are seen as if from another culture. Notwithstanding this cultural divide, the following section remains critically important, and employs Davis’ detailed presentation of the Christian agrarian philosophy using, in some cases, her own translations.<sup>637</sup>

### **Christian Agrarianism**

To approach this philosophy it is useful to sympathize with Orr’s observation that it is not a “small, whittled-down philosophy for rural

folks. It is, rather, a full-blown philosophy rooted in the realities of soil and nature as ‘the standard’ ...”<sup>638</sup> In fact, this is consistent with the manner by which agricultural science seeks to understand and guide natural processes in a manner that sustains human wellbeing. The view may not be shared by those who adopt a technological orientation, but that view as has been discussed in other chapters misses the wider role of agricultural science.

The broadly educated agricultural scientist with a sensitivity to the dynamics of nature understands implicitly the meaning of the verse from Isaiah, “If you listen willingly, the good of the land you shall eat.”<sup>639</sup> The later Old Testament philosopher, Ezekiel, questioned his society’s basis to deal with dire threats. Put in the language of Isaiah, he argued that the people had ceased to “listen willingly” to the natural flows and consequently worked against their own security. These two Hebrew examples, adopted by European Christianity, focus directly on harmony with nature in agricultural and other pursuits. The New Testament with its infused Greek philosophy includes a metaphorical end to the suffering world that may be better comprehended through references to the groaning of all nature to unite,<sup>640</sup> and to destruction being linked to its renewal.<sup>641</sup>

The Hebrew/Old Testament scripture’s amalgamation of diverse cultural myths in the first chapter of Genesis makes it clear that human wellbeing is dependent on the land and its fertility. It is the beginning of the metaphor for the integration of all things being expressed as humans’ relationship with God. Failing to heed the integrated natural flow leads to briar infestations<sup>642</sup> and drought<sup>643</sup> and the land not being responsive.<sup>644</sup> Genesis observes the human need to care for land and its fertility,<sup>645</sup> which yields the later poetic outcome based around agriculture in the Song of Songs, which may be read as a Persian-influenced love poem.<sup>646</sup> The prophetic tradition uses neglect of God as a metaphor for social deviancy, loss of soil productivity and the ruination of cities, as in “the fruitful land was a desert; all its towns lay in ruins”.<sup>647</sup> The most common criticism of giving credence to such writings is that they are interpretations of an unsophisticated tribe more than two millennia ago. That may be so in terms of the religious imagery employed, but that does not lessen the underlying observation of humans’ role within nature. In any

case, all philosophy is an interpretation in the time, language and culture of its authors.

Acknowledging that time and language define such writings, philosophy becomes a compounded interpretation of ancient stories and recurrent observations. For example, we may see it in Isaiah's warning: "Look, the Lord is ready to devastate the earth and leave it in ruins; he will mar its surface and scatter its inhabitants. Everyone will suffer – the priest as well as the people, the master as well as the servant, the elegant lady as well as the female attendant, the seller as well as the buyer, the borrower as well as the lender, the creditor as well as the debtor. The earth will be completely devastated and thoroughly ransacked. For the Lord has decreed this judgment. The earth dries up and withers, the world shrivels up and withers; the prominent people of the earth fade away. The earth is defiled by its inhabitants, for they have violated laws, disregarded the regulation, and broken the permanent treaty. So a treaty curse devours the earth; its inhabitants pay for their guilt. This is why the inhabitants of the earth disappear, and are reduced to just a handful of people."<sup>648</sup>

To take this literally requires the story of the post-flood Noah to be interpreted in a convoluted religious manner. Alternatively and in my opinion more logically, such statements can be seen as a consistent acknowledgement that human wellbeing is dependent on behaviour towards the essential things of life. Thus the chronology in the collation of stories becomes irrelevant and the essence of living within nature is made clearer. That appears to be a more rational understanding of what is called 'God's promise' after the flood to "never again curse the ground because of humankind, even though the inclination of their minds is evil from childhood on", and that "planting time and harvest, cold and heat, summer and winter, and day and night will not cease".<sup>649</sup> It is an early statement of the human quest for sustainability. Agriculture is at the centre of the philosophy for it was essential for survival, especially once towns grew into cities with social strata. This agrarian conception of the God of Israel has even been unnecessarily stretched to describe God as the first agriculturist when he "planted an orchard in the east, in Eden".<sup>650</sup>

According to agrarian cosmology, caring for the soil is a virtue

rewarded by an omnipotent God who “will bestow his good blessings, and our land will yield its crops”.<sup>651</sup> It is a logical philosophical understanding for the environment in which the Israelites lived with its arid shallow soils, which contrasted greatly with the lands of the Egyptians and Babylonians with rivers and canals and those of the Philistines in the fertile plain of Sharon. This is explained explicitly: “For the land where you are headed is not like the land of Egypt from which you came, a land where you planted seed and which you irrigated by hand like a vegetable garden. Instead, the land you are crossing the Jordan to occupy is one of hills and valleys, a land that drinks in water from the rains.”<sup>652</sup>

With this perspective of a tribe working fragile rain-fed soils, the centrality of land and its care can be seen as a logical focus of myth and metaphor. It also includes wordplay,<sup>653</sup> such as humans being formed from the soil using the Hebrew words ‘adam’ for human and ‘adama’ for soil.<sup>654</sup> The time before the earth as we know it is described in the agricultural language of the tribe – “before there was any shrub of the field on the earth, or any grain of the field had sprouted”.<sup>655</sup> The establishment story continues with Noah being named as “one who will bring relief”<sup>656</sup> from the poverty of the soil that is presumably a result of human mismanagement. He does bring relief after the flood<sup>657</sup> when “seedtime and harvest”<sup>658</sup> again return to normal and Noah “a man of the soil ... planted a vineyard”.<sup>659</sup> The pattern of the morally upright person practicing sensible agriculture is reiterated by later sages: “Does the ploughman plough all day in order to seed, open and harrow his soil? Does he not, if he has levelled its surface, then scatter black cumin and broadcast cumin, and put wheat in rows, barley in strips, and spelt in its own section?”<sup>660</sup>

The scriptural words present a philosophy in the context of the agriculture of the day. Theologians, with a different purpose, can rationalize the domineering words in the same book of Genesis by analysis of writing styles, which reveals a so-called Priestly author of Genesis 1 and a so-called Yahwistic author of Genesis 2 with opposing approaches to nature – the first as master, the second as servant.<sup>661</sup> This explanation allows consideration of what is

popularly considered to be a stumbling-block to environmental care – the apparent licence for humans to claim dominion over nature. God commands: “Be fruitful and multiply; fill the earth and conquer it and exercise mastery among the fish of the sea and among the birds of the sky and among every animal that creeps on the earth.”<sup>662</sup> Alternatively, this may also be seen as a philosophical leap to have all humans to act on God’s behalf and interpret mastery in terms of stewardship. The approach makes sound agricultural sense in a rainfed environment. This would appear to be in accord with the subsequent words of God “I give you every plant seeding seed that is on the face of all the earth, and every tree that has on it tree-fruit seeding seed; for you it shall be, for eating. And for all living creatures of the earth and for all fowl of the heavens and for all that creeps on the earth that has a living soul in it – all the grassy herbage [I give] for eating.”<sup>663</sup>

This reading can continue with the earth remaining the ‘property’ of God, which people are allowed to ‘possess’ if they live according to the rules<sup>664</sup> – rules that we might see as developed from experience, as in Figure 16. “If you walk in my ordinances and keep my commandments and do them, then I will give you your rains in their season, and the earth will give her produce, and the tree of the field will give its fruit. ... For you, threshing will overtake vintage, and vintage will overtake seeding. ... And I will turn toward you, and I will make you fruitful, and I will multiply you, and I will establish my covenant with you.”<sup>665</sup> And if the rules are not followed, “your land will not give its produce, and the trees of the land will not give their fruit”<sup>666</sup> and “your land will be desolate, and your cities will be a ruin”.<sup>667</sup> This is the basis for the later prophets outrage at the persistent flaunting of the rules.<sup>668</sup>

These sentiments align with their times and environment, and find echoes in the Greek Hesiod’s poetry from around the same period as the Hebrew prophets such as Amos, Hosea, and Micah who referred to the correlation between insecurity and “crooked decisions”.<sup>669</sup> The outcome of behaving badly was poor seasons, food shortages and domination by more powerful neighbours – the fears revealed in

such semi-historical narratives. In the world of the Israelites, Egypt dominated the wide region of Canaan and enslaved its peoples and taxed its farmers when they were not demanded for other labours. The Israelite Joseph only lived well while he acquired the extended farmland on behalf of Pharaoh.<sup>670</sup> Access to food defined power. The pattern has continued throughout history and is today evidenced in migration and risks of conflict, as adumbrated in Cribb’s recent book “Food or War”,<sup>671</sup> and overtly stated by a US Secretary of Agriculture that “food is a weapon.”<sup>672</sup>

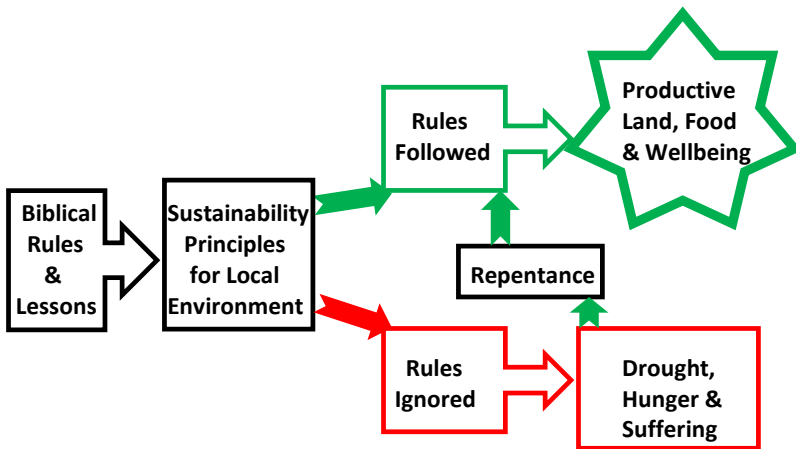


Figure 16. Biblical Agrarianism and Sustainability

Food as a weapon is, however, a two-edged sword, and the theme is picked up again in mystical terms in the New Testament where the outcome is inevitably “to destroy those who are destroying the earth”.<sup>673</sup> The Old Testament story traces the demise of Egypt through plagues and military debacle.<sup>674</sup> The Israelites escape from Egypt’s slavery only to be reprimanded for continuing to adhere to the avaricious values of their masters<sup>675</sup> when they attempt to hoard the metaphorically renewable food resource called ‘manna’.<sup>676</sup> In terms of agricultural sustainability, it seems significant that this sufficient nutrition in the desert becomes the symbol of the interdependence of humans as part of nature, a sample of which is to be kept in a pot as a reminder through time within “the ark of the

covenant”.<sup>677</sup> The mode of life that accorded with interpretations of sustainability in that era is one in which land is shared with trees, birds and other animals.<sup>678</sup>

The theme of interdependence is further elaborated in Leviticus with its laws, many of which appear nonsensical today. Monoculture, as much as we rely on it today to feed the world, is only one form of viable agriculture, yet it appears to be prescribed in such directives to not “seed your field in two kinds”.<sup>679</sup> Such verses are used by some fanatics to argue against transgenic technologies. Directives to fallow land regularly<sup>680</sup> are common sense, while others require a discerning analysis to determine which laws are only specific to their time and place. In any case, we are behoved to accept Old Testament stories as an amazing progression of human self-knowledge from outside forces directing life through to psychological realization that the centre of such fears is within each person.<sup>681</sup> The alternative, of viewing the laws as having some inherent durability, is posited on the fundamental view of life that there is a force separate from humans described as God, as in folk or literalistic Christianity. It is the same form of dichotomous thinking that pervades environmental discourse that separates humans out from integrated nature. Parallels exist today in the individualism that views humans as a single life form and thereby ignores the myriad life forms that constitute each of us, which is a more informed view of personal interdependence.

With the above caveat about individuals, other laws can be seen to be about social cohesion that might be discussed as social equity today. For example, descriptions of farmers’ impoverishment from debt-burdened land are linked to redemption by a relative sharing the burden – until the fifty year reversion of ownership and cancelling of debts.<sup>682</sup> Similarly, humane slaughter of livestock<sup>683</sup> was a socially beneficial rule. To obey these rules defined a balanced life in which “you will eat your bread to surfeit and dwell securely in your land ... you shall eat old grain long stored”.<sup>684</sup> As a philosophy rooted in agriculture and knowledge of the day it dwelt on “serving and preserving” the land<sup>685</sup> as a vocation that produced a harmonious life. Not caring for the land produced a cursed life.<sup>686</sup>

The fallow period mentioned as “six years you shall seed your land and gather its yield; but the seventh year you shall fallow it and leave it alone – and the vulnerable of your people will eat, and what they leave the animal of the field will eat; thus you shall do for your vineyard and for your olives”.<sup>687</sup> Some describe this as “an agrarian theocracy”<sup>688</sup> but it can also be seen as an advance over beliefs in spirits residing in natural phenomena. By ascribing to God the rights to nature, the Israelites effectively tied their social ideals to that theology for the common people. It was a philosophy that extended beyond the practical output of agriculture, as indicated in an admonition not to needlessly destroy living things - “now is the tree of the field human, that it can get away from you in the siege?”.<sup>689</sup> The theme was to be enlarged on in the 20<sup>th</sup> century by Schweitzer in his “Reverence for Life”.<sup>690</sup>

To amplify the rule-based approach various stories were invented. One story is that of a king who has been influenced by the Canaan philosophy of land ownership seeks to buy Naboth’s vineyard and land. Naboth refuses because to him it would be a profanity to sell land. Obsessed with the notion of acquisition, the king brings himself and the royal household down.<sup>691</sup> In the wisdom literature of Ecclesiastes, a king’s role in serving agriculture is made clear<sup>692</sup> in a verse I poetically render as “wealth and power still rely on the farm, but fools will forget and cause themselves harm”.<sup>693</sup> The king in Naboth’s story is a contrast to the biblical description of a city and its villages being like a mother and children, a metaphor that can also be found in agricultural terms in the Gospels.<sup>694</sup> However, to interpret such descriptions literally as the ideal of agriculture is overly romantic when it is recalled that these words were the product of a leisured elite supported by agricultural surplus. And in acknowledging this reality, it is easier to see such prophets as Amos, Hosea, Micah and Isaiah as harking back to a simpler time for peaceful metaphors in order to enhance the wellbeing of increasingly anxious city dwellers.

Going against the flow of nature<sup>695</sup> inspired prophets to describe annihilation of the city<sup>696</sup> and drought<sup>697</sup> as reactions to excessive taxation<sup>698</sup> and taking of metals for swords more than ploughs.<sup>699</sup> On the other hand, repenting to accord with nature leads to restoration

of “the fortunes of my people Israel, and they will rebuild devastated cities and settle down. And they will plant vineyards and drink their wine, and make gardens and eat their own fruit. And I shall plant them on their soil”.<sup>700</sup> Within their culture, the Israelites distinguished themselves from Canaan fertility rites based on the god Baal’s union with an earth goddess – a conception curiously persistent until today’s symbolism of land as the female body vulnerable to violation. However, the overarching message of those scriptures was that humans were to be responsible users of land rather than owners.

The Israelite philosophy was also distinguished from that of Egypt or Babylon in which religious leaders were part of national governance arrangements, a large aspect of which was food production. Thus loans, taxes, grain stores as well as sacrificial offerings were State operations. This familiar system was decried by the prophets when Israel showed signs of adopting the system; “They sow wind and harvest whirlwind, standing stalk – it has no ears; it yields no flour. Perhaps it yields; strangers swallow it. Israel is swallowed up”.<sup>701</sup> And as usual, if Israel returns to the proper relationship with nature, all will again be well with agriculture.<sup>702</sup> This need not be interpreted to mean that modern agriculture is offensive to nature. Rather it means that attention to the role of agriculture and humans as part of nature is the context in which it can continue – to be ‘sustainable’ in modern parlance. Such awareness is a characteristic of wisdom, and is mentioned in all of the great traditions. Perhaps another way to view this is in terms of awareness of the tasks in which one is engaged and their relative importance to life.

Food production is critically important to life, and awareness of its production is something of a forgotten virtue; this may be an error repeated by modern society that ancient philosophy has regularly highlighted. It may be the intention of biblical references to sloth and its inclusion as one of “the traditional seven deadly sins”<sup>703</sup> and apparently the only one that is not matched in Greco-Roman philosophy. Today sloth is poorly understood as laziness and is further confused with the virtue ascribed to leisure. It may also have referred to working in a manner that did not respect the work –

lacking awareness. Where routine tasks were once ascribed ritualistic meanings, these have been displaced over recent centuries by a view that physical work is a burden to be minimized, which curiously seems to exacerbate existential fears.

The primary existential risk in ancient times of food shortages continues today, even though such awareness may be limited among comfortable middle-class urbanites. The fear is expressed in such verses as: “Our fields and our vineyards and our houses we are pledging to get grain. ... We have borrowed money to pay the king’s tax – against our fields and our vineyards! ... We are subjecting our sons and our daughters to slavery ... and there is no power in our hands”.<sup>704</sup> The lack of power among those who produce the most essential component of existence – food – is foreshadowed as an urban bias in which speculation, corruption and deceit are linked to urban alienation from agriculture; the result is ultimately poor harvests.<sup>705</sup> However, this ancient urban-rural comparison becomes less stark when it is recalled that farmers then resided within the city walls and went to their fields each day with their working animals. And the reliance on agriculture is evident in well-known town names of that era, such as Bethlehem, meaning “house of bread”, which incidentally is represented in the Sanskrit form of Rotigaya in my attempt to represent the essential Gospel message as a Buddhist story.<sup>706</sup>

The idealistic origin of cities can be seen in such verses as: “He turned the wilderness into watered land ... and settled the hungry there, and they established a habitable city. And they sowed fields and planted vineyards, and they made a fruitful yield. And he blessed them, and they multiplied greatly, and he did not let their cattle be few – though they had been few, and bowed down from oppression, misery, and grief”.<sup>707</sup> The intimate bond between the farm and the town that is critical to a city being sustainable is one of the ways that the great biblical poem of the Song of Songs can be read. My interpretation of that book mentioned earlier<sup>708</sup> renders the love poem between the young couple as representing a city integrated with its surrounding farms with her body symbolizing the fertile land. Written in a period when the Israelites were adopting the agricultural knowledge of the Persians yet seeking to retain the

respect for land inherent in their philosophy, the result was to be the idealized city of Jerusalem.

An overall conclusion that might be drawn from this eclectic biblical anthology is the Israelite's development of a system of ethics that explained means by which they could improve their wellbeing. In that era, their psychological evolution from multiple gods to one God, and then increasingly to see that the properties ascribed to God were within the mind, is a practical guide to self-understanding.<sup>709</sup> The philosophy placed agriculture at the centre because it was critical to survival, and thus the philosophy addressed the primary existential fear of the tribe. And in order to maintain agriculture, the natural environment had to be respected. A similar understanding has led a few modern philosophers to suggest that contemplation, awe and wonder are appropriate responses in our understanding of nature.<sup>710</sup> From such thought, some have advanced secular versions of agrarianism and agricultural ethics.

### **Agrarian Ethics**

Popular agrarianism can be an outcome of ethical concerns about the environment. To discuss this philosophical aspect, it is necessary to recall that the ethics of environmental interactions has long been a concern of agriculture, albeit within a context of seeking to sustain productive potential; some of the ethics of agriculture, and its science, and food and its consumption are amplified in Chapter 10. Academic philosophy has been a late comer to the subject arriving in response to the concerns of the early 1970s that anthropogenic environmental change may have exceeded natural regeneration processes. As the field has matured, it has recognized the need to consider science within cultural contexts,<sup>711</sup> which mollifies misconceptions about agriculture's "wholesale alteration of landscapes and ecosystems to suit human purposes".<sup>712</sup> As discussed above, this modern Western self-accusation is popularly represented as Christianity licensing an exploitative attitude toward the environment<sup>713</sup> based on injunctions to dominate "the fish of the sea, the fowl of the air, and the cattle, and all the earth, and every creeping thing that creepeth upon the earth".<sup>714</sup>

Theologians and agrarians have argued that a correct reading of that

biblical text indicates that humans are stewards, which has stimulated attempts to recreate the image of St. Francis of Assisi as a caring form of Christianity.<sup>715</sup> Be that as it may, it is more relevant to note that environmental exploitation is not restricted to Christian cultures. For the West, in fact the USA, a history of environmental ideas<sup>716</sup> reveals an increased yearning for closeness to nature. Ironically, this yearning is often expressed by urbanites separated from nature and food production, which leads to humans being considered as if outside nature and threatening it. An example of this yearning is evident in modern interest in food production within cities, which is sometimes imagined to be a new discovery, as indicated in the following Box about reconnecting to farming. This contrasts with the grand US philosophical tradition of such figures as Emerson, whose Transcendentalism respected nature as an indicator of fundamental universal truths,<sup>717</sup> a principle that was then interpreted popularly as reverence for nature by his acolyte Thoreau<sup>718</sup> according to Salt's hagiography.<sup>719</sup> Thoreau favoured a type of pantheism mixed with his partial understanding of Darwin's work<sup>720</sup> to suggest a moral evolution based on living within nature.<sup>721</sup>

### **Reconnecting to Farming**

Agriculture expanded by increasing areas and yields until the most suited lands were cropped, whereupon intensification demanded ever higher yields. This process has preserved non-arable wilderness areas. However, success in constant yield increases has separated agriculture from food consumers. One means of continuing intensification gains is to integrate agriculture into urban situations, such as through 'vertical farming' based on controlled climate, facilitated pest control and precision application and recycling of nutrients and water, as is being done in Seattle<sup>722</sup> and Spain.<sup>723</sup> With organic certification and traceability there is potential for a price premium. New to some, the technology can also be seen as akin to middle-class gardening and to the agriculture of less development nations. The concept of producing food within cities has been practiced in another way in China where a megapolis and surrounding farmland are governed under a single administration, as in Shanghai.<sup>724</sup> Perhaps the major benefit of such approaches is the reconnection of urban consumers with their food production.

It is not appropriate to equate Thoreau's ideas with agrarianism, yet they are similar and in secular terms are more clearly enunciated by Lovelock<sup>725</sup> who has also attracted belief-based followers. Said called belief-based followers "the indulgence of spoiled tree huggers who lack a proper cause",<sup>726</sup> but in some cases beneficial actions result from rule-based ethics that counterbalance belief-based commercialism. Neither substitute for sound science and philosophy, which is better represented by Carson's 1962 'Silent Spring'<sup>727</sup> and its revelations about the impact of agricultural and other pesticides in the environment. Accompanying fears that population growth and resource use would exceed the carrying capacity of the planet,<sup>728</sup> her work was a fillip for improved agricultural ethics, which in turn extended to the treatment of livestock.<sup>729</sup> The thrust of the approach remains a valuable guide for ethical agriculture; it is based on objective information that learns from the integrated tradition of philosophy. In the West, an application of such thinking in the early Enlightenment period produced a type of agrarianism known as Physiocracy.

Physiocracy assumed that national wealth arose from the value of agricultural land and that prices paid for agricultural products was being driven down by consumers. Predating the similar implications of Adam Smith's 1776 'Wealth of Nations' described in Chapter 8, the economic theory emphasised productive work as the unit of wealth production as distinct from a ruler's wealth, gold or trade.<sup>730</sup> The philosophy lauded farmers over city dwellers in terms of both their productive contribution to society and their lifestyles. As a form of agrarianism, the philosophy may have been linked to the romance of the rural retreats of Roman senators who were officially prohibited from trading following a logic similar to that of China where upper class scholars and officials owned estates but left the trading to lower class merchants. The French founders of Physiocracy had been enamoured of the Chinese model, which was an expression of the Taoist 'Way of Nature'.

The philosophy of Physiocracy is rarely discussed and when presented is often seen as quaint and romantic – yet in addition to being among the first of the modern economic philosophies, it

contained observations that continue to affect the world's food distribution today. For example, physiocrats noted that reducing the price of staples during shortages in the interests of widening access introduced an unintended disincentive to producers. This has caused the philosophy to be anachronistically claimed as a foundation of free trade. The movement grew from the mid 1700s and became a fillip to agricultural science with the emergence of journals devoted to improved agronomic techniques linked to commerce in Europe and influencing the USA.<sup>731</sup>

The philosophy saw a natural order in land owners and productive agricultural workers being above the non-productive classes of merchants and artisans. Whatever we may make of that approach today, its underlying ethic suggests that wellbeing arises from discovering the laws of nature and seeking to live in accord with them. Leaning on the Chinese philosophy, it was discerned that good government relies on that same ethic to meet its responsibility of ensuring harmony with the 'Way of Nature'.<sup>732</sup> Some other elements of the philosophy included; a reliance on interest to assign value to the capital for investment, introducing the later popular term 'laissez faire', and observing that diminishing returns accrued from rising production.<sup>733,734</sup>

Adam Smith and his successors including Ricardo, Mill and George were influenced by the physiocrats, and as economic theory matured so a more sophisticated social awareness arose. As introduced in Chapter 8, Smith's moral insights were to be subverted by greater attention being paid to his financial observations. Likewise, there was a downgrading of the physiocratic ideal of free trade treating food as a privileged item that differed from non-essential goods that when in short supply do not lead to life-threatening situations. In modern life, food and other basics may take a slightly more sophisticated form under social influences and rising general wealth, yet the logic remains the same. As perhaps the first comprehensive economic philosophy of the European Enlightenment period, Physiocracy remains a useful ethical means of re-valuing the factors of production and life that are most critical. However, it is easily swept aside as being impractical insofar as it is seen as invoking a romantic idyll based on peasant food production systems.

### **'Noble' Peasant Agrarianism**

Discussions in wealthy cities about poor-country peasant agriculture sometimes lead to romantic notions tinged with academic ideologies. Where such agrarian myths of peasant's unchanging approaches to agriculture are tempered by informed agricultural socio-economics, those lobbyists attached to the romance have been termed 'ineffectual fools' or 'paternalistic friends'. Modern travel modes similarly portray the image of a lamentable demise of the rural idyll. Contented peasants thus become the 'noble savage' erroneously attributed to Rousseau when the projection may be better seen as anti-capitalist bias, or at least a denial of the right to equal opportunity.<sup>735</sup>

Regardless of misplaced notions of peasant agriculture, it is being marginalized by economic development in many nations, which leads to the loss of the integrated cosmologies that are common in traditional peasant conceptions of nature. This loss is a critical part of the agriculture-philosophy nexus in those situations, and it has been noted as a loss of global knowledge by those who have genuinely studied traditional cultures. A detailed consideration of philosophy in agrarian change in peasant societies notes the inappropriateness of, for example, an academic Marxist approach and concludes that "philosophy is at its best when its abstract, spare analysis is complemented by knowledge of appropriate bits of the world".<sup>736</sup> Experience with peasant agriculture readily indicates the religious, mythical, governance, agronomic, social and philosophical integrity of peasant cosmologies, such as in the example of the traditional porous irrigation 'muang fai' weirs that irrigated northern Thailand for a millennium.<sup>737</sup> However, such experience should also lead to being wary of interpreting traditions through an invented Western-orientation of agrarianism.

Agrarianism that lauds Asian peasants also makes an error in terms of technological development. Contrary to ideals of constancy of ancient techniques of production, peasant agriculture has continuously developed technologies that are sophisticated within their environment. The later arrival of industrial innovations to Asia than the West likewise does not mean that peasant agriculture was

not innovative. The occurrence of the industrial revolution in Europe rather than the earlier more advanced culture of Sung China is regarded mainly as a function of labour availability in China obviating the need for industrialization at that time.<sup>738</sup> On the other hand, it has also been argued that the elite's disdain of agricultural labour focussed their interests on 'cultured' more than economic matters, and the elite's ownership of the land offered no incentive to replace common labour.<sup>739</sup> However, it might also be possible that peasant cosmological values were shared, at least in part, with rulers and change would only be countenanced when those values failed; in such case, the benefits of risk-aversion would probably favour incremental over revolutionary change.

The agrarianism known as Chinese Agriculturalism has been introduced in Chapter 6. Other influences in Chinese history related to agriculture and philosophy can be interpreted through global perspectives, such as peasant rebellions. The rebellions known as the White Lotus, Nian, Moslem and Taiping uprisings can thus be seen as having arisen in the agricultural countryside from philosophical underpinnings. Taking place when food supply was threatened, peasants sought land ownership and governance changes because the values of the elite had failed to maintain environmental and social stability and food security. Another explanation suggests that the waning Qing Empire was accompanied by millenarian rebellions sharing characteristics with those of the Mediterranean,<sup>740</sup> that White Lotus followers reinterpreted Guan Yin as the earth mother,<sup>741</sup> and that the Taiping rebels followed a warped version of Protestantism.<sup>742</sup> These explanations, and others, may be true as all are inevitably partial when viewed through different cultural lenses.

Philosophical worlds also vary between types of agriculture, such as in 18<sup>th</sup> century France where subsistence rye, market wheat and wine grape production each focused on different values – respectively; home consumption, urban grain markets, and luxury wine markets. Innovation was greater where market forces were greater,<sup>743</sup> not because of individuals' marketing preferences but because different contacts introduced divergent worldviews. However, as Geertz concluded: "The Western conception of the person as a bounded, unique, more or less integrated motivational

and cognitive universe; a dynamic center of awareness, emotion, judgment, and action organized into a distinctive whole and set contrastively both against other such wholes and against a social and natural background is, however incorrigible it may seem to us, a rather peculiar idea within the context of the world's cultures."<sup>744</sup> Often the garnering of foreign 'noble' peasant practices in support of agrarianism falls victim to this Western concept of the individual.

### **Agrarian Faith**

Individualism is assumed in most modern Western conceptions and inevitably extends to agrarianism. It is concerned with spiritual harmony with land and rejects urban values, capitalism and technologies that do not support farmer independence and dignity. For example: "Agrarian ideals that emphasize concepts of virtue and moral character" have been claimed as sustainable as well as consistent with Enlightenment and ancient Greek agriculture.<sup>745</sup> Laudably it is socially responsible in minimizing harm and also possibly supportive of Brundtland's ideal to "meet the needs of the present without compromising the ability of future generations to meet their own needs".<sup>746</sup>

Faith in agrarianism, as in belief-based religion, hampers its own logic in the Kantian terms of the immaturity that lacks "courage to use your own understanding".<sup>747</sup> A deeper understanding of the agrarian philosophy is that of its greatest prophet, Leopold,<sup>748</sup> whose works are cherry-picked for simple practices by belief-based followers while his overall philosophical approach might be better seen as consequentialism or utilitarianism. A second agrarian prophet, Berry, acknowledges the impracticality of everyone engaging in agriculture and instead emphasizes ethical models of community and environmental care.<sup>749</sup> Nevertheless, the romantic appeal of agrarianism with its appropriation of Socrates, Plato and Aristotle among other philosophies<sup>750</sup> continues to attract ideologues. And just as benefits can arise from rote actions, so agrarianism can assist in correcting a free trade stance that fails to treat food as an essential commodity unlike soap or cars.<sup>751</sup>

Agrarianism is most prevalent in the USA where "advocates of sustainable agriculture characterize the underlying philosophy of

industrial agriculture in terms of greed and domination, while advocates of industrial agriculture describe the sustainable alternative as arising from nostalgia or xenophobic protectionism".<sup>752</sup> Invoking Jefferson's belief that farmers make the best citizens,<sup>753</sup> some agrarians have adjusted to industrialized agriculture by promoting 'organic' farming<sup>754</sup> in a market protected by certification. Others argue that this is distant from Berry's philosophy<sup>755</sup> and that of the Transcendentalists<sup>756</sup> who also claimed that the family farm integrates classical virtues and produces upright persons. Agrarian practices such as integrated pest control are more readily applied in small well-tended plots following age-old techniques that remain common in developing countries. Such techniques are difficult to scale-up, especially in high-labour-cost nations.<sup>757</sup> This limitation is shared with other belief-based approaches to agriculture, including those of Steiner<sup>758</sup> and permaculture.<sup>759</sup> In essence agrarianism is based on a number of ethical assumptions, some of which are elicited in Table 1.

Table 1. **Agrarian Claims**<sup>760</sup>

<b>Characteristic</b>	<b>Benefits Claimed</b>
Religion	Farming teaches that life is finite and depends on a deity
Romance	Technology corrupts while nature redeems
Morality	Farming induces harmony; modern society is alienating
Politics	Rural values are critical to democracy
Society	Rural reciprocity produces healthy communities

Within a wider philosophical consideration that embraces traditional, scriptural and academic contributions it can be unsurprisingly concluded that humans and their minds exist within the dynamism of nature. This leads back to the purpose of philosophy in enhancing human wellbeing and to Bentham's utilitarianism that seeks to optimize wellbeing over time.<sup>761</sup> However, as agrarianism is an exclusivist belief, it is an unlikely candidate for optimizing wellbeing for the majority, and in its popular form tends to eschew modern technologies.

### **Agrarianism & Technology**

Agrarianism in its belief-based form can assume that new agricultural technologies cause environmental problems and claim

that there are natural alternatives.<sup>762</sup> However, agricultural science is far wider than technology, and seeking to understand natural processes has always been the basis of the research that produces rising food yields. In many ways, this renders agrarianism a superfluous belief. On the other hand, agrarian and similar advocacy for local produce can confer benefits,<sup>763</sup> and combining such ideas with technology might allow urban agriculture to relink cities with their food in a practical manner.<sup>764</sup>

Yet urban agriculture does not quite fit with agrarianism's lauding of the moral and cultural benefits of farming that accrue from being in touch with the elements, caring for nature, producing one's own food and mixing with like-minded folks in community.<sup>765</sup> I am familiar with such cultural benefits in communities with which I have worked in international agriculture who form part of the more than two billion small farmers in developing countries that produce most of the world's food.<sup>766</sup> It is not a matter of those in food surplus nations electing to emulating such lifestyles, laudable as the motivation might seem – and it ignores the concomitant hardships. Such Western romance has been described as “not so much asking the global poor to give up their blankets so we may keep our jewelry, as clinging to our diamonds while demanding that they choose between those blankets and their only source of food. And blaming them – just for good measure – for the fact that they have to do so.”<sup>767</sup> The ethical issues become more complex than agrarianism beliefs.

One review of the ethics of food production and the environment concluded that “to assess their truth and moral claims, their strengths and weaknesses, their advantages and disadvantages, and their prejudices and presuppositions ... will inevitably lead one outside of philosophy to other disciplines in the humanities, social and natural sciences”.<sup>768</sup> That statement is the compass of this work, which is far wider than agrarianism's worldview. So when the accompanying statement is made, that “the relationship between food and the environment is, after all, more than a philosophical issue”, it means in this instance ‘more than modern academic philosophy’. Other constraints inherent in agrarianism relate to scale, which apart from global food issues is demonstrable from the example of water availability.

Popular ethics suggest that water is in short supply and as agriculture is the major user, an ethical response would be for it to use less. Agrarians claim, with some validity, that their approaches use less water. However to be clear, huge savings in water use by agriculture have been made and more are possible, but a sensible discussion needs to properly attribute the high water needs for feeding city populations plus specifically urban uses. Indices, such as the water footprint<sup>769</sup> for various industries, the water poverty index<sup>770</sup> and the aridity index,<sup>771</sup> are useful means of monitoring water use, modelling for which has been developed in agricultural and related sciences. That also applies to the added role of water in ecosystem function, which is where trade-offs between idealized philosophies and reality are particularly important.<sup>772</sup> I do not posit a solution; the balance of nutritious food, clean drinking water, servicing industry and cities while maintaining a functioning ecosystem does not lend itself to simplistic conclusions. The discussion can be extended to climate change, population, technology, pollution, agriculture, medicine, and so on.<sup>773</sup> An integrated philosophical understanding is essential for such matters to be considered rationally.<sup>774</sup> To propose agrarianism as a solution is simplistic, and risks sacrificing its potential benefits as an interpretation of philosophy derived from European Christianity. However, on a global scale agrarianism does not provide a viable means of feeding the world, nor does it offer an advance on the concept of stewardship that draws from same European philosophical sources.

### **Stewardship**

It is inherent in nature for animate beings to react against things that harm, which in humans has given rise to the moral principle to not treat others in a way we would not like ourselves to be treated. That philosophical conclusion is ancient, is not restricted to Christianity,<sup>775</sup> and continues to inform environmental ethics. However, a pragmatic line is drawn between humans and those parts of nature that are 'others' for most purposes in everyday life. The continuing ethic, which agrarianism within its own limitations also observes, privileges humans above other elements of nature while accepting a responsibility of care for them; this has historically been called stewardship.

Stewardship has mollified many potential excesses. It can be seen in Carson's work being a cultural re-organising mechanism that modified behaviour in a manner similar to an organism reacting to a harmful stimulus. I find this the most productive way of interpreting human actions as part of nature, which incidentally negates those who cast Carson as a one-eyed environmentalist. Her words were clear: "Through all these new, imaginative, and creative approaches to the problems of sharing our earth with other creatures there runs a constant theme, the awareness that we are dealing with life – with living populations and all their pressures and counter-pressures, their surges and recessions. Only by taking account of such life forces and by cautiously seeking to guide them into channels favourable to ourselves can we hope to achieve a reasonable accommodation between the insect hordes and ourselves."<sup>776</sup>

This philosophical argument emerges from the Christian conception of humans as an intelligent component of nature with responsibility to seek, for their own sake, means to live in harmony within it.<sup>777</sup> In agricultural ecosystem terms, stewardship is a middle path between the excesses of profit-alone commercialism and idealistic environmentalism; it is based on a respect for nature that governs dealing in it for human benefit.<sup>778</sup> Stewardship includes a continuing quest in research for improving agriculture, which in the instance of enhanced photosynthetic efficiency for example, has been labelled as "man's attempt to make fuller use of nature's gift".<sup>779</sup> Such work is conducted within the ecosystem concept common to agricultural science,<sup>780</sup> which goes further than agrarian ideals.<sup>781</sup> The concept views an agricultural ecosystem as a functioning unit that is stable as long as all interactions remain in balance. This management to suit human needs conflicts with the 'deep ecology' philosophy that considers that humans have no more rights to existence than any other component of an ecosystem.<sup>782</sup> It can also disturb anthropomorphic projections about the feelings of other animals. However, it is a coincidence of philosophy that both agrarianism and deep ecology, and perhaps even anthropomorphism, appear to logically lead to reductions in the human population. It is more than a coincidence that those favouring these philosophies are typically food secure. Yet deep ecology may be a philosophical ideal for future

aspirations if it is used as a guide for convergence of understanding to see ourselves as comprised of, as well as part of, other animate and inanimate things as a corollary to Darwin's insights.

Deep ecology and anthropomorphism are examples of useful conceptual tools, even when it is recognized that no lost ecosystem can be reproduced,<sup>783</sup> or that domestic animals have been bred to suit the environments in which they are raised. However, both deep ecology and anthropomorphism differ from agrarianism in that they are not practical outgrowths of the European Christian history that defines much of Western philosophy, but rather arise as part of modern secular theories that are better understood as ideals. This can be illustrated in the popular use of such statements as, 60 percent of ecosystem services having declined over the 50 years to 2015 as a result of agricultural, industrial and urban development,<sup>784</sup> which in ethical terms<sup>785</sup> undervalues human life in its arbitrary allocation of values to ecosystem services.

In practical terms, stewardship also affords humility by placing us within nature while productively acknowledging our intellectual penchant to be in control. This behavioural trait, acknowledged in myth and religion that prescribed means of curbing its impact on survival and wellbeing, is more evident in modern secular societies as a form of the anthropocentrism mentioned in Chapter 4. The contemporary French philosopher Bruckner describes such arrogance as "unbridled anthropocentrism that confirms our status as the 'master and destroyer' of the planet. To think, for example, that tomorrow we will be able to determine whether we have rain or sunshine, that we will eclipse nature, is to relapse into the Promethean fantasy nourished by the most fanatical adepts of progress."<sup>786</sup> By linking the trait back to an enduring myth mentioned in Chapter 5 as part of early philosophy's explanation of the illusion of power over nature, the value of a stewardship role can be seen to balance anomalies in such '-isms', and agrarianism.

*Agrarianism as a philosophical tradition of the West with Christian and later secular roots provides a means of addressing the interactions of humans in nature but is constrained when it rests in belief rather than*

*the principles behind those statements. It provides an ethical approach to agriculture within its limitations, but when it eschews new knowledge it ignores global food needs. In doing so it restricts itself to lifestyles of wealthy nations where unacknowledged subsidies underwrite the approach. Where agrarianism seems analogous to the majority of the world's farms, which are in poorer parts of the world, it lack the links of those traditional societies to their holistic cosmologies, even when it attempts to appropriate them into agrarianism. Of the agricultural and nature practices that arise from the cultural base of the West, stewardship emerges as a more responsible and durable approach. It may also be said that stewardship is one of the broad ethical lessons distilled from the Western tradition, other aspects of which relate to such matters as animal welfare and dietary choices, as outlined in the following chapter.*

## Chapter 10

### Agriculture & Ethics

*Western philosophy, like others, developed from an intimate connection with agriculture and even spawned its own versions of agricultural philosophy as described in the previous chapter. This connection originates from the most basic of human needs for secure food supply, which continues to characterize one of our most integrated relationships within nature. Unfortunately, the separation of disciplines that arose as philosophy became more complex has allowed it to be reduced to an academic interest that does not always comprehend its scientific components. As one of the most integrated of the applied sciences, agricultural science likewise continues to struggle to maintain links to a wider philosophical understanding and its essential history. Following the thesis of this work that this artificial separation within the search for knowledge and wellbeing fractures the original intention of philosophy, the applied philosophy of ethics is discussed further in this chapter.*

#### **Meta Issues**

Agriculture and food can be philosophically considered in various metaphysical ways, including nutrition, nature, culture, social good, spirituality, craving, aesthetics, diet, fuel, commodities and technological products. Epistemologically it may be seen to contain elements of: risk, trust, production know-how, and involuntary reactions. Aesthetically it may be viewed as: taste, appearance, and art. However, among the philosophical fields, modern philosophy and public interest usually consider food and in particular agriculture more in ethical than other philosophical terms. Among the marginalized in poor countries, this is centred on survival and malnutrition. In wealthy societies it usually focusses on luxury, production systems, animal welfare, rights to life, health, safety, personal morality, virtuous products, hospitality, manners and temperance.

A current example that is only of minor global importance concerns the ethics of vegetarianism-by-choice. Treated as either rights-based when it assigns animals and even sometimes ecosystems similar rights as humans, or utilitarian when it focusses on animals' ability to experience pleasure, vegetarianism raises public awareness of food production and animal welfare in wealthy societies. In that situation, it takes as its *bêtes noires* industrial animal agriculture and its impacts on the environment, which in some cases overlaps with advocates of the US agrarian philosophy<sup>787</sup> mentioned in Chapter 9. However, veganism and vegetarianism not only destroy diverse forms of animal life,<sup>788</sup> they also condemn hundreds of thousands of people to incomplete lives. This occurs from the interrupted mental and physical development caused by the lack of nutrients most readily provided by animal products – and those numbers of people exceed by multiples the numbers of vegetarians-by-choice. The overwhelming ethical issue is thus one of human equity. The argument, like that of animal welfare, needs to be conducted with the best available knowledge in order to inform the most appropriate way of living, which is the purpose of philosophy. Philosophy searches out new knowledge to inform these ethical matters through research-tested theories.

### **Ethical Theory**

Ethical theories have been developed around various aspects of agriculture, and it is important to qualify the use of the word 'theory' in terms of both science and everyday discourse. Much of science is based on probability, which means that a scientific theory is quite different to what might be called theory in common parlance. In science, a theory refers to confirmed knowledge with the highest possible degree of probability; this means that to seriously doubt a scientific theory requires it to be challenged by massive amounts of new knowledge. That is why at any one time there is usually only one or two operational theories that fit most of the known observable and empirically testable factors. When a new theory replaces an existing one it means that extensive observation, testing and informed arguments have been conducted, such as in the case of Darwin's theory of evolution supplanting teleological beliefs.

An ethical theory is somewhat similar to scientific theory. However,

ethical theory differs insofar as it deals with values derived from agreed or common objectives that can change. Multiple ethical theories may therefore exist across cultures and time, and are thus better defined by their applicability to a circumstance. When an ethical theory is seen as desirable but impractical under reigning circumstances, it is idealistic. However, when circumstances allow an ideal to be pursued, such as when scientific innovation has allowed an ethical objective to become realistic, values change. In agricultural science, an obvious example is the continuing ability to feed increasing numbers of people in the world leading to constant revisions of ethical arguments that are derived, for example, from Malthusian theory. In utilitarian ethical terms this is understood as allowing the greatest benefit to the greatest number of persons, which in common with scientific applications lends itself to risk analysis, as discussed below; it also represents the use of knowledge in the steps civilization takes toward living in accord within natural law.

The relationship between agriculture, agricultural science and ethics can be viewed through the ancient theory of natural law, which may have first been defined by Cicero in the following terms: "True law is right reason in agreement with nature: it is of universal application, unchanging and everlasting. . . . Whoever is disobedient is fleeing from himself and denying his human nature, and by reason of this very fact he will suffer the worst penalties, even if he escapes what is commonly considered punishment."<sup>789</sup> Refined more than a millennium later by Aquinas,<sup>790</sup> natural law assumes that appropriate human reason and actions define values. Reason is informed by knowledge generated by science, reflection and experience, which leads to continual improvement in understanding about what is natural. This is an argument for the 'natural truth' I have used elsewhere to describe a link between Eastern, Western, secular and theological morality, ancient insights and modern science.<sup>791</sup> In practical terms these diverse sources emerge as discussions of ethics.

The ethics of food production and processes have been a continuing theme of philosophy that can be traced from at least Plato's Republic outlining an ideal diet. Epicurus and Seneca similarly took food

seriously and in the Enlightenment Locke, Marx, Nietzsche, Rousseau and Voltaire all addressed the subject. Natural law in ancient Greek philosophy equated justice with the power of the stronger party. Aristotle employed the same word that today has emerged in the word 'physics', which included not only movement but potential to grow and change form. By the ninth century, the Irishman John the Scot cast this philosophy in Christian terms whereby nature included both creating and created entities in a holistic system in which all things arise from, and grow back towards, God.<sup>792</sup> Perhaps the next large step on that foundation was Newton's explanation of some basic natural physical laws. Thereafter, empiricists such as Locke, Berkeley, and Hume built on Galileo's insights while Descartes, Kant and others considered mathematics as a parallel means to knowledge alongside experience.

The concept is captured in Aquinas' statement that "every law framed by man bears the character of a law exactly to that extent to which it is derived from the law of nature. But if on any point it is in conflict with the law of nature, it at once ceases to be a law; it is a mere perversion of law." Darwin's theory exemplifies the process. In the current work about agriculture, we see agricultural science as a constant attempt to orient human actions in food production to something more in line with nature – this is the only viable meaning of sustainable agriculture. Sustainability thus contains ethical elements, as do animal welfare, globalized trading and biotechnology. In some Western universities, the subject 'philosophy of food' may even become a routine course.<sup>793</sup> If such a course eventuates, its foundations should span the sciences, economics, environmental studies and aesthetics within a broader base of philosophy. Pragmatically, it is more likely that the subject would be considered as applied ethics through a case study approach. Preferably, it would take an embracing perspective of humans within nature and rise above the narrowly-based right-and-wrong discussions that are encountered around food production.

### **Humans as Nature**

It has been claimed "that something is fundamentally wrong with our entire food system. The gap between consumers and producers, scientific developments that we are losing control of, impotent

governments, the boundless greed of large food and agriculture companies, apathetic consumers".<sup>794</sup> While there may be some truth in the details, the conclusion that the problems lie with agriculture and its practitioners is inconsistent with the philosopher's yardstick of logic. Logic requires that when beliefs fail to align with reality, the beliefs are in error; it also holds that correlations do not equate to causes. Thus, for example: the 'gap between consumers and producers' implicates consumers more than producers despite the opposite being assumed in many arguments; 'losing control' of scientific developments implies a lack of awareness of the conduct of science rather than a problem for scientists, and large agribusinesses may be rapacious at times yet it serves consumers' demand for ever-cheaper food. These are not arguments against the ethical issues that arise from agriculture – they are an attempt to bring balance into philosophical discussions.

Balance is also required in views of nature and what is natural in food. Idealized views can motivate a concerned community but ultimately ignore realities. For example, a notion that nature is universally acting in the interests of humans is unhelpful; it is a partial worldview insofar as it ignores the inseparability of humans from nature and hence from everything else. And by ignoring that fact, the notion single-mindedly treats death, disease, malnutrition and environmental change as consequences of negligent human actions. The manipulation of nature in the management of agriculture would better be viewed as a noble motivation to reduce human suffering, and thus increase wellbeing. The progressive search for knowledge would then be seen as aligning agricultural practice with natural functioning. This context has been assumed by Western philosophers across millennia, which incidentally points to a widening disparity between what we see today as urban and rural values (Table 2).

The rising separation from nature over time indicated in Table 2 is paralleled by a gap between the production and consumption of food. Accompanying these separations is an increased scarcity of the 'wild' nature imagined in urban arguments, and the inevitable impact of intensive agriculture on what might otherwise be seen as natural.

**Table 2. Some Philosopher's Views on Agriculture and Food**

<b>Philosopher</b>	<b>Views on Agriculture &amp; Food</b>
Epicurus (341-270 BCE)	"Before you eat or drink anything, pay attention rather to whom you eat or drink with than to what you eat or drink, for eating without friends is like the life of a wolf or a lion." <sup>795</sup>
Lucretius (c.50 BCE) 'On Nature' & Virgil (c.30 BCE) 'Georgica'	Praised farming technique and the lifestyle that produced bread, fruits, honey, meat and olives.  Both authors' texts informed Middle Age farming and values.
Deipnosophists (c.200CE)	Related eating well to studying the principles of nature.
Jean-Jacques Rousseau (1712-78)	Postulated improving moral character by judicious selection of foods.
Thomas Jefferson (1743-1826) & Agricultural Pragmatism	Emphasized farmers as a pillar of democracy, linked to nature and self-reliance and thus free in their pursuit of happiness.  "Science never appears so beautiful or any use of it so engaging as those of agriculture and domestic economy." <sup>796</sup>
Tolstoy (1828-1910)	Wrote novels extolling farming's integration with nature in contrast to industrial society, and the error of not allocating industrial development to modernizing agriculture before other sectors. <sup>797</sup>
Ralph Waldo Emerson (1803-82)	"The cow is sacrificed to her bag, the ox to his sirloin. Stall-feeding makes sperm-mills of the cattle, and converts the stable to a chemical factory." <sup>798</sup>
Karl Marx (1818-83)	After early enchantment with nature, his works moved to criticise agriculture as being a narrow-minded and enslaving occupation uncondusive of political action or industrial modernization.
Friedrich Nietzsche (1834-1900)	Claimed potentially weakening or strengthening effects of food, and criticized vegetarianism.

'Seen as natural' here refers to the idealistic view that nature is an unchanging state when uninterrupted by humans. That view is invalid in at least four ways because it neglects: the observer-effect on the object observed (the rest of nature in this case); humans as part of nature; that all parts of nature affect all other parts, and that nature is always in a state of change, even if not observed by humans.

In addition, the responsibility for adequate nutrition of our fellow humans requires, at least at our current state of knowledge, that most arable areas of the planet are farmed. In such a dynamic set of circumstances, it is only realistic to conclude that philosophical concern about agriculture must inevitably be expressed as a balance between multiple irresolvable ethical dilemmas.

### **Ethical Dilemmas**

The range of ethical dilemmas posed by agriculture and nutrition have not been a major theme of modern philosophy. This may seem surprising for a subject that concerns every person – all of us are part of the bio-chemical processes of assimilating nutrients and providing nutrients for other parts of nature. Expressed even more directly this means that life depends on death, which has been a major focus of philosophy in all major traditions. However, modern obfuscations of the subject of death cloud the matter and confuse discussions about sustainability.<sup>799</sup> Just as death can be forestalled by ingenuity working within natural processes, so it should be self-evident that agriculture works within natural processes to maintain agricultural environments in productive states. Agricultural science in this context can be seen as a continuing series of insights to manage pests, pathogens, nutrients, moisture, light and various other factors.

Livestock are a focus of ethical dilemmas concerning animal welfare, environmental impact, antimicrobial resistance and zoonotic diseases. These real concerns are often suggested by those distant from food production to be addressable by not consuming meat products. Yet larger ethical dilemmas impose themselves on that logic, including the compromised wellbeing of hundreds of millions of people. As illustrated in the following Box about livestock saving lives, human-animal interactions and other benefits are sometimes overlooked by advocates of blanket ethical laws. Compounding such interactions is the continuing contribution of science and technology, which when oriented appropriately, reduces the negative while enhancing the positive effects of such food production.

Agriculture is highly reliant on science that allows the intensification of production to yield more from productive lands in place of expanding agriculture into new and less productive areas. Associated

with intensification and urbanization, supermarket foods are increasingly processed products. Wealthy urban consumers that have recently rediscovered unprocessed foodstuffs now unwittingly place added demands on agriculture and its associated industries. Ethical dichotomies arise from such demands, as they do from an urbanized desire for an aesthetic landscape uninterrupted by the realities of food production. Separation from those realities of food production allow such demands to be made in ignorance of the costs and dilemmas they may cause. For example, urban projections of what is comfortable for livestock have produced some bizarrely unnatural environments for animals. This is balanced by animal welfare science informing the guidelines for animals to be provided with an environment that accords with their natural preferences. Such preferences for domesticated livestock are often functions of selective breeding of those animals that are comfortable in the production environment to such an extent that they become stressed in the anthropomorphised ideals of what might or might not have been natural for their imagined ancestors.

### **Livestock Save Lives**

Diets of the wealthy may be too high in animal products, but this is not the case for most of the world. Claims that vegetable-sourced protein requires less land than protein produced from animal-sources ignores the limited areas of arable land for crops compared to the extensive grasslands of the world. Ruminant livestock convert humanly-inedible fibrous material from non-arable land into protein and other nutrients across the world's rangelands. Other attributes well-known outside wealthy nations include: livestock mobility with nomads and migrants in droughts and wars; self-reproduction of the capital asset; insurance against hard times; draught and traction power; leather and the during-life products of milk, blood and eggs. Added to these is the critical need for animal-sourced foods in the first 1,000 days from conception for millions of children who otherwise would not develop full mental and physical capacity.<sup>800</sup>

### **Ethics and Breeding**

Breeding plants and animals to suit an environment is a critical

aspect of agriculture that has led to today's major foodstuffs being significantly different from their wild ancestors. Today the same process of selecting for desirable characteristics that has been practiced from more than ten millennia can be popularly misunderstood in discussions about current genetic modification approaches. For both animals and plants, genetic manipulation continues to reduce environmental impacts and improve the food safety and nutritional quality of foodstuffs while enhancing production efficiency. Consumers probably have little reason to be informed about detailed mechanisms of plant and animal breeding as products of applied philosophy, which can lead to misunderstanding of its application. Agricultural scientists commonly find it difficult to understand the motivation of opponents to modern breeding when the food security of all society is maintained by crops and animals that would not be able to feed us all had they not been subjected to genetic selection in the past .

Selective breeding may have even predated agriculture when gatherers<sup>801</sup> encouraged natural stands of desirable grains and more docile animals. This was a process of observing naturally occurring mutants with desirable traits and propagating from their progeny. The same process is followed in modern breeding by manipulating genetic structures to enhance desirable traits – but this process offends some well-fed persons who label such foods as unnatural or even more bizarrely, non-organic.<sup>802</sup>

Philosophically, it must be said that the ideological opposition to genetic selection fails to recognize the congruence of the objectives of 'organic' agriculture and biotechnological agriculture – notably to provide healthy food for all people. Arguments against biotechnology dwell on environmental and health concerns, and on manipulation of so-called 'immutable' units of life, while those in favour of the technologies argue the need to feed burgeoning populations and to do so profitably. Neither argument appears to be completely ethical – it is likely that profits are ranked above feeding the world despite the claims of biotechnology companies, just as it is likely that those arguing for global organic farming know, or else choose to ignore, that they are thereby condemning billions to starvation and malnutrition.

## **Choice & Risk**

Employing modern genetic modification practices is a logical development that accords with natural philosophy in the same manner as the traditional breeding practices. Beliefs to the contrary distract society from reasoned risk analysis and unproductively pit science against opinion. They also neglect the needs of persons in marginal parts of the world. A philosophical approach would probably invoke Kant's ethical theory,<sup>803</sup> which argues for the valuing of individuals and humanity. Some see this as akin to the Golden Rule, which in the Western tradition is expressed as: "whatsoever ye would that men should do to you: do ye even so to them: for this is the law and the prophets".<sup>804</sup>

In secular terms, this has emerged as Social Contract Theory that seeks to eliminate inherent biases in personal and society-wide ethical decisions. Narrowly-based science and ethics can arrive at different values if not integrated from the outset, such as the balance between individual and society rights – the former is popular in the modern West, while evolutionary biology suggests that survival of the individual is less important than that of the species. In that case the two explanations align when the social goal of stability is seen as an essential component of a civilization surviving by excluding contrary individuals, as has been consistent throughout history. Such examples assist in consideration of individualistic concerns about genetic technologies.

Genetically modified food products evoke concerns surrounding rights and safety that are often invoked in the public's search for certainty. The outcome of risk assessments has led to the labelling of modified products, which is said to allow consumers to be informed and thus have choice. However, choice assumes that consumers have sufficient knowledge to understand the information provided. The choices may appear to be rational but will also include emotion as Hume observed.<sup>805</sup> That insight reinforces the importance of the scientific method to eliminate bias as far as possible and to ensure the repeatability of findings and transparency of potential conflicts of interest. In that way, the scientific method yields outcomes based

on humanity's combined knowledge, which maintains an openness to challenge. This contrasts with unsubstantiated, uninformed or emotive beliefs – but often cannot negate their effect. These factors provide the basis for personal assessment of risks, perceptions of which vary between individuals, cultures and across time.

Appetites for risk vary, and life is never risk-free. It is rational to assess and even quantify risks and to mitigate their potential impacts before accepting those risks over which one has a choice. Mitigation may be seen as taking precautions, but this is not the same as the precautionary principle used in, for example, agricultural biotechnologies. Those opposed to such technologies argue for an idealistic interpretation of the precautionary principle, which is cast in terms of proven safety – zero chance of any negative effects. More realistically, the principle can be employed as a device to communicate between public and scientific understandings, such as in the German 'Vorsorgeprinzip' or foresight planning, which allows for zero tolerance of extreme but unlikely impacts as well as risk management through analysis, mitigation and benefit assessment for other risks. Perceptions of risk may also be raised by the increasingly rapid rate of technological outputs, and by those outputs that allow, for example, more detailed analysis of contaminants that may well have been part of life for generations. Today's lifestyles would be much less comfortable if an ethical 'law' of absolute safety had been applied to the food technologies upon which we now rely and know to be safe.

### **Futile Ethical Law**

Attempts to introduce logic into emotive arguments that claim a philosophical basis in agriculture have followed three general approaches. First, cost-benefit analyses focus on financial considerations, which require estimates to be made of costs and benefits that may accrue in an unknown future. The approach often ignores contingencies despite that being the intent of the original economic methodology. Second, a utilitarian approach enlarges on the cost-benefit analysis by justifying an action on the basis of "the greatest good for the greatest number".<sup>806</sup> The third approach is a rule-based system – a deontological approach – that predetermines obligations that are then used to assess the merit of an action. All

three produce challenging outcomes when it is considered that all persons have a right to adequate nutrition to live a full life.

Kant further refined ethical approaches by the identifying criteria that a moral person would use to assess an action. Containing elements of philosophy's universal and perhaps oldest guideline – the Golden Rule,<sup>807</sup> his assessment places the onus on individuals to act in a manner that they would want others to. It is expressed in the terms, “act only according to the maxim whereby you can at the same time, will that it should become a universal law”.<sup>808</sup> Others have proposed socially-based alternatives in which the individual's autonomy is subsumed by the groups – and so on. While all of these approaches are useful to the thoughtful person, those seeking the ethical certitude of a general law about food and agriculture must remain unsatisfied.

Academic philosophy attempts to refine agricultural and food ethics according to principles of choice, risk and general harm to each of; the wider environment, agricultural plants and animals, producers and consumers.<sup>809</sup> In many ways the approach accords with that of the value-chain concept employed in agricultural science, and it shares the common outcome of being a useful basis for discussion yet limited in practice beyond monetized values. One product of this type of approach in the most general terms, which is best understood as aspirational, is the United Nations' statement that “food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”.<sup>810</sup>

Such an aspirational vision may be challenged yet it serves as a focus for global issues. It transcends vested interests and tacitly acknowledges the futility of seeking absolute consensus on such issues as sustainability, animal welfare and technological innovation. Biological complexity makes the ethics of food and agriculture an arena that will continue to be contested by individuals, social groups and some academic philosophers; however, seeking specific simple ethical laws to suit transient views seems futile. On the other hand, a useful outcome of that contestation would be a realisation that the discussion itself is useful if it re-links consumers to food sources.

Discussions surrounding the ethics of food and agriculture can be productive in finding some commonality across individual values by including both producers and consumers. This is simply illustrated in Figure 17,<sup>811</sup> which acknowledges that multiple viewpoints, known as ethical relativism, arise – as paraphrased in Dostoyevsky’s famous line: “Without God ... everything is permitted”.<sup>812</sup> That philosophical insight – with ‘rule’ substituted for ‘God’ in today’s parlance – is an apt description of the relativism of Western society in recent decades, extending far beyond the matters of food and agriculture that concern us here.

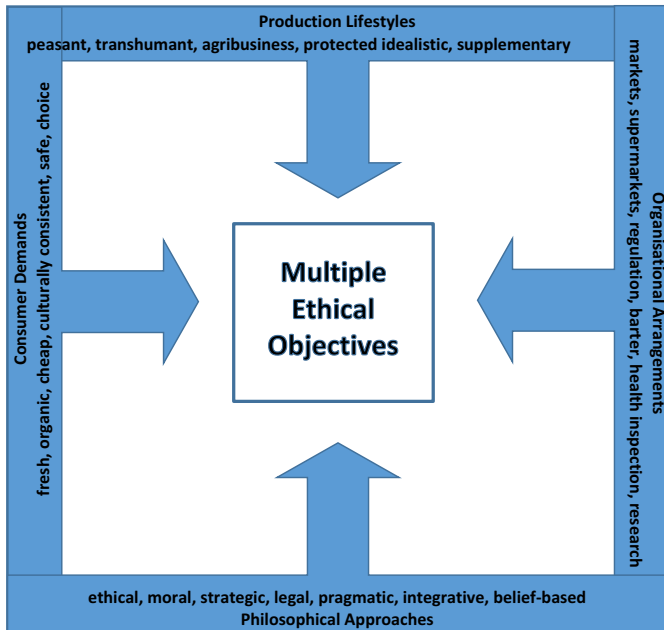


Figure 17. Interactions: Production, Consumers, Organisations and Philosophy

In earlier times, clearer ethical statements relied on social codification of insights from experience in the form of religion, expressed in both esoteric and literal terms for different social strata. However, with the demise of general understanding derived through religion, modern secular philosophy traces the idea that there is one correct answer to Aristotle’s statement that “there is only one way to

be correct. That is why error is easy and correctness is difficult, since it is easy to miss the target and difficult to hit it".<sup>813</sup> Rather than fault Aristotle, it is sufficient to note that archery is different from agriculture, which has multiple targets, including nutritional equity amidst general inequity, reducing collateral environmental effects, continuously increasing production ahead of population, predicting diverse emerging pathologies, guarding humans from zoonotic and other disease risks, and balancing these and myriad other targets. The balance is particularly complex in animal agriculture.

### **Animal Welfare**

Schweitzer's seminal 'Reverence for Life' united emerging modern philosophy with historical religious values that conduce to what he called 'peace',<sup>814</sup> which might otherwise be called 'absence of angst' – as illustrated in the following Box about peace in animal welfare. While this might be a minority view, it indicates a basis for one of the most complicated ethical issues raised about agriculture – the treatment of livestock. Issues of anthropocentrism versus anthropomorphism versus zoocentrism converge when viewed through Schweitzer's prism of respect. Anthropocentrism, which argues that humans are more important than other animals, is popularly designated as an outcome of the Judeo-Christian tradition and has proved useful in the development of the Western philosophical tradition even when it rejects conventional religious interpretations of nature.<sup>815</sup> Anthropomorphism has assumed increasing popularity as urban societies have grown wealthy and imaginatively ascribe human emotions to animals as a basis for their equitable treatment.<sup>816</sup> Such reasoning can quickly lead to distinctions between animals and humans being dissolved, which informs objective studies of science but can pit popular opinion against some outcomes in animal welfare science. Zoocentrism gives preference to animals over other life and while valuable for some discussions is not discussed further here.

The link between behaviour and genetics made in Darwin's 'On the Origin of Species' is invoked by those claiming knowledge of the psychological motivations and reactions of animals; however, Darwin was not intending such a direct association.<sup>817</sup> Behavioural studies of livestock have provided a valuable resource for

understanding agricultural science, but have not usually sought to ascribe human emotions to animal behaviour. More recent agricultural science includes neurological studies to inform understanding of animal comfort within animal welfare science, which itself is one of philosophy's significant modern outputs.<sup>818</sup> However, those invoking the name of philosophy today also get caught up in popular views about meat eating that do not appear to accord with historical realities.

### **Peace in Animal Welfare**

The science of animal welfare aims to optimize the wellbeing of livestock and in so doing can upend human perceptions. As one collation of ethical considerations concerning animals notes, "many inherited beliefs systems are facing challenges".<sup>819</sup> Human projections about animals' internal worlds confound social justice when perceptions of what animals find comfortable prove to be detrimental to their welfare; for example, the stress of free-range poultry being exposed to open skies, and the design of large pens for sows that do not cater for evolutionary-instilled instincts to protect their young. However, the motivations behind both such projections and scientific research seem to share a compassionate ethic. Compassion is a major component of Eastern philosophies, as in Buddhist practices for its cultivation,<sup>820</sup> and of the Western cultures' religions,<sup>821</sup> notwithstanding secular confusion of pity, guilt-shifting and sympathy with 'compassion'. Animal welfare science enlightens that popular confusion in terms expressed by the science-literate theologian and philosopher Schweitzer who concluded that "until he extends his circle of compassion to all living things, man himself will not find peace".<sup>822</sup>

Informed discussions about the ethics of meat consumption venture more widely than anthropomorphism and seek to understand the historical relationships between animals and humans. From hunting-based societies to modern industrial meat production a continuum of attitudes and relationships informs philosophy. Thus the early association of religious rites with animal sacrifices can be seen to reveal a sensitivity to animals akin to anthropomorphism; it might also be seen as anthropocentrism, or simply as gratitude for one animal allowing another – the human – to eat. For those moderns

invoking Indian vegetarianism as an ideal, which incidentally is belied by India's ranking as the world's largest milk producer and consumer, some other historical aspects seem relevant. Documentation of vegetarianism in India from two millennia ago indicates an association with the preparations for the killing of enemies in war,<sup>823</sup> which is hardly consistent with popular modern interpretations. From that apparent origin around 500 BCE, the ritual renunciation of meat by soldiers before entering battle occurred centuries before vegetarianism became part of Hindu practice. In the West, Schopenhauer's integration of respect for animals and the necessity to consume meat invokes the ethic of necessity.<sup>824</sup> We may argue with his logic – although it remains true for marginalized millions in dire circumstances in the world – but Schopenhauer clearly saw respect and welfare as compatible with meat consumption. Korthals has listed a sample of philosophers across the millennia who routinely supported meat consumption and thereby presents an evolution in our understanding, as is summarized in Table 3.<sup>825</sup>

Modern understanding does not accord with all such comments, yet they do indicate a progression in Western philosophical understanding. Now that we keep animals in huge numbers it remains quite reasonable to state that we must care for them. We have domesticated these species to suit our purposes and rendered them less fit to survive without us. Reciprocally, domestication has modified humans to suit the relationship, and in fact the relationship and hence domestication may even have been initiated by the animal.<sup>826</sup> I see these associations as part of the wider symbiotic relationships that occur throughout nature,<sup>827</sup> which leads me to be wary of suggestions to 'release livestock back into the wild'; that would remove the nutrition and other benefits of the symbiosis, and in any case assumes that the 'wild' and the domesticated animal are somehow the same as they were in an imagined Edenic age. It has also been pointed out that the welfare of domestic animals exceeds that which occurs in the wild where animal infanticide and self-abuse occur at higher rates.<sup>828</sup> Likewise, modern individualistic values can conflict with natural ecosystem functioning when care for individual animals is viewed above the natural processes that favour survival of the flock or herd in human-made environments.

**Table 3. Some Philosophers' Views on Meat Consumption**

<b>Philosopher</b>	<b>Views of Meat</b>
Yajnavalkya (Vedic, c.900 BCE)	"I eat beef as long as it is juicy."
Aristotle (384- 322BCE)	"Plants exist for the sake of animals ... animals exist for the sake of humankind, tame animals for the use that humans can make of them in connection with the food that they provide. ... When we are right in believing that nature makes nothing without a purpose, nothing without a final purpose, then it must be that nature has made all things specially for humankind." <sup>829</sup>
Thomas Aquinas (1225-1274)	"Just like in the creation of the human being there was first a living being, then an animal, and finally a human being, so also things such as plants, which only possess life, exist for animals, and animals in turn exist for human beings. ... That why it is justified to take the life of plants for the use of animals, and the life of animals for the use of human beings." <sup>830</sup>
Montaigne (1580)	"There is something like a certain respect, a general obligation, towards humankind, animals with life and feeling, and even trees and plants. We owe justice towards humans and grace and friendliness towards other beings. ... They and we have a common interest. ... When I play with my cat, who knows whether I am not a toy for her as much as she is for me? We amuse each other at equal footing. ... There is a certain respect and human obligation that binds us not only to animals with life and feeling, but also to trees and animals." <sup>831</sup>
Spinoza (1677)	"From this it is clear that a law that forbids animals from being slaughtered is founded rather in idle superstition ... than in sound reason. Reason does teach us that it is useful and even necessary to bind us with other people, but certainly not with animals or with other things; we have much greater rights to them than they have to us. Yes, since the right of any person is determined by his virtue or his capacity, for that reason humankind has a much greater right to animals than animals have to humankind. I do not dispute that animals have feelings; I only dispute that it is therefore forbidden to use and treat them according to our purpose as it suits us best, because by nature they do not correspond with us, and their affects differ by nature from human affects." <sup>832</sup>

Linnaeus (1760) interpreted through Kant	“Herbivorous animals exist in order to temper the rampant growth of the world of plants, which causes many plant species to suffocate. Predators are intended to limit the voracity of those plants. Lastly, there is the human being who, by hunting and reducing the number of predators, brings about a certain balance between the producing and disturbing forces of nature. And in that way, the human being, regardless of how he might be regarded in some way as objective, would yet in another way have the ranking of a means.” <sup>833</sup>
Kant (1790)	“When it is assumed that human beings must live on earth, then at least the means without which they cannot exist as animals or even as reasonable animals (in whatever low degree) must not be lacking. Therefore, those things in nature that are indispensable for this must be regarded as objectives of nature. It is clear from this that the external suitability (the appropriateness of a thing for other things) can only be regarded as an external objective of nature on the condition that the existence of that which is adjusted first or in a removed manner is objective of nature for itself.” <sup>834</sup>
Schopenhauer (1851)	“When the human race spread over the colder zones, it had to take to food that was just as unnatural for it as the climate was unnatural. In the Northern regions one cannot live without meat at all.” <sup>835</sup>
Nietzsche (1892)	“But vegetarianism also has more subtle effects, involving manners of thinking and feeling that have addictive consequences.” <sup>836</sup>

Human-made environments include intensive livestock farming, which while being a solution to increasing competition for land, can introduce new animal welfare concerns in terms of the five freedoms<sup>837</sup> recommended for welfare,<sup>838</sup> in addition to environmental concerns such as manure accumulation. The dynamic balance between such matters in livestock agriculture and indeed all aspects of agricultural science renders rule-based ethics impractical compared to philosophical consideration of multiple objectives. New ethical issues arrive with each innovation in all fields, including the genetic modification to better suit an animal or plant to an environment. Even such innovations as ruminant genetic modifications to reduce climate-active methane emissions and thus address other modern concerns can raise new welfare concerns.

Within this maze of ethical trade-offs in the livestock sciences various approaches to animal ethics have been propounded.

Livestock ethics can be approached in terms of; animal rights, natural integrity, environmental interactions, and animal welfare. The 'animal rights (or 'liberation')' approach limits human intervention in animals' lives, which seems to preclude humans from killing animals yet allows those animals to be killed by other animals. It also struggles to address the millennia-long symbiosis that has evolved between humans and livestock to the extent that livestock are dependent on humans for their welfare and survival. The 'natural integrity' approach, which holds that the genetics of an animal should not be changed, similarly seems to forget the large genetic changes induced through domestication across history. The 'environmental interactions' approach places human and animals within an ecosystem that is ascribed primacy and thus may downplay both human and animal welfare while also suffering from the impossibility of defining the boundaries of an ecosystem. The pragmatic alternative to all of these approaches is animal welfare that recognizes nature's dynamics and uses physiological and behavioural indicators as management tools that minimize stress in an animal.<sup>839</sup> In this way animal welfare emerges as the most practical form of applied philosophy that integrates knowledge across disciplines in an objective manner.

Animal welfare is a complex area that covers not only farm livestock but also pack and traction animals, sporting, recreational and pet animals, zoo residents, feral and wild animals as well as those used in laboratory tests. One approach to these diverse interactions between humans and animals is not possible. Additionally, urban separation from agriculture, and close proximity to highly-bred pets living in artificial urban environments confuses discussion of animal agriculture and animal welfare. Some bizarre suggestions arise from such estranged positions; for example, one reviewer of the diverse literature has proposed, apparently seriously, "to teach chickens who are constantly inclined to pick each other to death, even when rummaging freely, not to pick each other, through some form of therapy".<sup>840</sup> Selective breeding and sensitive management systems as is practiced is a more realistic interpretation of the knowledge

accumulated over millennia about pecking among chickens, and this is the approach of livestock science.

While livestock science represents a more consistent outcome of philosophy in terms of overall wellbeing, real issues do arise from the intensification of livestock industries. Commercial ends can sometimes be ranked above welfare means, and luxury animal products can drive bizarre production outputs even where they are implicated in human health issues. Intensive industries require strict disease control, which can contribute to overuse of antibiotics, antimicrobial resistance and mutation of livestock diseases that can infect humans. In addressing how a wealthy society prefers to have its animals treated, and the levels of risk to which it is prepared to expose itself, ethics must encompass all aspects of the situation with the costs for any actions being born by that society. This would be a logical response in many ways for well-nourished wealthy nations. But to expect that the same approach should be imposed in other non-intensive situations can easily lead to the zoocentrist approach of ranking the rights of animals above those of humans. By contrast, a balanced approach would address both negative and positive factors, which may be predominantly related to absolute human wellbeing in the form of vascular and digestive health in wealthy enclaves, and the inequities of mental and physical stunting in marginalized communities.

### **Livestock & Nutrition Ethics**

Reviews of animal sourced foods have noted that to “enhance environmental quality, sustain the economic viability of agriculture and enhance the quality of life for society”<sup>841</sup> implies reductions in animal-sourced-food consumption by the affluent and wider consumption of all products, including offal.<sup>842</sup> This in turn would allow reductions in livestock numbers, which would reduce the underappreciated risks of dangerous zoonoses – human diseases sourced to livestock – the global cost of which is estimated to have exceeded US\$ 80 billion between 1997 and 2009.<sup>843</sup> Similarly, reduced density of livestock raising would limit their incubator role in antimicrobial resistance, which by 2050 has been suggested will “be killing more people than cancer”.<sup>844</sup> By reducing livestock numbers while increasing production efficiencies, greater amounts

of animal food products essential for the wellbeing of millions in Africa and elsewhere can be forecast. Efficiency is increased by reducing losses from diseases, drought and predation, which in Africa cause the deaths of 25 percent of young and 10 percent of adult ruminants each year,<sup>845</sup> and globally is costed in billions of dollars. Animal health improvements to reduce deaths and curtail zoonotic diseases and antimicrobial resistance would improve production efficiency while reducing human health and environmental impacts.<sup>846</sup> The benefits are clear; the argument is utilitarian, especially for the millions currently condemned to mental and physical disability.

It has been calculated that 156 million young children's mental and physical capacity is constrained by limited intake of nutrients including vitamins A, B12, choline, iron and zinc; each of these is readily absorbed and metabolized from animal products. The problem is simply inadequate availability of animal sourced foods for these marginalized populations. The figures are significant: 30 percent of children are said to be vitamin A deficient; perhaps 17 percent of the globe is zinc deficient; 28 percent iodine deficient; undernutrition contributes to more than three million child deaths, which is about 45 percent of under-five years' child mortality. These micronutrients are essential in the first 1,000-3,000 days of life for brain development and it is "physiologically impossible for young children to get the nutrients they need without animal-source food". For example, "vitamin A comes packaged as retinol in an animal-source food, [which] is absorbed at 12-24 times the rate [of] plant-based choratinoid beta-carotene".<sup>847</sup> Similarly, the heme iron of animal-sourced foods is absorbed twice as readily as the non-heme iron in plants, vitamin B12 produced by anaerobic bacteria is only found in animal-sourced foods, and animal-sourced foods are high in choline - an essential nutrient for cell membrane, neurotransmission, memory, learning and gene expression.<sup>848</sup>

A few of the myriad interactions of the philosophical complexities of animal sourced foods are presented in terms of livestock and human wellbeing outcomes in Figure 18.<sup>849</sup> Expert reviews have concluded that "seeds, eggs and milk are Nature's first nutrients. They're designed to sustain and support the life of an organism's offspring



## **Civilization and Its Discontents**

Agriculture is the human interaction within nature to produce food and other products – that simple definition spans the whole period of civilization. In living within nature, agriculture has operated through three mechanisms: selecting plants and animals that suit an environment; selecting an environment to suit plants and animals, and managing natural variations associated with the two other mechanisms. Intensification of agriculture is thus management of natural processes. As human's most significant interaction within nature, it has successfully allowed civilization to emerge and famine to be forestalled. However, its biotechnological innovations that continue to support all lifestyles are poorly understood by consumers disconnected from food production.

Idle criticism of biotechnology would not be of concern if it did not cause wealthy urban consumers to expect their worldviews to spread abroad. Worldviews of the wealthy might be characterized as: extreme risk aversion when choices are abundant; popular credulity about health; anthropocentric animal welfare; idealistic sustainability, and pretensions of fair trade. Where such views influence academic philosophy and national policy through lobbies, foreign aid to poorer nations has been withheld to devastating effect.<sup>854</sup> Notwithstanding attempts to provide correct information, objections to technologies and the business of agriculture increase within comfortable enclaves.

Objections abound against genetic manipulation, biodiversity reductions, loss of ecosystem integrity and even global inequities in ownership of resources related to food. However, objectors to genetic modification, for example, are often unaware that it is the source of such products as: insulin injections used by diabetics; rennet used for cheese production; enzymes present in detergents, and yeasts used in food processing among other everyday products. Another objection concerns biodiversity loss, which is a genuine concern but in its popular form often excludes non-mammalian or undesired species in favour of animals that appeal to human emotions; yet reptiles, annoying insects and even microorganisms including pathogens are all part of biodiversity. These examples are presented only to show that such arguments cannot be single-sided

if they are to conduce to ethical understanding and compassion; this was the insight that Zen philosopher Suzuki eloquently observed in his encounter with Western culture that he described as based on dichotomous thinking.<sup>855</sup> Criticism of the concentration of ownership of key products and technologies within the food industries, which is said to introduce a risk of food being manipulatively withheld is a particular risk of cities as shown by history. However, it could be argued that the risk is less today than in the past as a result of international trade and sophisticated logistics.

Cities ('civitas') where civil ('civilis') life produces civilization in which knowledge is compounded to address issues that threaten the urban way of life. Today this means finding ways to produce nutritious food under increasingly variable climatic conditions while maintaining the principle of working within nature to minimize environmental impact. The processes of genetic manipulation practiced for more than 10,000 years now employ accumulated knowledge and molecular tools to maintain food supply. Whether one takes the universalist attitude to ethics or an individualistic one of living an examined life, the outcome seems the same, for surely one cannot live the philosophically good life by denying sound nourishment to others. Access to sound nourishment is a more fundamental right than the growing list of modern 'rights' in wealthy enclaves.

Western philosophy has incrementally developed arguments about the rights of all persons to certain goods,<sup>856</sup> which arrives at a similar position to that of Eastern traditions. That Eastern recognition of food, shelter, clothing and basic health care<sup>857</sup> as rights of all persons allowed rational consideration of other goods as luxuries or simply desirable items. It also invoked the pursuit of the philosopher's good life – translated as 'enlightenment' in some texts – as the most worthwhile occupation once basic needs and social responsibilities have been met. To eschew that lifestyle and to pursue excesses in sensuousness and comfort was held to be selfish, to be a distraction from understanding reality, and to cause worry. With today's globalization of knowledge, this means that access to safe and healthy food including clean water is a public good and a right for all persons in the world. Globally this demands respect for the means by which

all persons can access sound nutrition that avoids such afflictions as blindness, curbed mental development and physical stunting. This is not just the responsibility of agricultural science,<sup>858</sup> but of all who are well-fed and wealthy.

### **Respect in Philosophy**

The perfect world where all basic needs are agreed and met in a society is a worthy aim now expressed in the principles of the United Nations.<sup>859</sup> However, many see their own perfect world in terms of their own friends, values and borders, which inevitably leads to diverse attitudes about food and its production. Schweitzer's 'Reverence for Life',<sup>860</sup> while dealing with our attitude to other life forms, lends an ethic to modern philosophy about food and agriculture. As the ethical issues are far too complex for consideration by all in a society, respect for the lives of others and their views may be as far as the wider public might be expected to proceed.

Respect for diverse views is the basis for discussing philosophy in agriculture or any other application of our knowledge. In discussions that like to focus on the imagined evils of multinational agriculture, corporate conglomerates from A to Z are criticized; the list is long, including: Archer Daniels Midland; Bayer; Bunge; Cargill; Carrefour; Charoen Pokaphand; Danone; Dow; Dupont; Glencore; Kellogg; Kraft; Louis Dreyfus; Monsanto; Nestle; Pfizer; Safeway; Syngenta; Unilever, and Zoetis. These and other multinationals are part of the general intensification of agriculture that has resulted not only from agricultural science but also from the general globalizing influences and efficiencies that feed more people than ever before.

Intensification through application of technology also applies to the smallholders of poor countries that make up the majority of the world's farmers, which together with the conglomerates allows realistic calls to address hunger according to social justice ideals.<sup>861</sup> However, it is not realistic to assume that disadvantaged persons and cultures aspire to copy all aspects of rich lifestyles since worldviews and interpretations of rights vary across cultures, groups and individuals.<sup>862</sup> For me, this lesson from five decades of agricultural development experience has shown the integrating role of

philosophy. Food-insecure people in poor countries prioritize food for their children, survival and after that health, education and the pursuit of values important in their traditions, which provides little commercial leverage. But they have very limited power. By contrast, those in the wealthy enclaves that include parts of Asian and African cities are likely to be well-off consumers that have power second only to multinational agribusiness.

### **Consumer Ethics**

The rise of the modern consumer probably began with the European Enlightenment. Private freedoms introduced choices that affected local markets as they responded to individual and group demand. The change was paralleled with the rise of the role of the citizen, and together the new figure of a consumer-citizen influenced governance and markets to produce today's Western concept of democratic capitalism. This Western conception as explained by Hegel assumes that matters related to the general public as citizens are the business of politics, and matters of individual consumer choices that do not impinge on another's freedoms remain in the private domain.<sup>863</sup> With advances in knowledge, philosophical conflicts become evident between these roles of consumer and citizen. In the field of agriculture this is illustrated by consumer decisions made on the basis of low food prices being linked to unnecessary environmental impact, or even human exploitation in globalized markets.

The interactions between a multiplicity of global social and environmental factors would bewilder an ordinary consumer who is more likely to ignore much beyond price. Those who disagree with that statement are but a small segment of consumers that might once have been referred to as intellectuals, and even then the complexity of factors involved is still staggering. So it is more correct to say that consumers currently may discern some value differences in food products according to a product's perceived healthfulness, environmental impact or treatment of animals. Those are private benefits that do not automatically become public goods if the bulk of the world's food consumers are considered. Such public and private goods are wantonly confused in advertising and politics, which leads to agricultural producers often being nonplussed by consumer choices.

The gap between the worldviews of consumers and producers of agricultural goods is generally wider than for non-agricultural products. The gap is widened by the separation of urban consumers from rural producers and from industrial processing. Industrial processes may be influenced to be socially responsible where they operate within view of consumers, but in most circumstances the separation of consumers from the source of their food is difficult to address through a public program; therefore, in Hegelian terms it remains a private responsibility. Food companies that promote such values as fair trade, sustainable farming, free-range and so on, while probably valid within narrow definitions, might also be understood as seeking a marketing advantage. The role of an independent regulatory system therefore remains important – and will inevitably become overloaded if private ideals (even if not expressed in consumers' actions) are defined as public goods. In the West, it might be argued that most consumers who demand idealized foods without knowing their full costs have the capacity to inform themselves from more than whim and hearsay.

Consumer concern with food origins may spring from general feelings of guilt for enjoying a more comfortable lifestyle than people in poorer nations, or in response to environmental messaging, or to a sensitivity to death projected onto the slaughter of animals for meat. Such awakening of guilt might otherwise remain subdued in a balance of necessities – as implied by Russell's wry observation,<sup>864</sup> and if transcribed into purchase actions may assuage the guilt. If not, would it not add to the angst of modern life? The point can also be discerned in early philosophical admonitions to not idolize food<sup>865</sup> but to gratefully recall its origins and its dependence on climatic vagaries and human skill. As one of the most critical of the basic elements of life, to which all humans have a right according to the thesis of this work, there is a need to balance such considerations with the availability of nutritious food for all peoples.

With the philosophical genius of different cultures now widely accessible, it can be seen that all cultures have considered agriculture and food in their earliest works. Philosophical scriptures and writings were codified after agriculture allowed agro-cities to

emerge and as a consequence most written philosophies include metaphors taken from agriculture to explain psychological development – such words as cultivate, grow, mature, bear fruit, nourish and so forth. Consideration of these diverse approaches to understanding life indicates that no simple ethical rules arise for agriculture. While some ethical issues of millennia might be seen in black and white terms for everyday practicalities, ethical issues in agriculture do not condense to such convenient conclusions for modern consumers who have access to information about the global origins of their food. The challenging issues are omnipresent, including: incomplete lives caused by micronutrient deficiencies; environmental impacts from monocultures and poverty; technology's collateral impacts; the globally dominant numbers of small farmers; pesticide residues; environmental contamination; fertilizer runoff; soil degradation; water misuse; animal welfare; supermarkets; narrowing of the genetic base; hegemonic free trade; misplaced incentives; cultural preferences; global transportation of food, and more. It is impossible to address real or perceived negatives of any one of these issues in isolation from the others.

Rather than believe in a perfect world that seeks to address all such challenges by promulgating a privileged worldview, it may be useful to look at modes of food consumption. One crude distinction is that between those who eat in order to live and those who live in order to eat. The former category is vulnerable to hunger and malnutrition, which in terms of rights is much more important than any imagined right to a choice of tastes, cuisines and lifestyles – yet these are what is commonly referred to when the 'consumer' is used as a reference point. For that relatively smaller number of producers that serve those 'who live to eat', past assumptions of farmers having control of their own land are obsolete as it is consumers via markets that increasingly dictate what and how a crop or animal is produced. Grave responsibilities accrue to consumers in both cases; in the first instance the responsibility is to ensure a healthy life for all persons globally, and in the second to see oneself as implicated in environmental, animal and human treatment. I find this viewpoint more equitable than debates about landscape, subsidies or free trade that are conducted in isolation from other relevant factors. In the final analysis, as long as food production relies on the agricultural

sciences, all the issues mentioned in this work remain a constant balancing act for the informed consumer.

Consumer behaviour is just one further arena to demonstrate the wide and complex field of food and agriculture in philosophy and its agricultural sciences. Apart from the issues canvassed in this chapter, one further factor is worthy of mention, war. In philosophy, war is treated as its own complex field in the search for justifications for otherwise unacceptable behaviour. In addition, war is intricately linked to agriculture and food ethics.

### **Food and Conflict**

Cribb's corrective collation about the criticality of agriculture to survival and wellbeing introduces the subject of food and conflict by saying: "In recent centuries, more people have perished during wars from hunger than have died through direct military action".<sup>866</sup> War destroys food production and stocks, uses food as a recruitment incentive, and raises funds by trading food at contraband prices across frontiers, and then hunger and declining conditions prime contagions that spread in the absence of containment services. These existential issues are the most basic philosophical aspect of agriculture, and have been with us throughout history. In such survival situations, our instincts focus on family, tribe or group in a manner similar to other evolutionary traits. Residing mainly in Australia, home of a very old continuing human culture, the philosophy of which is only partly understood from graphic rock stories, I am struck by its relevance in these same existential terms. Aboriginal rock art depictions from the last Ice Age about 20,000 years ago when food resources became scarce have been interpreted as an indication of increased combative competition for declining food availability.<sup>867</sup>

Migration is a common response to food shortages in war as is evident today with Syrian and other refugees; worldwide there were around 70 million in 2018.<sup>868</sup> If economic refugees are counted, the 2017 figure of more than a quarter of a billion illustrates a fuller story because such migrants have made conscious decisions to leave declining conditions for wealthy nations that are, incidentally, the world's reliable food producers. From the 'Epic of Gilgamesh' to the

story of Abraham, morality is indicated in moving to more secure food lands. Conflict may also result from climate change incentivizing expansion into others' lands: "Around 1640 a series of intense droughts caused widespread crop failures in China, leading to unrest and uprisings which, in 1644, destroyed the Ming Dynasty".<sup>869</sup> In Africa, Rwanda's once balanced social system declined into civil war when its productive limits were exceeded – the same events are repeated often around the globe.<sup>870</sup> In India and Pakistan competition for agricultural water is monitored by military intelligence as a conflict hotspot.<sup>871</sup> It has ever been thus.<sup>872</sup>

Classical studies that inform academic philosophy indicate that Roman agriculture relied on small farms and larger slavery-based estates. Food was produced for cities where philosophical knowledge developed, yet the city itself nearly failed several times before its final collapse. For example, the post-Nero period of ineffectual pretenders and civil mayhem from food shortages was resolved by the practical self-educated Vespasian who instituted peace by ensuring food supply, and entertainment. A century later a major cooling event began – from 150 to 400 CE – affecting Egypt's grain production and Rome's security, and led to hunger that exacerbated epidemics.<sup>873</sup> History has countless similar events. Parallel situations continue today,<sup>874</sup> yet other historical cases that should instruct us are easily overlooked.

Last century, Russia's Stalinist ideology neglected agriculture by collectivization being parlayed into a philosophy. Whether this was done as an expedient or was the product of ideology, the philosophy has been studied in its own right ever since. In agricultural science, it is introduced to first year students to illustrate dubious ideologically inspired philosophy in the form of Lysenko's rejection of foundational genetic knowledge and empirical observations, notwithstanding some later epigenetic vindication.<sup>875</sup> A more positive example is from World War I when "British soldiers with agricultural skills [were pulled] out of the front line and put to work back on the farm".<sup>876</sup> Such pragmatism, repeated in WW II provided a more nutritious if unappetizing diet than that of opponents, and incidentally was a factor in the post-war creation of the UN Food and Agriculture Organisation.<sup>877</sup> The alternative in Germany was to

expand “living space” by taking other peoples’ lands. Today we continue to face the philosophical test of food security, which requires us to place science above ideology in pragmatic adaptation to climate change and rising food demand. This is better than just believing what we want to believe as Voltaire observed,<sup>878</sup> and that is the constant challenge for applied philosophy.

*Ethics is a complex aspect of agricultural science that has been confused by well-meaning sentiment that sometimes masquerades as philosophy. According to the wide compass of knowledge that this work defines as philosophy, the ethical dilemmas of today echo those of the past, albeit with different technological overtones. As with all aspects of philosophy, the issues cannot be viewed in isolation from each other, or from fundamental elements of our nature. The following chapter unifies some of those diverse influences on agricultural science and related intellectual and cultural constructs within philosophy.*

## Chapter 11

### Unifying Understanding: The Enlightenment to Today

*The advances of the Enlightenment introduced in Chapter 8 allowed science to emerge from natural philosophy. Since then science has continued to develop as it moved further away from academic philosophy, which itself was to become more distant from religion. Separation of these major knowledge groupings led to confused understanding, as illustrated in the previous chapter for some ethical matters. It has also meant that the integrated approach to philosophy of earlier times, and as advocated in this work, has been relegated a subordinate role in philosophy and its science. The agricultural advances of the Enlightenment and its product, agricultural science as applied philosophy, continued in universities as an integrated field that drew from both the humanities and the sciences. However, the relatively lower level of integration of historical and cultural knowledge in agricultural science led some to consider it to be merely a technological science; medicine was to suffer a similar fate. This chapter brings together these and other elements that form part of the integrated whole that makes up philosophy, beginning with the transition from the Enlightenment and its continuing legacy.*

#### **Emerging from the Enlightenment**

Today it is possible to ask “does the possibility of philosophical freedom, that is, existential renewal by means of serious engagement with philosophy, still exist? Or has philosophy long been reduced to just another formal academic pursuit ... ?”.<sup>879</sup> The question follows Heidegger’s commentary that our age is defined by technological problem-solving without reflection on other modes of thinking.<sup>880</sup> Reflection is an element of Eastern and earlier Western philosophy and until recently has been associated with religion. The decline of religion in the West has effectively relegated attempts to integrate sapiential and scientific knowledge<sup>881</sup> to a minority pursuit. This has

been expressed as academic “philosophy [being] embarrassed by the notion of metaphysical wisdom”,<sup>882</sup> which Heidegger foresaw in his words that “nothing religious is ever destroyed by logic [as] it is destroyed only by the God’s withdrawal”.<sup>883</sup> The insight is consistent with the observation that thought is an after-the-fact reflex, as modern neurological science seems to be confirming.<sup>884</sup> It is this line of argument that has given rise to the unnecessarily harsh criticism that modern knowledge advancement is based on “the blind and mindless type of natural research, which has generally established itself since the corruption of philosophy by Bacon and Newton with the Philosophy of Nature”.<sup>885</sup>

Those criticisms seek to correct modern philosophy including science, and as such accord with the thrust of this work. In the Enlightenment, Goethe posited that understanding of the processes of life was more important than that of the visible products that enter consciousness, and also implied a subjective relationship between the observer and the observed. The observer is thus a participant,<sup>886</sup> which today quantum science has brought us to accept. Wittgenstein expressed it as the ability to discern the “contrast between understanding the subject and what most people want to see”.<sup>887</sup> These are not reasons for doubting empiricism but rather a call to awareness that despite our best attempts at objectivity, bias may creep into experimental design. Steiner integrated Goethe’s empiricism and idealism in his interpretation of creative and scientific works,<sup>888</sup> and a little later Heidegger claimed that “science does not think”, meaning that science, when separated from other aspects of philosophy, gathers facts but can never provide a full representation.<sup>889</sup> The argument illustrates the gap between technological responses to such issues as food insecurity and philosophical considerations of the underlying causes in human actions; a simple example is conflict in which food is used as a weapon and thus agronomic research alone would not solve the problem. Such cases place agricultural science squarely within broadly-based philosophy.

Technical information is a powerful tool that has underpinned our rising lifestyles. However, in an holistic view the context of both research and its application would be positioned above technological

outputs. When an imbalance occurs from a technology being applied in ignorance of the context of its applicability, further research is inevitably called for to restore some balance. Scientists have long been aware of this risk, and many remain broadly informed of the context of their research while others prefer to become technologists with rudimentary contextual understanding. Such broad approaches belie the separate labelling of scientists, philosophers and thinkers. Thinking in integrated ecological terms has in the past yielded advocacy for nature reserves in agricultural regions, for example.<sup>890</sup> Identified early in the US by Emerson's instinctive linking of philosophy, religion and nature<sup>891</sup> in the tradition of the transient New England Transcendentalists,<sup>892</sup> such philosophical outcomes are sometimes overlooked when they are seen as 'religious', and not scientific. In fact, their insights are part of the continuity of broad philosophical development that could inform modern quasi-religious environmental beliefs and fears associated with human actions and population.

Population is used as a crude means of discussing anthropogenic impacts on the environment, even when it is claimed that "every child born in an industrial nation consumes eight times as much of the earth's natural resources as a child born in a developing country".<sup>893</sup> Enlightenment values have shown that a balance between needs and wants remains a valid social objective, just as past agricultural societies tended to reach an equilibrium with their environment and enshrine beneficial practices in lore. For those searching for examples of sustainability, remnant societies' living within their environment illustrate such long durability and ability to adapt to changing climates.<sup>894</sup> Their lore or cultural belief-systems form a critical part of philosophy as discussed in Chapter 4. Today with huge urban centres that are remote in distance and worldview from agricultural areas, the value of such lore is hardly appreciated. It is as if we, as the successors of the Enlightenment have curtailed our wellbeing by rejecting cultural systems that have served civilization for millennia. On the other hand, I see a dawning within science as part of philosophy to acknowledge culture in a wider understanding.

## **Culture, Agriculture and Philosophy**

In studying cultures, Geertz categorized religion as a system of symbols that convey pervasive and enduring actions to make sense of existence.<sup>895</sup> The definition is wider than conventionally religious meanings.<sup>896</sup> It is further widened by such comments as that of the neurologist Sacks': "I rejoice in the knowledge of my biological uniqueness and my biological antiquity and my biological kinship with all other forms of life. This knowledge roots me, allows me to feel at home in the natural world, to feel that I have my own sense of biological meaning, whatever my role in the cultural, human world."<sup>897</sup> The biological explanation is the current state of knowledge from science as a logical philosophical extension of religion. It requires an element of faith in the work of great minds and accords with Pascal's earlier view that faith is a means of going beyond the senses, by which he justified that humans are a superior component of nature because they can contemplate their own demise.<sup>898</sup>

The cycle of life and death is the logical focus of philosophy, and the evolution of our understanding is traced from the domestication of animals for regular meat supply leading into livestock substituting for human labour in agriculture. Thereafter, agriculture in connection with trade, markets and writing produced agro-cities in which a literate elite codified philosophies. Ancient kings became defenders of culture including writing and religion, and thereby produced such leadership images as the good shepherd protecting his flock.<sup>899</sup> Narratives serve a similar purpose to myths, which are transmitted across generations and so continually contribute to social integrity. When old stories cease to be useful, new stories are invented. Culture, religion, learning and knowledge transmission are interlinked within philosophy, as portrayed in one form of traditional imagery as reflections in the facets of a net of multiple jewels.<sup>900</sup>

Agriculture was 'the jewel in the crown' of cultures as they formed their philosophies. The whole was advanced by "systematic and selective observation, and the collection, coding, and eventually the visual storage of data; the analysis of stored data for regularities and cohesive structures; and the formulation of predictions on the basis of these regularities. ... Theory had not yet become as reflective and

detached as it later would; but the symbolic modeling of a larger universe had begun” with agriculture.<sup>901</sup> This is the reason why agriculture is omnipresent in early scriptural philosophy, as also related in the Chinese texts of Legalism even when misread through Western eyes as “technical literature that is only marginally philosophical”. Containing medicinal, agricultural and military decision tools<sup>902</sup> such early Chinese writings are paralleled by those of the Rigveda of ancient India, as discussed further in Chapter 6.

These ancient reminders are reiterated here to indicate that modern worldviews are products of the past as much as they are the result of recent discoveries. It is also a means of continuing to include the association of agriculture with philosophy more broadly than simply being “the single most profound ecological change in the entire 3.5 billion-year history of life”.<sup>903</sup> Hyperbole aside, such modern philosophical views arise on the back of agriculture’s success as applied natural philosophy including such advances as double cropping and complex breeding of animals and plants. However despite such success, existential fears transform awareness of human impact on other parts of nature into apocalyptic scenarios of ecological collapse. Cultural means of accommodating such fears have evolved into appeasement and atonement traditions, rituals and behavioural changes – and the same may be observed today in public reactions to fears about climate change, insect reductions, environmental decline and so on.

As explained in an earlier book<sup>904</sup> and alluded to herein, fears of environmental collapse can be traced to an existential fear of death, of which Sack’s statement above indicates a considered intellectual response for today. Some persons with that insight also conceive the benefits of science as having improved the lot of the vast majority of people in the world. They therefore support the continued development of knowledge that allows human acts to accord more closely with natural processes. Agricultural science takes that philosophically-informed approach, at least where it has not become captured by technological dominance. In that way, the examination of nature including ourselves is oriented to living more contented lives, which is the central purpose of philosophy.

Philosophy relies on a constant interaction with its historical components, which indicates that “even the most sophisticated societies eventually collapse”. Collapse might be forestalled by religion, which has thus been postulated to be an indicator of societal resilience.<sup>905</sup> Resilience arises from the cooperative nature of traditional communities, the commitment to the group and a common worldview. The tightest knit groups have been religious communities such as monasteries, which also peter out when they cease to adapt. An attempt to model religious communities as adaptive systems is indicated in Figure 19, which involves feedback loops that produce adjustments to cultural mores in response to environmental changes within a resource-limited regime. The model also includes a link between beliefs and social wellbeing that leads to crises of climate, epidemics and so on creating conditions for greater trust to be placed in popular leaders and supernatural belief. Could this perhaps describe aspects of the modern world? According to the model, if no appropriate leader arises in response to a crisis, the people search for one as is described in the ancient Hebrew philosopher’s lament, “is there no balm in Gilead?”<sup>906</sup> which employs the metaphor of balm as the cure of a leader to lead the group to a more healthy life.

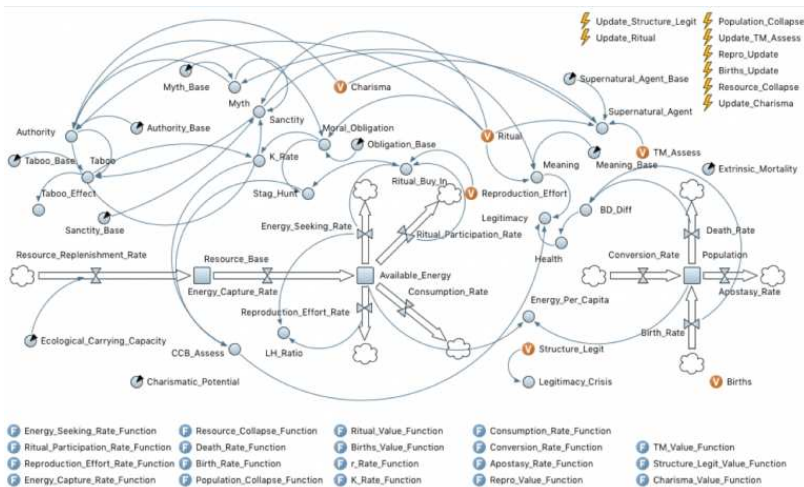


Figure 19. Religion as a Complex Adaptive System<sup>907</sup>

The links postulated in the model may be contestable in their effects. Nevertheless, the model exemplifies the need to consider interactions across disciplinary and experiential lines if a comprehensive philosophical view is to be pursued. Other demonstrations of the interrelationships include Schaeffer's<sup>908</sup> treatment of diverse cultural developments across history to address the question, 'how shall we then live?'. All of these approaches to examining life include the question of the role of ritual in modern understanding. Without dwelling on the nature of ritual, two responses may be proffered: first, more insightful participants in a religion characteristically comprehend the meaning behind esoteric rituals and beliefs. Second, ritual and belief pervade the lives of all humans, even those who claim to be secular.<sup>909</sup> To claim otherwise is pretence.

It might be said that we have forgotten the role of ritual in agriculture, or it might be seen that fears of environmental collapse have assumed the ritualistic role. Regardless of one's view, agriculture has secured civilization through reliable food supply and so underpinned the philosophical model by adapting to such factors as climate change, wars and population growth. Where agriculture fails to adapt adequately, migration or political change result. Wise leadership is necessary for the transition, as indicated through history in both real and mythical examples, such as, respectively; the migration led by Moses that was sustained by manna,<sup>910</sup> and the food-securing politics of the Flavian Emperor Vespasian that sustained Rome through a transition with grain from the north African provinces.<sup>911</sup> These elements persist as central to philosophy today, and it is apposite to note that the word 'wise' in the preceding sentence represents the second etymological root of 'philosophy'.<sup>912</sup> From Roman times to today, food production has increased by a multiple of at least 35 in response to population with most of both increases occurring in the recent decades. This has been possible by sustained scientific research, which makes it not only the fastest developing aspect of philosophy but also the area of greatest need for broad philosophical understanding. To appreciate the rapidity of the rise of scientific knowledge and its reliance on an historical philosophical base, the next section presents some examples of how present day agricultural science arose.

## Science in Philosophy

Darwin's postulation of the origin of species<sup>913</sup> developed from his observations around the world and provided an intellectual framework for the field of agricultural science. Vavilov hypothesized the centres of origin of major agricultural crops from observations and emerging genetic knowledge (Figure 5).<sup>914</sup> Darwin also mentioned aspects of agricultural science, such as animal breeding, and noted Malthus' arguments on the rate of food production increases.<sup>915</sup> Other natural philosophers confirmed such insights and recalled earlier philosophical developments including Mendel's plant genetic work.<sup>916</sup> From these four out of hundreds of philosophers have arisen both applied genetics and refinements to the understanding of natural selection; the former includes practical explications of the laws of nature of which we are part, while the latter is an explanation of the outcomes of processes in that nature known as evolution.

Observations also confirm our inherent need for society, which has led to the suggestion that we use our large brains to overcome innate tendencies to aggression and competition. It is further suggested that such rational action facilitates reproduction and nurturing of helpless young and the perpetuation of knowledge and culture.<sup>917</sup> Over time the size of the social group has expanded beyond a tribe to groups of tribes, to language groups and to towns and cities with stratified societies and their reliance on agricultural surplus. Warriors became critical to urban stability to fend off unsettled herders,<sup>918</sup> which led to agricultural civilizations becoming deterrent-based aggressive cultures. Some philosophers claim that we are endeavouring to overcome such war-like tendencies in a manner similar to the earlier overcoming of other innate traits. While acknowledging that survival traits have an evolutionary influence that is masked by civilized behaviour, it might also be argued that civilization is domesticating its residents and encoding new knowledge and behaviours in its lore.

New knowledge has spread rapidly since agriculture allowed stable civilization. One common albeit simplistic presentation traces the lineage of science from ancient Greece via North Africa to Europe

where self-governing cities and universities emerged with capitalism. The products of knowledge and capitalism are then seen to have spawned an educated commoner class as a product of inexpensive book printing, which led to challenging of the privilege of inherited nobility. Education perpetuated the spread of objective logic to test new ideas within the social aspect of our nature expressed as scientific processes through specialist meetings and peer review. Consensus between experts in a complex field is a social activity, and even considering occasional compromises, represents a peak in the history of philosophy. Expanding knowledge through research and seeking practical applications in complex socio-biological environments can thus be seen as the means by which ancient philosophical legacies are carried forward today.

Continued advances in understanding the operations of nature and means of living in accord with it rely on multiple inputs that draw on all aspects of science in its broadest sense. Public opinion, whether informed or not, influences the acceptability of research topics and applications – and should be conceived as a component of the dynamic environment in which knowledge is developed. It is therefore a subject of philosophy through the social sciences. This is the intent of ‘social licence’, which implies public education and honest communication that is seldom achieved in short time frames. In agriculture, examples of science requiring such a social license include genetic manipulation, animal welfare and pesticide technologies. By ignoring the spectrum of scientific disciplines needed for modern advances around such sensitive subjects, the status of science has declined in the wider society of the modern West. Now less accepted than they have been in the early 20<sup>th</sup> century, philosophical scientists lament the imbalance that can occur in academic philosophy when the observation and logic of positivism is marginalized.

Logic has relied on the dualistic thinking of Cartesian approaches that have produced either/or scenarios that range from Stalinism, Maoism and welfare states, to fears of environmental apocalypse, and even to a rise in personal beliefs in transcendence.<sup>919</sup> Dualism has also assumed separation of mind and brain, which in recent times has been discounted by a view of the unity in mental events and brain

processes. Likewise, some popular books criticizing religion as outdated or worse<sup>920</sup> dualistically focus on obvious cultural differences and overlook the areas of common intent in religions and the sciences. Seen in these ways, dualism may be just one of science's reductionist tools that must always be considered within an interactive context of multiple factors if it is to be consistent with the embracing conception of philosophy that conduces to wellbeing.

Contextualizing dualism can also demystify religion and reveal it as the source of knowledge advances through history across diverse fields including psychology. What is understood to be religion today in wealthy nations differs from what it was in past eras. Evangelical secularism now promotes new forms of belief, disciples of which claim the superiority of their belief-system when the emerging middle classes in once poor nations appear to accept Western trappings of education and consumption. However, just as unchallenged belief is a false basis for objective knowledge so in this case Western cultural missionaries fail to see the durability of extant cultural values that continue below superficial Westernization.<sup>921</sup> Overall it could even be argued that those who adopt Western trappings and maintain links to their own heritage are more widely connected to an embracing understanding of nature than their Western colleagues. In such a dynamic intellectual milieu, the weak link between religion and philosophy including science has led one extensive review to conclude that "many views of religion held by psychologists in the 20<sup>th</sup> century were very wrong".<sup>922</sup> This includes misunderstanding of Christianity in the West, and the benefits of an openminded acceptance of other world philosophies as exemplified in the life of Schrödinger, for example.

The life and thought of Schrödinger illustrates the role of science in philosophy. His conviction to Vedic philosophy informed insights that theories proposed by science were the means by which modern philosophy could advance. As his biographer notes: "He even considered the possibility of devoting his intellectual life to the field. It would have been an inopportune decision, since philosophers now began to consider their subject as a self-contained discipline pursued by specialists for academic ends."<sup>923</sup> While his views should be recalled within the historical context of the decline of the Austrian

empire, his worldview allowed such insights as “stability of a state of the world ... can only occur through the connection of each individual system with the whole rest of the world”.<sup>924</sup> Schrödinger expressed this in terms of energy flows; today it might be seen as a statement about sustainability.

Schrödinger bemoaned the demise of metaphysical guides for science and art. He attributed the decline to the rise of technology and an abandonment of the knowledge encapsulated in the insights of religion. He saw this as linked to poor leadership, low attendance to personal spiritual values and the shrinking of churches into political arms. In such a society, intellectuals eschewed political involvement and ignored the lessons of history. He concluded that an Eastern approach of not dismissing apparently contradictory theories was more practical than focusing on one or another in a binary manner. From this approach, he saw his scientific and other thought as part of an indivisible whole, which he chose to interpret through the Vedas. He concluded that “as inconceivable as it seems to ordinary reason: you – and every other conscious being taken in itself – you are all in all ... it is a vision of this truth that forms the basis of every morally valuable activity”.<sup>925</sup> Confronting as this insight may first appear, it remains the basis of the inherited knowledge from India and Greece on which we continue to build.

With an integrated worldview, Schrödinger was able to relate experimental observations to an holistic theory, an approach he considered essential for an objective mind. He observed that “almost all the other fellows do not look from the facts to the theory but from the theory to the facts; they cannot extricate themselves from a once accepted conceptual net”.<sup>926</sup> From his approach he was able to convincingly argue that the microcosm that he was discovering was reflected in the macrocosm. Although he may be better known for his contributions to quantum theory and ‘Schrödinger’s Cat’,<sup>927</sup> his view extended into biology through his lecture series ‘What is Life?’.<sup>928</sup> These presentations discussed genetics and inheritance, introducing the concept that chromosomes contain a genetic code, which in turn motivated Watson to unravel the genetic code with Crick. The point is worth emphasizing: it was the integrated perspective of

Schrödinger that inspired the detailed science of modern genetics, which is most widely applied in modern agriculture.

From such developments and vision Schrödinger increasingly sought to integrate new knowledge within philosophy, admitting an influence from Spinoza's insights. He confirmed the dual Greek assumptions of nature being comprehensible and objectivity requiring an external observer, which remain the basic philosophical assumptions of modern science. By spanning the breadth of philosophy, theoretical physics and practical biology, Schrödinger's worldview became even more integrated as he aged, extending to include consciousness in an holistic conception of evolution that focussed on the human species rather than individuals. Thus, while critical of faith-based religion and eschatology, he emphasised the various terms for unity and interconnectedness, including 'God' and 'Brahman' as productive concepts for communication.

The example of Schrödinger is used here as a convenient shorthand to demonstrate the operation of science and its inseparability from the insights of the great historical traditions under the embracing heading of philosophy. Other great scientists might equally have been used as examples – Einstein is mentioned throughout this work to illustrate similar points and was a frequent interlocuter with Schrödinger. Another means of linking early philosophical modes to thinking in order to advance today's quest for knowledge is the appropriating of an ancient myth; for example, Lovelock's Gaia hypothesis productively uses ancient myth as an integrating conception for philosophical discourse.

### **The Gaia Hypothesis**

Lovelock's hypothesis references the ancient Greek personification of the Earth as the primordial deity, Gaia – the mother of all life and of gods who was known as Terra by the Romans. Born out of Chaos, she appears in early Homeric poems including the Iliad<sup>929</sup> where black sheep are mentioned as sacrifices to her. Her creative power is represented in various myths, which while difficult to unify into a single story, illustrate a sophisticated means to understanding the cosmos and the human condition. The Gaia hypothesis invokes the concept in a manner that considers all organisms and inert material

to exist in a dynamical equilibrium that supports life.<sup>930</sup> This embracing philosophy provides a useful basis for communication about the environment and humans as part of it, despite the hypothesis having been trivialized by quasi-religious belief, such as when it was claimed that the 2004 tsunami was “the goddess Gaia rising from the ocean floor to punish our industrial civilization”.<sup>931</sup> Apart from such beliefs, the hypothesis is a convenient means of explaining the context in which agriculture is practiced.

Presenting the Earth as a self-regulating system with its biological systems interacting with the atmosphere and the solar system, the philosophical construct aids ecological thought. It also provides a mechanism for reductionist science to understand its role in a complex system. The feedback mechanisms that maintain this balance are postulated to operate within degrees of tolerance that suit life on earth. Solar energy intensity, atmospheric composition, ocean salinity, geological processes and biochemical aspects of life are all investigated to model the mechanisms of the overall system.

The holistic approach of the hypothesis is its conceptual utility rather than any literal interpretation of the earth as a single living being. It is not new, deriving as mentioned in its name from ancient myth and sharing elements with most animistic cosmologies and the underlying worldviews of most religions. While there does not seem to have been contact, Lovelock may have built his theory on Vernadsky’s recognition of atmospheric oxygen, nitrogen and carbon dioxide resulting from biological processes.<sup>932</sup> So, while some seek to hail the idea as original, others claim that its antecedents may be found in earlier philosophies. Lovelock working with the microbiologist Margulis provided the scientific basis for the hypothesis.<sup>933</sup> As it is not possible to test the hypothesis empirically, its major philosophical contribution has been as a metaphor to focus science and to understand humans’ place in the universe.

Some Western viewpoints criticize the hypothesis as teleological despite Lovelock’s insistence that he had not stated any purposeful attribute in the system’s homeostasis. Straightforwardly proposed as the Earth feedback hypothesis<sup>934</sup> and developed as a conceptual approach to detecting life on Mars, the Gaia Hypothesis was

published in journals<sup>935</sup> and later in 1979, in a book.<sup>936</sup> Today, it may be described as a philosophical tool of particular importance to another hypothesis that labels our current era as 'Anthropocene' – implying that human actions are implicated in environmental change. Since the most widespread human intervention in nature is agriculture, the Gaia hypothesis is an important mental construct for understanding and practicing agricultural science.

Today, much of the scientific community rejects the Gaia hypothesis as a scientific theory while acknowledging that it has provided a useful means of stimulating interdisciplinary studies.<sup>937</sup> By labelling the idea as an hypothesis, it should have been expected that it would be open to such challenge and given the difficulty of testing it from current knowledge, it might be better thought of as the Gaia Concept. As a concept, it encourages the inclusion of all possible factors in philosophical considerations, which is the context for sound agricultural and other applied science.

*Agricultural science may be seen as a product of the Enlightenment that has made such significant advances that its success is invisible to those who enjoy a surfeit of food and natural parks. No period of history could have foreseen the current ability to produce food as efficiently as is done today. More advances are already expected from emerging knowledge that will further reduce undesirable impacts and avoid the need to clear more lands for food production; some may even remove elements of food production from soil-based agriculture. These developments have occurred through the application of the insights of the Enlightenment that themselves built on philosophical knowledge across millennia. The invisibility of agriculture's successes is paralleled by that of the successes in other applied sectors including communications, medicine and the diverse elements that provide the material comforts of today. Invisibility has induced forgetfulness and encouraged 'unconsidered' lifestyles. From before Kierkegaard's time, the uneasy feeling of separation from nature that he defined as angst has accompanied these successes. The integration of all elements in life is the research approach by which fully-rounded philosophy seeks to make us feel at ease. The following chapter expands on this theme of integration.*

## Chapter 12

### Integrated Philosophy

*The fracturing of philosophy, including its component science, into disciplinary specialities as discussed throughout the preceding chapters is usually justified by the great intellectual investment that each speciality demands. Separation leads to each discipline developing its own jargon, which traps specialists into conversing mainly within their own kind. Cross-disciplinary attempts to resolve the 'silo' problem do not address the matter beyond a general level. Following the thesis of this work, this chapter assembles information from the discussion to praise the role of those who integrate knowledge, and to thereby position agricultural science within philosophy, where it shares the overall objective of enhancing wellbeing.*

#### **Commonalities**

A minor example of the dilemma of specialities concerning the diverse philosophical schools is the underlying production base of agriculture, land. Land can be considered in terms of its value, accessibility and rights. Utilitarianism argues the greatest good for the greatest number, which translates into agriculture in such ways as land values being proportional to agricultural products that are in demand.<sup>938</sup> Libertarianism on the other hand suggests that it is the right of land-holders to choose what they produce for their own maximum benefit. Egalitarianism implies the right of all to food and to access to land and water. Ecological-ism includes humans as part of organic processes thereby potentially allocating land a value wider than its productive capacity, ownership or human rights.<sup>939</sup> No other aspects of nature have excited so much concern as secure access to food, which relies on land and water. The discrete philosophical '-isms' cited above may not do it justice when they take a generic approach across all goods; I am arguing that until nutritious food is secured for all, then food remains special and cannot be treated in a manner akin to any item that is not essential for a potentially complete life. While hundreds of millions of marginalised people in poor regions of the world do not have reliable access to nutritious

food, it remains a special item in broad philosophical terms. Integrating the diverse fields of knowledge for this basic philosophical purpose requires the seeking of commonalities across development approaches, schools of thought, academic disciplines, practical fields and cultures.

A wealth of knowledge developed across history and pre-history is encountered by being open to myth, legend, folklore, religion, cultural stories, natural philosophy and academic philosophy. Definitions of 'primitive', 'sophisticated' and the various classifications of academic history and philosophy merge when myths of hunter-gatherers and agricultural civilizations are understood to address the human quest for wellbeing. Some may argue that it is useful to classify the myths and legends of 'primitive' societies as having been distorted by incoming cultural interpretations with which they amalgamated to become folklore. Yet remnant elements of folklore remain from what was once perpetuated in such communal gatherings as planting, harvesting, agricultural festivals and water collection.

Communal gatherings produced common understanding. With development, reticulated water and machine agriculture among other innovations produced lonelier if wealthier existences. Universal education has favoured educational specialization including academic philosophy, and so marginalised ancient folklore. Loss of communally-shared knowledge and a narrowing of the knowledge have together reduced the focus on wellbeing within philosophy. Despite all this, Western philosophy embodies exceptional accomplishments, and contrary to popular criticism has provided the world with logic, debate, technological advances and scientific insights. The process employed in making those great strides has been refined by comparison of differences. This has been remarkably useful. However, seeking some redress of the separation of disciplines and traditions in philosophy including its sciences is now an imperative that demands us to also seek commonalities.

Seeking commonalities across traditions is quite different from arriving at consensus of scholarly agreement within a school of thought. In fact seeking commonalities is often decried as unscholarly syncretism in both academia and theology. Over the decades, I have

become more wary of such unjustified dismissals in both sectors. In another work subtitled 'Syncretism in Commonalities',<sup>940</sup> I found that understanding about Southeast Asia is enhanced by comprehension of common cultural norms that lie beneath superficial national and introduced religious histories and viewpoints. Similarly within agricultural science, although it is impossible of any researchers to comprehend the whole context of their scientific work, a broad philosophical awareness can find natural commonalities that potentially reduce some unforeseen impacts of innovations. One possible outcome of this responsible approach is the pious hope that innovations would not be developed unless they offered a net benefit in overall wellbeing.

Requiring an appreciation of the interactions between multiple factors, eliciting commonalities also presents demanding intellectual challenges to comprehend other cultural viewpoints. Around the world, diverse cultures have developed their own intricate agricultural systems and philosophies. If commonalities are sought in the first instance, what appear to be differences can be understood as rational interpretations based on long experience from the interrelationships between people and their environment. For example, correlations between rice farming, group goals and cooperative working arrangements have been attributed to hot climates. Wheat on the other hand, and its association with individuality and analytical approaches, has been attributed to cool Mediterranean environments.<sup>941</sup> Yet commonalities between rice and wheat abound, from selective breeding techniques, to management adaptations, to climate responses, to processing options. Cosmologies built from such behaviours necessarily differ in detail but their resulting philosophies aim at the same objective of secure food supply as an initial element for wellbeing. Commonalities derive from that need to address essential human needs, primary among which is the need to feel at ease in the world – to be content.

The argument for this approach to commonalities allows a succinct explication of agricultural objectives across philosophical traditions, for example:

- Humans seek to reduce their fear of the unknown and death through beliefs and actions embedded in their hunting and agricultural environments;
- Beliefs and actions provide comfort that becomes embedded in traditions and rituals of philosophies and religions, which necessarily use agricultural metaphor to communicate insights;
- Traditions include both intellectual and experiential knowledge based on contemplative practices that are often associated with cultural actions supported by agricultural surpluses in expanding societies;
- Continuing dominant philosophical traditions remain encumbered by cultural accretions that can confuse narrow understandings from both literalistic belief and academic logic, and produce anachronistic applications in agriculture, religion and other fields;
- Narrowing of philosophy can be seen as a risk of humanism in the West; in broader historical terms it might even be said to have arisen with agricultural mechanisation;
- Broadly-based philosophy provides an overarching means to integrate all sciences including the humanities and to also integrate knowledge from other philosophical traditions.

Within this framework, a commonality can be seen between what is usually considered a major difference between the raiding conducted by pastoral nomads and hunters on settled agricultural states and the protection offered by the state. Enjoying healthier lifestyles from more diverse diets than agricultural peoples, as recorded by agricultural scribes of ancient China, Greece, Rome and elsewhere,<sup>942</sup> hunter/raiders opportunistically attacked agricultural settlements. In their logic, hunting was similar to the raiding of grain stores. Scott identifies this as fundamentally similar to the actions of states that extracted taxes from their peasants, with neither raiders nor states extracting more than would allow subsequent 'taxing'.<sup>943</sup> In ethological terms, both display the behaviours of an adapted parasite that maintains a balance with its host. Hunter/raiders and agriculturists evolved distinct worldviews that infused their belief systems and rituals, and in cases where the former assumed the state governance role over the agricultural community and settled, the

philosophies of the two groups were integrated. One example may be found in the pastoral influences of the Old Testament that carries into the New Testament allegories of the good shepherd, which spread among the settled agricultural communities of the Mediterranean.

As introduced earlier, the agrocities that grew and allowed a leisured and educated class to arise produced philosophy, which makes written philosophy an urban phenomenon. Furthermore and as detailed through this book, philosophy draws heavily of agricultural metaphor, and even lauds rural folk as being more virtuous than the urbanites. However, philosophical insights should not be interpreted superficially to rank farmers above others in society – that is not the intention, which is variously to recognize the centrality of reliable food supply, and the benefits of contact with nature. Philosophy is a product of the wide ethnic and ideological mixing that defines urban much more than rural life, and as new insights rely on diverse inputs and stimuli, the wide contacts of urban agglomerations can fuel philosophical development in a manner that contrasts with narrower views that we describe as ‘provincial’.

There is a further common element relevant to our discussion of agriculture and philosophy, which thoroughly integrates us all as animals domesticated by our own actions and interactions. Perhaps less romantic than references to farmers as the ‘salt of the earth’, the similarity of the origins of agriculturists and the domestication of livestock demands attention. States relied on agriculture, which relied on labour garnered through war slaves. Urbanites adapted to their protected lifestyles curtailed by governing powers to produce modern life. In that worldview, we who live within the modern state can be considered to be domesticated forms of once independent cultures. And in common with other domesticated animals, we have probably narrowed our diversity and skills in our modern ordered lives. We have also developed marked commonality in our relations to nature and in our moral views.

### **Commonalities in Morality**

It is often claimed that agricultural science operates philosophically in its social science and ethical considerations. That may be true, but it is not the full extent of what is meant; philosophy is much wider

than the shifting ethical mores and social licence that rhetorically address “the greatest moral challenge of our time”. Does the ‘greatest moral challenge’ really focus on such issues as antibiotic resistance, global warming and plastics in the environment?<sup>944</sup> These are issues, but I find some of such rhetoric reminiscent of the Y2K ‘millennium computer bug’ that raised fears around the year 2000. The Socratic version of the ‘examined life’ would see collective action as a solution to such issues within insights into some of their myriad interactions while accepting that the ‘unexamined’ lives of the majority might run counter to such action. This does not mean that the majority are not socially correct; in fact, ‘common-sense morality’<sup>945</sup> sets the limits for what is acceptable regardless of the beliefs of well-intended yet also unexamined views of an elite. Personal awareness thus trumps the naïve feel-good action sometimes demanded by privileged segments of the rich world for global actions. The awareness that is a constant through Indian philosophies has withered in the Western part of the Indo-European cultures.<sup>946</sup> Private piety among lifestyles that rely on wealthy economies supported by the world’s poor cannot be seen to be in accord with the tradition of philosophy as discussed herein.

Tradition includes accumulated knowledge for living in accord with nature. In agriculture, this is often referred to as traditional agricultural wisdom, which includes much of the folklore of integrated communities living non-industrialized lifestyles. The word ‘wisdom’, while often employed glibly, is intended to honour the knowledge honed by long observation of natural interactions and seeking to live within them. When accepted in that spirit, other insights from science can be productively considered in parallel to arrive at new knowledge. For example, scientific examination of traditional plants grown for specific health reasons has led to isolation of active ingredients being made available to millions of other people. However, when such research is conducted in isolation from its original integrated context, it risks becoming merely technological and introducing more unforeseen effects. Being aware of that risk allows realistic contributions to the sometimes uninformed debates about the benefits and hazards of technology. One modern philosopher has called this “something resembling ‘techno-wisdom’ ”.<sup>947</sup> Rather than accept that misnomer of ‘techno-wisdom’ as a solution, I retain the wider philosophical view of science.

Without a wide philosophical view, the astounding success of agricultural science in increasing global food availability is forgotten and can even result in unbalanced criticism of its environmental impacts. Of course there are impacts – just as all human actions have impacts. Sound science seeks to minimize negative impacts in its research, and to redress those that arise later through further sound research. However, some impacts have resulted from agricultural science that has been reduced to technological research in the race to meet the moral imperative of staving off starvation. Staving off starvation is an ethical action warranting informed risk-taking; however, when that imperative no longer applies, a continued technological focus without awareness of overall context offends the philosophical ethic. The general rule is thus that, except for emergencies, a strictly technological approach is less worthy of support than science that seeks to understand and mimic the operations of nature and is thus more aware of possible contingent effects. This may be idealistic in many circumstances, but it does provide a moral guideline for research.

When modern philosophers argue, “there’s not a lack of morality in the world; there’s too much”<sup>948</sup> they presumably refer to unconsidered and polarised views. Whether morality or ethics are based on divine prescriptions, on idealistic notions of rights or on changing social views, there are few if any absolutes. History is replete with disputes over the absolute interpretations of religious groups as well as secular states – for example, a current subject is molecular genetics in animals. Reliance on morality as a mechanism of social cohesion may have declined in the secular West, but in traditional societies,<sup>949</sup> ascribing a sacred status to resources critical to life was a means of acknowledging that they were “too valuable to be interfered with”.<sup>950</sup> To interfere with them was ‘taboo’ – a word from Tongan and Fijian, the adoption of which suggests concepts of such as ‘haram’ and ‘sin’. However, seeking to transplant such holistic traditional systems to other situations is usually pointless, for it is underlying principles rather than specific practices that are derived from natural interactions. Nevertheless, there is benefit in reflecting on lost respect and sacredness in modern society by studying cultures that have retained their traditions. This is the most useful way to find

wisdom in the ideals of such post-industrial rediscoveries as permaculture<sup>951</sup> and the biodynamic agriculture version of Steiner's insights.<sup>952</sup>

Seeking wisdom is another definition of philosophy, which overlaps with objective knowledge – and goes further. From ancient times, the myths and religions of early philosophy that aspired to harmony with the spirits was wisdom. Fairness and compassion in Judaism was personified as wisdom in a perennial and female form essential for a relationship with the divine.<sup>953</sup> Descriptions in Islam are remarkably similar.<sup>954</sup> The melding of Judaic conceptions with Greek thought in Christianity describes wisdom as a gift of the spirit,<sup>955</sup> cultivation of which engenders wise persons to be peace-loving, considerate, submissive, merciful, impartial, sincere and compassionate.<sup>956</sup> Indian religions sought the same objectives in such specific practices as the Buddhist Eightfold Path.<sup>957</sup> Hinduism describes the state of wisdom being awareness of oneself within all of nature, which is experienced as 'immortality' and perfect peace.<sup>958</sup> Chinese traditions likewise link knowledge to wisdom in the doctrine of the mean,<sup>959</sup> which at the more profound level of Taoism is expressed in the forms of charity, simplicity and humility.<sup>960</sup>

These summaries may not accord with believers' interpretations, but they are sufficient to show that wisdom embedded in myth, religion, culture and a tradition to live within nature's flows is the pinnacle of human knowledge. And the commonality of living within natural flows is clearly related to civilization's oldest and most pervasive environmental interaction, agriculture. With this approach to philosophy, practical ethics and morality require the acceptance of other cultures' insights and the knowledge accumulated by experts.

### **Expertise**

As an ideal, wisdom is probably unattainable and is better understood as some persons being wiser than others at some times, which may be a corollary of some people being more knowledgeable on some subjects. In the complex areas of agricultural science, a traditional society living within nature may be said to exhibit wise environmental actions. However, emulation of this wisdom would require adoption of the total cosmology and way of life of that society,

commonly at low population densities in simple lifestyles. This is impractical, and would appear to be immoral when the food demands of the globe currently rely on industrial agricultural approaches. The apparent dilemma is reduced by seeking to maintain a wide philosophical understanding among the experts engaged in innovations that sustain food production. However, experts today are under siege. Communication technologies among other changes have undermined trust in expert knowledge. Reasons for this decline have been suggested to include; a fear of technocratic dominance subverting democratic principles, technological expertise being seen as socially uninformed, and exaggeration of the benefits of innovations.<sup>961</sup>

Each of the criticisms of technology impinge on philosophy, not only in terms of scientists maintaining a contextual understanding of their work. Academic philosophy argues that Plato left complex matters to experts while Aristotle trusted such matters to the public – but such comparisons offer little here. Public views on complex matters can lead to disastrous outcomes, just as narrow technocratic dominance can forget both social realities and the side-effects of innovations. A ‘golden mean’ between the extremes in which experts engage with the public is often tendered as a solution, but it remains distant unless the public is adequately informed about the innovation and respects expertise. By comparison, respect for experts is high among experts in other fields, presumably as a result of having shared similar arduous paths to learning honed by rigorous criticism. The expert in animal genetics respects the rumen physiologist’s opinion on the complex interactions that affect nutrition – and so on through agronomic, health, rangeland management and the range of other expert fields. Yet despite specialization, experts can still be expected to understand in general terms the social and environmental context in which their work applies.

Appreciation of social and environmental context was axiomatic in the natural philosophy of the West, and remains embedded in Indian philosophical thought and its derivatives. For example, Indian influence on the Thai language produced the term ‘thammachat’ for the natural environment where ‘thamma’ is the same as ‘dharma’, an ancient term referring to nature and natural law, which includes the

duty to act in accordance with that law to live the highest form of life.<sup>962</sup> The theme may also be found in the Judeo-Christian tradition as well in Socrates' 'examined life'.<sup>963</sup> In agricultural science many do take such an approach, but some prefer a narrow technological approach which may explain the field's variable status and image.<sup>964</sup> In a world that is extremely wealthy in material terms with the equivalent of 'middle class' numbers said to number billions,<sup>965</sup> the continuing philosophical search for understanding is greater than ever before. These are all indications of the means by which agricultural science within philosophy is integrated with other knowledge, as discovered by great minds in other fields of learning.

### **Advancing by Integration**

Placing agriculture and in particular agricultural science within a broad definition of philosophy is a return to the approaches in the West that were current until recent centuries. The approach also acknowledges continuing Eastern traditions and gives credence to religious insights across all cultures, again based on the logic that religion was a source of European philosophy for most of its history and that other cultures have considered religion inseparable from learning and life. In recent times, Einstein explained this in terms that unite the illogical divisions that some academic philosophers maintain. He said: "Behind all the discernible concatenations [of nature], there remains something subtle, intangible and inexplicable. Veneration for this force beyond anything that we can comprehend is my religion."<sup>966</sup> He also acknowledged that if one employs conventional definitions, his god is that of Spinoza, which I speculate is a conception that accords with the implicit worldviews of many agricultural scientists, agriculturists and scientists in general. The perspective that I invoke here is one of acknowledging the constant challenges to our worldviews, as demonstrated across a few centuries of scientific discovery and summarized by Freud:

"In the course of centuries the naive self-love of men has had to submit to two major blows at the hands of science. The first was when they learned that the earth was not the centre of the universe but only a tiny fragment of the cosmic system of scarcely imaginable vastness. This is associated with Copernicus . . . The second blow fell when biological science destroyed man's supposedly privileged place

in creation and proved his descent from the animal kingdom and his ineradicable animal nature . . . But human megalomania will have suffered its third and most wounding blow from the psychological research of the present time [1933] which seeks to prove to the ego that it is not even master in its own house, but must content itself with scanty information of what is going on unconsciously in its mind.”<sup>967</sup>

Since then, further understanding of our nature has shown us that we are a complex of interacting biochemical processes and organisms. With this knowledge, coupled with the history of modifying our environment for our own comfort, has arisen an awareness that we may not be able to foresee the effects of our ever-more powerful technologies. As the geographically most widespread human intervention in the environment, agriculture creates major philosophical concerns about our actions. All three ‘blows’ described by Freud inform agricultural science and in particular that of Darwin exemplifies its expression as natural philosophy.

Charles Darwin’s path to his great advance may be seen to have been paved by his grandfather, Erasmus Darwin, whose ‘Phytologia or the Philosophy of Agriculture and Gardening’ begins with the words: “Agriculture and Gardening, though of such great utility in producing the nutriment of mankind, continue to be only Arts confiding of numerous detached facts and vague opinions without a true theory to connect them or to appreciate their analogy; at a time when many parts of knowledge of much inferior consequence have been nicely arranged, and digested into Sciences.” The sentiment clearly identified the need for agricultural science to be advanced within the natural philosophy tradition of the time by seeking to understand more of nature. Erasmus Darwin’s work discussed plant and animal physiology and nutrition, soil and land preparation and new ploughing technology within a context of bettering human wellbeing.<sup>968</sup> This context of his grandson’s upbringing provided a basis for what is one of the great philosophical advances of the recent two centuries.

The major philosophical work that documents what Charles Darwin conceived early in adult life in the 1830s was later published as ‘On

the Origin of Species'. Often popularly misunderstood, Darwin's thesis remains current – each species produces more progeny than can be sustained, and those that survive are those better suited to their environment and hence pass on their attributes to subsequent generations. Beginning with general observations, he conceived a pattern, as in his early diagram (Figure 20), and formulated a theory that he tested through observation over decades. The work is one of philosophy's clear steps in our understanding of ourselves and life.

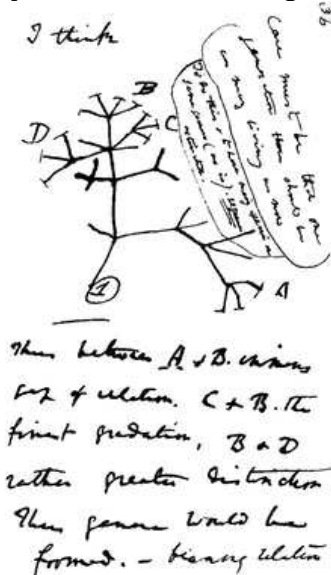


Figure 20. Darwin's first sketch of an evolutionary tree.<sup>969</sup>

From Darwin's time, literalist believers in a divine creator being responsible for all forms of life have refused to accept Darwin's work, often without studying it. Darwin addressed these criticisms rationally through evidence while orienting his insights to the prevailing religious mores of his time, even stating that "I should infer from analogy that probably all the organic beings which have ever lived on this earth have descended from some one primordial form, into which life was first breathed by the Creator". In this spirit, Darwin deliberately omitted discussion of human evolution from the work, not sharing it publicly for three decades in "The Descent of

Man'. Based on an extension of his earlier natural philosophy, he stated that "we can dimly foresee that there will be a considerable revolution in natural history".<sup>970</sup>

The wider philosophical context in which Darwin placed his work was an example of what Hegel had observed as essential for the advancement of knowledge for the benefit of humankind.<sup>971</sup> The success of agriculture in feeding rising populations has relied on evolutionary theory in animal and plant breeding and in environmental management. Breeding has the aim to render an animal or plant more suited to an environment while environmental management aims to modify an environment to suit an animal or plant. Zoonotic diseases – pathogens transmitted from livestock to humans – and antibiotic resistance are similarly understood in evolutionary terms within the agricultural sciences. These are all advances in philosophy that have built on the traditions of theology and ancient Greece.

### **Stumbling Understanding**

Western philosophy sees its tradition in the metaphysics and ethics derived from the ancient Greeks. Socrates, Plato and Aristotle included the arts in their philosophy in the sense of what we know as science and technical expertise by praising such thoughtful practitioners above politicians. However, it must also be acknowledged that they viewed practical knowledge as less than the encompassing knowledge that could be cultivated in thought. The rise of empiricism two millennia later with Bacon and then Locke, Berkeley, Hume and Mill set natural philosophy on an empirical path. Thereafter the French philosophers de Saint Simon and Comte and the German Marx insisted on the link between technology and socioeconomic development.<sup>972</sup> Through this process, the harm that technology might cause was recalled through such prophets as Blake.<sup>973</sup>

During this period, the integrated understanding of natural philosophy continued in parallel with technological empiricism. Darwin's insights had built upon this integration inspired by his intellectual predecessor, Humboldt, who "saw the earth as one living organism" and whose seven-volume 'Personal Narrative' was prized

by Darwin on his voyage on the Beagle. Humboldt's view that "all forces of nature are interlaced and interwoven" led to him proposing 'Gää' as the title of early drafts of his magnum opus that ultimately appeared as 'Cosmos'.<sup>974</sup> The lineage leads directly to Lovelock, who invoked the holistic image of Gaia, in this succession of integrationists – scientists who within the thesis of this book are at least as important as specialists in the sciences. Also in this lineage, Haeckel followed Darwin's insights and in 1866 coined the term 'ecology' and thereby united ancient and modern scientific insights that informed agricultural science as agroecology. The concept may be seen in Humboldt's early schematics of plant distributions across altitudes, latitudes and isohyets. Yet despite such a philosophical unity, agricultural science in common with other applied sciences was easily drawn into technological investigations that isolated subjects from their integrated contexts. The same occurred within the study of philosophy as a singular field.

Having separated philosophy from its natural sciences, and having specialized into sub-disciplines, academic philosophers are faced with a confusing cross-disciplinary task in considering the applied sciences. Those philosophers who do comment on agriculture, like scientists who comment on philosophy, are often seen as amateurs uneducated in the language of one or more of science or ethics or politics or aesthetics or metaphysics or even theology, despite theology and religion being a common basis of their fields. Furthermore, within philosophy "diverse schools for most of the twentieth century did not communicate with one another ... they often did not respect or take seriously one another's style and product".<sup>975</sup> It was Heidegger, observing the means through which humans act, who brought technological developments into the realm of existentialism as a major characteristic of modern society. Another branch of philosophy, one which owes its heritage to theology, is hermeneutics – the interpretation of written texts, which was extended to include culture and then science and its procedures. Hobbes saw science as a social enterprise and Kant widened the approach to include the mind's ability to create objects of knowledge. Various other schools of thought sought to integrate scientific thought into philosophy producing a patchy coverage.

Tracing the relationship of modern philosophy with science provides a context for agricultural science that can be illustrated by the period of German intellectual development<sup>976</sup> with its philosophical advances including agricultural science. Developments range from technologies that underpin most high-yield food production throughout the world to the unconventional cosmology of Steiner agriculture. The first includes the Haber-Bosch process for manufacturing nitrogen fertilizers;<sup>977</sup> called “the most important invention of the 20th century”,<sup>978</sup> we probably could not feed more than half of the world’s population without it. On the other hand, Steiner’s<sup>979</sup> postulates about plant nutrition fed fears of new technologies including manufactured fertilizers. Misguided assumptions about the declining nutritional quality of food and thus the strength of the populace combined with other misinterpretations and led to Nietzsche’s ‘Übermensch’<sup>980</sup> being grossly misused in a manner that neither advanced knowledge of the universe or means of living wisely. Also, while it might be claimed that Nietzsche’s concept of transcending good and evil has parallels with mystical writings,<sup>981</sup> its secular interpretation favoured artistic appreciation and national dominance, and as Pinker argues such “feats of greatness may not consist, though, in curing disease, feeding the hungry, or bringing about peace”.<sup>982</sup> A more practical interpretation was that which emanated from Scotland.

### **Goods & Bads**

Modern philosophy is sometimes reduced to two areas – learning the nature of the universe and where we fit into it, and learning how to live together wisely. Some philosophers contend that we know enough about the first area as a product of the scientific era.<sup>983</sup> Regardless of whether that view follows the Buddhist philosophical insight that these are unimportant matters,<sup>984</sup> or it seeks to retain an integrity of the universe by not dividing it into research disciplines, it is the second aspect of philosophy that is its enduring purpose. In pursuing that purpose, science seeks to understand the interactions within nature, which is sometimes misinterpreted as eliciting means by which to ‘dominate’. More correctly, a wider view reveals knowledge being continually refined so that what seems to be dominance is actually a retrospective application of current knowledge to earlier cruder forms. However, that earlier knowledge

usually had the same noble intent in its time. This is a further example of the constant challenge to maintain a wide view that spans the humanities and the sciences.

To take an example from agricultural science, extensive robotic farming is based on sensors to optimize fertilizer and pesticide applications and production costs while also potentially reducing soil acidification, biodiversity loss and so on. While it might be argued that such approaches do not restore lost soil and biota or enhance rural lifestyles, they are useful tools. They are accepted in the main as necessary trade-offs to produce the best outcome with the minimum negative contingencies – an instance of Smith’s economic ‘goods’ exceeding economic ‘bads’.<sup>985</sup> Smith’s philosophy is widely invoked for maximizing private wealth when in fact his wide definition of what is a ‘good’ was relative to what is a ‘bad’ in moral terms. Today agricultural science’s success in feeding the world’s huge population is a ‘good’, which because our current knowledge will be considered crude at some later stage, necessarily comes with diverse environmental and other impacts that might one day be deemed ‘bads’. In my mind, the goods have outweighed the bads.

In addition to the environmental impacts of agricultural development it is easy to argue that it is not in the realm of agricultural science to address war, poverty or the loss of traditional cultures. Yet each of these social impacts confounds the advances of agricultural science and is therefore part of philosophical understanding in the field. Anthropology, history, political science, psychology and sociology consider such impacts, yet are usually divorced from the biological sciences.<sup>986</sup> Objections to these academic modes produced the Romantic, the Counter-Enlightenment, Postmodern and other schools of academic philosophy that minimize reliance on rationality – again demonstrating a crude understanding<sup>987</sup> in terms of the philosophical objective of ‘learning how to live together wisely’.

Popper’s observation that science progresses by subjecting conjectures to empirical rebuttal is worth recalling in this instance.<sup>988</sup> In agricultural science, the approach to rural sociology tends to lean more towards accommodating new technologies than

overtly seeking to enhance the wellbeing of individuals and society in more than material terms. Even where non-material studies are conducted, rural sociology and psychology in the agricultural sciences are diminished when they only seek knowledge of individual motivations and social phenomena in order to focus marketing agencies. Agricultural science cannot afford to be parochial; it requires a contextual understanding of both interrelationships with all other components of the environment, and an appreciation of the major issues emerging across the world.

### **Global Megatrends**

As stated in Chapter 1 philosophy is the ‘systematic investigation to inform one’s conduct of life’ in order to enhance wellbeing and contentment. The definition is unhelpful unless it acknowledges differing stages of understanding among individuals. For some it can mean deep insight into reality and a level of awareness about the interactions in nature. However, for most people it can simply mean to reduce worries about change and survival. In the modern world, this second approach can take the form of addressing trends that cause angst in society. Such trends include depletion of mineral, energy, water and food resources while population and longevity continue to increase, climate changes and economic growth stimulates increased pressure on resources and change. Angst can lead to awareness, which can motivate actions that range from minor behaviour change that salves conscience, to research that aims to understand natural changes and develop means to accommodate them. Various futuristic projections of trends suggest means of ameliorating these issues,<sup>989</sup> many of which continue to involve agriculture.

As factual information has replaced the “dogmas and formulas”<sup>990</sup> of authority it has incidentally fed we who are alive today. We have learned that our insights derived from earlier generations can be contextualized by our additional knowledge as part of the natural progression that we call progress. And what we think we understand today will be refined and corrected by subsequent generations. Recognizing this is an outcome of the modern era which differs from most of history; it means that we do well to see complaints about the negative effects of progress as part of the natural means of

addressing them through new knowledge that we continually develop.

I have invoked widespread angst in modern life as a symptom of separation from nature following the arguments of diverse philosophers. However, in using that conception of life, I do not wish to imply that life is worse than in the past. It is not – it is much better. We mostly live longer, have less pain, are well fed and housed. So rather than join Thoreau’s dismal belief that “the mass of men lead lives of quiet desperation”,<sup>991</sup> it is more reliable to seek facts such as from the World Values Survey,<sup>992</sup> which indicated that 86 percent of those surveyed were ‘very’ or ‘rather’ happy. Ongoing philosophical understanding continually raises the bar of our expectations as we become freed from unfounded beliefs by knowledge, and that freedom and change may lead to some angst, which may be the price of progress that in turn stimulates new insights.

With today’s level of insight about progress, we can see agriculture as critical to each of the concerns presented above – limited supplies of minerals, energy, water and food resources; increased population and longevity; climate changes, and wealth-driven demands on resources. This is evident in: mined phosphate required for fertilizer; energy used in farming and transport of food inputs and products; water required for irrigation, and the need to ever increase food production that in turn contributes to increases in population, health and longevity. The intensification of agriculture that has produced this success is also associated with climate change through methane and other greenhouse gas emissions, and is also implicated in allowing the increased urbanization that demands more luxury food products. These seem to be products of instinctual human behaviour, which while modified by some, is increasingly prevalent with the rising wealth in populous regions of Asia and Africa.

Human behaviour has been shaped by evolution for survival of the species in a situation of scarcity. Knowledge about means of increasing security has led to the technological output of abundance for which human instinct is maladapted and which can only be reigned-in through conscious decisions. Conscious decisions are made on the basis of evidence when one behaves rationally, but since

emotion governs actions more than rational thought, there is a need to appeal to the emotions. This may seem anathema to scientists, yet it is part of the wider context of science as a major part of philosophy. In an applied philosophy such as agricultural science it can be difficult to communicate an experimental result or a comprehensive theory in an emotionally appealing manner.

Theories, more than technologies, are the great philosophical achievement of science tracing their lineage back through natural philosophy to abstract philosophy and religious insights. Evidence supports the veracity of a theory that has been tested scientifically. Communicating such matters beyond the learned fraternity is difficult, and so scientists prefer to 'let the evidence speak for itself'. However, in the history of philosophy the value of evidence was more in its ability to persuade through evocative speech than in demonstration of complex experiments.

### **Scientific Rhetoric**

The philosophical processes of science and its modern pace of knowledge development makes past forms of communication difficult – some even say that the scientific paper “is obsolete”.<sup>993</sup> With the huge and increasing volume of papers and imperatives to publish quality has become variable, which might be redressed by such means as ethical journal accreditation, limiting the words per author and listing retractions in curriculum vitae.<sup>994</sup> If the “future of science is the fate of the world” the need for greater public scientific literacy and respect is parallel to the need for vigilant continuous improvement in the management and communication of science.

The etymology of the word ‘evidence’ from the Greek ‘enargeia’ suggests an inseparability from oratory. Cicero employed the term in Latin as ‘evidentia’ for legal arguments where proof was evidence made persuasive by rhetoric.<sup>995</sup> When the term came into wider usage again after the Middle Ages, the meaning shifted towards a material proof being obvious, or self-evident. As evidence sometimes contradicted opinion, the Royal Society of London was created in 1660 with the motto ‘nullius in verba’, which is understood to mean

'take no one's word' without empirical experimentation.<sup>996</sup> When sitting beneath that motto in London, the Buddhist invocation came to mind – to 'test in your own experience' rather than blindly accept what a teacher or society says.<sup>997</sup>

In the 17<sup>th</sup> century environment, few Europeans understood the details of what the Royal Society's Fellows did, but were able to accept conclusions, in most cases, from the combination of the Fellow's credibility and the persuasiveness of their arguments. And as that understanding was in accord with the philosophical objective of improving wellbeing and contentedness, society benefited. By contrast, communicating science today has become compromised among the scientifically-illiterate public as well as by exaggeration and sometimes fraud among authors, as summarized above in the Box on scientific rhetoric.

*The sustained enquiries of agricultural science can take years, and involve the biological, physical, mechanical and social sciences in multiple interactions over time, which inevitably engages the emotions. Motivated by curiosity and wonder, which has long been described as the beginning of philosophy,<sup>998</sup> the image of the hyper-rational scientist is erroneous. Even Descartes, commonly held up as the arch rationalist, included wonder in his contemporary notions of God.<sup>999</sup> In less theistic terms, perhaps this is what Hume meant when he described reason as the slave of the passions.<sup>1000</sup> Yet as observed elsewhere herein, the passion associated with wonder can be quashed by technical reductionism that forgets its context, as the poet famously wrote: "Sweet is the lore which Nature brings;/Our meddling intellect/Mis-shapes the beauteous forms of things:—/ We murder to dissect".<sup>1001</sup>*

## Epilogue

Integrating all useful knowledge under philosophy includes cross-disciplinary research, commonalities of Eastern and Western insights and an historical perspective that contextualizes ancient myths and traditional knowledge. This integrated approach provides the context for ancient practices in agriculture that have proved sustainable across centuries, even if they are disappearing in the face of modernization. Most commonalities are glossed over glibly, although some are denigrated such as blanket dismissal of animism by theology, and theology by academic philosophy. Likewise within agricultural science, modern approaches dismiss traditional systems of irrigation, seasonal forecasts and the like that rely on empiricism. Modern empirical approaches offer real benefits in reducing inherent biases, but it would be foolish to believe that all can be explained from simple controlled comparisons or that humans can 'control' nature. This is clear when it is seen that the unwanted contingencies of applying the results of such research become a prime source for subsequent research. We should all acknowledge this dynamism – but we should not see it as wholly negative. It might be better conceived as humans working as part of an overall system and moving closer to natural processes.

Natural processes surpass our intellectual capacity, which can lead to imagined holistic hopes. However, there is no need to become romantic about holism – it is simply a description of how we behave. Our excesses are corrected either by our own initiative in follow-on research, or by unwanted reactions within nature that affect us. The obvious analogy is pain – a sentient being either reacts to reduce the pain or suffers its underlying consequences. Climate change now being part of Western public awareness is a current example of the process in action. The public will eventually realize that philosophy through science has been aware and working with climate change for at least several decades, in diverse forms from deep ecology to agricultural science adapting food species to changing environments.

The integrated view also acknowledges that agriculture has been dominated by nomads, pastoralists and opportunistic croppers of receding waters through most of history. This is millennia longer than what most people regard as traditional farmers. Rather than assuming that agriculture was widespread and continuous over the past 10 millennia, it is more realistic to see it as only arriving in its modern form in the last 500 years. Prior to that time, movement into and out of agriculture and cities was the norm for most groups or people, even when the well-documented empires such as Rome are considered. Our mistaken conception results in part from what we read, which is a product of the cereal cropping cultures where settled populations were formed into taxable hierarchies and recorded rules and socially-beneficial beliefs. The majority of peoples that had not opted for settled agriculture did not usually bother with writing in the forms that we value today, but relied more on oral traditions to transmit philosophical insights. Some of those oral stories hybridized with the insights of settled communities as cities grew and people converged leading to codified philosophy, much of it in the form of scriptures.

Philosophy in the form of scriptures might be claimed to have its widest intellectual base when it includes pastoral influences blended with agricultural metaphor, as compared to philosophies that arose within isolated urban environments. However, such an argument has little merit when it is recalled that all major religions contain both elements, albeit some more than others. For culturally Western readers, this emphasizes the value of first understanding the basic text of that culture, which contains both elements, and also indicates the tensions between agricultural and pastoral communities.<sup>1002</sup> Such an understanding of one's own cultural heritage provides the basis for integrating other cultures' insights. Acknowledging the need for such a base makes it difficult to argue for a secular approach to philosophy that eschews consideration of belief, myth, religion and scripture. The eternal quest to live at ease with nature today might be possible by retreat from modern life, but for those engaged intellectually the building-blocks of accumulated knowledge about living well and contentedly come with a wide historical view.

Historically, the fillip to philosophy that occurred in the Axial Age around 500 BCE coincided with the expansion of reliable cropping-based states. Another approximate period of importance was around the 17<sup>th</sup> century CE, which represents a marked acceleration of the numbers and size of agricultural states. States that grew larger accumulated sufficient resources for defence from raiding herders as settlements facilitated industry that manufactured weapons and improved agricultural tools. But still this did not mean that the whole world then became settled agricultural communities. Rather, it led to trade-based interactions between city-states with their settled cropping cultures and those who lived outside the state's realm. Living outside the state's influence often provided a healthier and longer life, with less dreary labour and less frequent childbearing. It is not a very long-bow to draw both labour and childbearing parallels to the scriptural curses in the times of pastoralists confronting the Sumerian cropping state – for man: “in the sweat of thy face shalt thou eat bread”,<sup>1003</sup> – and for woman: “multiply your pain in childbearing”.<sup>1004</sup>

Understanding the intent of scripture and myth might be called the beginning of wisdom<sup>1005</sup> in the sense that philosophy means ‘the love of wisdom’. It is part of embracing all knowledge that conduces to understanding life, which includes but is much more than specialist knowledge. Science including agricultural sciences was originally inseparable from philosophy, so this is really just a call to return to ‘where we started and know the place for the first time’.<sup>1006</sup> With philosophical insight we may be more constantly aware that we are part of nature and cannot be considered separate from it, even in abstract thought, even in technological tweaking. We can see the effects of separation in the great advance in knowledge that resulted from the European Enlightenment that liberated us from deism, but separated science from its unity within philosophy. As we became more narrowly focussed we created huge material advances well beyond the fundamentals of food and shelter. Today we assume those basics are secure and have added other goods including writing and education to transfer knowledge about securing food and other boons across generations. We are equipped to behave in this manner by evolutionary traits for survival that include an assumption of scarcity and hence a fear of food or other necessities not being secure,

which is otherwise described as being discontent or existential angst. Yet that matter itself has been the subject of philosophy through history.

Through history, those within a society with the luxury of pursuing philosophical understanding – the good life – have arrived at the awareness that it is the best way of life once the basics of life have been secured. With that first rung on the ladder to understanding secured for so many today, our secular age has been diverted from subsequent rungs by moral relativism and technological distractions as alternatives to the ‘good life’. Just as there’s “nothing new under the sun”,<sup>1007</sup> this scenario has been played out repeatedly through history with excesses followed by contrition in a process that is also part of the natural cycle. No doubt agriculture’s role in underpinning permanent settlement – civilization – is implicated in stimulating a desire for more material development; but that does not suggest that agriculture should be abandoned or stripped of the scientific advances that feed the world today. Rather it means that as continued research refines human actions to accord more with natural processes through science, it is more likely to be able to healthily feed all peoples.

It might be argued that the artificial separation of the social from the other sciences in modern education has achieved its aim of imparting knowledge across an ever widening base. In this context it has served society well. Now, as technology has greater access to knowledge, the emphasis of education shifts to ensuring a wide foundational understanding for individuals so that they are able to interpret biological, physical and social sciences and build on society’s cultural base. Rather than a criticism of Cartesian thinking, this recognizes a step by which our understanding has advanced – a philosophical development of our recent century. Climbing the next step we may see more clearly that our preference for black-white contrasts – the dichotomous thinking that Suzuki saw as the philosophical weakness of the West<sup>1008</sup> – has created the separation into analogues that we maintain through our principal vehicle of transmission, literacy.<sup>1009</sup> This should not be taken as a criticism of such a huge advance as literacy, which in any case both you and I are using at this moment to bridge that separation. Rather it is an eloquent indication of our

thoughts and actions all being functions that interrelate within nature.

Within the integrated view that humans exist as part of nature, I find it comfortingly logical to know that this includes all of our thoughts and actions. This understanding provides a context that reveals the illusory nature of any claim that we can control nature; it suggests that such claims or attempts may be little more than diversions from, or perhaps means of dealing with, anxiety. The more realistic viewpoint, that we exist only within the hypercomplexity of nature, therefore includes for example; insights across the ages, the more recent integrated worldviews of such figures as Humboldt, Darwin, Haeckel, Muir and Marsh, and even today's fledgling models from the Intergovernmental Panel on Climate Change. The interaction between rational thought and experience might be likened to antibodies that are primed to mollify the effects of pathogens on the whole organism. Some may see this as an analogy, others might see it as humans being agents within nature that act in its interests and are prompted by allergic reactions that are evoked as thoughts, guilt, contrition and compensatory actions. I do not claim that Aristotle, Averrões, Aquinas, Humboldt, Haeckel, Lovelock or any of the other geniuses on whom I rely in this work said this specifically, but it is what I understand from their insights. I go a step further and include the quasi-religious references, such as prophets' corrective voices in the wilderness,<sup>1010</sup> being understood as part of this integrated universal mechanism that supports a general movement towards homeostasis, or perhaps an 'omega point'.<sup>1011</sup>

How does this view explain our excessive impacts on nature such as rising atmospheric CO<sub>2</sub>, salination and eutrophication? My reply is: the very fact that we can identify these effects motivates us to address them, perhaps out of fear of consequences and self-preservation. Such definitions of motivations are useful after-the-fact explanations of our own functioning as agents within nature. It does not mean we have special powers – rather it means our power is minimal and our understanding limited to what we can perceive and conceive. Excessive impacts that are not addressable despite our attempts at remediation join with other natural actions that produce significant changes in nature, such as major volcanic and cosmic

events. Far from being nihilistic, this profound understanding of our place in nature also explains bullying lobbies, protests, wars and extreme environmental violence as natural actions.

Rather than absolving any of us from responsibility, this knowledge exposes our real level of ignorance of ourselves, life and nature. With such awareness of our ignorance we might see some assumed moral virtues revealed as fear of change – a fear that is routinely expressed as ‘sustainability’. Sustainable agriculture is said to be that which produces a regular output without any decline in natural capital – yet the very assumption that this is possible denies natural temporal variation, rises in population, cosmic influences and indeed the second law of thermodynamics. Civilization is not a static level of comfort but a constant adapting to changing environments. Philosophy has led to this point in our knowledge, and its application in agricultural science provides ready instances across the ages. For example, if we address increasing aridity in areas affected by climate change through technological innovations in isolation from social factors, the expected outcomes of technology may well be compromised. Agricultural science that continually seeks means of improving the integration of food production with natural processes including human actions is the only viable means of balancing adaption with sufficient healthy food for all persons. For those who go further and conceptualize deep ecology as an ideal that completes Darwinian philosophy, all of the above is consistent although that ideal is ultimately impractical if it degenerates into a belief that humans are a dispensable element of nature. Humans can be relied upon to fight for their own survival above any impractical theory, belief or philosophical extreme. But one day in the distant future they might lose, and if they ignore nature they will lose more quickly.

An alternative to adapting to change is a belief that, for example, constructing ‘Canute walls’ to fight rising sea levels is something more than temporary. Rejecting a need to move house or resisting immigration in the face of climate-induced changes can similarly be only successful temporarily. Throughout history sea levels and hence coastlines have changed and rainfall and temperature have varied, and the natural response has been to migrate. Across ten millennia, migration has informed the adaptive-orientation of agriculture that

is today expressed in the efficient breeding of crops and animals to suit changing environments and in the intensifying of production in order to minimize the area impacted by agriculture. Accepting and adapting to natural changes is a mature understanding of natural variations and endings, resistance to which may be seen as denying the inevitability of one's own death. The multi-millennial insights of philosophy about the cycles of change that define life is captured in such agricultural metaphors as mature seeds dying to produce new life.<sup>1012</sup> With the great advances in philosophic understanding from the period of the Enlightenment in which we continue to live we are able to assimilate the insights of ancient eras into today's understanding. New knowledge is informed by what came before, even when it negates some aspects of that prior understanding, which is why this book has worked with a wide definition of philosophy. To do otherwise is to risk that the application of new technologies will demand onerous attempts at remediation of unforeseen impacts.

Through agricultural metaphor, the universal insight that humans only exist as part of nature and do not exist as separate entities<sup>1013</sup> has shown us that the universe is not 'created' for our convenience or comfort. Life is therefore full of hazards and our collective knowledge is our means of transmitting wisdom to avoid hazards across generations by writing that is honed with argumentation to challenge belief with proof. The accelerating rate of understanding that characterizes recent centuries now explains our interactions with all other components of nature and is the source of innovation in agricultural science, as in all other aspects of applied philosophy. Life has become so much better than ever before – it is longer, less painful and less onerous. The very matters that we worry about, from climate change to nutritional security, are mechanisms within our interactions within nature, and as such our worries might be seen as part of the solution. I admit that the concept is difficult to grasp and therefore suggest that it might be conceived as our thoughts and actions being feedback mechanisms within nature. This is not meant to be understood in a mechanistic or literal sense, or even within the belief-based corruptions that are centred on the Gaia principle – although the original Gaia thought does seem consistent with the

idea. It might even be seen in some theological contributions to philosophy within the concept of love.

The word 'love' has been mentioned more than 20 times through this book, mainly in connection with the definition of philosophy as the 'love of wisdom'. Insofar as a philosophy underpins some agricultural uses of the term, it may be expressed in farmers love of their animals, the land, communities and the lifestyle. Cribb notes such love to be "one of the strongest motivations of farmers [that] underlies their incredible resilience and ability to struggle through tough times, their unending quest for innovations, their reliance on age-old traditions".<sup>1014</sup> It motivates them to keep farming in face of hardship, it holds farm families together – and it belies insistence that farming is just business. Across history, the subject of love is dealt with philosophically through religious much more than academic discourse. It is presumably omitted from empirical science because it cannot be measured precisely, and from commerce because it cannot be monetized. Immeasurable it may be, yet it remains one of our most powerful motivators – and when well-informed it produces our most sustainable progress. Unpopular as the sentiment may be in academic terms, such love of nature is likely to drive regenerative agricultural systems that recycle what leaks from agroecosystems today and what is regarded as waste – from cities even more than from farms. This age-old lesson is the antithesis of 'the love of money' *per se*.<sup>1015</sup> Some may see it as a distinction between mining and husbanding – however, I see it as a convergence of the two, where mined product is employed and recycled and mining sites are husbanded. This is the only way that our food system can function under the stress that nine billion of us place on what we blithely refer to as resources – in this conceptions they would be hyphenated as 're-resources'.<sup>1016</sup> It is another expression of our thoughts and actions being feedback correctives that assist the balance that sustains us and all other interactive components of nature.

The history of agriculture indicates its dominance over pastoralism for much of the world, and its increasing intensity. Livestock graze rangelands under increasingly scientific management systems, and nation states assume the right to settle their nomads and fence across

livestock migration routes. Yet shortages of livestock-derived foods continue to compromise about a billion lives today. Over the centuries of contact between pastoral nomads and settled farmers, nomadic philosophies have been absorbed into the philosophies of cropping states. Merged into our modern diverse knowledge bank these have influenced natural philosophy, which has in turn extended our sedentary lifespans far beyond their short duration in early cropping states. With that and other modern material gains, the primary function of the philosophies of the past to enhance the well-lived life remains. It uses agricultural metaphors for most of its written forms, yet the oral myths and stories across millennia also serve to convey the essential message that human life cannot be considered separate from wider nature. It is a humbling message for our fragile existence – humbling yet liberating from the angst produced from misguided illusions of control and independence.

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## Endnotes

- <sup>1</sup> Alexander, J. (2017) Who was the first philosopher? The Royal Institute of Philosophy. 16(46): 51-57. <<https://doi.org/10.1017/S147717561700001X>>
- <sup>2</sup> Aristotle, *Metaphysics*, 1, 2 & 1, 1
- <sup>3</sup> Levi-Strauss, C. (1968) *Tristes Tropiques*. Translated by Russell, J. [https://archive.org/stream/tristestropiques000177mbp/tristestropiques000177mbp\\_djvu.txt](https://archive.org/stream/tristestropiques000177mbp/tristestropiques000177mbp_djvu.txt)
- <sup>4</sup> Nissen, H. (2013) The Emergence of Writing in the Ancient Near East. *Interdisciplinary Science Reviews*, 10 (4): 349-361. <https://www.tandfonline.com/doi/abs/10.1179/isr.1985.10.4.349?journalCode=yisr20>
- <sup>5</sup> The Odyssey, and The Iliad. <https://ebooks.adelaide.edu.au/h/homer/>
- <sup>6</sup> Scott, J. (2017) *Against the Grain: A Deep History of the Earliest States*. Yale University Press. Pp281.
- <sup>7</sup> Quoted from Algabe. Initial Social Complexity in Southwestern Asia. In Scott, J. (2017) *Against the Grain: A Deep History of the Earliest States*. Yale University Press. Pp281.
- <sup>8</sup> Gibbon, E. (1789) *The History of the Decline and Fall of the Roman Empire*. <http://www.gutenberg.org/files/25717/25717-h/25717-h.htm>
- <sup>9</sup> Scott, J. (2017) *Against the Grain: A Deep History of the Earliest States*. Yale University Press. Pp281.
- <sup>10</sup> For example, Vespasian's reestablishment of stability in Rome after Nero and his successors' neglect, as summarized in Feeding Rome Feeding the World. In: Falvey, L. (2010) *Small Farmers Secure Food: Survival Food Security, the World's Kitchen and the Critical Role of Small Farmers*. Thaksin University Press. Pp232.
- <sup>11</sup> de Vries, J., van der Woude, A (1997) *The First Modern Economy: Success, Failure, and Perseverance of the Dutch Economy, 1500-1815*. Cambridge University Press. Pp767.
- <sup>12</sup> Ridley, M. (2011) *The Rational Optimist: How Prosperity Evolves*. Harper. Pp480.
- <sup>13</sup> Grøn, A. (2008) *The Concept of Anxiety in Søren Kierkegaard*. Mercer University Press. Pp166.
- <sup>14</sup> <http://www.gutenberg.org/files/14328/14328-h/14328-h.htm>
- <sup>15</sup> Engelhaupt, E. (2008) Do food miles matter?. *Environmental Science & Technology*. 42(10): 3482.
- <sup>16</sup> Ridley, M. (2011) *The Rational Optimist: How Prosperity Evolves*. Harper. Pp480.
- <sup>17</sup> <https://www.worldhunger.org/world-hunger-and-poverty-facts-and-statistics/#hunger-number>
- <sup>18</sup> Malthus (1798) <http://www.gutenberg.org/files/4239/4239-h/4239-h.htm>
- <sup>19</sup> Boserup (1965) [https://www.biw.kuleuven.be/ae/clo/idessa\\_files/boserup1965.pdf](https://www.biw.kuleuven.be/ae/clo/idessa_files/boserup1965.pdf)
- <sup>20</sup> Falvey, L. (2013) *Beliefs that Bias Food & Agriculture: Questions I'm Often Asked*. Institute for International Development. Pp 328.
- <sup>21</sup> Harvey, P. (2013) in Emmanuel, S. (2013) *A Companion to Buddhist Philosophy*. Wiley & Sons. Pp760.
- <sup>22</sup> Grimal, P. (translated by Maxwell-Hyslop, 1992). *The Penguin Dictionary of Classical Mythology*. Penguin Books. Pp480.
- <sup>23</sup> For example: Falvey, L. (2016) *Understanding Southeast Asia: Syncretism in Commonalities*. Thaksin University Press. Pp187.
- <sup>24</sup> Stephen Shennan, S. (2002) *Genes, Memes and Human History: Darwinian Archaeology and Cultural Evolution*. Thames and Hudson. Pp304.
- <sup>25</sup> Diamond, J. (1987). <http://www.sigervanbrabant.be/docs/Diamond.PDF>

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- <sup>26</sup> Leake, J. (2019) Land Degradation, Biodiversity and Productivity: Pressing Issues in Management of the World's Drylands – A Synthesis. In Squires, V. (2019) Drylands: Biodiversity, Management and Conservation. NOVA Science Publishers. (in press)
- <sup>27</sup> Scott, J. (2017) Against the Grain: A Deep History of the Earliest States. Yale University Press. Pp281.
- <sup>28</sup> Falvey, L. (2005) Religion and Agriculture: Sustainability in Christianity and Buddhism. Institute for International Development. Pp300.
- <sup>29</sup> [https://archive.org/stream/CAT10508105/CAT10508105\\_djvu.txt](https://archive.org/stream/CAT10508105/CAT10508105_djvu.txt)
- <sup>30</sup> Vaclav, S. (2001) Enriching the Earth: Fritz Haber, Carl Bosch, and the Transformation of World Food Production. MIT Press. Pp358.
- <sup>31</sup> Carlson, E. (2004) Mendel's Legacy: The Origin of Classical Genetics. Cold Spring Harbor Laboratory Press. Pp332.
- <sup>32</sup> [https://en.wikisource.org/wiki/Short\\_Treatise\\_on\\_God](https://en.wikisource.org/wiki/Short_Treatise_on_God)
- <sup>33</sup> Ehrlich, P. (1995) The Population Bomb. Buccaneer Books. Pp205.
- <sup>34</sup> <http://www.fao.org/3/p4228e/P4228E04.htm>
- <sup>35</sup> <http://dieoff.org/page36.htm>
- <sup>36</sup> Cribb, J. (2019) Food or War. Cambridge University Press. Pp335.
- <sup>37</sup> Goklany, I. (2004) Economic Growth, Technological Change, and Human Well-Being. [https://www.researchgate.net/publication/246008682\\_Economic\\_Growth\\_Technological\\_Change\\_and\\_Human\\_Well-Being](https://www.researchgate.net/publication/246008682_Economic_Growth_Technological_Change_and_Human_Well-Being)
- <sup>38</sup> Whewell, W. <https://archive.org/details/philosinductsci01wewrich/page/n9>
- <sup>39</sup> Verschuuren, G. (1986) Investigating the Life Sciences: An Introduction to the Philosophy of Science. Pergamon. Pp156.
- <sup>40</sup> Verschuuren, G. (1986) Investigating the Life Sciences: An Introduction to the Philosophy of Science. Pergamon. Pp156.
- <sup>41</sup> Carson, R. (1962) Silent Spring. Houghton Mifflin. Pp400.
- <sup>42</sup> <http://discovermagazine.com/2006/dec/25-greatest-science-books>
- <sup>43</sup> Lynas, M. (2018) Seeds of Science: Why We Got It So Wrong On GMOs. Bloomsbury. Pp288.
- <sup>44</sup> Adapted after: Verschuuren, G. (1986) Investigating the Life Sciences: An Introduction to the Philosophy of Science. Pergamon. Pp156.
- <sup>45</sup> Lynas, M. (2018) Seeds of Science: Why We Got It So Wrong On GMOs. Bloomsbury. Pp288.
- <sup>46</sup> Nuismer, S. (2017) Introduction to Coevolutionary Theory. Freeman. Pp395.
- <sup>47</sup> <http://www.isaaa.org/resources/publications/pocketk/16/>
- <sup>48</sup> Ridley, M. (2011) The Rational Optimist: How Prosperity Evolves. Harper. Pp480.
- <sup>49</sup> Nordhaus, W. (2015) The Climate Casino: Risk, Uncertainty, and Economics for a Warming World. Yale University Press. Pp392
- <sup>50</sup> <http://www.ipcc.ch/report/sr15/>
- <sup>51</sup> Popper, K. (1994) The Myth of the Framework: In Defence of Science and Rationality. Routledge. Pp248.
- <sup>52</sup> Borras, S., McMichael, P. and Scoones, I. (2011) The Politics of Biofuels: Land and Agrarian Change. Journal of Peasant Studies, 37(4): 575-592.
- <sup>53</sup> Bello, W. (2009) The Food Wars. Verso. Pp176.
- <sup>54</sup> Falvey, L. (2013) Beliefs that Bias Food & Agriculture: Questions I'm Often Asked. Institute for International Development. Pp328.
- <sup>55</sup> Falvey, L. (2010) Small Farmers Secure Food: Survival Food Security, the World's Kitchen and the Critical Role of Small Farmers. Thaksin University Press. Pp232.

- <sup>56</sup> De Castro, P., Adinolfu, F., Capitanio, F. Di Falco, S. and Mambro, A. (2013) *The Politics of Land and Food Scarcity*. Routledge. Pp168.
- <sup>57</sup> Falvey, L. (2019) *A History of Hassad Australia*.  
<[https://www.researchgate.net/publication/335472365\\_A\\_History\\_of\\_Hassad\\_Australia](https://www.researchgate.net/publication/335472365_A_History_of_Hassad_Australia)>
- <sup>58</sup> De Castro, P., Adinolfu, F., Capitanio, F. Di Falco, S. and Mambro, A. (2013) *The Politics of Land and Food Scarcity*. Routledge. Pp168.
- <sup>59</sup> <https://www.esri.ie/system/files?file=media/file-uploads/2015-07/WP340.pdf>
- <sup>60</sup> Grace, D., Dominguez-Salas, P., Alonso, S., Lannerstad, M., Muunda, E., Ngwili, N., Omar, A., Khan, M. and Ootob E. (2018) *The Influence of Livestock-derived Foods on Nutrition During the First 1,000 Days of Life*. Report 44. International Livestock Research Institute. Pp82. [ilri.org](http://ilri.org)
- <sup>61</sup> Stone, D (2012) *The Oxford Handbook of Postwar European history*. Oxford University Press. Pp767.
- <sup>62</sup> For example: Falvey, L. (2011) *Re-Cultivating Agricultural Science, or What I've Learned in 40 Years of Professional Life*. Institute for International Development. Pp139.
- <sup>63</sup> Whitehead, A. (1919) *The Concept of Nature: The Tarner Lectures Delivered in Trinity College, 11/1919*. Cambridge.  
[http://assets.cambridge.org/9781107113732/frontmatter/9781107113732\\_frontmatter.pdf](http://assets.cambridge.org/9781107113732/frontmatter/9781107113732_frontmatter.pdf)
- <sup>64</sup> Huber, P. and Mills, M. (2006) *The Bottomless Well: The Twilight of Fuel, the Virtue of Waste, and Why We Will Never Run Out of Energy*. Basic Books. Pp256.
- <sup>65</sup> Scott, J. (2017) *Against the Grain: A Deep History of the Earliest States*. Yale University Press. Pp281.
- <sup>66</sup> Sarton, G. (1960) *A History of Science, Volume 1*. Harvard University Press. Pp383.
- <sup>67</sup> Goodenough, U. (2000) *The Sacred Depths of Nature*. Oxford University Press. Pp224.
- <sup>68</sup> Lao Tzu (c.530BCE) *The Saying of Lao Tzu*. <http://www.sacred-texts.com/tao/salt/index.htm>
- <sup>69</sup> McDonald, J. (1980) *Tao Te Ching: An insightful and modern translation*. Qigong Vacations. Pp182.
- <sup>70</sup> Proverbs 4:7
- <sup>71</sup> <https://www.biblegateway.com/verse/en/Proverbs%204:7>
- <sup>72</sup> Teilhard de Chardin, P. (1959) *Man's Place in Nature*. William Collins. Pp127.  
<https://archive.org/details/MansPlaceInNature/page/n2>
- <sup>73</sup> Rickman, G. (1980) *The Corn Supply of Ancient Rome*. Clarendon Press. Pp304.
- <sup>74</sup> <http://www.buddhadasa.com/naturaltruth/twolanguage1.html>
- <sup>75</sup> Falvey, L. (2016) *Understanding Southeast Asia: Syncretism in Commonalities*. TSU Press. Pp187.
- <sup>76</sup> <http://www.verostko.com/mignot.html>
- <sup>77</sup> DeGregori, T. (2001) *Agriculture and Modern Technology: A Defense*. Iowa State University Press. Pp279.
- <sup>78</sup> Dewey, J. (1934) <https://www.gutenberg.org/files/37423/37423-h/37423-h.htm>
- <sup>79</sup> Pinker, S. (2018) *Enlightenment Now: The Case for Reason, Science, Humanism and Progress*. Penguin. Pp556.
- <sup>80</sup> Revel, J. and Ricard, M. (1998) *The Monk and the Philosopher: East Meets West in a Father-Son Dialogue*. Thorsorns. Pp320.
- <sup>81</sup> Chekhov, A. (translated by Koteliansky, S. and Woolf, L., 1921) *Note-Book of Anton Chekhov*. <https://onlinebooks.library.upenn.edu/webbin/gutbook/lookup?num=12494>
- <sup>82</sup> <https://americanhumanist.org/what-is-humanism/manifesto3/>
- <sup>83</sup> Aristotle, *Metaphysics Alpha*, 983b18.
- <sup>84</sup> O'Grady, P. *Thales of Miletus*. Internet Encyclopedia of Philosophy  
<<http://www.iep.utm.edu/thales/#H17>>.
- <sup>85</sup> Rendich, Franco. (2004) *The Origin of Indo-European languages: Structure and genesis of the mother tongue*. [Translation] Createspace. Pp280.

- <sup>86</sup> Wittgenstein, Ludwig. (1953) *Philosophical Investigations*. [In Klagg, James (2010) *Philosophy*. MIT Press. Pp264.]
- <sup>87</sup> <http://discovery.ucl.ac.uk/1458254/>
- <sup>88</sup> The Telegraph, 20 may 2011.  
<https://www.telegraph.co.uk/technology/google/8520033/Stephen-Hawking-tells-Google-philosophy-is-dead.html>
- <sup>89</sup> Henriques, G. (2003) The Tree of Knowledge System and the Theoretical Unification of Psychology. *Review of General Psychology* 7:150-182.
- <sup>90</sup> Reiser, O. (1958) *The Integration of Human Knowledge*. Boston: Porter Knowledge: Contrasting Wilson's Consilience with the Tree of Knowledge Sargent. *System. Theory & Psychology*. 18:731-755.
- <sup>91</sup> Adapted from: Henriques, G. (2003) The Tree of Knowledge System and the Theoretical Unification of Psychology. *Review of General Psychology*, 7:150-182.
- <sup>92</sup> Hegel, G.F.W. (1819; translated 1996) *Hegel's Lectures on the History of Philosophy*. Prometheus Books. Pp672. or other versions at: <http://www.gutenberg.org/ebooks/51635> or <<https://www.marxists.org/reference/archive/hegel/works/hp/hpconten.htm>>
- <sup>93</sup> Hegel, G.F.W. (1819; translated 1996) *Hegel's Lectures on the History of Philosophy*. Prometheus Books. Pp672. or other versions at: <http://www.gutenberg.org/ebooks/51635> or <<https://www.marxists.org/reference/archive/hegel/works/hp/hpconten.htm>>
- <sup>94</sup> Virgil (29 BCE) *Georgica*. <https://librivox.org>
- <sup>95</sup> [https://archive.org/stream/onnaturethingsd00carugoog/onnaturethingsd00carugoog\\_djvu.txt](https://archive.org/stream/onnaturethingsd00carugoog/onnaturethingsd00carugoog_djvu.txt)
- <sup>96</sup> Romero G. (2018) *Scientific Philosophy*. Springer. Pp188.
- <sup>97</sup> Russell, B. (1917) *Mysticism and Logic and Other Essays*. Alwyn and Unwin. Pp232.  
[https://en.wikisource.org/wiki/Mysticism\\_and\\_Logic\\_and\\_Other\\_Essays](https://en.wikisource.org/wiki/Mysticism_and_Logic_and_Other_Essays)
- <sup>98</sup> Weinberg, S. (1992) *Dreams of a Final Theory*. Pantheon. Pp334.
- <sup>99</sup> <http://www.gutenberg.org/files/4737/4737-h/4737-h.htm>
- <sup>100</sup> [http://www.buddhanet.net/pdf\\_file/milinda.pdf](http://www.buddhanet.net/pdf_file/milinda.pdf)
- <sup>101</sup> Romero G. (2018) *Scientific Philosophy*. Springer. Pp188.  
<https://www.accesstoinsight.org/tipitaka/sn/sn12/sn12.002.than.html>
- <sup>102</sup> <https://www.accesstoinsight.org/tipitaka/sn/sn36/sn36.009.nypo.html>
- <sup>103</sup> <http://self.gutenberg.org/authors/lindsay.falvey>
- <sup>104</sup> Quoted with minor changes from Sayers, D. (1954) *Introductory Papers on Dante*. Wipf. Pp30. [https://english.duke.edu/sites/english.duke.edu/files/file-attachments/sayers\\_the-meaning-of-purgatory.original.pdf](https://english.duke.edu/sites/english.duke.edu/files/file-attachments/sayers_the-meaning-of-purgatory.original.pdf)
- <sup>105</sup> Sayers, D. (1949) *The Divine Comedy*. Penguin Books. P352.
- <sup>106</sup> 'Nulla est homini causa philosophandi, nisi ut beatus sit'
- <sup>107</sup> Polyani, M. (1958) *Personal Knowledge*. Routledge. Pp503.
- <sup>108</sup> Schumacher, E. (1977) *A Guide for the Perplexed*. Jonathan Cape, London. Pp166.  
[https://monoskop.org/images/5/58/Schumacher\\_EF\\_A\\_Guide\\_for\\_the\\_Perplexed.pdf](https://monoskop.org/images/5/58/Schumacher_EF_A_Guide_for_the_Perplexed.pdf)
- <sup>109</sup> St Thomas Aquinas, *Summa theologiae*, I, 1, 5 ad 1. 3
- <sup>110</sup> Descartes, R. (1684) *Rules for the Direction of the Mind*.  
[https://archive.org/stream/descartessrulesf032479mbp/descartessrulesf032479mbp\\_djvu.txt](https://archive.org/stream/descartessrulesf032479mbp/descartessrulesf032479mbp_djvu.txt)
- <sup>111</sup> The Suramgama Sutra. [https://www.buddhanet.net/pdf\\_file/surangama.pdf](https://www.buddhanet.net/pdf_file/surangama.pdf)
- <sup>112</sup> Maritain, J. (1946, 2008) *The Dream of Descartes*. Philosophical Library. Pp224.
- <sup>113</sup> Carson, R. (1962) *Silent Spring*. Houghton Mifflin. Pp378.
- <sup>114</sup> <https://www.oxfam.org/en/campaigns/oxfam-internationals-position-transgenic-crops>
- <sup>115</sup> Lynas quoting Monbiot in Lynas, M. (2018) *Seeds of Science: Why We Got It So Wrong on GMOs*. Bloomsbury-Sigma. Pp304.
- <sup>116</sup> <http://www.etcgroup.org/content/deere-co-becoming-monsanto-box>
- <sup>117</sup> Haidt, J. (2013) *The Righteous Mind: Why Good People are Divided by Politics and Religion*. Penguin. Pp528.

- <sup>119</sup> Russell, B. (1903) [http://www.skeptic.ca/Bertrand\\_Russell\\_Collection.pdf](http://www.skeptic.ca/Bertrand_Russell_Collection.pdf)
- <sup>120</sup> Backhouse, S. (2016) *Kierkegaard: A Single Life*. HarperCollins. Pp304.
- <sup>121</sup> Russell, B. (1903) [http://www.skeptic.ca/Bertrand\\_Russell\\_Collection.pdf](http://www.skeptic.ca/Bertrand_Russell_Collection.pdf)
- <sup>122</sup> Schumacher, E. (1977) *A Guide for the Perplexed*. Jonathan Cape, London. Pp166. [https://monoskop.org/images/5/58/Schumacher\\_EF\\_A\\_Guide\\_for\\_the\\_Perplexed.pdf](https://monoskop.org/images/5/58/Schumacher_EF_A_Guide_for_the_Perplexed.pdf)
- <sup>123</sup> Schumacher, E. (1977) *A Guide for the Perplexed*. Jonathan Cape, London. Pp166. [https://monoskop.org/images/5/58/Schumacher\\_EF\\_A\\_Guide\\_for\\_the\\_Perplexed.pdf](https://monoskop.org/images/5/58/Schumacher_EF_A_Guide_for_the_Perplexed.pdf)
- <sup>124</sup> St. Augustine (c.415) ‘Nulla est homini causa philosophandi, nisi ut beatus sit’. *The City of God*. <https://archive.org/details/cityofgodtransla02auguuoft>
- <sup>125</sup> Machiavelli, N. Translated by Bondanella, P. (2008) *The Prince*. Oxford University Press. Pp133.
- <sup>126</sup> Hesiod (translated by Evelyn-White, H. 1914) *The Homeric Hymns and Homeric*. Harvard University Press. <http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0132%3Acard%3D42>
- <sup>127</sup> Athanassakis, A. (1983) *Hesiod: Theogony, Works and Days*. Shield. Pp192.
- <sup>128</sup> Julian Cribb reminds: “it was the Cthonic deities, Demeter, Persephone, Poseidon et al who presided over the food dimension, not those Johnny-come-lately sky gods from Scythia, Zeus, Hera, Apollo and whatnot. The old religion of Greece had a strong food/agriculture thread that was subordinated to the Olympian crew as time went by.”
- <sup>129</sup> Mayhew, A. (2010) Clarence Ayres: Technology, Pragmatism and Progress. *Cambridge Journal of Economics* 34(1): 213–222.
- <sup>130</sup> Quoted in Zeng, Xiongsheng. (2015) *The Foundation of Livelihood—Agriculture in Ancient China*. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) *A History of Chinese Science and Technology*. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>131</sup> Vavilov, N. (translated by Doris Live, 1992) *Origin and Geography of Cultivated Plants* Cambridge University Press. Pp498.
- <sup>132</sup> Ladizinsky, G. (1998) *Plant Evolution under Domestication*. Kluwer, Netherlands. Pp254.
- <sup>133</sup> Laudan, R. (2018) *With the Grain: Against the New Paleo Politics*. The Breakthrough Institute 9.
- <sup>134</sup> Perlmutter, D. (2015) *Grain Brain: The Surprising Truth about Wheat, Carbs, and Sugar: Your Brain’s Silent Killers*. Little Brown. Pp336.
- <sup>135</sup> Gerritsen, R. (2008) *Australia and the Origins of Agriculture*. Archaeopress. pp. 29–30.
- <sup>136</sup> Hillman, G. C. (1996) Late Pleistocene changes in wild plant-foods available to hunter-gatherers of the northern Fertile Crescent: Possible preludes to cereal cultivation. In D. R. Harris (ed.) *The Origins and Spread of Agriculture and Pastoralism in Eurasia*. UCL Books, London. pp.159–203.
- <sup>137</sup> Sato, Y. (2003) *Origin of rice cultivation in the Yangtze River basin*. In Y. Yasuda (ed.) *The Origins of Pottery and Agriculture*. Roli Books, New Delhi. p. 196.
- <sup>138</sup> Figure 9.8 [https://www.researchgate.net/publication/279384228\\_Seeds/figures?lo=1](https://www.researchgate.net/publication/279384228_Seeds/figures?lo=1)
- <sup>139</sup> Koester, H. (1995) *History, Culture, and Religion of the Hellenistic Age*. Walter de Gruyter. p 77.
- <sup>140</sup> Watson, A. M. (1983) *Agricultural Innovation in the Early Islamic World*. Cambridge University Press.
- <sup>141</sup> Snell, K. (1985) *Annals of the Labouring Poor, Social Change and Agrarian England 1660–1900*. Cambridge University Press.
- <sup>142</sup> Hannam, J. (2010) *God’s Philosophers: How the Medieval World Laid the Foundations of Modern Science*. Icon Books. Pp448.
- <sup>143</sup> McCosh, F. (1984) *Boussingault, Chemist and Agriculturist*. Dorrecht, Boston. Pp280. See also [http://en.wikipedia.org/wiki/Jean-Baptiste\\_Boussingault](http://en.wikipedia.org/wiki/Jean-Baptiste_Boussingault)
- <sup>144</sup> <http://www.cambridgeshirehistory.com/People/coproliteindustry.html>

- <sup>145</sup> Lynch, L. (2007) Oxford Companion to Scottish History. <http://www.oxfordreference.com/view/10.1093/acref/9780199234820.001.0001/acref-9780199234820>
- <sup>146</sup> Pinkard, T. (2002) German philosophy. Cambridge University Press. Pp394.
- <sup>147</sup> Vaclav, S. (2004) Enriching the Earth: Fritz Haber, Carl Bosch, and the Transformation of World Food Production. MIT Press. Pp338.
- <sup>148</sup> Byerlee, D. (2018) Feast and Famine: Staple Crops that Changed Global Food Systems in the 20<sup>th</sup> Century.
- <sup>149</sup> Falvey, L. (2010) Small Farmers Secure Food: Survival Food Security, the World's Kitchen and the Critical Role of Small Farmers. Thaksin University Press. Pp 232.
- <sup>150</sup> <https://archive.org/details/cu31924001039324>
- <sup>151</sup> Harlan, J. (1992) Crops and Man. American Society of Agronomy. Pp284.
- <sup>152</sup> Falvey, L. (2010) History of Rice in Southeast Asia and Australia. Chapter 7. In Sharma, S. (2010) Rice: Origin, Antiquity and History. CRC Press and Science Publishers. Pp567
- <sup>153</sup> Talhelm, T., Zhang, X., Oishi, S., Shimin, C., Duan, D., Lan, X. and Kitayama, S. (2014) Large-scale Psychological Differences within China Explained by Rice Versus Wheat Agriculture. Science 344(6184): 603-608.
- <sup>154</sup> <http://www.esp.org/books/malthus/population/malthus.pdf>
- <sup>155</sup> Heisey, P. (2015) The Structure of US Agricultural and Food Research, with an Emphasis on Seed-Biotechnology Research. NABC Report 27.
- <sup>156</sup> Lowder, S., Skoet, J. and Raney, T. (2016) The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide. World Development 87: 16-29.
- <sup>157</sup> Shakespeare, Hamlet 1.5.167-8, Hamlet to Horatio
- <sup>158</sup> Badgley, C., Moghtader, J., Quintero, E., Zakem, E., Chappell, M., Avilés-Vázquez, K., Samulon, A., and Perfecto, I., (2007) Organic Agriculture and the Global Food Supply. Renew. Agricultural Food Systems 22:86–108.
- <sup>159</sup> Connor, D. (2018) Organic Agriculture and Food Security: A Decade of Unreason Finally Implodes. Field Crops Research 225:128-9.
- <sup>160</sup> Lane, J. (2017) How can animal source foods contribute to nutrition? <https://www.slideshare.net/ILRI/lane-asf-may2017>
- <sup>161</sup> von Braun, J. (2014) Evolving Concepts of Nature. Plenary Session, Casina Pio IV, Vatican City. 24-28 October.
- <<http://www.pas.va/content/accademia/en/publications/acta/acta23/vonbraun.html>>
- <sup>162</sup> Falvey, L. (2010) Small Farmers Secure Food: Survival Food Security, the World's Kitchen and the Critical Role of Small Farmers. Thaksin University Press. Pp 232.
- <sup>163</sup> Gillis, J. (2009). Norman Borlaug, Plant Scientist Who Fought Famine, Dies at 95. New York Times. <[http://www.nytimes.com/2009/09/14/business/energy-environment/14borlaug.html?pagewanted=all&\\_r=0](http://www.nytimes.com/2009/09/14/business/energy-environment/14borlaug.html?pagewanted=all&_r=0)>
- <sup>164</sup> <https://www.perfectdayfoods.com/>
- <sup>165</sup> von Carlowitz, H.C. (1713) Sylvicultura oeconomica, oder haußwirthliche Nachricht und Naturmäßige Anweisung zur wilden Baum-Zucht.
- <sup>166</sup> von Braun, J. (2014) Evolving Concepts of Nature. Plenary Session, Casina Pio IV, Vatican City. 24-28 October.
- <<http://www.pas.va/content/accademia/en/publications/acta/acta23/vonbraun.html>>
- <sup>167</sup> Nadler, S. (2006) Spinoza's ethics : an introduction. Cambridge University Press. Pp281.
- <sup>168</sup> Viereck, G. (1930) Glimpses of the Great. Macauley. Pp469.
- <sup>169</sup> Crutzen, P.J. (2002) Geology of Mankind. Nature 415: 23.
- <sup>170</sup> Steffen W. Richardson, K., Rockström J., Cornell S., Fetzer, I., Bennett, E., Biggs, R., Carpenter, S., de Vries, W., de Wit, C., Folke, C., Gerten, D., Heinke, J., Mace, G., Persson,

- L., Ramanathan, V., Meyers, B. and Sörlin, S. (2015) Planetary boundaries: Guiding human development on a changing planet. *Science* 347(6223): 1259855
- <sup>171</sup> Rockström, J. et al. (2009) Planetary Boundaries: Exploring the Safe Operating Space for Humanity. *Ecology and Society* 14(2): 32. <http://www.ecologyandsociety.org/vol14/iss2/art32/>
- <sup>172</sup> Falvey, L. (2005) *Religion and Agriculture: Sustainability in Christianity and Buddhism*. Institute for International Development. Pp350.
- <sup>173</sup> Mokyr, J. (2016) *A Culture of Growth: The Origins of the Modern Economy*. Princeton University Press. Pp400.
- <sup>174</sup> Lake, M. (2018) Why our declining biblical literacy matters. *The Conversation*, April 16. [https://theconversation.com/why-our-declining-biblical-literacy-matters-94724?utm\\_medium=email&utm\\_campaign=Latest%20from%20The%20Conversation%20for%20April%20](https://theconversation.com/why-our-declining-biblical-literacy-matters-94724?utm_medium=email&utm_campaign=Latest%20from%20The%20Conversation%20for%20April%20)
- <sup>175</sup> For example: 1) Groves, L and Hinton, R. (2013) *Inclusive Aid: Changing Power and Relationships in International Development*. Routledge. Pp256. 2) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5281539/>
- <sup>176</sup> Genesis 1:28
- <sup>177</sup> Proverbs 22:28
- <sup>178</sup> Genesis 4:1-15
- <sup>179</sup> Falvey, L. (2005) *Religion and Agriculture: Sustainability in Christianity and Buddhism*. Institute for International Development. Pp350.
- <sup>180</sup> Grimal, P. (translated by Maxwell-Hyslop, 1992). *The Penguin Dictionary of Classical Mythology*. Penguin Books. Pp480.
- <sup>181</sup> Hegel, G. (1837; Translated by Sibree, J., 2001) *The Philosophy of History*. Batoche. Pp485. <https://www.marxists.org/reference/archive/hegel/works/hi/history3.htm>
- <sup>182</sup> Hegel, G. (1837; Translated by Sibree, J., 2001) *The Philosophy of History*. Batoche. Pp485. <https://www.marxists.org/reference/archive/hegel/works/hi/history3.htm>
- <sup>183</sup> Hegel, G. (1837; Translated by Sibree, J., 2001) *The Philosophy of History*. Batoche. Pp485. <https://www.marxists.org/reference/archive/hegel/works/hi/history3.htm>
- <sup>184</sup> <http://www.gutenberg.org/ebooks/1497>
- <sup>185</sup> Fichte, G. (translated by Breazeale, D., 1993) *Early Philosophical Writings*. Cornell University Press. Pp472.
- <sup>186</sup> Snow, C. (1959) *The Two Cultures*. Cambridge University Press. <http://s-f-walker.org.uk/pubsebooks/2cultures/Rede-lecture-2-cultures.pdf>
- <sup>187</sup> Schultz, J. (2018) What do we want to be when we grow up? The role of the humanities in a more mature national conversation. Public Lecture, Griffith Centre for Social and Cultural Research. Griffith Review. September 18.
- <sup>188</sup> Einstein, A. (1954; translated by Bargmann, S.) *Ideas and Opinions*. Bonanza Books. Pp377.
- <sup>189</sup> Wallace, W. (1977; 2012) *Elements of Philosophy: A Compendium for Philosophers and Theologians*. Alba House. Pp358.
- <sup>190</sup> Weischiepl, quoted in Dodds, M. (2012) *Unlocking Divine Action: Contemporary Science and Thomas Aquinas*. Catholic University of America Press. Pp314.
- <sup>191</sup> Galileo, G. quoted in Drake, S. (1957) *Discoveries and Opinions of Galileo*. Doubleday. Pp320.
- <sup>192</sup> Murphy, N. (2007) Reductionism: How Did We Fall into It and Can we Emerge from It? In, Murphy, N. and Stoeger, W. (2007) *Evolution and Emergence: Systems, Organisms, Persons*. Oxford University Press. Pp392.
- <sup>193</sup> Dodds, M. (2012) *Unlocking Divine Action: Contemporary Science and Thomas Aquinas*. Catholic University of America Press. Pp314.
- <sup>194</sup> Smith, H. (1997) *Forgotten Truth: The Common Vision of the World's Religions*. Harper. Pp192.

- 
- <sup>195</sup> Berlin, I. (2013) *The Roots of Romanticism*. Princeton University Press. Pp248.
- <sup>196</sup> Majjhima Nikaya, <https://www.accesstoinsight.org/tipitaka/mn/index.html>
- <sup>197</sup> Dodds, M. (2012) *Unlocking Divine Action: Contemporary Science and Thomas Aquinas*. Catholic University of America Press. Pp314.
- <sup>198</sup> Einstein, A. (1950) *Out of My Later Years*. Wisdom Library. Pp288.
- <sup>199</sup> Hawking, S. (1989) *A Brief History of Time: From Big Bang to Black Holes*. Bantam Books. Pp224.
- <sup>200</sup> Whitehead, A. (2010) *Process and Reality*. Simon and Schuster. Pp448.
- <sup>201</sup> Teilhard de Chardin, P. (1959) *Man's Place in Nature*. William Collins. Pp127.  
<https://archive.org/details/MansPlaceInNature/page/n2>
- <sup>202</sup> Romans 8:22
- <sup>203</sup> Davies, P. (1999) *Teleology without Teleology: Purpose through Emergent Complexity*. In Russell, R., Stoeger, W. and Ayala, F. (1999) *Evolutionary and Molecular Biology: Scientific Perspectives on Divine Action*. University of Notre Dame Press. Pp551.
- <sup>204</sup> Augustine (c.400; 2009) *Confessions*. Oxford University Press. Pp311.  
<sup>205</sup> <https://www.theguardian.com/environment/2014/mar/30/james-lovelock-environmentalism-religion>
- <sup>206</sup> Mitcham, C. (2009) *Religion and Technology*. Chapter in Olsen, J. et al. (2009) *A Companion to the Philosophy of Technology*. Wiley-Blackwell. Pp588.
- <sup>207</sup> Weber, M. (1905; translated by Parsons, T. 1930) *The Protestant Ethic and the Spirit of Capitalism*. Unwin. <https://www.marxists.org/reference/archive/weber/protestant-ethic/index.htm>
- <sup>208</sup> Genesis 11: 4-9
- <sup>209</sup> A shadoof was an early crane-like lever used to raise water for irrigation
- <sup>210</sup> Legge, J. (1891) *The Writings of Chung Tzu*. Vol. 39 and 40 in Muller, M. (1891) *The Sacred Books of the East*. Oxford University Press. <http://nothingistic.org/library/chuangtzu/>
- <sup>211</sup> White, L. (1967) *The Historical Roots of Our Ecologic Crisis*. *Science* 155: 1203-7.
- <sup>212</sup> Noble, D. (1999) *The Religion of Technology: The Divinity of Man and the Spirit of Invention* Penguin. Pp288.
- <sup>213</sup> Schumacher, E. (1973) *Small Is Beautiful: Economics as if People Mattered*. Harper & Row. Pp290.
- <sup>214</sup> James, W. (1896) *The Will to Believe*.  
<https://www.mnsu.edu/philosophy/THEWILLTOBELIEVEbyJames.pdf>
- <sup>215</sup> <https://cgspace.cgiar.org/handle/10568/24883>
- <sup>216</sup> <https://www.greenpeace.org/international/press-release/15111/greenpeace-calls-for-decrease-in-meat-and-dairy-production-and-consumption-for-a-healthier-planet/>
- <sup>217</sup> Lynch, J.M. and Pierrehumbert, R., (2019) *Climate Impacts of Cultured Meat and Beef Cattle*. *Frontiers in Sustainable Food Systems* 3:5. <https://fcrn.org.uk/research-library/climate-impacts-cultured-meat-and-beef-cattle>
- <sup>218</sup> Locklear, M. (April 9, 2018) *Lab-grown meat is inevitable. Will we eat it?*  
<https://www.engadget.com/2018/03/21/cultured-meat-public-perception/>
- <sup>219</sup> James, W. (1917) *The Varieties of Religious Experience: A Study in Human Nature Being. The Gifford Lectures on Natural Religion Delivered at Edinburgh in 1901-1902*.  
<https://www.gutenberg.org/files/621/621-pdf.pdf>
- <sup>220</sup> Seigfried, C. (2013) *Anti-Dogmatism as Defense of Religious Belief*. In Rydenfelt, H. and Pihlström (2013) *William James on Religion*. Palgrave. Pp203.
- <sup>221</sup> James, W. (1917) *The Varieties of Religious Experience: A Study in Human Nature Being. The Gifford Lectures on Natural Religion Delivered at Edinburgh in 1901-1902*.  
<https://www.gutenberg.org/files/621/621-pdf.pdf>
- <sup>222</sup> Clifford, W. (1877; 1999) *The Ethics of Belief and Other Essays*. Prometheus. Pp140.

- <sup>223</sup> Lewis, C. (1955) *The Ground and the Nature of the Right*. Columbia University Press. Pp97.
- <sup>224</sup> James, W. (1896) *The Will to Believe*.  
<https://www.mnsu.edu/philosophy/THEWILLTOBELIEVEbyJames.pdf>
- <sup>225</sup> [http://www.gutenberg.org/files/18269/18269-h/18269-h.htm#SECTION\\_III](http://www.gutenberg.org/files/18269/18269-h/18269-h.htm#SECTION_III)
- <sup>226</sup> Smith, A. (1790) *A Theory of Moral Sentiments*. Pp322.  
[https://www.ibiblio.org/ml/libri/s/SmithA\\_MoralSentiments\\_p.pdf](https://www.ibiblio.org/ml/libri/s/SmithA_MoralSentiments_p.pdf)
- <sup>227</sup> Hollinger, D. (2004) *Damned for God's Glory: William James and the Scientific Vindication of Protestant Culture*. In, Proudfoot, W. (2004) *William James and a Science of Religions*. Columbia University Press. Pp152.
- <sup>228</sup> Dawkins, R. (1990) *The Selfish Gene*. Oxford University Press. Pp368.
- <sup>229</sup> Sloan, D. (2002) *Darwin's Cathedral: Evolution, Religion, and the Nature of Society*. University of Chicago Press. Pp268.
- <sup>230</sup> Dawkins, R. (2006) *The God Delusion*. Black Swan. Pp496.
- <sup>231</sup> Kaplan, H. and Hill, K. (1985) *Hunting Ability and Reproductive Success Among Male Ache Foragers*. *Current Anthropology* 26: 131-133.
- <sup>232</sup> Howell, S. (1984) *Society and Cosmos: Chewong of Peninsular Malaya*. Oxford University Press. Pp294.
- <sup>233</sup> Falvey, L. (1979). *Sacrifices Involving Large Livestock in the Northern Thailand Highlands*. *Journal of Developing Areas* 13:275-282.
- <sup>234</sup> Bradie, M. (1986) *Assessing Evolutionary Epistemology*. *Biology and Philosophy* 1: 401-460.
- <sup>v1</sup> Darwin, C. (1871) *The Descent of Man and Selection in Relation to Sex*. [http://darwin-online.org.uk/converted/pdf/1889\\_Descent\\_F969.pdf](http://darwin-online.org.uk/converted/pdf/1889_Descent_F969.pdf)
- <sup>236</sup> Durkheim, E. (1912, translated by Fields, K. 1995) *The Elementary Forms of Religious Life*. <http://home.ku.edu.tr/~mbaker/cshs503/durkheimreligiouslife.pdf>
- <sup>237</sup> Sober, E. (1999) *The Multiple Realizability Argument Against Reductionism*. *Philosophy of Science* 66: 542-564.
- <sup>238</sup> Falvey, L. (2004) *Integrating Reductionist Research into International Agricultural Development: Re-conceiving Agricultural Research for Development; Technical Support for Development; Thai Agriculture; International Agriculture; Agricultural Education*. Collation of Publications for Higher Doctorate. Summarized in: Falvey, L. (2011) *Re-Cultivating Agricultural Science, or What I've Learned in 40 Years of Professional Life*. Institute for International Development. Pp139.
- <sup>239</sup> Harvey, G. (2005) *Animism: Respecting the Living World*. Wakefield Press. Pp248.
- <sup>240</sup> Lovelock, J. (1995) *The Ages of Gaia: A Biography of Our Living Earth*. Norton. Pp288.
- <sup>241</sup> Sloan, D. (2002) *Darwin's Cathedral: Evolution, Religion, and the Nature of Society*. University of Chicago Press. Pp268.
- <sup>242</sup> Bucer, M. in McNeill, J. (1967) *The History and Character of Calvinism*. Oxford University Press. Pp480.
- <sup>243</sup> Evans-Pritchard, E. (1956) *Nuer Religion*. Oxford University Press.  
[https://monoskop.org/images/8/8b/Evans\\_Pritchard\\_E\\_E\\_Nuer\\_religion\\_1956.pdf](https://monoskop.org/images/8/8b/Evans_Pritchard_E_E_Nuer_religion_1956.pdf)
- <sup>244</sup> Lansing, J. (1991) *Priests and Programmers: technologies of Power in the Engineered Landscape of Bali*. Princeton University Press. Pp216.
- <sup>245</sup> Falvey, L. (2000) *Thai Agriculture: Golden Cradle of Millennia*. Kasetsart University Press. Pp490.  
<https://www.youtube.com/watch?v=JVP2i5S0yCE>
- <sup>247</sup> Sloan, D. (2002) *Darwin's Cathedral: Evolution, Religion, and the Nature of Society*. University of Chicago Press. Pp268.
- <sup>248</sup> [http://www.dannysiegel.com/maimonides\\_8\\_degrees.pdf](http://www.dannysiegel.com/maimonides_8_degrees.pdf)

- 
- <sup>249</sup> Hull, D. (1973) *Darwin and His Critics: The Reception of Darwin's Theory of Evolution by the Scientific Community*. Harvard University Press. Pp473.
- <sup>250</sup> Lewis, C. (2017) *Surprised by Joy*. HarperOne. Pp304.
- <sup>251</sup> Campbell, J. (1993) *The Power of Myth*. Anchor. Pp293.
- <sup>252</sup> Falvey, L. (2005) *Religion and Agriculture: Sustainability in Christianity and Buddhism*. Institute for International Development. Pp350.
- <sup>253</sup> Armstrong, K. (2006) *A Short History of Myth*. Canongate. Pp176.
- <sup>254</sup> Ecclesiastes 1: 9-10
- <sup>255</sup> Falvey, L. (2009) *Pranja Anthology: The Book of Ecclesiastes rendered into Buddhist concepts in rhyming couplets*. Pp38.
- <sup>256</sup> Menzies, J. (2015) *True Myth: C. S. Lewis and Joseph Campbell on the Veracity of Christianity*. Lutterworth. Pp258.
- <sup>257</sup> Falvey, L. (2013) *Beliefs that Bias Food & Agriculture: Questions I'm Often Asked*. Institute for International Development. Pp328.
- <sup>258</sup> Cervantes, M. (1615, translated by Grossman, E. 2003) *Don Quixote*. Harper Collins. Pp975.
- <sup>259</sup> Maher, J. and Briggs, D. (1988) *An Open Life: Joseph Campbell in Conversation with Michael Toms*. Larson. Pp144.
- <sup>260</sup> Campbell, J. (1949, 2004) *The Hero with a Thousand Faces*. Princeton University Press. Pp247.
- <sup>261</sup> Socrates via Plato (c.370 BCE) *The Phaedrus*.  
<https://www.units.miamioh.edu/technologyandhumanities/plato.htm>
- <sup>262</sup> Campbell, J. (1949, 2004) *The Hero with a Thousand Faces*. Princeton University Press. Pp247.
- <sup>263</sup> Campbell, J. (1949, 2004) *The Hero with a Thousand Faces*. Princeton University Press. Pp247.
- <sup>264</sup> Gammage, B. (2012) *The Biggest Estate on Earth: How Aborigines Made Australia*. Allen and Unwin. Pp384.
- <sup>265</sup> Pascoe, B. (2004) *Dark Emu: Aboriginal Australia and the Birth of Agriculture*. Mangabala Books. Pp177.
- <sup>266</sup> Diamond, J. (2005) *Collapse: How Societies Choose to Fail or Succeed*. Penguin. Pp608.
- <sup>267</sup> Lovejoy, A. (1932) *The Supposed Primitivism of Rousseau's Discourse on Inequality*. *Modern Philology* 21:165-186.
- <sup>268</sup> <https://www.gutenberg.org/files/3600/3600-h/3600-h.htm#link2HCH0030>
- <sup>269</sup> Gammage, B. (2011) *The Biggest Estate on Earth: How Aborigines made Australia*. Allen and Unwin. Pp384.
- <sup>270</sup> <https://theconversation.com/dreamtime-and-the-dreaming-an-introduction-20833>
- <sup>271</sup> <https://www.aboriginalart.com.au/culture/dreamtime3.html>
- <sup>272</sup> Bernstein, R. (1998) *Freud and the Legacy of Moses*. Cambridge University Press. Pp151.
- <sup>273</sup> Strachey, J. (1995) *Sigmund Freud: The Interpretation of Dreams*, translated by James Strachey. Basic Books. Pp677.
- <sup>274</sup> Campbell, J. (1949, 2004) *The Hero with a Thousand Faces*. Princeton University Press. Pp247.
- <sup>275</sup> *Katha Upanishad* 1: 21, 23-25
- <sup>276</sup> <http://www.aina.org/books/eog/eog.pdf>
- <sup>277</sup> Herodotus, Book III: 23
- <sup>278</sup> Peck, D. (n.d.) *Misconceptions and Myths Related to the Fountain of Youth and Juan Ponce de Leon's 1513 Exploration Voyage*. New World Explorers, Inc.  
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.403.8989&rep=rep1&type=pdf>
- <sup>279</sup> Silverberg, R. (1996) *The Realm of Prester John*. Ohio University Press. Pp344.
- <sup>280</sup> *John* 5:1-15

- <sup>281</sup> Odyssey xii.62
- <sup>282</sup> John 4:14; Rev 21:6
- <sup>283</sup> John 12: 24
- <sup>284</sup> Summa contra Gentiles I,i
- <sup>285</sup> <http://www.gutenberg.org/ebooks/2395>
- <sup>286</sup> Bottigheimer, R. (2008) Before Contes du Temps Passé (1697): Charles Perrault’s “Grisélidis” (1691), “Souhais Ridicules” (1693), and “Peau d’asne” (1694). The Romantic Review 99(3): 175-189.
- <sup>287</sup> <https://ebooks.adelaide.edu.au/h/homer/>
- <sup>288</sup> Chantalakhana, C., Skunmun, P. and Falvey, L. (2558/2015) ภูมิปัญญา วัฒนธรรม และ สำนวนไทยจากไร่ (Thai Farmers’ Wisdom, Culture and Sayings – in Thai language, with English section ‘Some Examples of Thai Sayings in English’). Animal Husbandry Association of Thailand. Pp248.
- <sup>289</sup> Edward Clodd, quoted in: Rhys, J. (1901) Celtic Folklore: Welsh And Manx. Volume 2, Chapter XI, Folklore Philosophy. Oxford University Press. Pp718. <http://www.sacred-texts.com/neu/cfw/cf100.htm>
- <sup>290</sup> Rhys, J. (1901) Celtic Folklore: Welsh And Manx. Volume 2, Chapter XI, Folklore Philosophy. Oxford University Press. Pp718. <http://www.sacred-texts.com/neu/cfw/cf100.htm>
- <sup>291</sup> Weisskopf, W. (1955) The Psychology of Economics. Psychology Press. Pp266.
- <sup>292</sup> Scarborough, J. (2006) Drugs and Drug Lore in the Time of Theophrastus: Folklore, Magic, Botany, Philosophy and the Rootcutters. Acta Classica 49: 1-29. <https://www.jstor.org/stable/24595423>
- <sup>293</sup> Thorndike, L. (1923) A History of Magic and Experimental Science During the First Thirteen Centuries of Our Era. Macmillan. Pp1033. <http://www.tbm100.org/Lib/Tho23HM2.pdf>
- <sup>294</sup> For Al-Farabi’s 8<sup>th</sup> century work, see: Kilwardby, R. (1976) De Ortu Scientiarum. British Academy. Pp254.
- <sup>295</sup> Thorndike, L. (1923) A History of Magic and Experimental Science During the First Thirteen Centuries of Our Era. Macmillan. Pp1033. <http://www.tbm100.org/Lib/Tho23HM2.pdf>
- <sup>296</sup> Falvey, L. (2016) Understanding Southeast Asia: Syncretism in Commonalities. Thaksin University Press. Pp187.
- <sup>297</sup> Hume, D. (1757, 1957) The Natural History of Religion. Stanford University Press. Pp76.
- <sup>298</sup> Baring, A. and Cashford, J. (1993) The Myth of the Goddess: Evolution of an Image. Penguin. Pp800.
- <sup>299</sup> Cam (2019) University of Cambridge Alumni Magazine, Spring. <https://www.cam.ac.uk/secretlifeofplants>
- <sup>300</sup> Traverso, V. (2019) The Egyptian Egg Ovens Considered More Wondrous Than the Pyramids: A hatching system devised 2,000 years ago is still in use in rural Egypt. <https://www.atlasobscura.com/articles/egypt-egg-ovens>
- <sup>301</sup> <https://www.asianagrihistory.org/>
- <sup>302</sup> Falvey, L. (2005) Religion and Agriculture: Sustainability in Christianity and Buddhism. Institute for International Development. Pp 300.
- <sup>303</sup> Falvey, L. (2000) Thai Agriculture: Golden Cradle of Millennia. Kasetsart University Press. Pp490.
- <sup>304</sup> Charan Chantalakhana, Pakapun Skunmun and Lindsay Falvey (2558/2015) ภูมิปัญญา วัฒนธรรม และ สำนวนไทยจากไร่ Phumipanya Watanatham le SamnuanThaijakraina (Thai Farmers’ Wisdom, Culture and Sayings – in Thai language, with English section “Some Examples of Thai Sayings in English”). Animal Husbandry Association of Thailand. Pp248.
- <sup>305</sup> Barfield, R. (2011) The Ancient Quarrel Between Philosophy and Poetry. Cambridge University Press. Pp278.

- 
- <sup>306</sup> <http://www.religionandnature.com/ern/sample/Chidester--Animism.pdf>
- <sup>307</sup> Feldman, N. (2006) *Divided by God*. Farrar, Straus and Giroux. Pp320.
- <sup>308</sup> Falvey, L. (2005) *Religion and Agriculture: Sustainability in Christianity and Buddhism*. Institute for International Development. Pp345.
- <sup>309</sup> <http://www.gutenberg.org/ebooks/author/473>
- <sup>310</sup> <https://uwdc.library.wisc.edu/collections/aldoleopold/>
- <sup>311</sup> Waswo, R. (1997) *The Founding Legend of Western Civilization: From Virgil to Vietnam*. Wesleyan University Press. Pp373.
- <sup>312</sup> <https://www.loc.gov/resource/lhbtn.th028/?st=gallery>
- <sup>313</sup> Schilling, R. (1992) *The Penates in Roman and European Mythologies*. University of Chicago Press. Pp342.
- <sup>314</sup> Galinsky, G. (2016) *Aeneas, Sicily, and Rome*. Princeton University Press. Pp396.
- <sup>315</sup> Campbell, J. (1949, 2004) *The Hero with a Thousand Faces*. Princeton University Press. Pp247.
- <sup>316</sup> Waswo, R. (1997) *The Founding Legend of Western Civilization: From Virgil to Vietnam*. Wesleyan University Press. Pp373.
- <sup>317</sup> Gimpel, J. (2002) *La Révolution industrielle du Moyen Age*. Points. Pp288.
- <sup>318</sup> Acts 1:8
- <sup>319</sup> Waswo, R. (1997) *The Founding Legend of Western Civilization: From Virgil to Vietnam*. Wesleyan University Press. Pp373.
- <sup>320</sup> Connor, M. (2005) *The invention of Terra Nullius: historical and legal fictions on the foundation of Australia*. Macleay. Pp362.
- <sup>321</sup> Locke, J. (1689) <http://www.yorku.ca/cominel/courses/3025pdf/Locke.pdf>
- <sup>322</sup> Waswo, R. (1997) *The Founding Legend of Western Civilization: From Virgil to Vietnam*. Wesleyan University Press. Pp373
- <sup>323</sup> Pearce, R. (1998) *The Savages of America: A Study of the Indian and the Idea of Civilization*. University of California Press. Pp272.
- <sup>324</sup> <https://www.marxists.org/reference/archive/hegel/works/ae/index.htm>
- <sup>325</sup> Isaiah 2:4
- <sup>326</sup> Scott, J. (2009) *The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia*. Yale University Press. Pp464.
- <sup>327</sup> Falvey, L. (2013) *Beliefs that Bias Food & Agriculture: Questions I'm Often Asked*. Institute for International Development. Pp328.
- <sup>328</sup> Phongpaichit, P. and Baker, C. (2002) *Thailand: Economy and Politics*. Oxford University Press. Pp509.
- <sup>329</sup> Allsen, T. (2004) *Culture and Conquest in Mongol Eurasia*. Cambridge University Press. Pp264.
- <sup>330</sup> Windschuttle, K. (2002) *The Cultural War on Western Civilization*. New Criterion, January.
- <sup>331</sup> Said, E. (1979) *Orientalism*. Vintage. Pp368.
- <sup>332</sup> <https://www.accesstoinsight.org/tipitaka/an/an03/an03.065.than.html>
- <sup>333</sup> Waswo, R. (1997) *The Founding Legend of Western Civilization: From Virgil to Vietnam*. Wesleyan University Press. Pp373.
- <sup>334</sup> Chakrabarty, D. (2007) *Provincializing Europe: Postcolonial Thought and Historical Difference*. Princeton University Press. Pp336.
- <sup>335</sup> Jaspers, k. (2011) *The Origin and Goal of History*. Routledge. Pp314.
- <sup>336</sup> Zheng, Jiadong (2005) *The Issue of the "Legitimacy" of Chinese Philosophy*. *Contemporary Chinese Thought* 37:1.
- <sup>337</sup> Einstein, A. Extract from a Letter quoted by Needham, J. (2013) *The Grand Titration*. Routledge. Pp368.
- <sup>338</sup> Dutt, R. (1910, 1969) *The Ramayana and The Mahabharata*. Everyman. Pp335.

- <sup>339</sup> Confucius in Chai, C. and Chai, W. (1965) The Sacred Books of Confucius and other Confucian Classics. University Books. Pp373.
- <sup>340</sup> <http://www.bhagavad-gita.org/index-english.html>
- <sup>341</sup> Gosling, D. (2007) Science and the Indian Tradition: When Einstein met Tagore. Routledge. Pp186.
- <sup>342</sup> Virocana in the Chandogya Upanisad VIII.8.5
- <sup>343</sup> Virocana in the Chandogya Upanisad VIII.8.5
- <sup>344</sup> Socrates in Phaedo. Ph.66c-e]
- <sup>345</sup> The Rig Veda. Translated by O'Flaherty, W. (2005). Penguin Classics. Pp352.
- <sup>346</sup> Backhouse, S. (2016) Kierkegaard: A Single Life. HarperCollins Christian Publishing. Pp304.
- <sup>347</sup> Nene, Y. (2007) Glimpses of the Agricultural Heritage of India. Asian Agri-History Foundation. Pp902.
- <sup>348</sup> Balasubramanian, A. (2019) Vrikshayurveda: An Overview and It's Relevance for Agriculture Today. Asian Agri-History 23(1): 77-98.
- <sup>349</sup> Sheshadri, K. (2019) Agriculture-related Sciences in Agamashastra texts – Part 2: Shaiva and Shakta Agamas and Tantras. Asian Agri-History Vol. 23(1): 99-120.
- <sup>350</sup> Yajurveda 40:6
- <sup>351</sup> Vivekananda (1964) Complete Works, Volume II. Advaita Ashram. In: Gosling, D. (2001) Religion and Ecology in Southeast Asia. Routledge. Pp210.
- <sup>352</sup> Flood, G. (1996) An Introduction to Hinduism. Cambridge University Press. Pp367.
- <sup>353</sup> Jeste, D. and Vahia, I. (2008) Comparison of the Conceptualization of Wisdom in Ancient Indian Literature with Modern Views. Psychiatry 71(3): 197-209.
- <sup>354</sup> Baltes, P. (2003) The intermarriage of wisdom and selective optimization with compensation: Two meta-heuristics guiding the conduct of life. In Keyes C. and Haidt J. Flourishing positive psychology and the life well lived. APA Washington, DC.
- <sup>355</sup> Jeste, D. and Vahia, I. (2008) Comparison of the Conceptualization of Wisdom in Ancient Indian Literature with Modern Views. Psychiatry 71(3): 197-209.
- <sup>356</sup> Milinda-pañho (Questions of King Milinda). <http://www.aimwell.org/milinda.html>
- <sup>357</sup> Stanford Encyclopedia of Philosophy (2016) Logic in Classical Indian Philosophy. <https://plato.stanford.edu/entries/logic-india/#EarlClasPeri>
- <sup>358</sup> <https://www.wisdompubs.org/sites/default/files/preview/Nagarjuna%27s-Middle-Way-Book-Preview-R.pdf>
- <sup>359</sup> <http://www.perseus.tufts.edu/hopper/text?doc=Perseus:abo:tlg,0086,025:3>
- <sup>360</sup> Lal, M. (1992) Encyclopaedia of Indian Literature: Sasay to Zorgot. Sahitya Akademi. Pp818. [https://books.google.com.au/books/about/Encyclopaedia\\_of\\_Indian\\_Literature.html?id=KnPoYxrRfc0C](https://books.google.com.au/books/about/Encyclopaedia_of_Indian_Literature.html?id=KnPoYxrRfc0C)
- <sup>361</sup> Hajela, T. (2008) History of Economic Thought. Ane. Pp1210.
- <sup>362</sup> Project Madurai (2002) Tirukkusal. English Translation and Commentary by Rev Dr G U Pope, Rev W H Drew, Rev John Lazarus and Mr F W Ellis. First published by W.H. Allen, & Co, 1886, Reprinted by The South India Saiva Siddhantha Works Publishing Society, Tinnevely, Madras, India, 1962, 1982. Couplet 737. [http://www.projectmadurai.org/pm\\_etexts/pdf/pm0153.pdf](http://www.projectmadurai.org/pm_etexts/pdf/pm0153.pdf)
- <sup>363</sup> Project Madurai (2002) Tirukkusal. English Translation and Commentary by Rev Dr G U Pope, Rev W H Drew, Rev John Lazarus and Mr F W Ellis. First published by W.H. Allen, & Co, 1886, Reprinted by The South India Saiva Siddhantha Works Publishing Society, Tinnevely, Madras, India, 1962, 1982. Couplets 1031-1040. [http://www.projectmadurai.org/pm\\_etexts/pdf/pm0153.pdf](http://www.projectmadurai.org/pm_etexts/pdf/pm0153.pdf)
- <sup>364</sup> Whewell, W. <https://archive.org/details/philosinductsci01wewrich/page/n9>

- <sup>365</sup> Gosling, D. (2001) Religion and Ecology in Southeast Asia. Routledge. Pp210.
- <sup>366</sup> Quote from Bose. In: Gupta, M. (1964) Jagadish Chanda Bose: A Biography. Bharatiya Vidya Bhavan. Pp
- <sup>367</sup> Swearer, D. (1997) The Hermeneutics of Buddhist Ecology. In: Tucker, M. and Williams, D. (1997) Buddhism and Ecology: The Interconnection of Dharma and Deeds. Harvard Center for the Study of World Religions. Pp
- <sup>368</sup> Gosling, D. (2001) Religion and Ecology in Southeast Asia. Routledge. Pp210.
- <sup>369</sup> Gosling, D. (2007) Science and the Indian Tradition: When Einstein met Tagore. Routledge. Pp186.
- <sup>370</sup> Quoted in: Gosling, D. (2007) Science and the Indian Tradition: When Einstein met Tagore. Routledge. Pp186.
- <sup>371</sup> Compare to: Psalm 118: 22
- <sup>372</sup> Tagore, R. (1931) The Religion of Man. Allen and Unwin. Pp246.  
<https://archive.org/details/in.ernet.dli.2015.110209/page/n7>
- <sup>373</sup> Ebrey, Patricia (2010) The Cambridge Illustrated History of China. Cambridge University Press. Pp348.
- <sup>374</sup> Jaspers, Karl (2011) Origin and Goal of History. Routledge Revivals. Pp314.
- <sup>375</sup> Zeng, Xiongsheng. (2015) The Foundation of Livelihood—Agriculture in Ancient China. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) A History of Chinese Science and Technology. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>376</sup> Matthew 7:12
- <sup>377</sup> Hegel, G.F.W. (1819; translated 1996) Hegel's Lectures on the History of Philosophy. Prometheus Books. Pp672.
- <sup>378</sup> Bodhi, Bhikkhu (2000). The Connected Discourses of the Buddha: A Translation of the Samyutta Nikāya. Boston: Wisdom Publications.  
[http://lirs.ru/lib/sutra/Connected\\_Discourses\\_of\\_the\\_Buddha\(Samyutta\\_Nikaya\).Vol.II.pdf](http://lirs.ru/lib/sutra/Connected_Discourses_of_the_Buddha(Samyutta_Nikaya).Vol.II.pdf)
- <sup>379</sup> Wing-Tsit Chan (1969) A source book in Chinese philosophy. Princeton University Press. Pp874.
- <sup>380</sup> Lui, D. (2015) Overview of Ancient Chinese Science and Technology. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) A History of Chinese Science and Technology. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>381</sup> Lu, Yongxiang. (Translated by Qian, Chuijun 2015) A History of Chinese Science and Technology. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>382</sup> Zeng, Xiongsheng. (2015) The Foundation of Livelihood—Agriculture in Ancient China. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) A History of Chinese Science and Technology. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>383</sup> Luo, G. (2015) Biology: Compendium of Traditional Biology in China. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) A History of Chinese Science and Technology. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>384</sup> Vavilov, N. (1924, 2009) Origin and Geography of Cultivated Plants. Cambridge University Press. Pp536.
- <sup>385</sup> Luo, G. (2015) Biology: Origin and Development of Cultured Plants in China. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) A History of Chinese Science and Technology. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>386</sup> ภูมิปัญญา วัฒนธรรม และ สำนวนไทยจากไร่ Phumipanya Watanatham le SamnuanThaijakraina (Thai Farmers' Wisdom, Culture and Sayings – in Thai language, with English section “Some Examples of Thai Sayings in English”). Animal Husbandry Association of Thailand. Pp248. Charan Chantalakhana, Pakapun Skunmun and Lindsay Falvey (2558/2015)
- <sup>387</sup> Sterckx, R. (2017) Thinking through Agriculture in Early China. Asian & Middle Eastern Studies Faculty Research Groups. <http://www.ames.cam.ac.uk/directory/sterckxroel>
- <sup>388</sup> <http://www.chinaknowledge.de/Literature/Classics/shangshu.html>

- <sup>389</sup> Saban, F. (2015) Sacrifice. In, Wilkins, J. and Nadeau, R. (2015) *A Companion to Food in the Ancient World*. Wiley Blackwell. Pp457.
- <sup>390</sup> Sellmann, James (2010). *Timing and rulership in Master Lü's Spring and Autumn annals*. SUNY Press. Pp277.
- <sup>391</sup> Graham, A. C. (1979) *The Nung-chia School of the Tillers and the Origins of Peasant Utopianism in China*. *Bulletin of the School of Oriental and African Studies*. 42(1): 66–100.
- <sup>392</sup> Confucius, translated by Lau, D.C. (1998) *The Analects*. Penguin Classics. Pp160.
- <sup>393</sup> Maverick, Lewis (1938) *Chinese Influences Upon the Physiocrats*. *Economic History*. 3.
- <sup>394</sup> Sellman, J. (2002) *Timing and Rulership in Master Lü's Spring and Autumn Annals*, State University of New York Press. Pp272.
- <sup>395</sup> Confucius. <http://confucius.org/lunyu/lange.htm>
- <sup>396</sup> Sun Tzu. <https://ctext.org/art-of-war>
- <sup>397</sup> Qian, S. (2009) *The First Emperor*. *Selections from the Historical Records*. Oxford: Oxford University Press. Pp208.
- <sup>398</sup> Zeng, Xiongsheng. (2015) *The Foundation of Livelihood—Agriculture in Ancient China*. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) *A History of Chinese Science and Technology*. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>399</sup> Lui, D. (2015) *Overview of Ancient Chinese Science and Technology*. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) *A History of Chinese Science and Technology*. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>400</sup> <http://www.sabrizain.org/malaya/library/embassysiam2.txt>
- <sup>401</sup> Jiang, X. (2015) *Astronomy: Exchange and Comparison of Chinese and Foreign Astronomies*. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) *A History of Chinese Science and Technology*. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>402</sup> Zeng, Xiongsheng. (2015) *The Foundation of Livelihood—Agriculture in Ancient China*. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) *A History of Chinese Science and Technology*. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>403</sup> Ebrey, Patricia (2010) *The Cambridge Illustrated History of China*. Cambridge University Press. Pp348
- <sup>404</sup> Shuchun Guo, S. and Tian, M. (2015) *Mathematics: Overview and Features of the Development of Traditional Chinese Mathematics*. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) *A History of Chinese Science and Technology*. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>405</sup> Shuchun Guo, S. and Tian, M. (2015) *Mathematics: 'The Nine Chapters of the Mathematical Art', Liu Hui and Mathematics in the Song and Yuan Dynasties*. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) *A History of Chinese Science and Technology*. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>406</sup> Wang, Q. (2015) *Geoscience: Overview of Ancient Geoscience and Views of Geological Disasters and Abnormalities*. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) *A History of Chinese Science and Technology*. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>407</sup> Lui, D. (2015) *Overview of Ancient Chinese Science and Technology*. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) *A History of Chinese Science and Technology*. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>408</sup> Jiang, X. (2015) *Astronomy: The Study of Heaven in Ancient China: An Overview*. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) *A History of Chinese Science and Technology*. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>409</sup> Jiang, X. (2015) *Astronomy: The Study of Heaven in Ancient China: An Overview*. In Lu, Yongxiang (Translated by Qian, Chuijun 2015) *A History of Chinese Science and Technology*. Volume 1. Shanghai Jiao Tong University Press. Pp503.
- <sup>410</sup> Buruma, I. (1984) *Behind the Mask: On Sexual Demons, Sacred Mothers, Transvestites, Gangsters, and Other Japanese Cultural Heros*. Pantheon. Pp242.

- 
- <sup>411</sup> Falvey, L. (2005) Religion and Agriculture: Sustainability in Christianity and Buddhism. Institute for International Development. Pp350.
- <sup>412</sup> Bruun, O. and Kalland, A. (1995) Images of Nature: An Introduction. In, Asian Perceptions of Nature: A Critical Approach. Curzon Press. Pp276.
- <sup>413</sup> Kathirithamby-Wells, J. (2005) Socio-political Structures and the Southeast Asian Ecosystem. In, Bruun, O. and Kalland, A. (1995) Asian Perceptions of Nature: A Critical Approach. Curzon Press. Pp276.
- <sup>414</sup> Falvey, L. (2016) Understanding Southeast Asia: Syncretism in Commonalities. Thaksin University Press. Pp187.
- <sup>415</sup> Falvey, J.L. (1979) Sacrifices Involving Large Livestock in the Northern Thailand Highlands. Journal of Developing Areas 13:275-282.
- <sup>416</sup> Sparkes, S. (2005) Taming Nature – Controlling Fertility. In, Bruun, O. and Kalland, A. (1995) Asian Perceptions of Nature: A Critical Approach. Curzon Press. Pp276.
- <sup>417</sup> Sandall, K. (2005) Nature as the Virgin Forest. In, Bruun, O. and Kalland, A. (1995) Asian Perceptions of Nature: A Critical Approach. Curzon Press. Pp276.
- <sup>418</sup> Bruun, O. (2005) Fengshui and the Chinese Perception of Nature. In, Bruun, O. and Kalland, A. (1995) Asian Perceptions of Nature: A Critical Approach. Curzon Press. Pp276.
- <sup>419</sup> White, L. (1967) The Historical Roots of Our Present Environmental Crisis. Science 155: 1204-1207.
- <sup>420</sup> Suzuki, D. (1959) The Role of Nature in Zen Buddhism.  
[https://archive.org/stream/in.ernet.dli.2015.537255/2015.537255.zen-and\\_djvu.txt](https://archive.org/stream/in.ernet.dli.2015.537255/2015.537255.zen-and_djvu.txt)
- <sup>421</sup> Falvey, L. (2005) Religion and Agriculture: Sustainability in Christianity and Buddhism. Institute for International Development. Pp350.
- <sup>422</sup> Pederson, P. (2005) Nature, Religion and Cultural Identity. In, Bruun, O. and Kalland, A. (1995) Asian Perceptions of Nature: A Critical Approach. Curzon Press. Pp276.
- <sup>423</sup> Van De Mierop, Marc (2015) Philosophy Before the Greeks: The Pursuit of Truth in Ancient Babylonia. Princeton University Press. Pp 312pp.
- <sup>424</sup> Van De Mierop, Marc (2015) Philosophy Before the Greeks: The Pursuit of Truth in Ancient Babylonia. Princeton University Press. Pp 312pp.
- <sup>425</sup> Russell. B. (1945) History of Western Philosophy - and its Connection with Political and Social Circumstances from the Earliest Times to the Present Day. Allen and Unwin. Pp923.
- <sup>426</sup> Diodorus (1<sup>st</sup> century BCE) Library of History. II 29.2.
- <sup>427</sup> Van De Mierop, Marc (2015) Philosophy Before the Greeks: The Pursuit of Truth in Ancient Babylonia. Princeton University Press. Pp 312pp.
- <sup>428</sup> Russell. B. (1945) History of Western Philosophy - and its Connection with Political and Social Circumstances from the Earliest Times to the Present Day. Allen and Unwin. Pp923.
- <sup>429</sup> Russell. B. (1945) History of Western Philosophy - and its Connection with Political and Social Circumstances from the Earliest Times to the Present Day. Allen and Unwin. Pp923.
- <sup>430</sup> Encyclopedia of World Religions (2008) Pp1200.
- <sup>431</sup> The Iliad, Book 1, lines 5-6. <https://ebooks.adelaide.edu.au/h/homer/>
- <sup>432</sup> Mügge, M. Philosophy During the Tragic Age of the Greeks: Nietzsche On Thales.  
[http://nietzsche.holtof.com/Nietzsche\\_various/Nietzsche\\_on\\_Thales.htm](http://nietzsche.holtof.com/Nietzsche_various/Nietzsche_on_Thales.htm)
- <sup>433</sup> Lerner, R. (2005) Averroes on Plato's "Republic". Cornell University Press. Pp176. JSTOR, [www.jstor.org/stable/10.7591/j.ctt1287cp4](http://www.jstor.org/stable/10.7591/j.ctt1287cp4).
- <sup>434</sup> Cromer, A. (1993) Uncommon Sense: The Heretical Nature of Science. Oxford University Press. Pp240.
- <sup>435</sup> <https://ebooks.adelaide.edu.au/h/homer/>
- <sup>436</sup> Deuteronomy 1:1-5.
- <sup>437</sup> Koran 18:1-5.
- <sup>438</sup> Cromer, A. (1993) Uncommon Sense: The Heretical Nature of Science. Oxford University Press. Pp240.

- 
- <sup>439</sup> Neugebauer, O. (1969) *The Exact Science in Antiquity*. Dover. Pp288
- <sup>440</sup> <https://archive.org/details/thirteenbookseu03heibgoog>
- <sup>441</sup> Backhouse, S. (2016) *Kierkegaard: A Single Life*. Harper Collins Christian Publishing. Pp304.
- <sup>442</sup> Russell, B. (1945) *History of Western Philosophy - and its Connection with Political and Social Circumstances from the Earliest Times to the Present Day*. Allen and Unwin. Pp923.
- <sup>443</sup> Falvey, L (2010) *Small Farmers Secure Food: Survival Food Security, the World's Kitchen and the Critical Role of Small Farmers*. Thaksin University Press. Pp232.
- <sup>444</sup> Guillaumont, A. (2004) *Un philosophe au désert, Évagre le Pontique*. Vrin. Pp430.
- <sup>445</sup> See for example, my summary of Vespasian in the section: Acknowledgements - of the continuing past: Feeding Rome; Feeding the World. In: Falvey, L. (2010) *Small Farmers Secure Food: Survival Food Security, the World's Kitchen & the Crucial Role of Small Farmers*. Thaksin University Press. Pp225.
- <sup>446</sup> Quoted in: Harrison, F. (1918) *Roman Farm Management: The Treatises Of Cato And Varro*. Macmillan. Pp365. <http://www.gutenberg.org/cache/epub/12140/pg12140-images.html>
- <sup>447</sup> Harrison, F. (1918) *Roman Farm Management: The Treatises Of Cato And Varro*. Macmillan. Pp365. <http://www.gutenberg.org/cache/epub/12140/pg12140-images.html>
- <sup>448</sup> Andrewes, A (1971) *Greek Society*, Pelican. Pp352.
- <sup>449</sup> Harrison, F. (1918) *Roman Farm Management: The Treatises Of Cato And Varro*. Macmillan. Pp365. <http://www.gutenberg.org/cache/epub/12140/pg12140-images.html>
- <sup>450</sup> <http://classics.mit.edu/Virgil/georgics.mb.txt>
- <sup>451</sup> Smiley, C. (1931) *Virgil: His Philosophic Background and His Relation to Christianity*. *Classical Journal* 26: 660-675.
- <sup>452</sup> Dryden, J. (1697)
- <sup>453</sup> <https://quod.lib.umich.edu/e/eebo/A65112.0001.001/1:18?rgn=div1;view=fulltext>
- <sup>454</sup> De Bruyn, F. (2004) *From Georgic Poetry to Statistics and Graphs: Eighteenth-Century Representations and the 'State' of British Society*. *The Yale Journal of Criticism*, 17(1): 107-139.
- <sup>455</sup> *Varro's Rerum Rusticarum*. <http://www.gutenberg.org/cache/epub/12140/pg12140-images.html>
- <sup>456</sup> *Rerum rusticarum libri III*. <https://archive.org/details/onfarmingmterent00varruoft/page/n5>
- <sup>457</sup> Harrison, F. (1918) *Roman Farm Management: The Treatises Of Cato And Varro*. Macmillan. Pp365. <http://www.gutenberg.org/cache/epub/12140/pg12140-images.html>
- <sup>458</sup> Geljon, A. and Runia, T. (2013) *On cultivation: Philo of Alexandria: Introduction, Translation and Commentary*. Leiden. Pp312. Also:
- <sup>459</sup> *Varro's Rerum Rusticarum*. <http://www.gutenberg.org/cache/epub/12140/pg12140-images.html>
- <sup>460</sup> Seneca 'Moral Letter'
- <sup>461</sup> 86:15. [https://en.wikisource.org/wiki/Moral\\_letters\\_to\\_Lucilius/Letter\\_86](https://en.wikisource.org/wiki/Moral_letters_to_Lucilius/Letter_86)
- <sup>462</sup> Addison, J. (1854) *The Works of the Right Honourable Joseph Addison*,. Bohn. Pp860. <https://catalog.hathitrust.org/Record/001398451>
- <sup>463</sup> Bailey, C. (1923) *The Legacy of Rome*. Clarendon Press. Pp512.
- <sup>464</sup> Bailey, C. (1923) *The Legacy of Rome*. Clarendon Press. Pp512.
- <sup>465</sup> Watson, A. (1983) *Agricultural Innovation in the Early Islamic World*. Cambridge. Pp272.
- <sup>466</sup> Kerridge, E. (1967) *The Agricultural Revolution*. Allen and Unwin. Pp428.
- <sup>467</sup> For example: <http://www.perseus.tufts.edu/hopper/text?doc=plin.+nat.+toc>
- <sup>468</sup> <http://www.perseus.tufts.edu/hopper/text?doc=plin.+nat.+toc>
- <sup>469</sup> Wilkins, J. and Nadeau, R. (2015) *A Companion to Food in the Ancient World*. Wiley Blackwell. Pp457.

- <sup>468</sup> Galen (c.200, Translated by Powell, O., 2003) *Galen: On the Properties of Foodstuffs*. Cambridge University Press.
- <sup>469</sup> Passet, L. (2011) *Refus du Luxe et Frugalité à Rome*. PhD dissertation. Université de Lyon.
- <sup>470</sup> Grimm, V. (1996) *From Feasting to Fasting, the Evolution of a Sin: Attitudes to Food in Late Antiquity*. Routledge. Pp294.
- <sup>471</sup> Wilkins, J. and Nadeau, R. (2015) *A Companion to Food in the Ancient World*. Wiley Blackwell. Pp457.
- <sup>472</sup> <https://www.accesstoinsight.org/tipitaka/sn/sn56/sn56.011.than.html>
- <sup>473</sup> Seneca (c.60) *Epistle 88 & 92*.
- <sup>474</sup> <https://www.accesstoinsight.org/tipitaka/sn/sn56/sn56.011.than.html>
- <sup>475</sup> <https://plato.stanford.edu/entries/plato-timaeus/>
- <sup>476</sup> <http://www.epicurus.net/en/menoceus.html>
- <sup>477</sup> Hitch, S. () *Sacrifice*. In, Wilkins, J. and Nadeau, R. (2015) *A Companion to Food in the Ancient World*. Wiley Blackwell. Pp457.
- <sup>478</sup> JPS Tanakh 1917; Genesis 3:19
- <sup>479</sup> Hitch, S. (2015) *Sacrifice*. In, Wilkins, J. and Nadeau, R. (2015) *A Companion to Food in the Ancient World*. Wiley Blackwell. Pp457.
- <sup>480</sup> van Straten, F. (1995) *Hiera Kalá: Images of Animal Sacrifice in Archaic and Classical Greece*. *Religions in the Greco-Roman World* 127. Leiden. Pp374.
- <sup>481</sup> Falvey, J. (1979) *Sacrifices Involving Large Livestock in the Northern Thailand Highlands*. *Journal of Developing Areas* 13:275-282.
- <sup>482</sup> James Hannam (2010) *God's Philosophers: How the Medieval World Laid the Foundations of Modern Science*. Icon Books. Pp448.
- <sup>483</sup> Augustine of Hippo (trans. Roger Green), *De Doctrina Christiana* (Oxford: Clarendon Press, 1995), p. 125 [II:144].
- <sup>484</sup> M.-D. Chenu (trans. Jerome Taylor and Lester K. Little), *Nature, Man and Society in the Twelfth Century: Essays on New Theological Perspectives in the Latin West*, (Chicago: Chicago University Press, 1968), p. 12.
- <sup>485</sup> Hugh of St Victor quoted in Peter Harrison, *The Bible, Protestantism, and the Rise of Natural Science* (Cambridge: Cambridge University Press, 1998), p. 1
- <sup>486</sup> *Book 7 of The Code of Maimonides. (Mishneh Torah)*
- <sup>487</sup> <http://creativecommons.org/licenses/by/4.0/>
- <sup>488</sup> Pearl Kibre and Nancy G. Siraisi, 'The Institutional Setting: The Universities', in *Science in the Middle Ages*, ed. David C. Lindberg (Chicago: Chicago University Press, 1978), p. 120.
- <sup>489</sup> Olaf Pedersen, *The First Universities: Studium Generale and the Origins of University Education in Europe* (Cambridge: Cambridge University Press, 1997), p. 211.
- <sup>490</sup> Thomas Aquinas, ed. Thomas Gilby, *Summa Theologiae*, vol. 1 (London: Blackfriars, 1964), p. 17 [Pt I, Q 1, Art 5].
- <sup>491</sup> Albertus Magnus, *Book of Minerals* (Oxford: Clarendon Press, 1967), p. 69 [2.2.1].
- <sup>492</sup> Actual name: Ibn Rushd, (1126-1198)
- <sup>493</sup> Willam Wallace, 'The Philosophical Setting of Medieval Science', in *Science in the Middle Ages*, ed. David C. Lindberg (Chicago: Chicago University Press, 1978), p. 104.
- <sup>494</sup> P.G. Maxwell-Stuart, ed., *The Occult in Mediaeval Europe, 500–1500: A Documentary History* (Basingstoke: Palgrave Macmillan, 2005), p. 229.
- <sup>495</sup> Thomas Aquinas, ed. Marcus Lefebvre, *Summa Theologiae*, vol. 38 (London: Blackfriars, 1975), p. 221 [Pt 2.1, Q 77, Art 3].
- <sup>496</sup> Thomas Aquinas, eds Thomas O'Meara and Michael Duffy, *Summa Theologiae*, vol. 40 (London: Blackfriars, 1968), p. 55 [Pt 2.2, Q 95, Art 5].
- <sup>497</sup> *Posterior Analytics in Aristotle, The Complete Works of Aristotle*, p. 122 [75a38].
- <sup>498</sup> Blair, P. (1990) *The World of Bede*. Cambridge University Press. Pp356.

- <sup>499</sup> A.G. Molland, 'The Geometrical Background to the Merton School', *The British Journal for the History of Science* vol. 4, no. 2 (1968), p. 110.
- <sup>500</sup> Michel de Montaigne (trans. M.A. Screech), *The Essays of Michel De Montaigne*. (Harmondsworth: Penguin, 1993), p. 170.
- <sup>501</sup> Adapted from Galileo Galilei (trans. Stillman Drake), *Dialogue Concerning the Two Chief World Systems: the Ptolemaic and Copernican* (Berkeley: University of California Press, 1953), p. 107.
- <sup>502</sup> James M. Lattis, *Between Copernicus and Galileo: Christoph Clavius and the Collapse of Ptolemaic Cosmology* (Chicago: University of Chicago Press, 1994), p. 183.
- <sup>503</sup> William Whewell, 'Mrs Somerville on the Connexion of the Sciences', *The Quarterly Review* vol. 51, no. 1 (1834), p. 59.
- <sup>504</sup> Daniel 2: 31-33, 41-43
- <sup>505</sup> Maurice A. Finocchiaro, *The Galileo Affair: A Documentary History* (Berkeley: University of California Press, 1989), p. 229.
- <sup>506</sup> [https://en.wikipedia.org/wiki/List\\_of\\_Catholic\\_clergy\\_scientists](https://en.wikipedia.org/wiki/List_of_Catholic_clergy_scientists)
- <sup>507</sup> <http://trumpeter.athabascau.ca/index.php/trumpet/article/view/436/715>
- <sup>508</sup> Marshall, P. (2015) *Nature's Web: Rethinking Our Place on Earth*. Routledge. Pp513.
- <sup>509</sup> Isaacson, W. (2008). *Einstein: His Life and Universe*. Simon and Schuster. Pp675.
- <sup>510</sup> [https://en.wikisource.org/wiki/Ethics\\_\(Spinoza\)/Part\\_5](https://en.wikisource.org/wiki/Ethics_(Spinoza)/Part_5)
- <sup>511</sup> For example, Buddhism:  
<https://www.accesstoinsight.org/tipitaka/sn/sn12/sn12.002.than.html>
- <sup>512</sup> Marshall, P. (2015) *Nature's Web: Rethinking Our Place on Earth*. Routledge. Pp513.
- <sup>513</sup> Palissy, B. (2018) *Les Oeuvres de Bernard Palissy: Publiées d'Après Les Textes Originaux, Avec Une Notice Historique Et Bibliographique Et Une Table Analytique*. Forgotten Books. Pp532.
- <sup>514</sup> Urvoay, D. translated by Stewart, O. (1991) *Ibn Rushd (Averroes)*. Routledge. Pp156.
- <sup>515</sup> Stroumsa, S. (2011) *Maimonides in His World: Portrait of a Mediterranean Thinker*. Princeton University Press. Pp248.
- <sup>516</sup> Shakespeare, W. (1623) *As You Like It*. <https://william-shakespeare.classic-literature.co.uk/as-you-like-it/>
- <sup>517</sup> Newton, I. (1687, 1846) *Mathematical Principles of Natural Philosophy*.  
[http://redlightrobber.com/red/links\\_pdf/Isaac-Newton-Principia-English-1846.pdf](http://redlightrobber.com/red/links_pdf/Isaac-Newton-Principia-English-1846.pdf)
- <sup>518</sup> <http://www.gutenberg.org/ebooks/author/2447>
- <sup>519</sup> Russell. B. (1945) *History of Western Philosophy - and its Connection with Political and Social Circumstances from the Earliest Times to the Present Day*. Allen and Unwin. Pp923.
- <sup>520</sup> <http://www.constitution.org/jjr/ineq.htm>
- <sup>521</sup> Russell. B. (1945) *History of Western Philosophy - and its Connection with Political and Social Circumstances from the Earliest Times to the Present Day*. Allen and Unwin. Pp923.
- <sup>522</sup> <http://www.gutenberg.org/files/40670/40670-h/40670-h.htm>
- <sup>523</sup> Spinoza, B. *Complete Works*. Hackett. Pp992.
- <sup>524</sup> Whewell, W. <https://archive.org/details/philosinductsci01wewrich/page/n9>
- <sup>525</sup> Bryant, J. and Baggot la Velle, L. (2018) *Introduction to Bioethics*. Wiley & Sons. Pp360.
- <sup>526</sup> Wulf, A. (2015) *The Invention of Nature: Alexander von Humboldt's New World*. Knopf Doubleday. Pp496.
- <sup>527</sup> Whewell coined 'scientist' in his review of a book of the outstanding natural philosopher, thenceforth 'scientist', Mary Somerville in the *Quarterly Review* of 1834.
- <sup>528</sup> <https://www.gutenberg.org/files/1228/1228-h/1228-h.htm>
- <sup>529</sup> <http://paulkingsnorth.net/2011/04/21/the-quants-and-the-poets/>
- <sup>530</sup> <https://www.bartleby.com/126/37.html>
- <sup>531</sup> <https://www.poetryfoundation.org/poems/45557/the-tables-turned>

- 
- <sup>532</sup> van Wyhe, J. (2015) *The Annotated Malay Archipelago* by Alfred Russel Wallace. National University of Singapore Press. Pp801.
- <sup>533</sup> Anon. (1869) *British Quarterly Journal* 50:235-7. Quoted in: van Wyhe, J. (2015) *The Annotated Malay Archipelago* by Alfred Russel Wallace. National University of Singapore Press. Pp801.
- <sup>534</sup> Wallace, A. (1869) *The Malay Archipelago*. Volumes 1 & 2. <http://www.gutenberg.org/files/2530/2530-h/2530-h.htm> and <http://www.gutenberg.org/files/2539/2539-h/2539-h.htm>
- <sup>535</sup> Wallace, A. (1869) *The Malay Archipelago*. Volumes 1 & 2. <http://www.gutenberg.org/files/2530/2530-h/2530-h.htm> and <http://www.gutenberg.org/files/2539/2539-h/2539-h.htm>
- <sup>536</sup> Wallace, A. (1869) *The Malay Archipelago*. Volumes 1 & 2. <http://www.gutenberg.org/files/2530/2530-h/2530-h.htm> and <http://www.gutenberg.org/files/2539/2539-h/2539-h.htm>
- <sup>537</sup> Maxwell, N. (2012) *In Praise of Natural Philosophy: A Revolution for Thought and Life*. *Philosophia* 40(4)
- <sup>538</sup> Gay, P. (1977) *The Enlightenment an Interpretation: The Science of Freedom*. Norton. Pp743.
- <sup>539</sup> Weinberg, S. (1993) *Dreams of a Final Theory*. Hutchinson. Pp260.
- <sup>540</sup> <https://www.telegraph.co.uk/technology/google/8520033/Stephen-Hawking-tells-Google-philosophy-is-dead.html>
- <sup>541</sup> Maxwell, N. (2012) *In Praise of Natural Philosophy A Revolution for Thought and Life*. *Philosophia* 40(4)
- <sup>542</sup> Cula-Malunkyovada Sutta. <https://www.accesstoinsight.org/tipitaka/mn/mn.063.than.html>
- <sup>543</sup> Russell, B. (1927) *Why I am not a Christian*. <https://users.drew.edu/jlenz/whynot.html>
- <sup>544</sup> <https://plato.stanford.edu/entries/determinism-causal/>
- <sup>545</sup> Einstein, A. (1926) Letter to Max Born, 4 December.
- <sup>546</sup> Holbach, P. (1836) *System of Nature: Laws of the Moral and Physical World*. Matsell. Pp368. <http://www.ftarchives.net/holbach/system/0syscontents.htm>
- <sup>547</sup> Holbach, P. (1836) *System of Nature: Laws of the Moral and Physical World*. Matsell. Pp368.
- <sup>548</sup> Holbach, P. (1836) *System of Nature: Laws of the Moral and Physical World*. Matsell. Pp368. <http://www.ftarchives.net/holbach/system/0syscontents.htm>.
- <sup>549</sup> Durant, W. (1965) *The Age of Voltaire: The Story of Civilization Volume IX*. Simon & Schuster. Pp898.
- <sup>550</sup> Tocqueville, A. (1840, Translated by Mansfield, H. and Winthrop, D., 2002) *Democracy in America*. University of Chicago Press. Pp816. <http://seas3.elte.hu/coursematerial/LojkoMiklos/Alexis-de-Tocqueville-Democracy-in-America.pdf>
- <sup>551</sup> Lloyd, W. (1933) *Two Lectures on the Checks to Population*. Oxford University. <https://archive.org/details/twolecturesonch00lloygoog/page/n6>
- <sup>552</sup> Hardin, G. (1968) *The Tragedy of the Commons*. <http://science.sciencemag.org/content/sci/162/3859/1243.full.pdf>
- <sup>553</sup> Smith, A. (1776) *An Inquiry into the Nature and Causes of the Wealth of Nations*. [https://books.google.com.au/books?id=C5dNAAAACAAJ&pg=PP7&redir\\_esc=y#v=onepage&q&f=true](https://books.google.com.au/books?id=C5dNAAAACAAJ&pg=PP7&redir_esc=y#v=onepage&q&f=true)
- <sup>554</sup> Tribe, D. (1991) *Doing Well by Doing Good*. Pluto. Pp135.
- <sup>555</sup> Falvey, L. (2012) *Derek Tribe: International Agricultural Scientist*. The Crawford Fund. Pp252.
- <sup>556</sup> Russell, B. (1945) *History of Western Philosophy - and its Connection with Political and Social Circumstances from the Earliest Times to the Present Day*. Allen and Unwin. Pp923.

- <sup>557</sup> Macleod, C. (2017). In: The Stanford Encyclopedia of Philosophy. <https://plato.stanford.edu/entries/mill/>
- <sup>558</sup> <https://eet.pixel-online.org/files/etranslation/original/Mill,%20Principles%20of%20Political%20Economy.pdf>
- <sup>559</sup> Campbell, J. (1993) *The Power of Myth*. Anchor. Pp293.
- <sup>560</sup> Dawson, J. (2015) *John Knox*. Yale University Press. Pp373.
- <sup>561</sup> Hermann, A. (2013) *The Scottish Enlightenment: The Scots Invention of the Modern World*. Harper Collins. Pp454.
- <sup>562</sup> Vierhaus, R. (1988) *Germany in the Age of Absolutism*. Cambridge University Press. Pp172.
- <sup>563</sup> Edgar, J. (1893) *History of Early Scottish Education*. James Thin. Pp.333.
- <sup>564</sup> Hermann, A. (2013) *The Scottish Enlightenment: The Scots Invention of the Modern World*. Harper Collins. Pp454.
- <sup>565</sup> Hermann, A. (2013) *The Scottish Enlightenment: The Scots Invention of the Modern World*. Harper Collins. Pp454.
- <sup>566</sup> Broadie, A. (2007) *The Scottish Enlightenment: The Historical Age of the Historical Nation*. Birlinn. Pp240.
- <sup>567</sup> <https://books.google.co.uk/books?id=7RHdDAAAQBAJ&pg=PT921&lpg=PT921&dq=%E2%80%9Cman+acquainted+with+history+may,+in+some+respect,+be+said+to+have+lived+from+the+beginning+of+the+world,+and+to+have+been+making+continual+additions+to+his+stock+of+knowledge+in+every+century%E2%80%9D&source=bl&ots=bclKkq4hma&sig=BxhhtQAeHvGajWupXR90DSpOFQ&hl=en&sa=X&ved=2ahUKewixqP-F3sTeAhWRyYUKHb9YCbAQ6AEwBnoECAMQAQ#v=onepage&q=%E2%80%9Cman%20acquainted%20with%20history%20may%2C%20in%20some%20respect%2C%20be%20said%20to%20have%20lived%20from%20the%20beginning%20of%20the%20world%2C%20and%20to%20have%20been%20making%20making%20additions%20to%20his%20stock%20of%20knowledge%20in%20every%20century%E2%80%9D&f=false>
- <sup>568</sup> Burns, R. (1795) *A Man's a Man for a' That*. <http://www.robertburns.org/works/496.shtml>
- <sup>569</sup> Emerson, R. (2013) *The Contexts of the Scottish Enlightenment*. In, Broadie, A. (2013) *The Cambridge Companion to the Scottish Enlightenment*. Cambridge University Press. Pp366.
- <sup>570</sup> Emerson, R. (2013) *The Contexts of the Scottish Enlightenment*. In, Broadie, A. (2013) *The Cambridge Companion to the Scottish Enlightenment*. Cambridge University Press. Pp366.
- <sup>571</sup> [https://books.google.co.uk/books/about/Select\\_Transactions\\_of\\_the\\_Honourable\\_th.html?id=x4hJAAAAYAAJ&redir\\_esc=y](https://books.google.co.uk/books/about/Select_Transactions_of_the_Honourable_th.html?id=x4hJAAAAYAAJ&redir_esc=y)
- <sup>572</sup> <http://www.hist-analytic.com/Broadberkeley.pdf>
- <sup>573</sup> Broadie, A. (2007) *The Scottish Enlightenment: The Historical Age of the Historical Nation*. Birlinn. Pp240.
- <sup>574</sup> Falvey, L. and Bardsley, B. (1997) *Land and Food: Agricultural and Related Education in the Victorian Colleges and the University of Melbourne*. Institute of Land and Food Resources, University of Melbourne. Pp266.
- <sup>575</sup> Emerson, R. (2013) *The Contexts of the Scottish Enlightenment*. In, Broadie, A. (2013) *The Cambridge Companion to the Scottish Enlightenment*. Cambridge University Press. Pp366.
- <sup>576</sup> Stewart, D. (1829) *Elements of the Philosophy of the Human Mind*. Hillard and Brown.
- <sup>577</sup> Hume, D. (1738) *Treatise of Human Nature*. <https://www.gutenberg.org/files/4705/4705-h/4705-h.htm>
- <sup>578</sup> <https://ourworldindata.org/yields-and-land-use-in-agriculture#yields-over-the-long-term>
- <sup>579</sup> Hume, D. (1757) *The Natural History of Religion*. <http://oll.libertyfund.org/titles/hume-the-natural-history-of-religion>
- <sup>580</sup> Hume, D. (1778) *History of England*. <http://oll.libertyfund.org/titles/hume-the-history-of-england-6-vols>
- <sup>581</sup> Brown, W. (2009) *An Essay on the Existence of a Supreme Creator*. Bibliobazar. Pp390.

- 
- <sup>582</sup> Stewart, M. (2013) Religion and Rational Theology. In, Broadie, A. (2013) *The Cambridge Companion to the Scottish Enlightenment*. Cambridge University Press. Pp366.
- <sup>583</sup> Turnbull, G. (1740) *The Principles of Moral and Christian Philosophy*.  
<http://oll.libertyfund.org/titles/turnbull-the-principles-of-moral-and-christian-philosophy-2-vols>
- <sup>584</sup> Hume, D. (1757) *The Natural History of Religion*. <http://oll.libertyfund.org/titles/hume-the-natural-history-of-religion>
- <sup>585</sup> Hume, D. (1738) *Treatise of Human Nature*. <https://www.gutenberg.org/files/4705/4705-h/4705-h.htm>
- <sup>586</sup> Garrett, A. (2013) *Anthropology: The Original of Human Nature*. In, Broadie, A. (2013) *The Cambridge Companion to the Scottish Enlightenment*. Cambridge University Press. Pp366.
- <sup>587</sup> Rousseau, J. (1754) *Discours sur l'inégalité*. [Cole translation: What is the Origin of Inequality Among Men, and is it Authorised by Natural Law?]  
<https://www.gutenberg.org/ebooks/author/26352>
- <sup>588</sup> Hutcheson, F. (1755) *A System of Moral Philosophy*.  
<https://archive.org/details/systemofmoralphi02hutc/page/n5>
- <sup>589</sup> Wood, P. (2013) *Science and the Scottish Enlightenment*. In, Broadie, A. (2013) *The Cambridge Companion to the Scottish Enlightenment*. Cambridge University Press. Pp366.
- <sup>590</sup> Maxwell, R. (1743) *Select Transactions of the Honourable the Society of Improvers in the Knowledge of Agriculture in Scotland*.  
<https://babel.hathitrust.org/cgi/pt?id=nnclcu50582488;view=1up;seq=13>
- <sup>591</sup> Emerson, E. (1979) *The Philosophical Society of Edinburgh, 1737-1747*. *British Journal for the History of Science* 12: 154-91.
- <sup>592</sup> Smellie, W. (1790, 2010) *The Philosophy of Natural History*. Gale. Pp440.
- <sup>593</sup> Wood, P. (2013) *Science and the Scottish Enlightenment*. In, Broadie, A. (2013) *The Cambridge Companion to the Scottish Enlightenment*. Cambridge University Press. Pp366.
- <sup>594</sup> Descartes, R. (1641) *Meditations on First Philosophy*.  
<http://www.earlymoderntexts.com/authors/descartes>
- <sup>595</sup> Klemme, H. (2103) *Scepticism and Common Sense*. In, Broadie, A. (2013) *The Cambridge Companion to the Scottish Enlightenment*. Cambridge University Press. Pp366.
- <sup>596</sup> Hume, D. (1779, 1990) *Dialogues Concerning Natural Religion*. Penguin. Pp160.  
<https://quod.lib.umich.edu/cgi/t/text/pageviewer-idx?cc=ecco;c=ecco;idno=004895521.0001.000;node=004895521.0001.000%3A2.10;seq=94;page=root;view=text>
- <sup>597</sup> Smith, A. (1759) *Theory of Moral Sentiments*. <https://www.adamsmith.org/the-theory-of-moral-sentiments/>
- <sup>598</sup> Turco, L. (2013) *Moral Sense and the Foundation of Morals*. In, Broadie, A. (2013) *The Cambridge Companion to the Scottish Enlightenment*. Cambridge University Press. Pp366.
- <sup>599</sup> Smith, A. (1763) *Lectures on Jurisprudence*. In Meek, R., Raphael, D. and Stein, P. (1978) *The Glasgow Edition of the Works and Correspondence of Adam Smith*. Oxford University Press. Pp654.
- <sup>600</sup> Malherbe, M. (2013) *The Impact on Europe*. In, Broadie, A. (2013) *The Cambridge Companion to the Scottish Enlightenment*. Cambridge University Press. Pp366.
- <sup>601</sup> Fleischacker, S. (2013) *The Impact of America: Scottish Philosophy and the American Founding*. In, Broadie, A. (2013) *The Cambridge Companion to the Scottish Enlightenment*. Cambridge University Press. Pp366.
- <sup>602</sup> Fleming, I. and Robertson, N. (1990) *Britain's First Chair of Agriculture at the University of Edinburgh 1790 to 1990*. East of Scotland College of Agriculture.

- 
- <sup>604</sup> Falvey, L. (2017) Agricultural Education: in Victoria & the Faculty of Agriculture, University of Melbourne. Society of Old Agriculture Fellows, University of Melbourne. Pp230.
- <sup>605</sup> Fleming, I. and Robertson, N. (1990) Britain's First Chair of Agriculture at the University of Edinburgh 1790 to 1990. East of Scotland College of Agriculture.
- <sup>606</sup> Smith, A. (1776) An Inquiry into the Nature and Causes of the Wealth of Nations. Volumes 1 & 2. Strahan, London. [https://www.ibiblio.org/ml/libri/s/SmithA\\_WealthNations\\_p.pdf](https://www.ibiblio.org/ml/libri/s/SmithA_WealthNations_p.pdf)
- <sup>607</sup> Falvey, L. (2017) Agricultural Education: in Victoria & the Faculty of Agriculture, University of Melbourne. Society of Old Agriculture Fellows, University of Melbourne. Pp230.
- <sup>608</sup> Muller, A. (1978) Quesnay's Theory of Growth: A Comment. Oxford Economic Papers, New Series. 30(1): 150–56.
- <sup>609</sup> Steiner, P. (2003) Physiocracy and French Pre-Classical Political Economy. In Biddle, J., Davis, J. and Samuels, W. (2003) A Companion to the History of Economic Thought. Blackwell. Pp712.
- <sup>610</sup> Clarke, J. (1997) Oriental Enlightenment: The Encounter Between Asian and Western Thought. Routledge. Pp288.
- <sup>611</sup> Broadie, A. (1997) The Scottish Enlightenment: An Anthology. Canongate. Pp820.
- <sup>612</sup> Broadie, A. (2007) The Scottish Enlightenment: The Historical Age of the Historical Nation. Birlinn. Pp240.
- <sup>613</sup> Salzberger, F. (2013) The Political Theory of the Scottish Enlightenment. In, Broadie, A. (2013) The Cambridge Companion to the Scottish Enlightenment. Cambridge University Press. Pp366.
- <sup>614</sup> Steuart, J. (1767) An Inquiry into the Principles of Political Economy. <https://www.marxists.org/reference/subject/economics/steuart/index.htm>
- <sup>615</sup> Steuart, J. (1805) Works, Political, Metaphysical and Chronological. <https://archive.org/details/workspoliticalm00steuogoo/page/n6>
- <sup>616</sup> Steuart, J. (1759) Dissertation on the Policy of Grain: with a View to a Plan for Preventing the Scarcity or Exorbitant Prices in the Common Markets of England. <https://www.hetwebsite.net/het/profiles/steuart.htm>
- <sup>617</sup> Schumpeter, J. (1954) History of Economic Analysis. <http://www.urbanlab.org/articles/economics/Schumpeter%201954%20-%20history%20economic%20analysis.pdf>
- <sup>618</sup> Hutchison, T. (1988) Before Adam Smith: The emergence of political economy, 1662-1776. Blackwell. Pp469.
- <sup>619</sup> Haakonssen, K. (2013) Natural Jurisprudence and the Theory of Justice. In, Broadie, A. (2013) The Cambridge Companion to the Scottish Enlightenment. Cambridge University Press. Pp366.
- <sup>620</sup> Berry, C. (2013) Sociality and Socialisation. In, Broadie, A. (2013) The Cambridge Companion to the Scottish Enlightenment. Cambridge University Press. Pp366.
- <sup>621</sup> [http://www.efm.bris.ac.uk/economics/working\\_papers/pdf/efm/dp08601.pdf](http://www.efm.bris.ac.uk/economics/working_papers/pdf/efm/dp08601.pdf)
- <sup>622</sup> James, H. (2005) Sustainable agriculture and free market economics: Finding common ground in Adam Smith. Agriculture and Human Values 23:427–438.
- <sup>623</sup> Smith, A. (1776) An Inquiry into the Nature and Causes of the Wealth of Nations. Pp663. <http://www.gutenberg.org/files/3300/3300-h/3300-h.htm>
- <sup>624</sup> Smith, A. (1790) A Theory of Moral Sentiments. Pp322. [https://www.ibiblio.org/ml/libri/s/SmithA\\_MoralSentiments\\_p.pdf](https://www.ibiblio.org/ml/libri/s/SmithA_MoralSentiments_p.pdf)
- <sup>625</sup> Smith, A. (1776) An Inquiry into the Nature and Causes of the Wealth of Nations. Pp663. <http://www.gutenberg.org/files/3300/3300-h/3300-h.htm>
- <sup>626</sup> Peter M. Jones, P. (2016) Agricultural Enlightenment: Knowledge, Technology, and Nature, 1750-1840. Oxford Scholarship Online. Pp 270. [www.oxfordscholarship.com](http://www.oxfordscholarship.com)

- 
- <sup>627</sup> Pinker, S. (2018) *Enlightenment Now: The Case for Reason, Science, Humanism and Progress*. Penguin. Pp556.
- <sup>628</sup> Koplin, J. and Savulescu, J. (2019) Time to Rethink the Law on Part-human Chimeras. *Journal of Law and the Biosciences*, 1–14. doi:10.1093/jlb/lsz005  
<https://watermark.silverchair.com>
- <sup>629</sup> Pinker, S. (2018) *Enlightenment Now: The Case for Reason, Science, Humanism and Progress*. Penguin. Pp556.
- <sup>630</sup> Russell. B. (1945) *History of Western Philosophy - and its Connection with Political and Social Circumstances from the Earliest Times to the Present Day*. Allen and Unwin. Pp923.
- <sup>631</sup> Hume, D. (1738) *Treatise of Human Nature*. <https://www.gutenberg.org/files/4705/4705-h/4705-h.htm>
- <sup>632</sup> Isaiah 2:4
- <sup>633</sup> Davis, E. (2008) *Scripture, Culture, and Agriculture: An Agrarian Reading of the Bible*. Cambridge University Press. Pp234.  
<http://www.gutenberg.org/cache/epub/4391/pg4391-images.html>
- <sup>634</sup> Falvey, L. (2015) *Religion and Agriculture: Sustainability in Christianity and Buddhism*. Institute for International Development. Pp350.
- <sup>635</sup> Falvey, L. (2015) *Religion and Agriculture: Sustainability in Christianity and Buddhism*. Institute for International Development. Pp350.
- <sup>636</sup> Davis, E. (2008) *Scripture, Culture, and Agriculture: An Agrarian Reading of the Bible*. Cambridge University Press. Pp234.
- <sup>637</sup> Davis, E. (2008) *Scripture, Culture, and Agriculture: An Agrarian Reading of the Bible*. Cambridge University Press. Pp234.
- <sup>638</sup> Orr, D. (2003) *The Uses of Prophecy*. In Wirzba, N. (2003) *The Essential Agrarian Reader: The Future of Culture, Community, and the Land*. University of Kentucky Press. Pp276.
- <sup>639</sup> Isaiah. 1:19
- <sup>640</sup> Romans 8:18-25
- <sup>641</sup> Revelations 11:16-18, 21; 1,5
- <sup>642</sup> Genesis 3:17-19
- <sup>643</sup> Deuteronomy 11:11-17
- <sup>644</sup> Isaiah 16:8; Hosea 4:3
- <sup>645</sup> Genesis 2:15
- <sup>646</sup> Falvey, L. (2012) *Song of Songs of Solomon*.  
<http://www.gutenberg.us/eBooks/WPLBN0002828508-Song-of-Songs-of-Solomon-A-Poetic-Interpretation-by-Falvey-John-Lindsay-Dr-.aspx?>
- <sup>647</sup> Jeremiah 4: 26
- <sup>648</sup> Isaiah 24:1-6
- <sup>649</sup> Genesis 8:21-22
- <sup>650</sup> Genesis 2:8
- <sup>651</sup> Psalm 85:12
- <sup>652</sup> Deuteronomy 11:10-12
- <sup>653</sup> Davis, E. (2008) *Scripture, Culture, and Agriculture: An Agrarian Reading of the Bible*. Cambridge University Press. Pp234.
- <sup>654</sup> Genesis 2:7
- <sup>655</sup> Genesis 2:5-6
- <sup>656</sup> Genesis 5:29
- <sup>657</sup> Genesis 6:11-13
- <sup>658</sup> Genesis 8:22
- <sup>659</sup> Genesis 9:20
- <sup>660</sup> Isaiah 28:24-26
- <sup>661</sup> Hiebert, T. (1996) *The Yahwist's Landscape: Nature and Religion in Early Israel*. Oxford University Press. Pp232.
- <sup>662</sup> Genesis 1:26, 28

- 
- 663 Genesis 29-30  
664 Leviticus 25:23  
665 Leviticus 26:3-5, 9)  
666 Leviticus 26:20  
667 Leviticus 26:34  
668 Ezekiel 20:7-8  
669 Davis, E. (2008) *Scripture, Culture, and Agriculture: An Agrarian Reading of the Bible*. Cambridge University Press. Pp234.  
670 Genesis 47:13-26  
671 Cribb, J. (2019) *Food or War*. Cambridge University Press. Pp335.  
672 Butz, E. (1974) What to Do: Costly Choices. *Time*. November 11:80. [comment made at World Food Conference, Rome]  
673 Revelations 11:18  
674 Exodus 14:26-15:19  
675 Exodus 16:3  
676 Exodus 16:28  
677 Exodus 16:33-34  
678 Deuteronomy 20:19, 22:4, 6-7; 25:4  
679 Leviticus 19:19  
680 Leviticus 25:2  
681 Miles, J. (1996) *God: A Biography*. Vintage. Pp446.  
682 Leviticus 25  
683 Leviticus 11  
684 Leviticus 26:5, 10  
685 Genesis 2:15  
686 compare: Genesis 3:17; 4:11; Leviticus 26; Psalms 72; 37  
687 Exodus 23:10-11  
688 Habel, N. and Wurst, S. (2000) *The Earth Story in Genesis*. Volume 2. Pilgrim. Pp236.  
689 Deuteronomy 20:19  
690 Meyer, M. (Editor, 2002) *Reverence For Life: The Ethics of Albert Schweitzer for the Twenty-First Century* (Albert Schweitzer Library). Syracuse University Press. Pp376.  
691 1 Kings 21  
692 Ecclesiastes 5:9  
693 Falvey, L. (2008) *Pranja Anthology*.  
<http://www.gutenberg.us/eBooks/WPLBN0002170104-Ecclesiastes--Pranja-Anthology-Qoheleth-c-250BCE-2008-by-Lindsay-Falvey.aspx>  
694 Numbers 21:25; Joshua 15:45, 47 Matthew 23:37  
695 Falvey, L. (2002) Sustainable Agriculture and Natural Truth: A Consideration of Technology and Wisdom. *Asian Agri-History Journal* 5: 23-28. 24.  
696 Amos 9:8  
697 Hosea 13:15  
698 Amos 5:11  
699 For example, Isaiah 2:4; Micah. 4:3  
700 Amos 9:14-15  
701 Hosea 8:7-9)  
702 For example, (Hosea 2:18-19, 21-22  
703 Davis, E. (2008) *Scripture, Culture, and Agriculture: An Agrarian Reading of the Bible*. Cambridge University Press. Pp234.  
704 Nehemiah 5:3-5  
705 Micah 6:9-16

- 
- <sup>706</sup> Falvey, L. (2009) *Dharma as Man: A Myth of Jesus in Buddhist Lands*. Uni-verity Press. Pp250.
- <sup>707</sup> Psalm 107:35-39
- <sup>708</sup> Falvey, L. (2012) *Song of Songs of Solomon*.  
<http://www.gutenberg.us/eBooks/WPLBN0002828508-Song-of-Songs-of-Solomon-A-Poetic-Interpretation-by-Falvey-John-Lindsay-Dr-.aspx?>
- <sup>709</sup> Miles, J. (1996) *God: A Biography*. Vintage. Pp446.
- <sup>710</sup> Koha'k, E. (1992) *Perceiving the Good*. In, *The Wilderness Condition: Essays on Environment and Civilization*. Sierra Club. Pp345.
- <sup>711</sup> Gardiner, S. and Thompson, A. (2016) *Introducing Contemporary Environmental Ethics*. *The Oxford Handbook of Environmental Ethics*. Oxford Handbooks Online. Pp616.  
<http://www.oxfordhandbooks.com.ezp.lib.unimelb.edu.au/view/10.1093/oxfordhb/9780199941339.001.0001/oxfordhb-9780199941339-e-46?print>
- <sup>712</sup> Lyons et al. (2015) in Gardiner, S. and Thompson, A. (2016) *Introducing Contemporary Environmental Ethics*. *The Oxford Handbook of Environmental Ethics*. Oxford Handbooks Online. Pp616.  
<http://www.oxfordhandbooks.com.ezp.lib.unimelb.edu.au/view/10.1093/oxfordhb/9780199941339.001.0001/oxfordhb-9780199941339-e-46?print>
- <sup>713</sup> White, L. (1967) *The Historical Roots of Our Ecological Crisis*. *Science, New Series* 155(3767): 1203-1207
- <sup>714</sup> Genesis 1:26
- <sup>715</sup> Barbour, I. (1973) *Western Man and Environmental Ethics*. Addison-Wesley. Pp276.
- <sup>716</sup> Nash, R. (2001) *Wilderness and the American Mind*. Yale University Press.
- <sup>717</sup> Emerson, R. (1836, 2000) *The Essential Writings of Ralph Waldo Emerson*. The Modern Library. Pp880.
- <sup>718</sup> Thoreau, H. (2017) *Walden*. CreateSpace. Pp196.
- <sup>719</sup> Salt, H. (2000) *The Life of Henry David Thoreau*. University of Illinois Press. Pp192.
- <sup>720</sup> Darwin, C. (1859, 2001) *On the Origin of Species*. Harvard Paperbacks. Pp540.
- <sup>721</sup> Taylor, B. (1995) *Ecological Resistance Movements: The Global Emergence of Radical and Popular Environmentalism*. SUNY Press. Pp440.
- <sup>722</sup> Roberts, D. (2018) <https://www.vox.com/energy-and-environment/2017/11/8/16611710/vertical-farms>
- <sup>723</sup> <http://www.gulf-times.com/story/567176/Spanish-team-keen-to-expand-greenhouse-project-in->
- <sup>724</sup> Falvey, L. (2013) *Beliefs that Bias Food & Agriculture: Questions I'm Often Asked*. Institute for International Development. Pp 328.
- <sup>725</sup> Lovelock, J. (1995) *Gaia: A New Look at Life on Earth*. Oxford University Press. Pp157.
- <sup>726</sup> Nixon, R. (2013) *Slow Violence and the Environmentalism of the Poor*. Harvard University Press. Pp370.
- <sup>727</sup> Carson, R. (1962). *Silent Spring*. Houghton Mifflin. Pp378.
- <sup>728</sup> Hardin, G. (1968) *The Tragedy of the Commons*. *Science* 162(3859): 1243-1248.
- <sup>729</sup> Singer, P. (1979) *Animal Liberation*. Harper. Pp368.
- <sup>730</sup> Marx, K. and Engels, F. (1988), pp. 348, 355, 358 *Theories of Surplus Value*. *Economic Manuscripts of 1861–1863 in the Collected Works of Karl Marx and Frederick Engels: Volume 30*, International Publishers. Pp538.
- <sup>731</sup> Steiner, P. (2003) *Physiocracy and French Pre-Classical Political Economy*. Chapter 5. in Biddle, J., Davis, J. and Samuels, W. *A Companion to the History of Economic Thought*. Blackwell. Pp736.
- <sup>732</sup> Bodde, D. (2005) *Chinese Ideas in the West*. Asia for Educators, Columbia University.  
<http://www.learn.columbia.edu/nanxuntu/html/state/ideas.pdf>

- <sup>733</sup> Baghdiantz McCabe, I. (2008) *Orientalism in Early Modern France: Eurasian Trade Exoticism and the Ancien Regime*. Berg. Pp409.
- <sup>734</sup> Spiegel, H. (1983) *The Growth of Economic Thought: Revised and Expanded Edition*. Duke University Press. Pp896.
- <sup>735</sup> Brass, T. (2014) *Class, Culture and the Agrarian Myth*. Brill. Pp447.
- <sup>736</sup> Little, D. (1989) *Understanding Peasant China: Case Studies in the Philosophy of Social Science*. Yale University Press. Pp322.
- <sup>737</sup> Falvey, L. (2001) The Tai and Thai Agriculture. *Asian Agri-History Journal* 5: 109-122.
- <sup>738</sup> Chao, K. (1975) *Man and Land in Chinese History: An Economic Analysis*. Stanford UNiversity Press. Pp282.
- <sup>739</sup> Lippert, V. (1978) The Development of Underdevelopment in China. *Modern China* 4: 251-328.
- <sup>740</sup> Hobsbawm, E. (1959) *Primitive Rebels: Studies in Archaic Forms of social movement in the nineteenth and twentieth centuries*. Praeger. Pp173.  
<https://ourrebellion.files.wordpress.com/2012/07/eric-hobsbawm-primitive-rebels.pdf>
- <sup>741</sup> Perkins, D. (2013) *Encyclopedia of China: History and Culture*. Routledge. Pp684.
- <sup>742</sup> Spence, J. (1996) *God's Chinese Son: The Taiping Heavenly Kingdom of Hong Xiuquan*. Norton. Pp432.
- <sup>743</sup> Tilly, C. (1976) *The Vendée*. Harvard University Press. Pp373.
- <sup>744</sup> Geertz, C. (1974) From the Native's Point of View: On the Nature of Anthropological Understanding. *Bulletin of the American Academy of Arts and Sciences* 28(1): 26-45.  
[http://hypergeertz.jku.at/GeertzTexts/Natives\\_Point.htm](http://hypergeertz.jku.at/GeertzTexts/Natives_Point.htm)
- <sup>745</sup> Thompson, P. (2010) *The Agrarian Vision: Sustainability and Environmental Ethics*. University of Kentucky Press. Pp325. <https://www.jstor.org/stable/j.ctt2jcqjc.4>
- <sup>746</sup> Brundtland, G. (1987) *Our Common Future*. Oxford University Press. Pp400.
- <sup>747</sup> Immanuel Kant (1784) *An Answer to the Question: What is Enlightenment?*  
<https://www.marxists.org/reference/subject/ethics/kant/enlightenment.htm>
- <sup>748</sup> <https://uwdc.library.wisc.edu/collections/aldoleopold/>
- <sup>749</sup> <http://www.wendellberrybooks.com/books.html>
- <sup>750</sup> <https://www.accesstoinsight.org/ptf/dhamma/sacca/sacca4/samma-kammanto/index.html>
- <sup>751</sup> Falvey, L. (2013) *Beliefs that Bias Food & Agriculture: Questions I'm Often Asked*. Institute for International Development. Pp328.
- <sup>752</sup> Thompson, P. (2010) *The Agrarian Vision: Sustainability and Environmental Ethics*. University of Kentucky Press. Pp325. <https://www.jstor.org/stable/j.ctt2jcqjc.4>
- <sup>753</sup> Jefferson (1785) Letter to John Jay. [http://avalon.law.yale.edu/18th\\_century/let32.asp](http://avalon.law.yale.edu/18th_century/let32.asp)
- <sup>754</sup> Guthman, J. (2014) *Agrarian Dreams: The Paradox of Organic Farming in California*. University of California Press. Pp328.  
<http://www.wendellberrybooks.com/books.html>
- <sup>756</sup> Miller, P. (1950) *The Transcendentalists: An Anthology*. Harvard University Press. Pp540.  
<http://www.fao.org/agriculture/crops/core-themes/theme/pests/ipm/en/>
- <sup>758</sup> Paull, J. (2011) Attending the First Organic Agriculture Course: Rudolf Steiner's Agriculture Course at Koberwitz, 1924. *European Journal of Social Sciences* 2(1):64–70.
- <sup>759</sup> Mollison, B. (1991) *Introduction to Permaculture*. Tagari. Pp216.
- <sup>760</sup> Inge, M (1969) *Agrarianism in American Literature*. Odyssey Press. Pp388.  
<https://plato.stanford.edu/entries/bentham/>
- <sup>762</sup> Jefferson, V. (2004) An Overview of the Genetically Modified Food Debate. In *Genetically Engineered Foods*, by N. Harris. Greenhaven Press. Pp112.
- <sup>763</sup> Pollan, M. (2008) *In Defense of Food: An Eater's Manifesto*. Penguin. Pp256.

- 
- <sup>764</sup> Despommier, D. (2011) *The Vertical Farm: Feeding the World in the 21st Century*. Picador. Pp336.
- <sup>765</sup> Berry, W. (2010) *What Are People For?* Counterpoint. Pp210.
- <sup>766</sup> Falvey, L. (2010) *Small Farmers Secure Food: Survival Food Security, the World's Kitchen and the Critical Role of Small Farmers*. Thaksin University Press, pp232.
- <sup>767</sup> Shue, H. quoted in Gardiner, S. and Thompson, A. (2016) *Introducing Contemporary Environmental Ethics*. *The Oxford Handbook of Environmental Ethics*. Oxford Handbooks Online. Pp616.  
<http://www.oxfordhandbooks.com.ezp.lib.unimelb.edu.au/view/10.1093/oxfordhb/9780199941339.001.0001/oxfordhb-9780199941339-e-46?print>
- <sup>768</sup> Gardiner, S. and Thompson, A. (2016) *Introducing Contemporary Environmental Ethics*. *The Oxford Handbook of Environmental Ethics*. Oxford Handbooks Online. Pp616.  
<http://www.oxfordhandbooks.com.ezp.lib.unimelb.edu.au/view/10.1093/oxfordhb/9780199941339.001.0001/oxfordhb-9780199941339-e-46?print>
- <sup>769</sup> [www.waterfootprint.org](http://www.waterfootprint.org)
- <sup>770</sup> <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.13.2349&rep=rep1&type=pdf>,
- <sup>771</sup> Vörösmarty, C., Green, P., Salisbury, J. and Lammers, R. (2000) *Global Water Resources: Vulnerability from Climate Change and Population Growth*. *Science*, 289:(5477): 284-288.
- <sup>772</sup> Falkenmark, M. and Folke, C. (2002) *The Ethics of Socio-ecohydrological Catchment Management: Towards Hydrosolidarity*. *Hydrology and Earth System Sciences* 6(1): 1-10.
- <sup>773</sup> Gardiner, S. and Thompson, A. (2016) *Introducing Contemporary Environmental Ethics*. *The Oxford Handbook of Environmental Ethics*. Oxford Handbooks Online. Pp616.  
<http://www.oxfordhandbooks.com.ezp.lib.unimelb.edu.au/view/10.1093/oxfordhb/9780199941339.001.0001/oxfordhb-9780199941339-e-46?print>
- <sup>774</sup> Thompson, P. (2010) *The Agrarian Vision: Sustainability and Environmental Ethics*. University of Kentucky Press. Pp323.
- <sup>775</sup> Wattles, J. (1996) *The Golden Rule*. Oxford University Press. Pp272.
- <sup>776</sup> Carson, R. (1962). *Silent Spring*. Houghton Mifflin. Pp378.
- <sup>777</sup> <https://onlinelibrary.wiley.com/doi/abs/10.1002/sce.3730180102>
- <sup>778</sup> Schweitzer, A. (1998) *Out of my Life and Thought*. Johns Hopkins University Press. Pp272.
- <sup>779</sup> Tang, P. (1944) *Helios and Prometheus: A Philosophy of Agriculture*. *The Scientific Monthly* 58(3): 169-175.
- <sup>780</sup> Willis, A. (1997) *The Ecosystem: An Evolving Concept Viewed Historically*. *Functional Ecology* 11(2): 268-271.
- <sup>781</sup> Leopold, A. (1949) *A Sand County Almanac and Sketches Here and There*. Oxford University Press. Pp240.
- <sup>782</sup> Naess, A. (1973) *The Shallow and the Deep, Long-Range Ecology Movement. A Summary*. *Inquiry* 16: 95-100.  
<http://www.wildsreprisal.com/PDF's/Cascadia%20Rising/The%20shallow%20and%20the%20deep,%20long-range%20ecology%20movement.pdf>
- <sup>783</sup> Elliott, R. (1997) *Faking Nature: The Ethics of Environmental Restoration*. Routledge. Pp192.
- <sup>784</sup> <https://www.millenniumassessment.org/en/Reports.html>
- <sup>785</sup> Gardiner, S. and Thompson, A. (2016) *Introducing Contemporary Environmental Ethics*. *The Oxford Handbook of Environmental Ethics*. Oxford Handbooks Online. Pp616.  
<http://www.oxfordhandbooks.com.ezp.lib.unimelb.edu.au/view/10.1093/oxfordhb/9780199941339.001.0001/oxfordhb-9780199941339-e-46?print>
- <sup>786</sup> Bruckner, P. (2012) *The Tyranny of Guilt*. Princeton University Press. Pp256.
- <sup>787</sup> Kaplan, D. (2012) *The Philosophy of Food*. University of California Press. Pp321.

- 
- <sup>788</sup> Evans, M (2019) *On Eating Meat: The Truth About its Production and the Ethics of Eating it*. Murdoch Books. Pp312.
- <sup>789</sup> Cicero (51BCE) *De Re Publica*. <http://www.gutenberg.org/files/54161/54161-h/54161-h.htm>
- <sup>790</sup> Aquinas, T. (1274) *Summa Theologica*. <https://dhspritory.org/thomas/summa/>
- <sup>791</sup> Falvey, L. (2002) Sustainable Agriculture and Natural Truth: A Consideration of Technology and Wisdom. *Asian Agri-History Journal* 5: 23-28. 24.
- <sup>792</sup> [https://openlibrary.org/authors/OL224030A/Johannes\\_Scotus\\_Erigena?sort=old#editions](https://openlibrary.org/authors/OL224030A/Johannes_Scotus_Erigena?sort=old#editions)
- <sup>793</sup> Kaplan, D. (2012) *The Philosophy of Food*. University of California Press. Pp321.
- <sup>794</sup> Korthals, M. (2004) *Before Dinner: Philosophy and Ethics of Food*. The International Library of Environmental, Agricultural and Food Ethics. Springer. Pp219.
- <sup>795</sup> *The Essential Epicurus* (1993). Penguin. Pp101.
- <sup>796</sup> Jefferson, T. (1798) <https://founders.archives.gov/documents/Jefferson/01-30-02-0136>
- <sup>797</sup> Tolstoy, L. (1875) Translated by Pevear, R. and Volokhonsky, L. (2004). *Anna Karenina*. Penguin. Pp864.
- <sup>798</sup> Emerson, R. (1876) *English Traits*. <http://www.gutenberg.org/files/39862/39862-h/39862-h.html>
- <sup>799</sup> Falvey, L. (2005) *Religion and Agriculture: Sustainability in Christianity and Buddhism*. Institute for International Development. Pp350.
- <sup>800</sup> Iannotti, I., Lutter, C., Stewart, C., Riofrío, C., Malo, C., Reinhart, G. and Palacios, A. (2017) *Pediatrics*, July 2017. Eggs in early complementary feeding and child growth: A randomized controlled trial. <http://pediatrics.aappublications.org/content/pediatrics/140/1/e20163459.full.pdf>
- <sup>801</sup> Pascoe, B. (2004) *Dark Emu: Aboriginal Australia and the Birth of Agriculture*. Mangabala Books. Pp177.
- <sup>802</sup> Thompson, R. (2011) *Agro-Technology: A Philosophical Introduction*. Cambridge University Press. Pp258.
- <sup>803</sup> Kant, E. (1796) *The Metaphysics of Ethics*. <https://oll.libertyfund.org/titles/kant-the-metaphysics-of-ethics>
- <sup>804</sup> Matthew 7:12 for Christianity; found in similar forms in all of the world's religions.
- <sup>805</sup> Hume, D. (1738) *Treatise of Human Nature*. <https://www.gutenberg.org/files/4705/4705-h/4705-h.htm>
- <sup>806</sup> Bentham (1748-1832), Bentham, J. (1789, 1907) *An Introduction to the Principles of Morals and Legislation*. Clarendon Press. <http://oll.libertyfund.org/titles/bentham-an-introduction-to-the-principles-of-morals-and-legislation>
- <sup>807</sup> Wattles, J. (1996) *The Golden Rule*. Oxford University Press. Pp272.
- <sup>808</sup> Kant, Immanuel (1785, Translated by Ellington, J., 1993) *Grounding for the Metaphysics of Morals*. Hackett. Pp92.
- <sup>809</sup> Mepham, B. (1996) *Food Ethics*. Routledge. Pp192.
- <sup>810</sup> FAO (1996) *The Rome Declaration agreed at the World Food Summit*. <http://www.fao.org/docrep/003/w3613e/w3613e00.HTM>
- <sup>811</sup> Korthals, M. (2004) *Before Dinner: Philosophy and Ethics of Food*. The International Library of Environmental, Agricultural and Food Ethics. Springer. Pp219.
- <sup>812</sup> Dostoyevsky, F. (1880) translated by Constance Garnett, 1912) *The Brothers Karamazov*. Heinemann. [http://www.online-literature.com/dostoyevsky/brothers\\_karamazov/73/](http://www.online-literature.com/dostoyevsky/brothers_karamazov/73/)
- <sup>813</sup> Aristotle (384-322BCE) *Nicomachean Ethics*, 1106b. <http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0054%3Abekker+page%3D1106b>
- <sup>814</sup> *The Ethic of Reverence for Life*. <http://www.animal-rights-library.com/texts-c/schweitzer01.pdf>
- <sup>815</sup> Spinoza (1677) *Ethics* 5, 37. <https://ebooks.adelaide.edu.au/s/spinoza/benedict/ethics/>

- <sup>816</sup> Kennedy, J. (1992) *The New Anthropomorphism*. Cambridge: Cambridge University Press. Pp175.
- <sup>817</sup> Darwin, C. (1872) *The Expression of the Emotions in Man and Animals*. [http://darwin-online.org.uk/converted/pdf/1897\\_Expression\\_F1152.pdf](http://darwin-online.org.uk/converted/pdf/1897_Expression_F1152.pdf)
- <sup>818</sup> For example, see <http://www.animalwelfare.net.au/>
- <sup>819</sup> Turner, J. and D'Silva, J. (2006) *Animals, Ethics and Trade: The Challenge of Animal Sentience*. Earthscan. Pp286.
- <sup>820</sup> Dhammika Sutta. Sn 2.14  
<https://www.accesstoinight.org/tipitaka/kn/snp/snp.2.14.irel.html>
- <sup>821</sup> For example, Colossians 3:12
- <sup>822</sup> Schweitzer, A. (1949; 1987) *The Philosophy of Civilization*. Prometheus. Pp346.
- <sup>823</sup> Jha, D. (2002) *The Myth of the Holy Cow*. Verso. Pp184.
- <sup>824</sup> Schopenhauer, A. (1851, 2014) *Parerga and Paralipomena*. Cambridge University Press. Pp480.
- <sup>825</sup> Korthals, M. (2004) *Before Dinner: Philosophy and Ethics of Food*. The International Library of Environmental, Agricultural and Food Ethics. Springer. Pp219.
- <sup>826</sup> Caras, R. (2002) *A Perfect Harmony: The Intertwining Lives of Animals and Humans Throughout History*. Simon & Schuster. Pp.271.
- <sup>827</sup> Falvey, L. (1998) *Introduction to Working Animals*. MPW Australia. Pp200.
- <sup>828</sup> Broom, D (1991) *Animal Welfare: Concepts and Measurement*. Journal of Animal Science 69: 4167-4175.
- <sup>829</sup> Aristotle (384-322BCE) *Politics*, Book 1(8): 1256
- <sup>830</sup> Aquinas, T. (1274) *Summa Theologiae*.  
[http://www.documentacatholicaomnia.eu/03d/1225-1274\\_Thomas\\_Aquinas\\_Summa\\_Theologiae\\_%5B1%5D\\_EN.pdf](http://www.documentacatholicaomnia.eu/03d/1225-1274_Thomas_Aquinas_Summa_Theologiae_%5B1%5D_EN.pdf)
- <sup>831</sup> Montaigne, M. (1580, 1992) *Montaigne: Complete Essays*. Viking. Pp1344.
- <sup>832</sup> Spinoza, B. (1677) *Ethics* 4: 37. <https://www.gutenberg.org/files/3800/3800-h/3800-h.htm>
- <sup>833</sup> Kant, I. (1790) *Critique of Judgement*. <http://oll.libertyfund.org/titles/kant-the-critique-of-judgement>
- <sup>834</sup> Kant, I. (1790) *Critique of Judgement*. <http://oll.libertyfund.org/titles/kant-the-critique-of-judgement>
- <sup>835</sup> Schopenhauer (1851) *Parerga und Paralipomena*. Parerga und Paralipomena
- <sup>836</sup> Nietzsche, F. (1892, Translated by Kaufmann, W., 1974) *The Gay Science*. Pp416.
- <sup>837</sup> The five freedoms are, from: hunger and thirst; discomfort; pain, injury and disease; inability to express normal behaviours, and fear and distress.
- <sup>838</sup>  
<http://webarchive.nationalarchives.gov.uk/20121010012427/http://www.fawc.org.uk/freedoms.htm>
- <sup>839</sup> Broom, D (1991) *Animal Welfare: Concepts and Measurement*. Journal of Animal Science 69: 4167-4175.
- <sup>840</sup> Korthals, M. (2004) *Before Dinner: Philosophy and Ethics of Food*. The International Library of Environmental, Agricultural and Food Ethics. Springer. Pp219. Referring to Metz, J. (2000) *Veehouderijsystemen van de toekomst*. Wageningen: Universiteit & Researchcentrum, oratie.
- <sup>841</sup> Perry, B., Robinson, T. and Grace, D. (2018) Review: Animal health and sustainable global livestock systems. *Animal*, April 10.
- <sup>842</sup> Rööös, E., Patel, M., Spångberg, J., Carlsson, G. and Rydhmer, L. (2016) Limiting livestock production to pasture and by-products in a search for sustainable diets. *Food Policy* 58: 1–13.
- <sup>843</sup> World Bank (2012) *People, pathogens and our planet – The Economics of One Health*, Volume 2, World Bank. Washington, DC.

- <sup>844</sup> Perry, B., Robinson, T. and Grace, D. (2018) Review: Animal health and sustainable global livestock systems. *Animal*, April 10.
- <sup>845</sup> Grace, D. (2014) The business case for One Health. *Onderstepoort Journal of Veterinary Research* 81: 1–6.
- <sup>846</sup> ILRI (2018) On the need for expanding sustainability frameworks and veterinary vision in developing countries. *ILRI News*, April 24.  
[https://mail.google.com/mail/u/0/?ui=2&ik=ee39da8bbd&jsver=-CePnFTesrE.en\\_GB.&view=pt&msg=162f904056bf54be&search=inbox&siml=162f904056bf54be](https://mail.google.com/mail/u/0/?ui=2&ik=ee39da8bbd&jsver=-CePnFTesrE.en_GB.&view=pt&msg=162f904056bf54be&search=inbox&siml=162f904056bf54be)
- <sup>847</sup> Iannotti, L. (2018) Livestock and animal-source foods. *Global Forum for Food and Agriculture*, Berlin, March 6. <https://news.ilri.org/2018/03/06/lora-iannotti-on-livestock-and-animal-source-foods-at-berlins-global-forum-for-food-and-agriculture/> 1/11
- <sup>848</sup> Iannotti, L. et al. (2017) Eggs early in complementary feeding increase choline pathway biomarkers and DHA: a randomized controlled trial in Ecuador. *American Journal of Clinical Nutrition*. <https://www.ncbi.nlm.nih.gov/pubmed/29092879>
- <sup>849</sup> Grace, D., Dominguez-Salas, P., Alonso, S., Lannerstad, M., Muunda, E., Ngwili, N., Omar, A., Khan, M. and Otoo E. (2018) The Influence of Livestock-derived Foods on Nutrition During the First 1,000 Days of Life. Report 44. International Livestock Research Institute. Pp82. [ilri.org](http://ilri.org)
- <sup>850</sup> Iannotti, L., Lutter, C., Stewart, C., Riofrío, C., Malo, C., Reinhart, G. and Palacios, A. (2017) Pediatrics, July 2017. Eggs in early complementary feeding and child growth: A randomized controlled trial.  
<http://pediatrics.aappublications.org/content/pediatrics/140/1/e20163459.full.pdf>
- <sup>851</sup> Grace, D., Dominguez-Salas, P., Alonso, S., Lannerstad, M., Muunda, E., Ngwili, N., Omar, A., Khan, M. and Otoo E. (2018) The Influence of Livestock-derived Foods on Nutrition During the First 1,000 Days of Life. Report 44. International Livestock Research Institute. Pp82. [ilri.org](http://ilri.org)
- <sup>852</sup> <http://www.anthropocenemagazine.org/2018/03/what-if-we-treated-meat-consumption-like-food-waste/> after Shepon et. Al. (2018) The opportunity cost of animal based diets exceeds all food losses. *Proceedings of the National Academy of Sciences*.
- <sup>853</sup> Randolph, T., Schelling, E., Grace, D., Nicholson, C., Leroy, J., Cole, D., Demment, W., Omere, A., Zinsstag, J. and Ruel, M. (2007) Invited Review: Role of Livestock in Human Nutrition and Health for Poverty Reduction in Developing Countries. *Journal of Animal Science* 85(11): 2788–2800.
- <sup>854</sup> *The Economist* (2002) GM Crops in Africa: Better dead than GM-fed? September 19.
- <sup>855</sup> Suzuki, D. (2016) *Selected Works of D. T. Suzuki, Volume III: Comparative Religion*. University of California Press, Pp320.
- <sup>856</sup> Rawls, J. (1971) *A Theory of Justice*. Harvard University Press. Pp560.
- <sup>857</sup> For example, <https://www.wisdomlib.org/buddhism/book/the-bhikkhus-rules/d/doc1739.html>
- <sup>858</sup> <https://www.cgiar.org/>
- <sup>859</sup> <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>
- <sup>860</sup> The Ethic of Reverence for Life. <http://www.animal-rights-library.com/texts-c/schweitzer01.pdf>
- <sup>861</sup> Unger, P. (1996) *Living High and Letting Die: Our Illusion of Innocence*. Oxford University Press. Pp200.
- <sup>862</sup> O’Neill, O. (2000) *Bounds of Justice*. Cambridge University Press. Pp232.
- <sup>863</sup> <http://www.efm.bris.ac.uk/het/hegel/history.pdf>
- <sup>864</sup> ‘The only thing that alcohol does for them is to awake their sense of guilt, which does not bother them during times when they are more sensible.’ Russell, B. (1954) *The Conquest of Happiness*. Pp224.

- 
- <sup>865</sup> Philippians 3:18- 19
- <sup>866</sup> Cribb, J. (2019) Food or War. Cambridge University Press. Pp335.
- <sup>867</sup> <http://www.bradshawfoundation.com/bradshaws/description30.php>.
- <sup>868</sup> <http://www.unhcr.org/en-au/news/stories/2018/6/5b222c494/forced-displacement-record-685-million.html>
- <sup>869</sup> Cribb, J. (2019) Food or War. Cambridge University Press. Pp335.
- <sup>870</sup> <http://www.fao.org/ag/againfo/resources/documents/Lxehtml/tech/ch3b.htm>
- <sup>871</sup> <https://digitalcommons.pepperdine.edu/drlj/vol18/iss1/4>
- <sup>872</sup> [http://futuredirections.org.au/wp-content/uploads/2016/01/FDI\\_Food\\_and\\_Water\\_WEB.pdf](http://futuredirections.org.au/wp-content/uploads/2016/01/FDI_Food_and_Water_WEB.pdf)
- <sup>873</sup> McMichael A. (2017) Climate Change and the Health of Nations. Oxford University Press.
- <sup>874</sup> Falvey, L. (2010) Small Farmers Secure Food: Survival Food Security, the World's Kitchen and the Critical Role of Small Farmers. Thaksin University Press. Pp 232.
- <sup>875</sup> Graham, L. (2016) Lysenko's Ghost: Epigenetics and Russia. Harvard University Press. Pp224.
- <sup>876</sup> Cribb, J. (2019) Food or War. Cambridge University Press. Pp335.
- <sup>877</sup> The Nobel Peace Prize 1949. Lord Boyd Orr. Award Ceremony Presentation Speech by Gunnar Jahn, Chairman of the Nobel Committee. Referred to in Introduction of: Falvey, L. (2012) Derek Tribe – International Agricultural Scientist: Founder of The Crawford Fund. Pp252. The Crawford Fund in association with The Institute for International Development. Pp250.
- <sup>878</sup> Knapp, B. (2000) Voltaire Revisited. Twayne. Pp228.
- <sup>879</sup> Roy, K. (2018) The Power of Philosophy: Thought and Redemption. Palgrave. Pp235.
- <sup>880</sup> Heidegger [http://www.psyg.org/question\\_concerning\\_technology.pdf](http://www.psyg.org/question_concerning_technology.pdf)
- <sup>881</sup> Falvey, L. (2002) Sustainable Agriculture and Natural Truth: A Consideration of Technology and Wisdom. Asian Agri-History Journal 5: 23-28. 24.
- <sup>882</sup> Roy, K. (2018) The Power of Philosophy: Thought and Redemption. Palgrave. Pp235.
- <sup>883</sup> [https://ebookppsunp.files.wordpress.com/2016/06/martin\\_heidegger\\_j-glenn\\_gray\\_translator\\_frebookfi-org.pdf](https://ebookppsunp.files.wordpress.com/2016/06/martin_heidegger_j-glenn_gray_translator_frebookfi-org.pdf)
- <sup>884</sup> For example: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3746176/>
- <sup>885</sup> Shelling, F. (1988) Ideas for a Philosophy of Nature. Cambridge University Press. Pp324.
- <sup>886</sup> Wahl, D. (2005) Zarte Empirie: Goethean Science as a Way of Knowing. Janus Head 8(1):58-75.
- <sup>887</sup> Wittgenstein, L. (1998) Culture and Value. Wiley. Pp236. <https://www.scribd.com/doc/127662302/Ludwig-Wittgenstein-Culture-and-Value-Revised-Edition-Wiley-Blackwell-1998>
- <sup>888</sup> Steiner, R. (1988; Lindemann, W. trans.) Goethean Science. Mercury. Pp158. [https://www.rsarchive.org/Books/Download/Goethean\\_Science-Rudolf\\_Steiner-1.pdf](https://www.rsarchive.org/Books/Download/Goethean_Science-Rudolf_Steiner-1.pdf)
- <sup>889</sup> Roy, K. (2018) The Power of Philosophy: Thought and Redemption. Palgrave. Pp235.
- <sup>890</sup> Gosling, D. (2001) Religion and Ecology in Southeast Asia. Routledge. Pp210.
- <sup>891</sup> Emerson, R. (2015) The Complete Works of Ralph Waldo Emerson. Palala Press. Pp390.
- <sup>892</sup> Packer, B. (2007) The Transcendentalists. University of Georgia Press. Pp320.
- <sup>893</sup> Calculation by Hope of the Judge Institute, Cambridge. Quoted in: Gosling, D. (2001) Religion and Ecology in Southeast Asia. Routledge. Pp210.
- <sup>894</sup> Gadgil, M and Guha, R. (2012) This Fissured Land. Oxford University Press. Pp245.
- <sup>895</sup> Geertz, C. (1973) Growth of Culture and the Evolution of Mind. In Interpretation of Cultures. Basic Books. Pp480. <https://is.muni.cz/el/1423/jaro2016/SOC757/um/61816961/clifford-geertz-the-interpretation-of-cultures.pdf>
- <sup>896</sup> Bellah, R. (2011) Religion In Human Evolution: From the Paleolithic to the Axial Age. Harvard University Press. ProQuest Ebook Central. Pp746. <http://ebookcentral.proquest.com/lib/unimelb/detail.action?docID=3301004>.

- 
- <sup>897</sup> Sacks, O. (2017) *The River of Consciousness*. Picador. Pp256.
- <sup>898</sup> <https://www.gutenberg.org/files/18269/18269-h/18269-h.htm>
- <sup>899</sup> Matthew 18:12–14
- <sup>900</sup> Indra's Net. See <http://ntireader.org/taisho/t0279.html>
- <sup>901</sup> Merlin, D. (1993) *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Harvard University Press. Pp324.
- <sup>902</sup> Bellah, R. (2011) *Religion In Human Evolution: From the Paleolithic to the Axial Age*. Harvard University Press. ProQuest Ebook Central. Pp746.  
<http://ebookcentral.proquest.com/lib/unimelb/detail.action?docID=3301004>.
- <sup>903</sup> Eldredge, N. (2001) *The Sixth Extinction*.  
<http://www.actionbioscience.org/evolution/eldredge2.html>
- <sup>904</sup> Falvey, L. (2005) *Religion and Agriculture: Sustainability in Christianity and Buddhism*. Institute for International Development. Pp350.
- <sup>905</sup> Wood, C. (2018) *Charisma, Ecology and Social Collapse: A Simulation Experiment*.  
<http://mindandculture.org/2018/05/08/charisma-ecology-and-social-collapse-a-simulation-experiment/>
- <sup>906</sup> Jeremiah 8:22.
- <sup>907</sup> Wood, C. (2018) *Charisma, Ecology and Social Collapse: A Simulation Experiment*.  
<http://mindandculture.org/2018/05/08/charisma-ecology-and-social-collapse-a-simulation-experiment/>
- <sup>908</sup> <http://www.rationalpi.com/theshelter/live.html>
- <sup>909</sup> Rappaport, R. (1999) *Ritual and Religion in the Making of Humanity*. Cambridge University Press. Pp535.
- <sup>910</sup> Exodus 16:1-36.
- <sup>911</sup> Levick, B. (2016) *Vespasian*. Routledge. Pp346.
- <sup>912</sup> Cribb, J. (2019) *Food or War*. Cambridge University Press. Pp335.
- <sup>913</sup> Darwin, C. (1859) *The Origin of Species*. [http://darwin-online.org.uk/converted/pdf/1861\\_OriginNY\\_F382.pdf](http://darwin-online.org.uk/converted/pdf/1861_OriginNY_F382.pdf)
- <sup>914</sup> Vavilov, N. (translated by Doris Live, 1992) *Origin and Geography of Cultivated Plants* Cambridge University Press. Pp498.
- <sup>915</sup> Malthus, T. (1798) *An Essay on the Principle of Population*.  
<http://www.esp.org/books/malthus/population/malthus.pdf>
- <sup>916</sup> Mendel, G. (1865) *Experiments in Plant Hybridization*.  
<http://www.mendelweb.org/Mendel.html>
- <sup>917</sup> Cromer, A. (1993) *Uncommon Sense: The Heretical Nature of Science*. Oxford University Press. Pp240.
- <sup>918</sup> Genesis 4.
- <sup>919</sup> Taylor, C. (2007) *A Secular Age*. Belknap. Pp896.
- <sup>920</sup> Dawkins, R. (1992) *Viruses of the Mind*. Voltaire Lecture to the Humanists Association.  
<http://bactra.org/Dawkins/viruses-of-the-mind.html>
- <sup>921</sup> Falvey, L. (2016) *Understanding Southeast Asia: Syncretism in Commonalities*. Thaksin University Press. Pp187.
- <sup>922</sup> Nelson, J. (2009) *Psychology, Religion and Spirituality*. Springer. Pp731.
- <sup>923</sup> Moore, W. (2015) *Schrödinger: Life and Thought*. Cambridge University Press. Pp513.
- <sup>924</sup> Schrödinger, E. (1924) Bohr's New Radiation Hypothesis. Quoted in: Moore, W. (2015) *Schrödinger: Life and Thought*. Cambridge University Press. Pp513.
- <sup>925</sup> Schrödinger, E. (1961) *Meine Weltansicht*. Quoted in: Moore, W. (2015) *Schrödinger: Life and Thought*. Cambridge University Press. Pp513.
- <sup>926</sup> Schrödinger to Einstein; Letter dated August 8, 1935. Quoted in: Moore, W. (2015) *Schrödinger: Life and Thought*. Cambridge University Press. Pp513.
- <sup>927</sup> [http://hermes.ffnub.es/luisnavarro/nuevo\\_maletin/Schrodinger\\_1935\\_cat.pdf](http://hermes.ffnub.es/luisnavarro/nuevo_maletin/Schrodinger_1935_cat.pdf)

- <sup>928</sup> <http://www.whatislife.ie/downloads/What-is-Life.pdf>
- <sup>929</sup> Homer. *The Iliad*. iii. 104, 278, xv. 36, xix. 259.
- <sup>930</sup> Lovelock, J. (1979) *A New Look at Life on Earth*. Oxford University Press. <https://www.marxists.org/reference/subject/philosophy/works/us/gaia.htm>
- <sup>931</sup> Bruckner, P. (2012) *The Tyranny of Guilt*. Princeton University Press. Pp256.
- <sup>932</sup> Samson, P. and Pitt, D. (1999) *The Biosphere and Noosphere Reader: Global Environment, Society, and Change*. Routledge. Pp224.
- <sup>933</sup> Margulis, L. (1999) *The Symbiotic Planet: A New Look at Evolution*. Basic Books. Pp176.
- <sup>934</sup> Lovelock, J. (2001) *Homage to Gaia: The Life of an Independent Scientist*. Oxford: Oxford University Press. Pp428.
- <sup>935</sup> Lovelock, J. (1972) Gaia as seen Through the Atmosphere. *Atmospheric Environment* 6(8): 579-580.
- <sup>936</sup> Lovelock, J. (2000) *Gaia: A New Look at Life on Earth*. Oxford. Pp176.
- <sup>937</sup> Tyrrell, T. (2013) *On Gaia: A Critical Investigation of the Relationship between Life and Earth*, Princeton University Press. Pp208.
- <sup>938</sup> Driver, J. (2014) The History of Utilitarianism. *The Stanford Encyclopedia of Philosophy*. <http://plato.stanford.edu/archives/win2014/entries/utilitarianism-history/>
- <sup>939</sup> <https://uwdc.library.wisc.edu/collections/aldoleopold/>
- <sup>940</sup> Falvey, L. (2016) *Understanding Southeast Asia: Syncretism in Commonalities*. Thaksin University Press. Pp187.
- <sup>941</sup> Cross, S., Hardin, E. and Gercek-Swing, B. (2011) The what, how, why, and where of self-construal. *Personality and Social Psychology Review*, 85, 933-944.
- <sup>942</sup> Beckwith, C. (2009) *Empires of the Silk Road*. Princeton University Press. Pp512.
- <sup>943</sup> Scott, J. (2017) *Against the Grain: A Deep History of the Earliest States*. Yale University Press. Pp281.
- <sup>944</sup> Schwenkenbecher, A (2018) We need to rethink our moral obligations to create a better world. *The Conversation*, March 20.
- <sup>945</sup> de Lazari-Radek, K. and Singer, P. (2014) *The Point of View of the Universe: Sidgwick and Contemporary Ethics*. Oxford Scholarship Online. <http://www.oxfordscholarship.com/view/10.1093/acprof:oso/9780199603695.001.0001/acprof-9780199603695>
- <sup>946</sup> Williams, J. and Kabat-Zinn (2013) *Mindfulness: Diverse Perspectives on its Meaning, Origins and Applications*. Routledge. Pp328.
- <sup>947</sup> Matthew Beard, M (2018) We must develop ‘techno-wisdom’ to prevent technology from consuming us. *The Conversation*, March 19. [https://theconversation.com/we-must-develop-techno-wisdom-to-prevent-technology-from-consuming-us-91656?utm\\_medium=email&utm\\_campaign=Latest%20fro... 1/4](https://theconversation.com/we-must-develop-techno-wisdom-to-prevent-technology-from-consuming-us-91656?utm_medium=email&utm_campaign=Latest%20fro...)
- <sup>948</sup> Dean, T. (2018) The greatest moral challenge of our time? It’s how we think about morality itself. *The Conversation*, March 12. [https://theconversation.com/the-greatest-moral-challenge-of-our-time-its-how-we-think-about-morality-itself-92101?utm\\_medium=email&utm\\_campaign=Latest%20... 1/4](https://theconversation.com/the-greatest-moral-challenge-of-our-time-its-how-we-think-about-morality-itself-92101?utm_medium=email&utm_campaign=Latest%20...)
- <sup>949</sup> For example, Nene, Y. (2007) *Glimpses of the Agricultural Heritage of India*. Asian Agri-History Foundation. Pp902.
- <sup>950</sup> An Oxford English Dictionary definition. <https://en.oxforddictionaries.com/definition/sacred>
- <sup>951</sup> <https://holmgren.com.au/about-permaculture/>
- <sup>952</sup> Steiner, R. (1924, 1972) *Agriculture: A Course of Eight Lectures*. Bio-Dynamic Agricultural Association. Pp172.
- <sup>953</sup> Ecclesiastes 1:2,18
- <sup>954</sup> Quran 2:269
- <sup>955</sup> 1 Corinthians 1:17–31

---

<sup>956</sup> James 3:17

<sup>957</sup> Karunamuni, N. and Weerasekera, R. (2017). Theoretical Foundations to Guide Mindfulness Meditation: A Path to Wisdom. *Current Psychology*. <https://doi.org/10.1007%2Fs12144-017-9631-7>

<sup>958</sup> Brihadaranyaka Upanishad 1.3.28.

<sup>959</sup> Simandan, D., (2018) Wisdom and foresight in Chinese thought: sensing the immediate future. *Journal of Futures Studies*. 22(3): 35-50.

<sup>960</sup> Chinese Text Project <http://ctext.org/dao-de-jing>

<sup>961</sup> Durant, D (2018) Servant or partner? The role of expertise and knowledge in democracy. *The Conversation*, March 9. [https://theconversation.com/servant-or-partner-the-role-of-expertise-and-knowledge-in-democracy-92026?utm\\_medium=email&utm\\_campaign=Latest%20from%20T... 3/7](https://theconversation.com/servant-or-partner-the-role-of-expertise-and-knowledge-in-democracy-92026?utm_medium=email&utm_campaign=Latest%20from%20T...)

<sup>962</sup> Santikaro Bhikkhu (2001) Jesus and Christianity in the Life and Works of Buddhadasa Bhikkhu. In Perry Schmidt-Leukel in cooperation with Thomas Josef Götz OSB and Gerhard Köberlin (2001) *Buddhist Perceptions of Jesus: Papers of the Third Conference of the European Network of Buddhist-Christian Studies* (St. Ottilien 1999). Published by Eos-Verlag in St. Ottilien, 2001. Pp. 179.

<sup>963</sup> Plato's Apology (38a5-6) <http://www.perseus.tufts.edu/hopper/text?doc=plat.+apol.+38a>

<sup>964</sup> Falvey, L., Barlow, S., Beard, J., Hickey, M., Larkins, F., Lee Dow, K., Topp, J., White, R. and Wood, N. (2017) *Agricultural Education – in Victoria & the Faculty of Agriculture, University of Melbourne*. Society of Old Agriculture Fellows. Pp231.

<sup>965</sup> Kharas, H. (2017) *The Unprecedented Expansion of the Global Middle Class: An Update*. Brookings Global Economy & Development Working Paper 100. Pp32. [https://www.brookings.edu/wp-content/uploads/2017/02/global\\_20170228\\_global-middle-class.pdf](https://www.brookings.edu/wp-content/uploads/2017/02/global_20170228_global-middle-class.pdf)

<sup>966</sup> Quoted in: Gosling, D. (2007) *Science and the Indian Tradition: When Einstein met Tagore*. Routledge. Pp186.

<sup>967</sup> Freud, S. (1979) *Introductory Lectures on Psycho-Analysis*. Digireads. Pp240.

<sup>968</sup> Darwin, E. (1800) *Phytologia or the Philosophy of Agriculture and Gardening, With the Theory of Draining Morasses, and with An Improved Construction of the Drill Plough*. Bensley. Pp682. <https://archive.org/details/b22014597>

<sup>969</sup> [http://darwin-online.org.uk/EditorialIntroductions/vanWyhe\\_notebooks.html](http://darwin-online.org.uk/EditorialIntroductions/vanWyhe_notebooks.html)

<sup>970</sup> <http://darwin-online.org.uk/>

<sup>971</sup> Hegel, G. (1837; Translated by Sibree, J., 2001) *The Philosophy of History*. Batoche. Pp485. <https://www.marxists.org/reference/archive/hegel/works/hi/history3.htm>

<sup>972</sup> Olsen, J., Pedersen, S. and Hendricks, V. (2009) *A Companion to the Philosophy of Technology*. Wiley. Pp575.

<sup>973</sup> Erdman, D. (2011) *Blake: Prophet Against Empire*. Dover. Pp624.

<sup>974</sup> Wulf, A. (2015) *The Invention of Nature: Alexander von Humboldt's New World*. Knopf Doubleday. Pp496.

<sup>975</sup> Olsen, J., Pedersen, S. and Hendricks, V. (2009) *A Companion to the Philosophy of Technology*. Wiley. Pp575.

<sup>976</sup> Watson, P. (2010) *German Genius: Europe's Third Renaissance, the Second Scientific Revolution and the Twentieth Century*. Simon and Shuster. Pp964.

<sup>977</sup> <http://people.idsia.ch/~juergen/haberbosch.html>

<sup>978</sup> Smil, V. (1999) *Nature* 29: 415. Also: <http://vaclavsmil.com/wp-content/uploads/docs/smil-article-1999-nature7.pdf>

<sup>979</sup> Steiner, R. (1924, Translated by Adams, G. 1977) *Agriculture: A Course of Eight Lectures*. [https://wn.rsarchive.org/Lectures/GA327/English/BDA1958/Ag1958\\_index.html](https://wn.rsarchive.org/Lectures/GA327/English/BDA1958/Ag1958_index.html)

<sup>980</sup> <http://www.gutenberg.org/files/1998/1998-h/1998-h.htm>

<sup>981</sup> St John of the Cross <https://archive.org/details/completeworksofs02johnuoft/page/n8>

- 
- <sup>982</sup> Pinker, S. (2018) *Enlightenment Now: The Case for Reason, Science, Humanism and Progress*. Penguin. Pp556.
- <sup>983</sup> Maxwell, N. (2000) Can Humanity Learn to become Civilized? The Crisis of Science without Civilization  
*Journal of Applied Philosophy* 17: 29-44. <http://www.nick-maxwell.demon.co.uk>  
<sup>984</sup> <https://www.accesstoinsight.org/tipitaka/mn/mn.063.than.html>  
<sup>985</sup> <http://www.gutenberg.org/ebooks/authors/search/?query=Smith,+Adam>
- <sup>986</sup> Maxwell, N. (2000) Can Humanity Learn to become Civilized? The Crisis of Science without Civilization  
*Journal of Applied Philosophy* 17: 29-44. <http://www.nick-maxwell.demon.co.uk>
- <sup>987</sup> Cascardi, A. (1999) *Consequences of Enlightenment*. Cambridge University Press. Pp268.
- <sup>988</sup> Popper, K. (2002) *The Logic of Scientific Discovery*. Routledge. Pp544.
- <sup>989</sup> Hajkowicz, S., Cook, H. and Littleboy, A. (2012). *Our Future World: Global megatrends that will change the way we live. The 2012 Revision*. CSIRO, Australia.
- <sup>990</sup> Kant (1784) <http://www2.idehist.uu.se/distans/ilmh/Ren/idehist-enlighten-kant02.htm>  
<sup>991</sup> <https://www.gutenberg.org/files/205/205-h/205-h.htm>
- <sup>992</sup> <http://www.worldvaluessurvey.org/wvs.jsp>
- <sup>993</sup> The atlantic
- <sup>994</sup> Finkel, A. (2018) Science isn't broken, but we can do better: here's how. Keynote speech, 2018 Quality in Postgraduate Research Conference, Adelaide, April 17. [Summary: The Conversation, April 17. <https://theconversation.com>
- <sup>995</sup> Lancaster, J. (2018) What might appear to be common sense is not always based on scientific evidence. *The Conversation*, April 20.  
<sup>996</sup> <https://royalsociety.org/about-us/history/>
- <sup>997</sup> Kalama Sutta. <https://www.accesstoinsight.org/tipitaka/an/an03/an03.065.than.html>
- <sup>998</sup> Plato, *Theaetetus*. <http://classics.mit.edu/Plato/theatu.html>
- <sup>999</sup> Descartes, R. <https://www.scribd.com/doc/124428108/The-Philosophical-Writings-of-Descartes-Volume-2>
- <sup>1000</sup> Broiles, R. (2012) *The Moral Philosophy of David Hume*. Springer. Pp99.
- <sup>1001</sup> Wordsworth, W. *The Tables Turned*. <https://www.poetryfoundation.org/poems/45557/the-tables-turned>
- <sup>1002</sup> Genesis 4:1-16
- <sup>1003</sup> Genesis 3:19
- <sup>1004</sup> Genesis 3:16
- <sup>1005</sup> cf. different specific words of Proverbs 9: 10, and 4: 5-9
- <sup>1006</sup> T.S. Elliot (1942) *Little Gidding*, in *Four Quartets*.  
<http://www.columbia.edu/itc/history/winter/w3206/edit/tseliotlittlegidding.html>
- <sup>1007</sup> Ecclesiastes 1:9
- <sup>1008</sup> Suzuki, D. (2016) *Selected Works of D.T. Suzuki, Volume III: Comparative Religion*. University of California Press, Pp320.
- <sup>1009</sup> Abram, D. (1997) *The Spell of the Sensuous: Perception and Language in a More-Than-Human World*. Vintage. Pp368.
- <sup>1010</sup> Isaiah 40:3; Matthew 3:1-3
- <sup>1011</sup> Teilhard de Chardin, P. (1959) *Man's Place in Nature*. William Collins. Pp127.  
<https://archive.org/details/MansPlaceInNature/page/n2>
- <sup>1012</sup> John 12: 24  
<sup>1013</sup> <https://www.accesstoinsight.org/tipitaka/kn/miln/miln.intro.kell.html>
- <sup>1014</sup> Email from Julian Cribb to the author, 15 September 2019.
- <sup>1015</sup> 1 Timothy 6:10
- <sup>1016</sup> Etymology: derived from Latin 'resurgere' meaning 'rise again'.

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