

Mohammad Hashim Kamali · Osman Bakar
Daud Abdul-Fattah Batchelor
Rugayah Hashim *Editors*

Islamic Perspectives on Science and Technology

Selected Conference Papers

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Preface

The collection of papers that are featured in this book was presented at the International Conference on ‘Developing Synergies Between Islam and Science & Technology for Mankind’s Benefit’, held at the International Institute of Advanced Islamic Studies (IAIS) Malaysia, Kuala Lumpur, on 1–2 October 2014.

The conference was formally opened by the former Prime Minister of Malaysia, Tun Abdullah Ahmad Badawi, and involved two keynote speeches, invited talks from eminent scholars, and talks by senior scholars, as well as some PhD candidates reporting on their research findings. The conference, consisting of both plenary and parallel sessions, included two open forums: one on bioethics and the other on the teaching and history of Islamic science. Presenter-authors were requested to contribute recommendations that could be taken up by governments, institutions, NGOs, and the public to hopefully ensure beneficial outcomes to sectors of humanity. The conference was closed with discussions on some of the important issues raised.

The conference objectives were:

- To promote a better understanding of the key issues related to religion in general, and to Islam in particular, in the current pursuit of scientific knowledge and in enhancing the well-being of humanity at large
- To address urgent ethical issues related to human biology/medical sciences and impacts on the living environment
- To investigate a more holistic faith-inclusive methodology for the teaching of science in Islamic educational institutions

Of a total of 37 papers presented, 26 were selected for inclusion in the present volume. The papers were wide-ranging in scope and organised under the following four clusters:

- Philosophy of Science, Cosmology and Emergence of Biological Systems
- Tawhidic Science – Principles and General Applications
- Tawhidic Science – Bioethics Applications
- Teaching and History of Science

The overarching theme of the conference included the need to investigate the epistemological and cosmological underpinning of science and technology (S&T) from an Islamic perspective, especially to understand the utilitarian aspects of S&T so as to better serve humanity. This conference aimed at addressing concerns that S&T should not, as appears to some today, be imperilling mankind's very existence, due to its misuse to serve powerful and elite interests. Ethical issues were addressed pertaining to the sound application of the Natural Sciences in serving humanity.

The deep metaphysical and cosmological issues regarding the role of science that can enhance understanding of our position in the 'grand scheme of things' were addressed as also the underlying substratum of current thinking that modern science already knows the answers and the fundamental questions are settled. The major role that religion and Islam, in particular, can play in this regeneration process was underlined. A comprehensive and holistic approach was to be sought that accorded with the principle of Divine Oneness (*Tawhīd*) and the higher goals and purposes (*maqasid*) of Islam.

In what follows, I recapitulate some of the opening remarks that I made at the inaugural session of the conference in my capacity as the host and head of IAIS Malaysia.

Whereas religion and ethics advocate restraint, the globalised world of scientific modernity and technological explosion with their secularist leanings are pushing humanity in the opposite direction, compelling us to raise the question: is there a crisis of values? Science, which is the motive power that propels technology, is the continuous process of interlinking observations and experiences into a coherent and logical structure that is then codified into a body of knowledge. Yet such knowledge remains open to challenge and modification through fresh observation, new experience and creativity of thought.

The benefits of S&T to human well-being are undeniable. Yet the epistemology and method that propel scientific enquiry have followed a questionable trajectory that is blind to value and can advance both benefit and harm. The harmful effects of S&T are threatening human life and the health of its earthly habitat. The purity of the earth's natural environment is being compromised at an alarmingly rapid pace. Science and technology seem to have closed the doors to wisdom that one needs to know how best to make use of them.

Our space is more crowded than ever before by a multitude of philosophical views and outlooks on how to understand religion and science and how to see the notions of progress, human well-being and ethics through their lenses. At one extreme we have the secular humanists arguing that modern science provides a necessary and sufficient basis for life and learning. From this viewpoint, religious worldviews are at best inconsequential and at worst an obstacle to human progress.

Muslim scientists were successful in their contributions to science and civilisation when they maintained the nexus between existential reality and its metaphysical dimension, a theo-centric value order that guided their scientific enquiry, and their quest for knowledge and truth. Reality according to this outlook was not limited to the world of sensory experience but extended to the non-physical world, the '*alam al-ghayb*', as in the language and attestation of the Qur'an.

The fruits of scientific enquiry and innovation in its Islamic vision belong to all of mankind. This is the inalienable implication of the principle of *Tawhīd*, the Oneness of Being that runs deep in shaping the Islamic worldview and epistemology of knowledge. When S&T are informed by faith and ethics, they must serve the human interest and advance the efflo-

rescence of a humane society and civilisation. Yet the prevailing scientific modernity subscribes to the view that science has no need for religion and views religion as the enemy of science. The Islamic view is that religion and science are truly in need of each other. This would explain why there is a need to present a credible critique of the epistemology of contemporary S&T. I believe that Islam's spiritual and intellectual resources and its holistic vision of scientific enquiry can make a significant contribution to the creation of a new scientific and technological culture that is focused on serving the interests of the whole of humanity.

Because of the diversity of themes and topics, there would be papers of interest to a large and broad group of academics and practitioners, from Islamic scholars and social scientists to physical scientists and engineers in a whole gamut of disciplines. This book should be of benefit to students, scholars and lay persons, Muslim and non-Muslims alike, who wish to obtain a more holistic understanding of Islam and science for humanity's benefit. Non-Muslims would be able to see the contributions Islam can make for the betterment of the world. It is also an important role for scientists of all persuasions to cooperate for the betterment of human society and the global environment.

A great deal of enthusiasm was generated in the conference discussions, especially during the concluding plenary session, on the importance of the chosen conference theme. Many prominent speakers recommended that this conference should be followed up and made into an annual event. It was also widely acknowledged that contributions to the natural sciences from the Muslim world were in short supply and need to be addressed. On behalf of IAIS Malaysia, I do hope we can actualise that recommendation to organise follow-up events on this or allied topics in the future. We are certainly working on beefing up one of the five of IAIS's research units on science, technology, environment and ethics from our own resources. For a follow-up and annual event, IAIS would need sponsorship and we plan to solicit outside support for this purpose.

It remains for me to thank Y.A.B. Tun Abdullah Haji Ahmad Badawi, former Prime Minister of Malaysia, for kindly accepting to officiate the opening of the conference and to record my appreciation and gratitude to the conference co-organisers, event partners and all those who supported IAIS Malaysia in this endeavour. We organised this event jointly with the International Islamic University Malaysia (IIUM), the Academy of Islamic Studies, Universiti Malaya (AIS-UM) and the Sultan Omar 'Ali Saifuddin Centre for Islamic Studies (SOASCIS), University of Brunei Darussalam with the support also of Universiti Teknologi MARA (UiTM) and the National Centre of Excellence for Islamic Studies, Griffith University, Australia. Having had the benefit of attending the conference sessions and reading the papers presented, I take this opportunity to commend the efforts and contributions of our learned speakers, authors and presenters whose deliberations and insights helped to make this international conference a success and also make the publication of the present volume possible.

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Part I
Opening Section

Chapter 1

Introduction

Osman Bakar and Daud Abdul-Fattah Batchelor

This book comprises selected articles that are based on papers presented at the International Conference on *Developing Synergies between Islam and Science & Technology for Mankind's Benefit* held at IAIS Malaysia, Kuala Lumpur, on 1–2 October 2014. The articles deal with various aspects of the central theme of the Conference, namely, the possible synergies that can be developed between Islam, science and technology (S&T) with the view of ensuring that the pursuit of S&T is for the benefit of the whole of humanity. Their authors are scholars, academics and researchers representing various academic disciplines, some of whom are of international repute in their specialised fields. However, despite the variety of issues treated and the diversity of approaches adopted in these articles in response to the Conference theme and subthemes, the common thread that runs through all of them is the high relevance of Islam in its multidimensional relations with S&T.

The book has a precious message for both Muslims and non-Muslims alike. The significance of this volume is that, taken together and viewed as a whole, the articles provide a multi- and interdisciplinary treatment of the interrelationship between Islam and S&T that can throw much light on what Islam is able to contribute to the present humanity in the creation of a new scientific and technological culture in the twenty-first century founded on universal spiritual, intellectual and moral-ethical values. The relevance of the religion and civilisation of Islam to the contemporary issues posed by the application of S&T is clearly demonstrated in this volume. Of particular importance is the claim made by Islam that as a religion and as a civilisation, not only is it keen to offer the world a new appreciation of S&T that would be truly beneficial, but it also has the resources to do so. The various Islamic perspectives on S&T presented in the articles comprising this volume, significantly displaying both variety and unity, may be viewed as a comprehensive but critical re-examination of the mainstream thinking on the meaning and significance of the human pursuit of S&T. The world has good reason to listen to an Islamic discourse on S&T that conveys ideas and messages relevant not only to the global Muslim

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ummah, itself constituting almost one quarter of humanity, but also to the rest of the world. We provide below a brief summary of each of the articles contained in this book.

Osman Bakar in his keynote speech titled, *Science and Technology for Mankind's Benefit: Islamic Theories and Practices – Past, Present and Future* (Chap. 3), addressed the overarching theme of the Conference, namely, the role of Islam in ensuring that S&T is applied for humanity's benefit. Bakar pointed out that S&T are necessarily value-laden since mankind is guided by values, religious or otherwise, in pursuing development and progress. In comparing Islamic and Western civilisations, he highlighted the character of Islam that it has promoted the core Qur'anic value of *wasatīyyah* (moderation) to produce a balanced civilisation and that S&T development in Muslim lands has been historically applied 'without transgressing the moral-ethical bounds' of Islam's Divine Law (the *Sharī'ah*), whereas Western civilisation may justifiably be characterised as imbalanced, ending in it ultimately displacing religion from the S&T domain altogether. The consequences are seen in the impacts on the well-being of mankind and the environment. An Islamic critique of the mainstream global thinking is 'very much needed' today. Bakar describes three types of ignorance – arrogant ignorance, preferable ignorance and innocent ignorance. Islam moderates extremes by shunning non-beneficial knowledge. He discusses the exemplary contributions of the early scholars, al-Farabi and al-Ghazzali, in assessing in terms of well-being the societal benefits of various S&Ts. The way forward, Bakar believes, is for Muslim scholars to critically compare these classical theories with contemporary ones on the benefits of S&T and to stress the application of *maqasid al-sharī'ah* and ethics in assessing the merits of contemporary technology. This proposal is taken up by Amana Raquib in Chap. 11. Bakar also suggests the pursuit by scholars and academics of a synthesis of the classical Islamic and modern views of scientific and technological progress.

The second keynote speech delivered by *M. Kamal Hassan*, titled *The Necessity of Studying Natural Sciences from the Qur'anic Worldview* (Chap. 4), complements Bakar's address. Hassan points out that the alarming aspects of modern science and its secular worldview resulting in ecological, economic and human crises have eroded public confidence in the natural sciences. As believing Muslims subscribing to the Tawhidic worldview based on the Oneness of God as enunciated by the Qur'an, it is high time for serious Muslim scholars, especially scientists, to undertake the much-needed paradigm shift through an inspired enlightened spiritual outlook integrating divine revelation and reason in the study of natural phenomena and their applications. Insightful western leaders and scholars – such as Richard Tanas, Bernard Rollin and Immanuel Wallerstein – have correctly identified many of the errors and deficiencies of modern science and the need for a theistic or metaphysical worldview, which is closely in line with informed Islamic critiques. The Qur'anic concept of knowledge places supreme value on knowing God, together with man's proper relationship with God as the highest goal. Hassan discusses the special merits of the 'people of sound intellects' (*Ūlū al-Albāb*) mentioned in the Qur'an and declares that Muslim scientists of the innovative and creative period of Islamic civilisation, as well as contemporary scholars – who have been inspired by the

Qur'anic worldview – are of this nature and represent ideal role models for today's scientists. A major obstacle to progress is human arrogance, and scientists today need to inculcate the spirit of humility in their endeavours as servants of Allah and His *khalifah* (vicegerent) on earth to understand nature and the universe in a holistic fashion as a necessary form of true worship of God.

1.1 Philosophy of Science, Cosmology and the Emergence of Biological Systems

Alparslan Açıkgenç in his *Philosophy of Science in Epistemological Perspective* (Chap. 5) has argued for the need to reformulate a philosophy of science from an Islamic perspective, which would comprehend all the epistemologically valid scientific approaches. Every science has its specific subject matter, method, theories and discoveries. The epistemologically characterised phenomena which unfold are called *scientific phenomena*, which lead to the emergence of specific sciences. The characteristics developed by a certain civilisation or community are termed its *scientific tradition*. Scientific phenomena comprise four integral factors: process in history, the human knowledge system, the emergent body of knowledge and the scientific community. Philosophy of science requires considering all of these. Of the four factors, two factors render science as universal and global, i.e. subject matter and the human knowledge system, while the other two render science as local, i.e. scientific process in history and the scientific community. Epistemology, sociology and history of science are all integral to a complete philosophy of science. *Açıkgenç* considers characteristics of an Islamic scientific tradition to be the following: (1) the Tawhidic moral and spiritual worldview as the epistemological ground in Muslim society, (2) the scientific conceptual scheme manifesting this worldview so that ideas developed will complement religious truth and (3) a specific scientific conceptual scheme comprising a network of concepts, facts and their conceptions in particular sciences, which are related to religious truths. When comparing science and Revelation, it is Revelation which is more authoritative. Such a science as the one developing from the Islamic scientific tradition will not lead to bewilderment but rather to a sense of wonder concerning the arts of the Creator. Consequently, Muslims need to correctly understand the nature of science and how it has developed in different civilisations if we aspire to scientific achievements. Science students in particular should have adequate knowledge of the history of Islamic science and its philosophical perspective.

Mulyadhi Kartanegara in his article, *Rumi on the Living Earth: A Sufi Perspective* (Chap. 6), discusses the views of classical scholars, especially Rumi and also Mulla Sadra, on the nature and development of the universe and all its elements. Like the Ikhwan al-Safa' before them, Rumi and Mulla Sadra considered the universe and its elements as living beings with intelligence. Rumi spoke of the role of love (*'ishq*) in God's creation of the universe that makes it alive and in the active attraction of

God's creatures towards Him and His Perfection as the fundamental force for evolutionary change. Kartanegara maintains that Sadra explained it in terms of a trans-substantial motion. This is in contrast to the narrow mechanistic theory of Charles Darwin that provides no role for the Supernatural. An interesting convergent theory in the West is the idea of a living earth proposed in the 1970s by James Lovelock. Known as the 'Gaia hypothesis', this idea posits the earth as a superorganism or self-regulating complex teleological system that facilitates conditions suitable for life. Rumi holds man in high esteem as the *microcosm* since it is for him that God created the universe. As the world is a living creature capable of loving and being loved, if man's internal condition is dark, the world will change from harmony and balance into disorder. 'Whatever man does will be reflected on the world'. Kartanegara argues, therefore, that as God's representative on earth (*khalīfat Allāh fi'l-ard*), it is man's duty to manage the earth responsibly.

In his article on *Sayyid Qutb's Understanding of the Universe as a Living and Meaningful World* (Chap. 7), İbrahim Özdemir discusses the contributions of the Egyptian ideologue of the Muslim Brotherhood, Sayyid Qutb, to the modern discourse on Islam, cosmology and ecology. Qutb's ideas studied by Özdemir are contained in his Qur'anic Commentary, *Fī Zilāl al-Qur'ān (In the Shade of the Qur'an)*. Özdemir points out that although most of us often take nature for granted, Qutb on the other hand sees the universe as full of meaning for human beings and that 'it is not difficult for a keen reader of the Qur'an and the book of nature to see the same message in both'. Özdemir highlights in particular Qutb's commentary on the verse *al-Isra'* 17:44, which speaks of *tasbīh*, the glorification of God by all creatures, both animate and inanimate. Qutb sees in this verse a scriptural basis for affirming the idea of ecological consciousness in the most universal sense. Özdemir believes this commentary clearly indicates that Qutb was a pioneer of Muslim ecological thinking in modern times. Further, Özdemir highlighted Qutb's understanding that the whole of nature is Muslim by virtue of the fact that the universe 'works according to divine laws – the so-called natural laws – and according to the way God has designed and created it'.

Ahmad Badri Abdullah and Daud Abdul-Fattah Batchelor's article, titled *The New Approach in Western Science Towards Understanding the Nature of Life and Mind in Terrence Deacon's 'Incomplete Nature': An Analysis from Islamic Perspectives* (Chap. 8) registers major interest in an intriguing non-reductionist scholastic 'breakthrough' approach to the development of life forms on earth as proposed by a Western scientist. Deacon's most telling output suggested in his conclusions that life forms trend in a planned direction (teleodynamics) and, while not of a deist nature, is in harmony with the Islamic perspective that all creation is progressing according to God's overall predetermined Plan. Deacon elaborated on some partly new concepts – ententionals, constraints and absentials – as core elements, which emphasise the critical role of emergent processes in the emergence of living reproducing, sentient beings. He proposed that emergence involves three distinct steps of thermodynamics, morphodynamics and teleodynamics. Deacon's theory is discussed from the purview of the Qur'an, Sunnah and Muslim scholars, Jalaluddin Rumi, Mulla Sadra and Mohammed Iqbal. While Deacon argued against

Descartes-style dualism of body and mind, with which Badri and Batchelor agree, the latter would reinstate a dualism to emphasise that mankind are differentiated by possessing spirit (*rūh*) and high-level language, whose direct source is God Almighty.

1.2 Tawhidic Science: Principles

Mehdi Golshani's contribution, *Islam Can Give a Proper Orientation to Science and Technology Development* (Chap. 9), stresses that the Islamic worldview engenders a suitable comprehensive framework for scientific work and its applications. In enumerating five roles that religion can play in supporting scientific activity, Golshani finds considerable support for each role from the views of a number of leading Western scholars and scientists. Their views lend support to a revision of the current dominant reductionist scientific outlook towards acknowledging the existence of the Supreme-being.

Adi Setia in his contribution, *Vision in Action: Operationalising the Islamisation of Science & Technology* (Chap. 10), clarified that 'Synergy between Islam and S&T refers to the critical and creative integration of the latter into the ethico-intellectual framework of the worldview of Islam, leading to the holistic Islamisation of S&T rather than to the reductionist techno-scientisation of Islam'. Setia first provides a set of premises as a foundation on which Islamic-minded researchers/scholars can proceed on building a healthy Islamic science, which is truly beneficial for mankind. He then shows applications of these to various scientific disciplines. He raises an interesting novel question regarding creationary theory 'whether it could be infused with experiential content sufficient enough for it to be *re-expressed* as a physical, scientific theory amenable to rigorous systematic empirical inquiry' to then be on a par with Darwinian evolutionary theory. Setia suggests that Muslim scientists should not restrict the debate to just biological systems but expand it to become more holistic 'by formally generalising the [grand] design theory to all natural phenomena – biological or physical – i.e. to both biotic and abiotic systems'. To a degree, Terrence Deacon's 'Incomplete Nature' theory provides an intriguing base for such an investigation, as discussed by Badri and Batchelor in Chap. 8, and views of Muslim scholars, such as Mohamed Iqbal and Sayed al-Nursi, are also relevant.

Amana Raquib in her article, *Maqasid al-Sharī'ah: A Traditional Source for Ensuring Design and Development of Modern Technology for Humanity's Benefit* (Chap. 11), answers Osman Bakar's earlier call in attempting to translate the interrelations between the various *Sharī'ah* Objectives into a unified Islamic techno-ethical framework for a holistic understanding and development of technology that is both moral and practically feasible. Raquib has delineated important values such as establishing justice, compassion, brotherhood, self-restraint, moderation, balance, intellectual and spiritual development, moral rectitude and environmental conservation, which should be reinforced, while negative values – selfishness,

self-indulgence, extravagance, greed, purposelessness, transgression – should be thwarted. She believes that in this manner human interest (*maṣlahah*) can be served ‘by wisely, ethically and holistically crafted technologies that serve to liberate humankind from the current meaningless cycle of innovation, consumption and dissipation of technological goods and services’.

1.3 Tawhidic Science: General Applications

Mohammad Hashim Kamali in his exposition on *Islam and the Environment: an Examination of the Source Evidence* (Chap. 12) provides the Islamic epistemological foundations within the expansive environmental field. This field incorporates considerations of many disciplines of the natural sciences – meteorology, geology, biology and soil science – as well as the human sciences, social science and health sciences. The Qur’an arguably provides more guidance about nature and the earth, i.e. environmental ethics, than any other sacred scripture. Kamali identifies the main principles of responsibilities for man as the pinnacle of God’s creation – *khilāfah* (vicegerency), *amānah* (trust) and assignment to build and develop the earth (*i‘mār al-arḍ*) while maintaining a balanced (*wasāṭiyyah*) and clean (*ṭahārah*) environment. Man is duty-bound to avoid corruption (*fasād*), waste (*isrāf, tabdhīr*) and harm (*ḍarar*). Evidence of the existence of an environmental crisis is clear to see, especially the changes in climate and sea levels, loss of biodiversity and critical habitats, worsening environmental health and desertification. Countries, companies and individuals responsible for negative impacts should have to pay the costs of environmental restoration, while Muslim societies benefiting from divine guidance should be leaders in exemplifying good environmental practice.

Daud Abdul-Fattah Batchelor in his article *Reducing Wasteful Consumption Towards Sustainability by Waste Avoidance Using Self-Improvement (Tazkiyah) and Contentment (Qana‘ah) Approaches* (Chap. 13) provides a highly preferred approach for waste minimisation by encouraging consumers worldwide to develop their resilience to modern marketing messages by not purchasing unnecessary goods, thereby avoiding wasteful consumption. Such interventions are at the highest priority field of waste avoidance at the peak of the waste minimisation hierarchy. The key is to reduce wants to just needs through reflection and changing one’s mindset (*tafakkur*) and self-improvement (*tazkiyah al-naḥs*), which is also the direction towards achieving true contentment (*qana‘ah*) and well-being. This is easier said than done and requires an intense struggle with one’s soul (*naḥs*) and desires, by reducing love and attachment to material things, and to appreciate the spiritual nature (*rūḥ*) of our being. The benefits will be reflected in healthier people and a better balanced and sustainable living environment on earth.

Ahmad Dimiyati’s valuable contribution is titled, *Integrating Spirituality into Efforts for Improving Value Chains of Farm Products* (Chap. 14), which further confirms that integration of spiritual practices in workplaces enhances the development of attitudes and behaviours, which engender better technical and economic

performances in value chains of farm products in West and East Java, Indonesia. Heightened spirituality also generally enhanced the prosperity of the individuals concerned. This was well-demonstrated by surveys conducted on two Islamic boarding schools (*pondok-pondok pesantren*) affiliated with the Islamic organisation, *Nahdlatul Ulama* (NU), with associated agribusinesses and using *taşawwuf*-based practices. Positive results were also shown by a tea-producing enterprise loosely affiliated with the *Muhammadiyah* organisation. The NU-affiliated enterprises exhibited a four-strand spiral of positive growth in spirituality synergistically resulting in social improvement, cultural advancement and economic prosperity. This report reflects just one segment of the widely observable general rise of Islamic consciousness (and its spreading benefits) within Indonesian Muslim society today.

Muzaimi Mustapha, Nur Syairah Ab Rani, Mohamed Faruque Reza, Wan Nudri Daud and Muhammad Amiri Ab. Ghani collaborated on research reported in *Neurotechnological Advances in Exploring Melodic Recitation of the Noble Qur'an: Uncovering the Neural Circuitry in the Human Brain* (Chap. 15). They compared the recognised phenomenon of 'Qur'anic chills' experienced by listeners to Qur'anic recitations with the widespread well-documented experience across cultures of 'musical chills' resulting from listening to inspirational musical passages. They reported research showing that the neural basis of musical chills involves brain circuitry 'similar to neuroimaging studies of highly rewarding and/or motivationally important stimuli'. Using the advanced electroencephalography and magnetoencephalography equipment available at Universiti Sains Malaysia, Kelantan, Malaysia, they are currently conducting research to try to identify neural associations with the 'chills' resulting from the rhythmic and melodic Qur'anic verses.

Abdul Nasir Jaafar and Mohamed Ridza Wahiddin announce a new theory in *A New Quantum Theory in Accordance with Islamic Science* (Chap. 16). This theory has been developed, they claim, from the application of principles of Islamic Science, specifically the pairing concept and the one-to-one correspondence principle, based on Qur'anic verses. Their scientific analysis posits that an electron can consist of both a unit electrical charge as well as a permanent magnet. The latter is considered a new concept and, together with the electrical charge, can possibly explain the zero point energy at almost 0 °K that is poorly understood. A derived mathematical equation for calculating an electron's potential energy is provided. The theory needs to be tested for veracity, but if correct it could have important benefits for humanity in a whole gamut of technological fields, including quantum biology, quantum computers and superconductivity.

1.4 Tawhidic Science: Bioethics

Abdurrezak A. Hashi in his article (Chap. 17) presents a comparative account of the bioethical discussions on the interaction between moral values and scientific discoveries in bioscience – on the relationship between *what can be done* and *what ought to be done* in determining an acceptable way forward. Three positions are reviewed: