

THREE MEANINGS OF ISLAMIC SCIENCE:
TOWARD OPERATIONALIZING ISLAMIZATION OF SCIENCE

Adi Setia

The twin historical and philosophical meanings of Islamic science are to be integrated into a third operative, programmatic meaning pertaining to the systemic reapplication of Islamic cognitive and ethical values to science and technology in the contemporary world. This will involve critical integration of the scientific endeavor into the conceptual framework of the Islamic worldview, and the concomitant explication of the cognitive, methodological, and axiological implications of such integration for present and future scientific research. This operative redefinition of Islamic science will render it into a new over-arching 'paradigm' or 'research program' pregnant with novel methodological and empirical implications (and hence, novel discoveries) for remanifesting the Islamic worldview in everyday individual and societal life through the vision and practice of a non-Western, authentically Islamic science and technology geared first and foremost toward identifying and solving the true problems and satisfying the real needs of the Ummah.

Keywords: Islamic worldview; Islamic science; Islamization of Science; Islamic ethico-cognitive values; al-Attas; Nasr; Bakar; research program; operative meaning.

Introductory

Earlier I have outlined briefly the need to reformulate the concept of 'Islamic science' as a long-term, practical empirico-conceptual research

Adi Setia is Assistant Professor of History and Philosophy of Science, Department of General Studies, International Islamic University, Malaysia. Email: adi_setia@iiu.edu.my

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program.¹ This reformulation arises, in particular, in response to the question raised, often tacitly, by concerned, practising Muslim scientists, namely, “How do we actually go about realigning our scientific work along the lines envisaged by al-Attas,² Nasr,³ and Bakar⁴ in their many writings on various aspects of the philosophy and history of Islamic science?” So there is, on the one hand, a growing understanding of the concept of Islamic science itself, while, on the other, a conundrum with regard to executing the concept.⁵

I think one of the main reasons for this already more than three decades’ old *operational impasse* is that the major writers on Islamic science

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1. “Islamic science as a Scientific Research Program” in *Islam & Science*, Vol. 3 (Summer 2005) No. 1, 93–101.
 2. Syed Muhammad Naquib al-Attas, *Islam and the Philosophy of Science* (Kuala Lumpur: ISTAC, 1989), which also constitutes Chapter III of his *Prolegomena to the Metaphysics of Islam: An Exposition of the Fundamental Elements of the Worldview of Islam* (Kuala Lumpur: ISTAC, 2001), 111–142; idem, *The Positive Aspects of Taṣawwuf: Preliminary Thoughts on an Islamic Philosophy of Science* (Kuala Lumpur: ASASI, 1981); cf. Adi Setia, “Al-Attas’ Philosophy of Science: An Extended Outline” in *Islam & Science*, Vol. 1 (2003) No. 2, 165–214.
 3. Seyyed Hossein Nasr, *An Introduction to Islamic Cosmological Doctrines* (Cambridge, MA: Harvard University Press, 1964); idem, *Science and Civilization in Islam*, 2nd ed. (Cambridge: Islamic Texts Society, 1987).
 4. Osman Bakar, *Classification of Knowledge in Islam: A Study in Islamic Philosophies of Science* (Cambridge: Islamic Texts Society, 1998); idem, *The History and Philosophy of Islamic science* (Cambridge: Islamic Texts Society, 1999).
 5. On 9–10 February 2007, an intensive workshop attended by about forty selected Malaysian and Indonesian scientists was organized by Professor Shaharir Muhammad Zain, Professor Wan Ramli Wan Daud, Dr. Muhammad Alinor and Dr. Assanah Mydin of the Islamic Academy of Science, Malaysia (ASASI) to address this conundrum under the guiding theme of “Reviving Islamic science,” with further, more specialized, national, regional and international workshops in the pipeline. This question is latent, especially in the last few chapters, throughout Muzaffar Iqbal, *Islam and Science* (Aldershot, UK: Ashgate: 2002); see the generally positive, non-scholarly review of Dr. Iqbal’s book by John Maxwell Kerr accessible online at http://www.scimednet.org/library/reviewsN86+/N86Iqbal_islam.htm (accessed March 27, 2007). A more scholarly and intellectually challenging review is Roxanne D. Marcotte, “Review of *Islam and Science*,” in *Ars Disputandi* (<http://www.ArsDisputandi.org>) Vol. 6 (2006), accessed March 27, 2007.

(or on the Islamization of Science⁶) have not engaged (or have not meant to engage) closely with the detailed, empirical aspects of the various disciplines of modern science as they are presently taught and practiced by Muslim scientists the world over. For instance, while all three authors, al-Attas, Nasr, and Bakar, have written and argued against the Darwinian theory of evolution from the philosophical and metaphysical points of view,⁷ none, to my limited knowledge, has so far offered a concomitant positive counter-theory that is both conceptually and empirically rich enough to account for the same observed biological phenomena ostensibly accounted for by the mainstream evolutionary theory. A positive, empirical counter-theory is important simply because Darwinian theory presents itself, and is understood, first and foremost, as an empirical, scientific theory rather than a metaphysical, philosophical one.⁸ So, for lack

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6. That is, briefly speaking, critical integration of mainstream scientific research and its results into the conceptual framework of the Islamic worldview. Syed Muhammad Naquib al-Attas, *Islam and Secularism*, 2nd edn. (Kuala Lumpur ISTAC, 1993), 44 ff and 182 ff defines 'Islamization' as "the liberation of man first from magical, mythological, animistic, national-cultural tradition opposed to Islam, and then from secular control over his reason and his language." For his application of this definition to "present-day knowledge," including the human, natural, physical and applied sciences, see *ibid.*, 162 ff. For the limited purpose of this paper, 'science' is simply taken to refer to "the systematic study of the natural world."
 7. Osman Bakar, ed., *Critique of Evolutionary Theory: A Collection of Essays* (Kuala Lumpur: ASASI and Nurin, 1987), which include articles by Nasr, Bakar and others; cf. Syed Muhammad Naquib al-Attas, *A Commentary on the Hujjat al-Siddiq of Nūr al-Dīn al-Rānirī: being an exposition of the salient points of distinction between the positions of the theologians, the philosophers, the Ṣūfīs and the pseudo-Ṣūfīs on the ontological relationship between God and the world and related questions* (Kuala Lumpur: Ministry of Culture, 1986), 460–461.
 8. Harun Yahya's many colorfully illustrated anti-evolution books, especially the remarkable *Evolution Deceit: The Scientific Collapse of Darwinism and Its Ideological Background*, trans. Mustapha Ahmad (London: Ta Ha, 2000), brings to our attention in great detail the many scientific, as opposed to the philosophical or metaphysical, shortcomings of darwinian and neodarwinian evolutionary theories, but there is no attempt at all therein to construct a proper scientific counter-theory. On the other hand, Abdul Wahid Pallacken, "Origin of Genetic Information and Evolution of Biological Species" in *Islam & Science*, Vol. 3 (Summer 2005) No. 1, 7–42, both criticizes evolution and attempts to construct an alternative theory but its conceptual foundations are rather weak and largely ungrounded in the Islamic intellectual tradition, especially with regard to Islamic psychology

of a well-articulated, empirically rich, counter-theory,⁹ whether they like it or not, biologists, including those who privately believe in a transcendent creative agent of power and intelligence, are stuck with the default theory and they will continue to interpret known and yet to be discovered biological phenomena along the lines predetermined by that theory.¹⁰

That said, one has to admit wholeheartedly that the pioneering philosophical works of al-Attas, Nasr and Bakar are of fundamental importance for opening our eyes to the very possibility (hence, imperative even!) of constructing relevant counter-theories to mainstream Western theories, especially if the latter are shown to be grounded, whether explicitly or implicitly, in underlying metaphysical foundations incompatible with, or even undermining, the Islamic worldview, i.e., the Islamic metaphysical vision of truth and reality.¹¹ The key-word here is ‘construction’, specifically, the proactive creative work of constructing viable alternative scientific theories that are, on the one hand, grounded in, or compatible with, Islamic metaphysics, while, on the other, *empirically responsible*, i.e., that can adequately account for the same sets of observed phenomena ostensibly accounted for by rival, ‘un-Islamic’ (or ‘less-than-Islamic’) theories, and even, if possible, supersede them altogether.¹²

and natural philosophy.

9. Such as along the lines of Michael Behe, *Darwin's Black Box: The Biochemical Challenge to Evolution* (New York: Free Press, 1996). My review of Behe's book is published in *Jawhar: Journal of Book Review*, Vol. 3 (February/March 2006) No. 1, 75–82.
10. The analogy here is this: if you go to someone's house and point out to him its leaking roof and crumbling walls but fail to build for him (or teach him to build) a better house to live in, he will thank you very much for being so kind and go on living in it until it falls over and buries him in the rubble.
11. Syed Muhammad Naquib al-Attas, *Prolegomena to the Metaphysics of Islam: An Exposition of the Fundamental Elements of the Worldview of Islam* (Kuala Lumpur: ISTAC, 2001).
12. For instance, in the way atomism displaced hylomorphism, or in the way cognitive psychology (which is arguably more compatible with Islamic faculty psychology) displaced behaviourism. Another example is the way many alternative, traditional medical systems (such as Japanese *kampo*, Indian ayurvedic and Chinese acupuncture) are shown to be just as effective as (or even more effective than) modern allopathic medicine in treating the same types of illnesses, minus, of course, the side-effects inherent in modern synthetic drugs. So, if rival scientific theories can account for the same set of phenomena, or solve the same set of empirical problems, then the theories most compatible with the Islamic worldview should be identified, chosen, improved upon, extended and incorporated/integrated into the

I think that is the true *operative essence* of Islamic science: that it has to be involved in an unapologetic, proactive construction of empirico-conceptual frameworks for interpreting and interacting with the world in a way that is self-consciously inspired by,¹³ and hence, in harmony with, the ethico-cognitive principles of Islam.¹⁴ Without this proactive vision or *proactivity*, we are left with three reactivities: (i) a shallow ‘Qur’ānic scientific-miracle’ or ‘*tafsīr ‘ilmī*’¹⁵ approach that always seems to run after the

ISRP (Islamic science Research Program).

13. In the past when Islamic culture was predominant, it can be surmised that the Qur’ānic inspiration for the pursuit of science was mostly tacit. It was there in, or as, the general intellectual ambience and need not be explicitly brought to the fore. This may explain why, as noticed by Roxanne D. Marcotte in “Review of Islam and Science”, 3, there is little direct reference to the Qur’ān in “most scientific works.” But in today’s Westernized world, especially in the light of the growing realization that the scientific enterprise is thoroughly *value-laden*, it is of the utmost imperative for Muslim scientists to be critically self-conscious about their Islamic worldview so that they can determine for themselves to what extent their work can or cannot be integrated into it and act accordingly.
14. That is, principles derived from Islamic epistemology and axiology of science as will be elaborated in detail on another occasion, but see, meanwhile, ‘Adi Setia, “Al-Attas’ Philosophy of Science: An Extended Outline” in *Islam & Science*, Vol. 1 (December 2004) No. 2, 187–194 and 204–211.
15. Brief critical reviews of this approach are Mustansir Mir, “Scientific Exegesis of the Qur’ān—A Viable Project?” in *Islam & Science*, Vol. 2 No. 1 (Summer 2004), 33–42; and Jalees Rehman, “Searching for Scientific Facts in the Qur’ān: Islamization of Knowledge or a New Form of Scientism?,” in *Islam & Science*, Vol. 1 No. 2 (December 2003), 245–252. See also Chapter 10 of Muzaffar Iqbal, *Islam and Science* (Aldershot, UK: Ashgate, 2002), for his less than optimistic review of the Qur’ānic scientific exegesis project. A scathingly terse review by Taner Edis, “Qur’an-science: scientific miracles from the 7th century,” accessible online at <http://www2.truman.edu/~edis/writings/articles/quran-science.html>, is interesting for drawing attention to parallel developments in the “Bible-science” of the literalist, fundamentalist Christian creationists. My personal view here is that the so-called *al-tafsīr al-‘ilmī* or scientific exegesis should be recast as *al-tafsīr al-kalāmī* along the lines of Fakhr al-Dīn al-Rāzī’s *Mafātīḥ al-Ghayb* as exemplified in his exegesis of the the Qur’ānic concept of *taskhīr* in relation to certain aspects of observed human and natural phenomena, by which relation that concept is imbued with empirical and experiential content or meaning; see ‘Adi Setia, “*Taskhīr*, Fine-Tuning, Intelligent Design and the Scientific Appreciation of Nature” in *Islam & Science*, Vol. 2 (Summer, 2004) No. 1, 7–32. As exemplified

tailcoats of (arbitrarily selected) modern, Western empirical discoveries, without ever coming out with original discoveries or insights of its own;¹⁶ (ii) a repetitive, largely unsystemic, negative critique, however sophisticated, of various modern theories or methods incompatible with Islamic metaphysics or ethics without concomitant positive critique giving rise to viable, systemic counter-theories and counter-methods;¹⁷ and (iii) an overly

in the *Maḥāṭib al-Ghayb*, *kalām* exegesis involves rigorous semantico-conceptual analyses of Qur'ānic concepts in order to draw out their logical implications for actual, empirical investigations of the physical world whose results may or may not coincide with the truth-claims of modern science. It is dialectical since it mediates disciplined, reflective intellectual dialogue between revelation and creation. It was through the *kalām* dialectical method that the natural sciences in the past were critically appropriated, naturalized, and incorporated into the conceptual framework of the Islamic worldview. This was a constructive process which generated a new, Islamized science of nature, which, I think, should be the whole point of a proper, contemporary scientific exegesis of any degree of intellectual profundity. Another consideration for not using the term *tafsīr 'ilmī* is to preempt a narrowing, in the public consciousness, of the classical rich meaning of the term *'ilm* to the modern impoverished meaning of the term 'science'. This issue will be further elaborated at another opportunity, *inshā'ā'llāh*. Badi'uzzamān Sa'īd al-Nūrsī's profoundly influential *Rasā'il al-Nūr* can be read as a new approach to *tafsīr kalāmī* for effective engagement with the intellecto-moral challenges of the modern age. The *Maḥāṭib* and the *Rasā'il*, though seven centuries apart, are, in spirit and purpose, identical.

16. And without bothering to consider the tentative and sometimes highly contentious nature of such discoveries or their underlying assumptions rendering them valid.
17. On the whole, Islamic critiques of evolution, for instance, have remained repetitively of a general nature and hence conceptually and empirically stagnant and unproductive for the past three decades except lately in the works of Harun Yahya (especially *Evolution Deceit*), who engages it largely from within in greater scientific detail, but even here there is no attempt at a corresponding counter-theory. Another example is the relatively recent Islamic medico-fiqhi concern with certain biotechnological driven innovations (cloning, stem-cell therapy, organ transplant, gene therapy, etc.) in Western medicine with no attempt whatsoever at a deeper philosophical, methodological, sociomedical, and political economic critique, hence the tacit unexamined assumption of a universal, context-free relevance of the medical problems driving these, largely private-interest, business-driven, for-profit rather than for-health, innovations. For a sampling of these medico-fiqhi concerns, see Ahmed Abdul Aziz Yacoub, *The Fiqh of Medicine: Responses in Islamic Jurisprudence to Developments in*

romanticized glorification of the so-called “golden age” of Islamic science that assaults the hearing like the pitiable lament of a defeated psyche. In the absence of this proactive, *operative vision*, Islamic science will continue to be viewed by scientists, including religiously pious Muslim scientists, as purely reactionary to the ‘normal’¹⁸ state of affairs, and thus fail to draw them into understanding and furthering its ‘abnormal’¹⁹ radical cause.²⁰

Due to the many published scholarly studies available, I think we now know enough about the history and philosophy of Islamic science to argue for and formulate a more proactive, operative approach toward reviving Islamic science in the manner envisaged by al-Attas, Nasr, and Bakar; i.e., in a manner that relates it organically and seamlessly to the authentic Islamic intellecto-religious tradition while engaging constructively with modern science, and thus revives it as an unapologetic constructive contributor to contemporary technoscientific discourse.²¹

Medical Science (London: Ta Ha, 2001); cf. V. Rispler-Chaim, *Islamic Medical Ethics in the 20th Century* (Leiden: Brill, 1993).

18. ‘Normal’ here in the Kuhnian sense. Since most Muslim scientists, even very pious religious ones, are so totally immersed by education and training in mainstream modern Western scientific culture with little or no significant exposure to non-Western scientific systems, they lack the necessary comparative perspective for critically evaluating what they presently do as scientists. They simply cannot conceive of any other way to do science; even if informed of such alternative approaches, they will consider them ‘abnormal’ if not beyond their ken.
19. ‘Abnormal’ here again in the Kuhnian sense, meaning simply what is not being done or pursued by the great majority of scientists for one reason or another. So ‘abnormal’ science is not necessarily quackery or pseudo-science; on the contrary, it can be just as rational and empirical as normal science or even more so, only that it has not yet grown influential enough amongst mainstream scientists to be counted as normal. For Thomas Kuhn’s view of scientific change, see his influential *The Structure of Scientific Revolutions*, 2nd ed. (Chicago: University of Chicago Press, 1970), which can be adapted, with qualifications, to our project.
20. In this respect, Paul Feyerabend, *Against Method: Outline of an Anarchistic Theory of Knowledge* (London: Verso, 1986), can be read by Muslim scientists as opening the way for them to create better alternatives to Western science such as Islamic science.
21. It is in this regard that I find wanting writings on various aspects of the Islamization of the sciences by Ismail al-Faruqi and Ziauddin Sardar, as these generally bypass altogether the conceptual profundity of traditional Islamic and modern Western philosophico-scientific debates and appeal directly to Qur’anic categories with little or no systemic

Some Historical Lessons

In the Qurʾān it is stated that *Verily, in their stories is a lesson for owners of hearts*.²² So I think we can try fulfilling the Divine injunction implicit in this verse with regard to what pertinent lessons we, as “people of understanding,” should draw from the success stories of our great Muslim scientists, philosophers, and theologians of yore.

First of all let us look briefly at scientists²³ such as Ibn Haytham (965–1040), acclaimed in both the East and West as the founder of modern optics by virtue of his seminal work *Kitāb al-Manāẓir*.²⁴ His empirical optical discoveries and formulation of the scientific research methodology underpinning them were in the immediate context of close critical engagement with various ancient Greek optical theories, in both their philosophical and empirical aspects. He was not satisfied by finding these theories wanting in one way or another, rather, he went further by systematically setting out to construct counter-theories that could be found not-wanting, i.e., that could stand up to rigorous, objective logico-mathematical analyses and refined, innovative observational testing. He was, similarly, constructively critical of Ptolemaic astronomy, so much so that his *al-Shukūk ‘alā al-Baṭlamyūs* (*Doubts about Ptolemy*)²⁵ laid the groundwork for subsequent improvements to it by al-Ṭūsī (1201–1274)²⁶ and Ibn Shāṭir (1304–1375) that eventually lead directly or indirectly to the Copernican “revolution.”²⁷

analysis and informative input. I think this “short-cut, rush-rush” approach is shallow, to say the least, and will paradoxically result in an uncritical, passive reception of the very same secular Western sciences it set out to “Islamize” in the first place. This paradoxical situation has already taken firm hold at the International Islamic University Malaysia which is basically premised on the Faruqian approach to Islamization.

22. *Yūsuf*: 111.

23. Or rather those generally recognized as scientists in the modern sense of the term, though they were a lot else besides.

24. A. I. Sabra, trans. and comm., *The Optics of Ibn Haytham: Books I–III: On Direct Vision*, 2 vols. (London: Warburg Institute, 1989); cf. Muhammad Saud, *The Scientific Methodology of Ibn Haytham* (Islamabad: Islamic Research Institute, 1990); cf. Saleh B. Omar, *Ibn Haytham’s Optics: A Study of the Origins of Experimental Science* (Minneapolis: Bibliotheca Islamica, 1977).

25. Arabic text edited with annotations by A. I. Sabra, 2nd ed. (Cairo: Dār al-Kutub, 1996).

26. Unless otherwise stated, all dates refer to Common Era.

27. Details in Edward S. Kennedy, *Astronomy and Astrology in the Medieval World* (Aldershot: Variorum, 1998); David A. King, *Islamic Mathematical Astronomy* (Aldershot: Variorum, 1998); George Saliba,

Similar proactive, self-confident critical engagement is evident in the case of mathematicians such as ‘Umar al-Khayyāmī (d. 1131) and Jamshīd al-Kāshī (d. 1429). The former formulated a new postulate to demonstrate Euclid’s problematic fifth postulate (the parallel postulate) which eventually lead to the rise of non-Euclidean geometry, while the latter perfected the decimal place value notational system for both integers and fractions.²⁸ In other sciences such as medicine, for example, one may cite the works of physicians such as Abū Bakr Muḥammad Ibn Zakariyyā al-Rāzī (865–925) with his *al-Shukūk ‘alā al-Jālīnūs* (*Doubts about Galen*),²⁹ in which he criticizes Galen’s humoral theory and postulates other material qualities from his own clinical observations and chemical experiments.

In philosophy, the case of Ibn Sīnā (980–1037) is well known. Though greatly influenced by the Aristotelian philosophical system, he envisaged the need to bring the more problematic aspects of that system into greater harmony with Islamic metaphysics. His reformulation of the metaphysics of efficient causation is a case in point.³⁰ Then, in the case of *kalām*, we have the great theologian-philosopher al-Ghazālī (1058–1111) who, in his *Tahāfut*,³¹ went further in Islamizing Aristotelism by eliminating intermediary causation altogether and offering in its place a positive, alternative causal theory that is arguably even more empirically adequate than the criticized and rejected peripatetic theory. This series of constructive thrusts and counter-thrusts eventually lead to the full-fledged atomism and occasionalism of post-Ghazālīan, Fakhrurāzīan (d. 1209) *kalām* physical theory,³² a development in which much of peripatetic natural philoso-

A History of Arabic Astronomy: Planetary Theories during the Golden Age of Islam (New York: New York University Press, 1994); Noel Swerdlow and Otto Neugebauer, *Mathematical Astronomy in Copernicus’s De Revolutionibus* (New York: Springer, 1984).

28. Details in J. L. Berggren, *Episodes in the Mathematics of Medieval Islam* (New York: Springer-Verlag, 1986); cf. Victor J. Katz, *A History of Mathematics* (Reading, MA: Addison-Wesley, 1998), for the excellent Chapter 7 on Islamic Mathematics, 238–287 passim; Daoud S. Kasir, *The Algebra of Omar Khayyam* (New York: AMS Press, 1972).
29. Edited by Mehdi Mohaghegh (Kuala Lumpur: ISTAC, 1993).
30. Michael Marmura, “Avicenna on Causal Priority” in Parviz Morewedge, ed., *Islamic Philosophy and Mysticism*, 3rd ed., (New York: Caravan Books, 1981).
31. *Tahāfut al-Falāsifah*, trans. Michael Marmura (Provo, Utah: Brigham Young University Press, 2000).
32. ‘Adi Setia, “The Theologico-Scientific Research Program of the *Mutakallimūn*: Intellectual Historical Context and Contemporary Concerns with Special Reference to Fakhr al-Dīn al-Rāzī” in *Islam & Science*, Vol. 3 (Winter, 2005) No. 2, 127–151; idem, “Atomism ver-

phy was “appropriated” into mainstream, ‘orthodox’ intellecto-religious discourse and hence “naturalized”³³ (i.e., Islamized).

Again, these positive achievements were brought about in the wake of systemic engagement with both the ‘hard’ and ‘soft’ aspects of the Greek sciences, so much so that many, if not most, of the post-Ghazālīan *mutakallimūn*, even arguably right up to the mid-nineteenth century, were also practicing, accomplished scientists (*ṭabī‘iyyīn*) and philosophers (*ḥukamā’*) in their own right.³⁴ This essentially programmatic nature of classical Islamic religio-scientific investigations (*baḥṭh/mabāḥiṭh*)³⁵ sketchily described above which critically assimilated and built on the works of the past in order to go beyond them was still more or less prevalent up to the advent and consolidation of global European colonial expansionism in the 19th century, even in the Malay-Islamic Far East.³⁶ In the case of tech-

sus Hylomorphism in the *Kalām* of Fakhr al-Dīn al-Rāzī” in *Islam & Science*, Vol. 4 (Winter 2006) No. 2, 113–140. Cf. Dimitri Gutas, “The Heritage of Avicenna: The Golden Age of Arabic Philosophy, ca. 1000–1350” in Jules Janssens and Daniel De Smet, eds., *Avicenna and His Heritage: Acts of the International Colloquium, Leuven, September 8–11* (Leuven: Leuven University Press, 2002), 81–97; Ayman Shihadeh, “From al-Ghazālī to al-Rāzī: 6th/12th Century Developments in Muslim Philosophical Theology” in *Arabic Science and Philosophy*, Vol. 15 (2005), 141–179; and A. I. Sabra, “Science and Philosophy in Medieval Islamic Theology: The Evidence of the Fourteenth Century” in *Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften*, 8 (1994), 1–42. See also A. I. Sabra’s important forthcoming “*Kalām* Atomism as an Alternative Philosophy to Hellenizing *Falsafa*: An Interpretation of Ash‘arite *Kalām* Ontology” as reported on the website <http://www.ou.edu/islamsci/Sabra-publications05.pdf>.

33. This is the so-called ‘Sabra’s thesis’; see A. I. Sabra, “The Appropriation and Subsequent Naturalization of Greek Science in Medieval Islam” in *History of Science*, 25 (1987), 223–243; reprinted in F. Jamil Ragep et al. eds., *Tradition, Transmission, Transformation: Proceedings of Two Conferences on Pre-modern Science, held at the University of Oklahoma* (Leiden: E. J. Brill, 1996), 3–27.
34. See, for instance, Peter Gran, *The Islamic Roots of Capitalism: Egypt, 1760–1840* (Austin: University of Texas Press, 1979) for the case of the important but little studied, Shaykh Ḥasan al-‘Aṭṭār (1766–1835) of Mamlūk, Napoleonic and, later, Muḥammad ‘Alī Pasha’s Post-Napoleonic Egypt.
35. For instance, an early philosophico-scientific work of Fakhr al-Dīn al-Rāzī is entitled *al-Mabāḥiṭh al-Mashriqiyyah* (*The Eastern Researches*), ed., Muḥammad al-Mu‘taṣim biLlāh al-Baghdādī, 2 Vols. (Beirut: Dār al-Kitāb al-‘Arabī, 1990).
36. Shaykh Aḥmad bin Muḥammad Zayn al-Faṭānī (1856–1908), for instance, was a practicing surgeon, physician, medical researcher, and

nology as opposed to science and philosophy, this same constructive attitude can also be argued for, again right up to the mid-nineteenth century, especially in the case of Mamlūk Egypt, Ottoman Turkey, Ṣafavid Persia, Mughal India, Islamic Civilization in China, and some of the Sultanates of the Malay Archipelago of the Islamic Far East, although, admittedly, much textual and artifactual research needs to be done and published in order to render this thesis persuasive.³⁷

experimenter. He wrote medical treatises and encouraged his own countrymen, the Malay Muslims, to undertake scientific research into their own indigenous, medicinal resources. His student, Rāja Ḥāji Aḥmad Ṭabīb Riyāw, was also a medical author and known to make his own surgical instruments from bamboo. For detailed surveys of the sociohistorical background of these Malay-Islamic scholars who worked against a backdrop of increasing European and Siamese colonial encroachment, see Azyurmardi Azra, *The Origins of Islamic Reformism in Southeast Asia: Network of Malay-Indonesian and Middle Eastern 'Ulama' in the Seventeenth and Eighteenth Centuries* (Honolulu: University of Hawaii Press, 2004); and Engseng Ho, *The Graves of Tarim: Genealogy and Mobility Across the Indian Ocean* (Berkeley: University of California Press, 2006).

37. In the case of the Malay-Islamic Far East, preliminary studies by Ustaz Haji Wan Muhammad Saghir Wan Abdullah and researchers affiliated with ASASI of the life and works of nineteenth-century Malay 'Ulama' who wrote in both Arabic and Jawi show many of them to be practicing, accomplished physicians, astronomers, logicians, mathematicians and philosophers. Among them we have Shaykh Aḥmad bin 'Abdul Laṭīf (1855–1916) who wrote *Rawḍat al-Ḥussāb* and *Ālam al-Ḥussāb fī 'Ilm al-Ḥisāb* (Kuala Lumpur: Khazānah al-Faṭāniyyah, 2002), both on mathematics; and Shaykh Aḥmad bin Muḥammad Zayn al-Faṭānī who wrote *Luqṭat al-'Ajlan fī mā Tamassa ilayhi Ḥājat al-Insān* and *Ṭayyib al-Iḥsān fī Ṭibb al-Insān* (Kuala Lumpur: Khazānah al-Faṭāniyyah, 2005), both on medicine. For Egypt, a study that comes to mind is Peter Gran, *The Islamic Roots of Capitalism: Egypt, 1760–1840*, op. cit; for India, Zaheer Baber, *The Science of Empire: Scientific Knowledge, Civilization and Colonial Rule in India* (Albany, NY: SUNY Press, 1996); and Frederic F. Clairmont, *The Rise and Fall of Economic Liberalism: The Making of the Economic Gulag*, rev. ed. (New York: Apex Press, 1996), especially Chapter 3 on “The Indian Dossier”. For the case of Muslims in China, see, for instance, the excellent historical overview by Umar Faruq Abd-Allah, “Seek Knowledge in China: Thinking Beyond the Abrahamic Box,” Nawawi Foundation Paper, accessible online at <http://www.nawawi.org/downloads/article5.pdf>, accessed April 1 2007. One can only surmise the real extent of indigenous Chinese-Islamic contribution to “Science and Civilization in China.” The definitive, masterful study of Chinese science and technology from the earliest time till the modern era is Joseph Needham

These Muslim scientists, philosophers and theologians not only cultivated a constructive approach to the ‘foreign sciences’ but they were also self-critical as well as mutually critical amongst themselves. The point here is not whether some of the later scholars of the last three centuries were aware of, and tried to “catch up” with, the scientific advancements of the colonizing imperialistic West, but rather to what extent they continued to identify, and address themselves to, religious, scientific and technological problems arising out of their respective indigenous sociocultural contexts, for creative science is, first and foremost, about solving one’s own problems (i.e., problems you posit to yourself) not the problems of others (i.e., problems created for, and imposed on, you by others). For sure, many if not most of these “indigenous” contexts were to some extent conditioned by global Western civilizational challenges, yet, more often than not, these very challenges spurred the creation of dynamic, largely autonomous intellecto-cultural spaces rendering possible effective, proactive responses.³⁸ I dare say that these autonomous spaces only shrunk significantly and even disappeared altogether during the so-called postcolonial, “independence” era of the mid-twentieth century, which is rather ironic, though, in the final analysis, unsurprising, once the disembodied, insidious westernizing process had set in to complete the work left undone, or that could not be done, by the departing, “civilizing” imperialists.³⁹

et al, *Science and Civilization in China*, 7 Vols. (Cambridge: Cambridge University Press, 1954–2004).

38. The underlying, broad theoretical framework for this thesis in the case of the Malay-Islamic world is Syed Muhammad Naquib al-Attas, *Preliminary Statement of a General Theory of the Islamization of the Malay-Indonesian Archipelago* (Kuala Lumpur: Dewan Bahasa dan Pustaka, 1969).
39. Serge Latouche, *The Westernization of the World: The Significance, Scope and Limits of the Drive towards Global Uniformity*, trans. Rosemary Morris (Oxford: Polity Press, 1996). In the case of Ottoman Turkey, Kemal Atatürk did what the occupying Western forces did not or could not do: abolish the Caliphate and institutionalize the complete secularization of Turkey. A recent Malaysian case in point is the overly hostile and politically motivated takeover of The International Institute of Islamic Thought and Civilization (ISTAC) by the International Islamic University Malaysia (IIUM) in 2002, thus eliminating a once vibrant, internationally acknowledged, autonomous intellecto-cultural space for the pursuit of a genuinely authentic Islamization of sciences. The takeover is being contested in court by the Founder-Director with little indication so far of an amicable resolution of the case even after five long years. Justice delayed is certainly justice denied!

I think it is more fruitful for our particular purpose here to read the history of Islamic science not as a long chronological series of ossified discoveries whose value is often obsessively seen in the extent of them being anticipative or otherwise of modern discoveries, but rather as indicative of an underlying, creatively dynamic pattern of meaningful intellectualizing about the human and natural world within the over-arching context of religious experience of revelation. To be curt, those great Muslim scientists of the past were simply not worried about anticipating Copernicus or Newton or Einstein; rather, they were totally concerned about doing something that could be meaningful to themselves and to their community, and, perhaps, be acceptable to their Creator. Since that is the case with regard to our forebears, why are we today so much more concerned with catching up with the West than with doing really original, creative science that is *appropriate* to our socio-natural context and geared first and foremost toward solving our problems *as conceived by us*? The big question about any science or any technology is not whether it is advanced or backward, high or low with respect to the West, but whether it is truly useful and beneficial with respect to us. From this *autonomous perspective*, the question of the “decline” of Islamic science is, to a large extent, an intellectual red herring.

Therefore, the purpose of studying the history of Islamic science for Muslims today is not only to know who discovered what first, second, or last, but, more importantly, to rearticulate clearly in contemporary terms the often hidden, underlying creative thought processes leading to those discoveries and to bring to light their usually not-so-apparent background of internally generated problematics, regardless of whether these discoveries be of a physical or conceptual nature. For it must be understood that these discoveries, if truly meaningful, were only discovered to solve problems or to achieve objectives that arose or were conceived from within the socio-intellectual dynamics of the then predominant, cosmopolitan Islamic world-civilization. Without achieving this deep-level understanding, those scientific artifacts, works and relics of the long bygone and (for most people) well-nigh forgotten past will have no substantive, larger meaning for the great majority of Muslims living in the immediate, everyday life of the real, overly westernized,⁴⁰ secularized⁴¹ world (as opposed to the sterile, elitist life of expensive science museums, grand exhibition halls, glossy coffee-table books and innumerable feel-good film documen-

40. Serge Latouche, *The Westernization of the World: The Significance, Scope and Limits of the Drive towards Global Uniformity*, op. cit.

41. Syed Muhammad Naquib al-Attas, *Islam and Secularism*, op. cit.

taries).⁴²

To clarify this issue further I think we need to demarcate three distinct yet interlinked operative meanings of the term ‘Islamic science’. By ‘operative’, I mean what scholars or researchers actually refer to when they say they are “studying” or “talking about” Islamic science.

Three Meanings of Islamic science

The first meaning pertains to the subject matter of the formal academic discipline that studies the history of the development of empirical science and technology in Islamic Civilization in relation to the sciences of earlier (e.g., Greek, Indian) and later (i.e., Latin European) civilizations. This meaning places Islamic science squarely within the larger discipline of History of Science as envisaged by George Sarton.⁴³ Islamic science simply means history of science in Islamic culture and society; it is less about conceptual theory than actual practice and empirical results. Some notable works, among many, indicative of this meaning are A. I. Sabra’s *The Optics of Ibn Haytham*,⁴⁴ Daniel Martin Varisco’s *Medieval Agriculture and Islamic science: The Almanac of a Yemeni Sultan*,⁴⁵ Roshdi Rashed’s *Encyclopedia of the History of Arabic Science*,⁴⁶ and Donald R. Hill, *Islamic science and Engineering*.⁴⁷ The valuable, ongoing multi-volume reference work of meticulous research and documentation on the Islamic scientific and literary tradition undertaken by Professor Fuat Sezgin is, to a large extent, in this

42. Recently, the Malaysian Ministry of Science, Technology and Innovation (MOSTI) in collaboration with Professor Fuat Sezgin’s Frankfurt-based Institute for Arab-Islamic science held a three-month exhibition of Arab-Islamic scientific instruments, artifacts and manuscripts in Kuala Lumpur. The exhibition was very successful in terms of generating attendance and media coverage, and invoking in the general Muslim public a sense of pensive nostalgia for the Islamic technoscientific past. However, without critical appreciation of the actual sociocultural *operative context* of these exhibited artifacts, such nostalgic feelings will soon fade away and never be translated into positive action for reviving Islamic science in the real world. For a catalogue of the exhibition in three languages, Malay, English and Arabic, see Fuat Sezgin, *Scientific Excellence in Islamic Civilization: Islamic science Ahead of Its Time: Catalogue* (Kuala Lumpur: MOSTI, 2006).

43. George Sarton, *Introduction to the History of Science*, 3 vols. (Baltimore: Williams and Wilkins, 1927–48).

44. (London: Warburg Institute, 1989).

45. (Seattle: University of Washington Press, 1994).

46. Roshdi Rashed, ed. with Régis Morelon, 3 vols. (London: Routledge, 1996).

47. (Edinburgh: Edinburgh University Press, 1994).

category.⁴⁸ Also, the excellent, well documented and illustrated scholarly articles accessible online through the website muslimheritage.com provide a very comprehensive survey of practically all the empirical sciences cultivated in Islamic Civilization.⁴⁹ One can no longer pretend to be a *tabula rasa* with regard to the subject.

The second meaning pertains to the subject matter of the sub-discipline in Islamic Philosophy that serves to describe and clarify in objective, contemporary terms the methodological and philosophical principles that have guided or undergirded the cultivation of the sciences in Islamic civilization. This meaning renders Islamic science as part of philosophy and philosophy of science in general, and focuses more on the conceptual or intellectual rather than the empirical, practical or artifactual aspects of Islamic science. Notable works in this regard are also many, including al-Attas’ *Islam and the Philosophy of Science*, Nasr’s *Introduction to Islamic Cosmological Doctrines*, Bakar’s *Classification of Knowledge in Islam*, Franz Rosenthal’s *Knowledge Triumphant: The Concept of Knowledge in Medieval Islam*,⁵⁰ Fazlur Rahman’s *Avicenna’s Psychology*⁵¹ and many others. A useful internet resource in this regard is www.muslimphilosophy.com⁵² covering practically all aspects of Islamic Philosophy, including philosophical aspects of Islamic science. Moreover, many valuable articles and even whole books are downloadable from this website for free in pdf format. Again, mere lack of the relevant references can no longer be offered as an easy excuse for ignoring the subject.

Obviously it is in the latter category of works that the meaning of Islamic science most overlaps with the meaning of Islamic Philosophy, while in the former case, Islamic science can be and usually is studied on

48. Fuat Sezgin, *Geschichte des arabischen Schrifttums*, Vol. 1 ff. (Leiden: Brill, 1967 ff.; Institut für Geschichte der Arabisch-Islamischen Wissenschaften: Frankfurt am Main, 1995 ff.).

49. <http://www.muslimheritage.com/topics/default.cfm> accessed March 26, 2007.

50. (Leiden: E. J. Brill, 1970), a wide ranging, original study of the concept of *‘ilm* (knowledge, science) in the Islamic intellecto-religious tradition.

51. (London: Oxford University Press, 1952); cf. Syed Muhammad Naquib al-Attas, *The Nature of Man and the Psychology of the Human Soul: A Brief Outline and a Framework for an Islamic Psychology and Epistemology* (Kuala Lumpur: ISTAC, 1990), which also constitutes Chapter IV of the *Prolegomena*, 143–176; cf. Mohd Zaidi bin Ismail, *The Sources of Knowledge in al-Ghazālī’s Thought: A Psychological Framework of Epistemology* (Kuala Lumpur: ISTAC, 2002).

52. <http://www.muslimphilosophy.com/> accessed March 27, 2007.

its own with little reference to Islamic Philosophy as such. Most scholars and researchers, when they talk about Islamic science, are either referring to its empirical, philosophical, or both aspects. However, none, to my very limited knowledge, have tried to read Islamic science in any systematic manner as essentially *programmatic* in nature, i.e., as a *systemic research program* that has continually been creatively enriched and rearticulated throughout its history by the *intellecto-scientific ijtihād*⁵³ of succeeding generations of scholars, each generation in response to the demands and challenges of their age, although support for this reading can easily be gleaned from the many accessible published studies on various aspects of the history and philosophy of science in Islamic culture and civilization.

This is not to say that these scholars of the past self-consciously viewed what they were doing as programmatic in the Lakatosian⁵⁴ sense of the term, but their actual intellectual attitude towards it, as can be gleaned from their works, certainly was programmatic in that sense. Hence, al-Ghazālī's *Tahāfut al-Falāsifah*⁵⁵ is not merely a one-off reaction against peripatetic philosophy, but a more comprehensive programmatic outline for a new *kalām*, a new kind of Islamic philosophico-theological system termed *kalām jadīd* by Ibn Khaldūn (1332–1406).⁵⁶ Al-Shāfi'ī's (767–820) *Risālah*⁵⁷ is a program to set fiqh on a more organized disciplinary framework. Ibn Khaldūn's *Muqaddimah*⁵⁸ is essentially a new socio-historical research program; and so on and so forth. Similarly, in order for us to revive Islamic science today, we should build on the works of al-Attas, Nasr, and Bakar, and in order to do that, we have to critically re-read their works, especially al-Attas' *Prolegomena*, in an operative, programmatic framework.

The third meaning pertains then to the subject matter of the (yet to be created) discipline that serves to reformulate the concept of Islamic science as a long term creative research program dedicated toward a systemic reapplication of Islamic cognitive and ethical values to science and

53. In this regard, see Umar Faruq Abd-Allah, "Innovation and Creativity in Islam," Nawawi Foundation Paper, accessible online at <http://www.nawawi.org/downloads/article4.pdf>, accessed April 1, 2007.

54. Imre Lakatos, *The Methodology of Scientific Research Programmes* (Cambridge: Cambridge University Press, 1984).

55. *The Incoherence of the Philosophers*, trans. Michael Marmura (Provo, Utah: Brigham Young University Press, 2000).

56. Ibn Khaldūn, *Muqaddimah*, trans. Franz Rosenthal, 3 vols. (New York: Princeton University Press, 1958), 3: 53–53.

57. Trans. Majid Khadduri (Baltimore: John Hopkins Press, 1961).

58. Trans. Franz Rosenthal, 3 vols. (New York: Princeton University Press, 1958).

technology in the contemporary world.⁵⁹ This reformulation, in order to be realized, will necessarily require leading Muslim scientists of high, contemplative (as opposed to merely technical) acumen to work toward a critical integration of the scientific endeavor into the conceptual framework of the Islamic worldview, and the concomitant explication of the cognitive,⁶⁰ methodological and axiological implications of such integration for present and future empirical scientific research. This programmatic redefinition of Islamic science will render it into a new over-arching ‘paradigm’⁶¹ or ‘research program’⁶² pregnant with novel methodological and empirical implications (and hence, novel discoveries) for remanifestating the Islamic worldview in everyday individual and societal life through the vision and practice of a non-Western, authentically Islamic science and technology geared first and foremost toward identifying and solving the true problems and satisfying the real needs of the Ummah.

For the effective, substantial realization of this third, programmatic, meaning, leading Muslim scientists should take some time off from their busy professional teaching and research work to cultivate the philosophico-historical acumen necessary for grasping the first two meanings of Islamic science in sufficient conceptual depth and informative detail. This acumen, once attained, will enable them to undertake the arduous theoretical and empirical work of fleshing out the direction and content

59. This new discipline may tentatively be called Principles of Islamic science or *Uṣūl al-‘Ilm al-Islāmī* in Arabic, or, to be more terminologically exact, *Uṣūl al-‘Ulūm al-Ṭabī‘iyyah al-Islāmiyyah*. It will serve to mediate the empirical application of fundamental insights drawn from Islamic philosophy of science to actual scientific research in any scientific disciplines whatsoever. In short, it is to be a rigorously articulated *operative* Islamic history and philosophy of science, a kind of systemic critical thinking as applied to Islamic science, conceived somewhat along the lines of Ronald N. Giere, *Understanding Scientific Reasoning*, 4th ed. (New York: Holt, Rinehart and Winston, 1997). Giere’s textbook is meant to guide students (and teachers), by close analyses of selected historical and contemporary case studies, to appreciate how the rarefied abstruse concepts so passionately debated amongst philosophers and historians of science are concretely grounded in, and hence relevant to, actual empirical scientific work.

60. Or, *epistemic*.

61. In the Kuhnian sense, in Thomas Kuhn, *The Structure of Scientific Revolutions*, 2nd ed. (Chicago: University of Chicago Press, 1970).

62. In the Lakatosian sense, in Imre Lakatos, *The Methodology of Scientific Research Programmes*, op. cit. For our purpose here, the Lakatosian ‘research program’ has a more direct, operative relevance.

of aspects of the Islamic science Research Program applicable to their specializations or particular areas of research.⁶³ In practice, then, these three meanings have to be mastered and integrated into a single whole and applied to any particular scientific research project one is involved in. From the history of science in Islam, we draw lessons from the successes and failures⁶⁴ of previous sages as constituting an invaluable heritage and resource for instilling self-confidence, breaking impasses and inspiring fresh ideas. From the lessons of Islamic philosophy, particularly where they pertain to scientific thought and practice, we learn the art of critical reflection and analysis by which we may harmonize between our human drive to know and our human need to be happy, so that the science we cultivate be a constructive rather than destructive aspect of our civilization. By reading the history and philosophy of Islamic science as programmatic in nature we build the capacity to construct and cultivate a new, contemporarily relevant Islamic science and Technology that, on the one hand, will manifest and realize our value system and hence directed toward fulfilling our physical, emotional and spiritual needs, and, on the other, engage constructively with Western modern science and technology. To further elaborate one needs to go into some details of the *conceptual content* of this general Islamic science Research Program (ISRP).

Islamic science Research Program I

In the Qurʾān it is stated clearly that Allāh will reveal His signs in the

63. If medicine, then an Islamic Medicine Research Program (IMRP); if chemistry, then an Islamic Chemistry Research Program (ICRP); if agriculture, then an Islamic Agriculture Research Program (IARP); if physics, then an Islamic Physics Research Program (IPRP); if economics, then an Islamic Economics Research Program (IERP); if biology, then an Islamic Biology Research Program (IBRP); if psychology, then an Islamic Psychology Research Program (IPsyRP); if architecture, then an Islamic Architecture Research Program (IArcRP); and so on and so forth. Obviously we are not to “Islamize” every discipline and sub-discipline that is offered us in the academic market place, for it is an essential aspect of the general Islamic science Research Program (ISRP) that it functions to *axiologically differentiate* between those disciplines whose mastery is important for the welfare of the Ummah and those which are superfluous, or, even worse, intellectual red herrings. Here, a creative, *applicative re-reading* of Bakar’s important study *Classification of Knowledge in Islam* will have a pivotal role to play. In this regard, see also al-Attas, *Islam and Secularism*, 164 ff.

64. “Failures” in the sense of what, from the perspective of hindsight, they could have further achieved but did not.

cosmic horizons and in our own selves until it shall be clearly manifest to us (and to humankind in general) that it (the Qur’ān) is the truth/the real.⁶⁵ This verse implies that the revealed, metaphysical truths of the Qur’ān have their physical, sensible, observable and experiential counterparts in phenomenal creation which manifest, indicate and instantiate these transcendent truths. But in other verses there is a caveat to the effect that these Divine signs are only recognizable as such by people who think and reflect,⁶⁶ meaning those who think and reflect correctly in both the rational, discursive (*fikrī*)⁶⁷ and the intellective, contemplative (*‘aqlī*) sense,⁶⁸ otherwise they reject them and view nature as bereft, or independent, of the Divine presence. This implies that these phenomenal signs, for most people, including scientists, do not self-evidently point to Allāh, otherwise all will be believers as a matter of course as there will be no cognitive testing of their innate, *fiṭrī*⁶⁹ intelligence, and hence no intellectual motivation for the cultivation of the theoretical and practical sciences. In other words, as pointed out in various ways by Nūrsī (1878-1960),⁷⁰ Nasr⁷¹ and al-Attas,⁷² there is a certain degree of cognitive ambiguity in phenomena, in the sense that they both veil and unveil the Divine presence. The ultimate test for humankind on earth, and which they must pass in order

65. *Fuṣṣilat*: 53; for *al-ḥaqq/al-ḥaqīqah* as ‘truth-reality’, see al-Attas, *Prolegomena*, 125 ff.

66. e.g., *al-Baqarah*: 164.

67. Al-Attas, *Prolegomena*, 122 ff.

68. i.e., ratiocination within the ambit of intellection according to Nasr, *Science and Civilization in Islam*, 21 ff; cf. al-Attas, *Prolegomena*, 122 ff.

69. For a study of the concept of *fiṭrah* in the Islamic intellectual tradition, see Yasein Mohamed, *Fitra: The Islamic Concept of Human Nature* (London: Ta Ha Publishers, 1996).

70. Yamine Mermer and Redha Ameer, “Beyond the Modern: Sa’id al-Nūrsī’s View of Science” in *Islam & Science*, Vol. 2 (Winter 2004) No. 2, 119–160 passim; cf. Yamine Mermer, “The Hermeneutical Dimension of Science: A Critical Analysis Based on Sa’id Nursi’s *Risale-i-Nur*” in *The Muslim World Review*, Special Issue: *Sa’id Nursi and the Turkish Experience*, LXXXIX: 3–4 (July–October 1999), 270–96 passim; cf. Sukran Vahide, “The Book of the Universe: Its Place and Development in Bediuzzaman’s Thought” in *A Contemporary Approach to Understanding the Qur’an: The Example of the Risale-i-Nur*, Proceedings of the the International Symposium held in Istanbul 20–22 September (Istanbul: Sozler Nesriyet: 1998), 466–483 passim.

71. *Science and Civilization in Islam*, 21 ff.

72. *Prolegomena*, 135–136.

to attain to true, everlasting salvation, is to perceive the Divine presence through the superficial veil of phenomena. This means that the *semiological ambiguity* of nature serves the purpose of being an *intellecto-moral test* of mankind's fidelity⁷³ to their Creator. Of course Islam teaches many ways by which one can see through the veil and attain to true knowledge/*ma'rifah* and hence true worship/*'ibādah*, but here we shall restrict ourselves to the way of discursive investigative science understood as systematic, empirical study of nature, which in the past was largely undertaken within the more general disciplinary frameworks of *falsafah*, *kalām* and *ḥikmah*.

There is the further consideration that the Qur'ān is not only true/real with regard to what it says about the ontological reality,⁷⁴ that is veiled and yet unveiled by the phenomenal world, but also with regard to what it says about both the physical and human aspects of the phenomenal world itself and the laws governing them. Again for most people, it is not immediately obvious that these lower phenomenal realities exhibit features confirming or realizing in detail what the Qur'ān says about them by way of general, often allusive, indications, hence the need again for the cultivation of both the intellectual and religious sciences. For instance, the Qur'ān mentions that nothing in nature is in vain or wasted,⁷⁵ a truth that is now borne out in all its factual empirical, quantitative details through the ecological and environmental sciences.⁷⁶ The Qur'ān mentions directly the healing

73. This refers to man's covenant with God mentioned in the Qur'ān (*al-A'rāf*: 172). For a profound elaboration on the implications of this primordial covenant for the meaning and practice of religion in Islam, see al-Attas, *Islam and Secularism*, 51 ff; *idem*, *Prolegomena*, 41 ff.

74. That is, the Divine essence, attributes and acts, and the unseen spiritual realities such as angels and *jinn*s, including eschatological realities and events.

75. *Rabbanā mā khalaqta hādha bāṭilan* ("O our Lord, you have not created this in vain...," *Āl 'Imrān*: 191).

76. In the past this verse may have inspired, for instance, the creation of oil-lamps in which the left-over soot was recycled into ink (brought to my attention by Naguib Mohd Nor, my aerospace engineering friend). Today we have the corresponding 'zero-waste' and 'waste-to-wealth' approaches in industrial and engineering processes gaining ground in the West and in Japan which can be appropriated by Muslim engineers within a comprehensive, well-articulated outlook towards the environment. This will necessitate, of course, the rejection of the so-called Gaia hypothesis underpinning the secular green movement in the West and Japan, and its replacement with an authentic, Islamic environmental ethical framework derived from the Islamic philosophy of nature; see, for instance, the relevant articles in Richard C. Foltz et. al., eds., *Islam and Ecology: A Bestowed Trust*

and nutraceutical benefits of honey⁷⁷ and indirectly the therapeutic value of sleep,⁷⁸ general truths that, when clarified enough through relevant biological and medical research, become successfully applicable to specific health related situations.⁷⁹

With respect to the more ethico-moral domains of intellectual life, the Qur’ān mentions the Prophet, *sallaLlāhu ‘alayh wa sallam*, as being sent as a “mercy for all creation” (*raḥmatan li al-‘ālamīn*),⁸⁰ inanimate, animate, and human. This in itself is a general abstract truth that becomes concretely self-evident for believers not living in the Prophet’s lifetime through the science of *sīrah* or prophetic biography.⁸¹ We are obliged to obey Allāh in all aspects of our life, a general moral, injunctive truth that is rendered objectively realizable in actual conduct through the science of *uṣūl al-fiqh*⁸² which intellectually mediates between the general normative injunctions of the Qur’ān and Sunnah and their positive applications in the complexity of diverse personal and social contexts. We are obliged to

(Cambridge, MA: Harvard University Press, 2003). For a concrete application of authentic Islamic environmental ethics in the case of Zanzibar’s Muslim fishing community, see Sbah Ahmed, “Inspiring Change in Zanzibar” in *EcoIslam*, No. 1 (January 2006), accessible online through the website http://www.ifees.org.uk/newsletter_1_small.pdf. A more recent, similar case study is reported in Abdur-Razzaq Lubis et. al., “Pioneering Islamic Environmental Practice in Indonesia” in *EcoIslam*, No. 2 (September 2006), accessible online at http://www.ifees.org.uk/newsletter_2_small.pdf.

77. *al-Naḥl*: 69.

78. *al-Furqān*: 47; *al-Nabā’*: 9.

79. For a discussion, see Aisha Subhani, “The Virtue of Sleep” in *Seasons*, Semi-annual Journal of Zaytuna Institute, Vol. 3 (Spring 2006) No. 1, 67–73; and P. C. Morgan, “Honey as Medicine,” in *Seasons*, Semiannual Journal of Zaytuna Institute, Vol. 1 (Autumn–Winter 2003–2004) No. 2, 79–90.

80. *al-Anbiyā’*: 107. For a beautiful commentary on this verse, see the Nawawi Foundation Paper by Dr. Umar Faruq Abd-Allah, “Mercy, the Stamp of Creation,” accessible online in pdf format at <http://www.nawawi.org/downloads/article1.pdf>

81. The best so far in English, by scholarly consensus, is Martin Lings, *Muḥammad: His Life Based on the Earliest Sources* (Allen and Unwin, 1983; Cambridge: Islamic Texts Society, 1991; Kuala Lumpur: A. S. Noordeen, n.d.).

82. Mohammad Hashim Kamali, *Principles of Islamic Jurisprudence*, 2nd rev. ed. (Cambridge: Islamic Texts Society, 1991); Kuala Lumpur: Ilmiah Publishers, 2000); cf. Imran Ahsan Khan Nyazee, *Theories of Islamic Law: The Methodology of Ijtihād* (Kuala Lumpur: The Other Press, 2002).

obey the Prophet, a moral, injunctive truth for the realization of which the science of *ḥadīth* criticism,⁸³ with its distinctive testimonial logic of *sanad*⁸⁴ scrutiny, was cultivated and refined. So the programmatic reading of the Islamic sciences of nature should also be extendable to what is usually known as the “religious” sciences, especially if we want to revive the latter so as to engage and overcome constructively and in a systemic manner the many complex socio-religious and political economic problems that are peculiar⁸⁵ to our present, overly westernized age. However, in order to keep this discourse within manageable limits, I shall restrict myself to the problem of reviving Islamic science, i.e., science as systematic investigation of nature.

Islamic science Research Program II

As stated earlier,⁸⁶ the Islamic science Research Program, in general, consists of an unchanging *core metaphysical component* underpinning the program, and a surrounding network of auxiliary explicative theories and hypotheses for relating the metaphysical abstract core to the concrete physical world. The role of the *network of auxiliary theories* is to provide directions for the conceptual clarifications and empirical investigations of various aspects of this permanent metaphysical core by relating them to corresponding aspects of the physical world, thus imbuing the former with experiential and empirical content or meaning. In other words, the auxiliary, theoretical network is that by which we intellectually mediate between the metaphysical worldview of revelation and the physical world of creation, through which mediation we provide rational and scientific support for that worldview, thus enriching and clarifying it conceptually

83. Muhammad Zubayr Siddiqi, *Ḥadīth Literature: Its Origin, Development, Special Features and Criticism*, rev. ed. (Cambridge: Islamic Texts Society, 1993).

84. The uninterrupted chain of authorities on which a tradition is based.

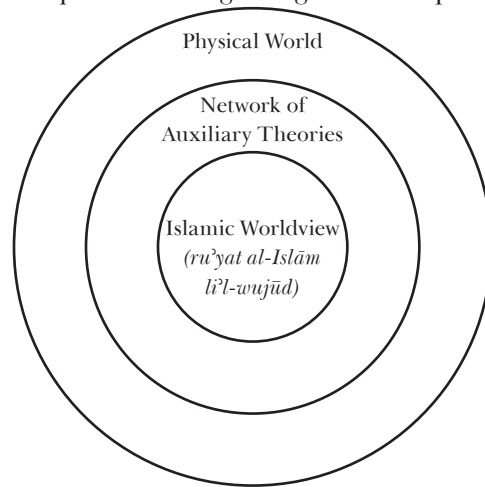
85. “Peculiar” in the sense that many, if not most, of the problems of the Ummah today, in contrast to the pre-colonial past, are the direct results of the imposition, by insidious or direct means, of alien Western secular civilizational norms on traditional Muslim societies. Two very good examples of this contemporary intellecto-religious revival are Nuh Ha Mim Keller, *Port in a Storm: A Fiqh Solution to the Qibla of North America* (Amman: Wakeel Books, 2001); and Shaykh Afifi al-Akiti, *Defending the Transgressed by Censuring the Reckless against the Killing of Civilians* (UK: Aqsa Press, 2006; Germany: Warda Publications, 2006), the whole text of which is downloadable from the website <http://www.warda.info/fatwa.pdf>, accessed on April 1 2007.

86. ‘Adi Setia, “Islamic science as a Scientific Research Program” in *Islam & Science*, Vol. 3 (Summer 2005) No. 1, 93–101.

and empirically *until it becomes manifest to them (and to us also) that it (the Qur’ānic worldview and all that it implies) is the truth/the real*.⁸⁷ Schematically, the Islamic science Research Program can be represented in the form of three concentric circles as shown below:

The inner circle represents the unchanging, permanent, revealed metaphysical core expressed as the ‘Islamic worldview’ (*ru’yat al-Islām li al-wujūd*).⁸⁸ The middle circle represents the network of auxiliary theories and hypotheses which may be modified, changed or added to from time to time; this may be called the ‘network of auxiliary theories’ (*shabakah al-naẓariyyāt al-mulḥaqah*). The outer circle represents nature (*al-ṭabī‘ah*), the physical, sensible world itself, or simply, the ‘physical world’. Islamic scientific creativity lies exactly in the middle circle and consists in articulating objective theoretical frameworks for facilitating a sufficiently detailed reading of the physical world as unveiling (affirmative of) rather than veiling (unaffirmative of) the truth and reality of the revealed, metaphysical core.

By “objective” is meant that this “sufficiently detailed reading” is to be amenable to participation and scrutiny by non-Muslim scientists, if they so wish, even if they do not believe the metaphysical core, by reference to the very same physical world accessible to both Muslims and non-Muslims alike. It is by virtue of this objectivity that Muslim scientists involved in ISRP will have no problem recognizing and incorporating certain posi-



87. *Fuṣṣilat*: 53.

88. Al-Attas, *Prolegomena*, 2; Cf. the diagrams in al-Attas, *Islam and Secularism*, 156–159.

tive elements of Western and eastern sciences into their research.⁸⁹ It is not possible here to elaborate further on the creative nature of the middle circle of the ISRP, which is basically where the discursive reason (*fīkr*) and contemplative intellect (*ʿaql*) mediate between the book of revelation and the book of creation; however, we may invoke a simple general example.

The Qurʾān says that the Prophet, peace and blessings of Allāh be on him, was sent as a mercy (*raḥmah*) to all the worlds. If we, as scientists, are to follow in the footsteps of the merciful (*raḥmatic*) Prophet, then the way we study nature and interact with it (*muʿāmalat ʿālam al-ṭabīʿah*)⁹⁰ is constrained by the prophetic ethics of cosmic mercy.⁹¹ This means that much of what we do or take for granted in contemporary science and technology has to be seriously and systemically rethought since it is obviously unrestrained by the ethics of mercy. Modern science and its technological offshoots are, in many diverse, complex ways, very aggressive toward nature and, by extension, toward humankind as part of nature.⁹² If by definition

89. The basis of this shared *epistemic objectivity* is the mutual affirmation of a certain degree of methodological equivalence between Islamic and Western science, or between theistic and agnostic science; for a good discussion of this methodological issue see Stephen C. Meyer, “The Methodological Equivalence of Design and Descent” in J. P. Moreland, ed., *The Creation Hypothesis: Scientific Evidence for an Intelligent Designer* (Downer’s Grove, IL: InterVarsity Press, 1994), 113–138. It is by virtue of this shared epistemic objectivity that the Greek sciences were appreciated by classical Muslim thinkers, that aspects of Islamic science and philosophy were appreciated by the Latin West, and that now we are witnessing amongst Muslims and westerners alike a general rethinking of modern science and technology and the quest for holistic, human- and nature-friendly alternatives.

90. As pointed out by my colleagues, Dr. Zaini Othman and Dr. Mohd. Khialdin, this means that the concept of *muʿāmalah* now largely restricted in the discipline of *fiqh* as applying to interactions and transactions between human beings together with all its ethico-juridical precepts (such as *lā ḍarar wa lā ḍirār*, that is, “no harming and no reciprocating harm”) are to be critically extended to all human interactions with the natural environment, especially technoscientific interactions, since it is these which are having the greatest impact on nature and natural resources.

91. For a beautiful commentary on the cosmic mercy of the Prophet, see the Nawawi Foundation Paper by Dr. Umar Faruq Abd-Allah, “Mercy, the Stamp of Creation,” accessible online in pdf format at <http://www.nawawi.org/downloads/article1.pdf>.

92. An eloquent indictment of Western technoscientific behavior toward nature by a Western observer is Donald Worster, *Nature’s Economy: A*

science is “the study of nature,” then obviously it is in the interest of science to preserve nature in order to guarantee its continued study by science. *Thus scientific curiosity entails moral responsibility.* However, the paradox now is that the more science knows about nature, the more of it is devastated, and the less there remains of it to be studied and appreciated. It is as if the modern pursuit of abstract, cerebral science and its manipulative technological offshoots have to go hand in hand with the desolation and disappearance of living nature as an unavoidable consequence, but that position is unacceptably fatalistic for truly concerned Muslim scientists. For them, the Qurʾānic ethics of universal, cosmic mercy shows the way toward another way of doing science that respects and preserves nature (and by extension humankind) rather than destroys it, and I believe that a well articulated ISRP involving all thinking, reflective and self-critical scientists will facilitate the way toward realizing that science in practice. The following are some particular examples by way of illustration.

Vivisection (the very term means “to cut alive”) is the way modern, business-driven medicine tortures live animals to test drugs in order to rid humanity of their ever lengthening list of old and new diseases.⁹³ As a method of medical research it is relatively new (a hundred or so years old) and peculiar to modern Western medical culture. Quite apart from the extrinsic question of ethics in respect thereof, there is also a more fundamental intrinsic question, namely the question of the scientific integrity (or cognitive value) of the underlying, largely unexamined assumption of a significant degree of biological and physiological similarity between laboratory test animals and human beings justifying extrapolations of clinical results from one to the other. The ISRP for Muslim medical researchers in

History of Ecological Ideas (Cambridge: Cambridge University Press, 1988), where, on page 343, he says, “The sudden acceleration of environmental damage throughout the world since World War Two has been largely the consequence of our scientific enterprise...there can be no getting around the fact that science has made possible the modern devastation of nature.”

93. Pietro Croce, *Vivisection or Science: An Investigation into Testing Drugs and Safeguarding Health* (London: Zed Books, 1999), reviewed by ʿAdi Setia in *Islam & Science*, Vol. 3 (Summer 2005) No. 1, 87–90; cf. Moneim A. Fadali, *Animal Experimentation: A Harvest of Shame* (Los Angeles: Hidden Springs Press, 1997), and Ray Greek, *Sacred Cows and Golden Geese: The Human Cost of Experimenting on Animals* (London: Continuum International, 2000). An informative, eye-opening monograph on the proper treatment of animals according to the traditional Islamic sources is, Al-Hafiz B. A. Masri, *Animals in Islam* (Petersfield, Hants: Athene Trust, 1989).

this regard will be to find systemic alternatives of unquestioned scientific and ethical integrity to vivisection, including valid alternatives critically sourced from marginalized Western and eastern medical traditions which could be incorporated into the ISRP (or to be more specific, the IMRP, Islamic Medicine Research Program). Some of these alternatives can also be gleaned by undertaking evidence-based medical research into the well documented but largely neglected vast corpus of the very successful one thousand years' old Islamic cosmopolitan medical tradition.⁹⁴

Modern agriculture, to take another example, is overly chemical intensive with widespread use of pesticides, herbicides, synthetic nitrogen fertilizers and so on, which poison the earth, kill rural wildlife, even toxify the harvests and disrupt the health of farmers. Traditional farming methods have been perfectly adapted to local socio-natural conditions generating a symbiotic, holistic balance between the needs of humanity and the rights of nature. As the word implies, agriculture is a culture, a whole way of life of mutual respect, communal give and take, and cooperative rather than competitive living. There are also agro-innovations of course, but innovations within ecological limits, as the case of Andalusian agricultural science and practice show.⁹⁵ It is not a mere business, as the modern corruption of the original word into "agribusiness" would have it, which imposes the corporate tyranny of impersonal profit-maximization on once self-respectful, independent farmers and indigenous peoples, reducing them into wage- and debt-slaves, squatters on the very lands they once have had customary rights to but now wrested from them by faceless, soulless corporations. It is strange that agricultural food production, which once unquestionably served the welfare of humankind, should now, in the hands of big agrochemical companies like Monsanto,⁹⁶ be seen to

94. A good starting point for delving into the operative context of the Islamic medical tradition is Fazlur Rahman, *Health and Medicine in the Islamic Tradition: Change and Identity* (Chicago: Kazi Publications, 1998); cf. Franz Rosenthal, *Science and Medicine in Islam: A Collection of Essays* (Aldershot: Variorum, 1991); cf. Sheikh Nazim Adil al-Haqqani An-Naqshabandi, *Natural Medicines*, 2nd ed. (London: Ta Ha Publishers, 1992).

95. A. M. Watson, *Agricultural Innovation in the Early Islamic World* (Cambridge: Cambridge University Press, 1983).

96. On the case against Monsanto, see, for instance, the relevant articles in Brian Tokar, ed., *Redesigning Life?: The Worldwide Challenge to Genetic Engineering* (London: Zed Books, 2001), which is reviewed in 'Adi Setia, *Islam & Science*, Vol. 1 (Summer 2005) No. 3, 91–92. See also, Nicanor Perlas, "Biotechnology or Sustainable Agriculture?" in *Kesturi*, Journal of the Islamic Academy of Science Malaysia, Vol. 1

be working toward destroying the very ecological basis of that welfare. In order to return agricultural practice onto the ethical path of mercy toward humanity and nature, an authentic Islamic Agricultural Research Program (IARP) would be one that eschews harmful chemicals altogether and instead looks into the various effective organic methods now available such as permaculture,⁹⁷ and develop new ones by, for instance, drawing on the thousand years' accumulated experience of a very successful Islamic agricultural tradition, the original, truly 'green' revolution.⁹⁸

To return to the question of scientific objectivity (i.e., the question of what should count as objectively verified knowledge and the research methods by which this objectivity is ascertained), this has more to do with the cognitive rather than ethical values underpinning the ISRP, though in Islamic scientific practice, the cognitive merges seamlessly into the ethical and becomes one with it. In other words, cognitive evaluation and ethical evaluation are both intrinsic to the scientific enterprise in Islam, as is quite evident in Ibn Haytham's much studied scientific methodology. The realization that scientific objectivity and methodological probity are not possible without concomitant ethico-moral integrity has been growing in the West and is now moving more toward the Islamic position thus allowing room for mutual constructive engagement on this important metascientific issue.⁹⁹

(June 1991) No. 1, 43–80.

97. Bill Mollison, *Introduction to Permaculture*, rev. ed. (Sisters Creek, Tasmania: Tagari Publications, 1997).
98. A. M. Watson, *Agricultural Innovation in the Early Islamic World* (Cambridge: Cambridge University Press, 1983). For a powerful, impassioned indictment of the modern, big-business driven, state-sponsored "green revolution," see Vandana Shiva, *The Violence of the Green Revolution: Third World Agriculture, Ecology and Politics* (Penang: Third World Network, 1997); see also idem, *Monocultures of the Mind: Biodiversity, Biotechnology and the Third World* (Penang: Third World Network, 1995).
99. Larry Laudan, *Science and Values* (Berkeley, CA: University of California Press, 1984); R. Proctor, *Value-Free Science?: Purity and Power in Modern Knowledge* (Cambridge, MA: Harvard University Press, 1991); Helen Longino, *Science as Social Knowledge: Values and Objectivity in Scientific Inquiry* (Princeton: Princeton University Press, 1990); John Ziman, *Reliable Knowledge: An Exploration of the Grounds for Belief in Science* (Cambridge: Cambridge University Press, 1978); idem, *Public Knowledge: Essay Concerning the Social Dimension of Science* (Cambridge: Cambridge University Press, 1968); idem, *Real Science: What It is and What It Means* (Cambridge: Cambridge University Press, 2000); and many other works of like nature, es-

To illustrate very briefly how the concept of scientific objectivity actually operates in the ISRP with respect to cultivating a critical attitude toward Western science, let us consider the twin Qurʾānic cognitive principles of *tabayyun* (investigation, scrutiny)¹⁰⁰ and *burhān* (proof, evidence).¹⁰¹ Due to the global dominance of Western science, Muslim scientists are continuously bombarded with reports of promising new methods, discoveries and techniques in prestigious Western journals like *Nature*, *Science*, *New Scientist* and *Scientific American*. It will be irresponsible of them to take these reports at face value without undertaking their own investigation (*tabayyun*) into the often hidden underlying context of these reports and ascertaining their empirical adequacy (*burhān*) and “epistemological autonomy” (*al-istiqlāl al-ʿilmī*) from powerful forces geared less toward global scientific enlightenment than narrow political economic enrichment.¹⁰² Creative understanding and practice of *tabayyun* and *tabarhūn*, as exemplified by Ibn Haytham, will help Muslim scientists to separate the wheat from the chaff of Western science and incorporate it into the ISRP. For instance, in the case of chemistry, the growing new field of ‘green chemistry’¹⁰³ is something that shows great promise of eliminating the threat of toxic chemicals from the human and natural environment, thus

pecially Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy* (London: Routledge, 1998), and also Brian Martin, *The Bias of Science* (Canberra: Society for Social Responsibility in Science, 1979).

100. *al-Hujurāt*: 6.

101. *al-Baqarah*: 111.

102. This consideration is particularly pertinent given the fact that much of post-World War II Western science operates within the broad policy matrix of the political economic report prepared for President Harry Truman by Vannevar Bush, who headed the Manhattan Project, entitled *Science: The Endless Frontier*; see Pietro Greco, “Comment: John Ziman” in *Journal of Science Communication*, Vol. 5 (December 2006) No. 4. See also the valuable collection of articles in Ziauddin Sardar, ed., *The Revenge of Athena: Science, Exploitation and the Third World* (London: Mansell, 1988).

103. Mike Lancaster, *Green Chemistry: An Introductory Text* (Cambridge: Royal Society of Chemistry, 2002); Paul T. Anastas and John C. Warner, *Green Chemistry: Theory and Practice* (New York: Oxford University Press, 2000); V. K. Ahluwalia and M. Kidwai, *New Trends in Green Chemistry* (Boston: Kluwer Academic Publishers, and New Delhi: Anamaya Publishers, 2004). For the twelve principles of green chemistry according to the American Chemical Society and the United States Environmental Protection Agency, see: http://www.chemistry.org/portal/a/c/s/1/acsdplay.html?DOC=greenchemistryinstitute%5Cgc_principles.html, accessed March 27, 2007.

realizing the ethico-juridical principle of *lā ḍarar wa lā ḍirār* (“no harming and no reciprocating harm”), which is itself derived from the cosmic, prophetic principle of universal mercy.

Finally, there is the very important, strategic question of the appropriate higher educational institutional framework for realising the ISRP over the long term, especially by educating and training postgraduate researchers to creatively apply ISRP principles to their respective specializations.¹⁰⁴ As pointed out by S. Nomanul Haq, there is a great need to revise the way we educate university science students so that they know how to integrate their scientific knowledge and expertise into the more fundamental and higher goals of human life and thus avoid the destructive pitfalls of scientism.¹⁰⁵ True science is beneficial knowledge (*al-‘ilm al-nāfi‘*) that is geared toward serving rather than subverting these higher, human goals. And the highest goal, the *summum bonum*, is, of course, “to bring a sound conscience to the meeting with the Lord,”¹⁰⁶ and thereby attain His pleasure (*marḍātiLlāh*).

Conclusion

The foregoing shows that the ISRP can be a very exciting, wide-ranging alternative scientific research program for Muslim scientists, especially if they are serious about wanting the Islamic worldview to be operative in the scientific and technological domains of life. We now have Islamic Law and Islamic Economics as operative realities in academic and public institutions, and there is no reason why Islamic science, due to its cosmo-

104. A thorough going treatment of this educational institutional question is Wan Mohd Nor Wan Daud, *The Educational Philosophy and Practice of Syed Muhammad Naquib al-Attas: An Exposition of the Original Concept of Islamization* (Kuala Lumpur: ISTAC, 1998), which expounds at length Syed Muhammad Naquib al-Attas, *The Concept of Education in Islam* (Kuala Lumpur: ISTAC, 1999), as concretely realised in the establishment of the International Institute of Islamic Thought & Civilization (ISTAC) in 1987. See also Wan Mohd Nor Daud, *The Beacon on the Crest of a Hill: A Brief History and Philosophy of ISTAC* (Kuala Lumpur: ISTAC, 1991), and Sharifah Shifa al-Attas, *ISTAC Illuminated: A Pictorial Tour of the International Institute of Islamic Thought & Civilization (ISTAC)* (Kuala Lumpur: ISTAC, 1998). A tertiary educational institute modeled on ISTAC is in the process of being established in Indonesia by the Institute for the Study of Islamic Thought and Civilization (INSISTS); may Allāh ease the way toward the realization of this noble goal, *āmin!*

105. “Science, Scientism, and the Liberal Arts” in *Islam & Science*, Vol. 1 (December 2003) No. 2, 267–271.

106. *al-Shu‘arā’*: 89.

politan nature and universal appeal, should not attain similar or greater level of professional and popular acceptance, even amongst non-Muslims. All we need to do, in my opinion, is to recast the first and second meanings of Islamic science into the operative, programmatic framework of the third meaning and then apply this meaning to one's particular field of scientific specialization, provided, of course, that specialization is *axiologically justifiable*¹⁰⁷ from within the perspective of the Islamic worldview. I hope the foregoing has shown clearly, if somewhat sketchily, that the cognitive and ethical concerns inherent in the ISRP will eventually result in methods, techniques and even products that exhibit and embody those concerns and thus create a truly beneficial scientific future for Muslims, and, by extension, for the world.¹⁰⁸

*You are the best community sent out for mankind; you enjoin what is right and forbid what is wrong, and you believe in Allāh.*¹⁰⁹

107. For an elaboration with regard to the “determining of the order of priority” of the sciences, see al-Attas, *Islam and Secularism*, 164 ff.

108. This thesis shall, *inshāʾaʾLlāh*, be elucidated further through detailed analyses and syntheses of selected historical and contemporary case studies in a forthcoming monograph to be tentatively entitled *The Islamic science Research Program: Principles and Practice*.

109. *Āl ʿImrān*: 110.