

HEALTH SCIENCES IN EARLY ISLAM

Volume I



Collected Papers By Sami K. Hamarneh
Edited By Munawar A. Anees

FROM THE PRINTED VERSION

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HEALTH SCIENCES IN EARLY ISLAM

COLLECTED PAPERS BY SAMI K. HAMARNEH

EDITED BY MUNAWAR A. ANEES

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Publisher's Note

HEALTH SCIENCES IN EARLY ISLAM was published in 1983 by Zahra Publications and Noor Health Foundation. This book is based on the collected papers of the eminent Dr. Sami Khalaf Hamarneh. This collection was a ground breaking project commissioned by Shaykh Fadhlalla Haeri and undertaken by Dr. Munawar Ahmed Anees.

Dr. Hamarneh was born on February 2, 1925 in Madaba, Jordan. He did his B.Sc. in Pharmacy in 1948 from Syria and his Masters in Pharmacology and Pharmaceutical Biochemistry in 1959. He was awarded a PhD from the University of Wisconsin. He retired as Curator Emeritus from the Division of Medical Sciences at The Smithsonian Institution in 1979. Dr. Hamarneh subsequently set up the Institute for the History of Arabic Sciences in Aleppo, Syria and then worked with the Faculty of Medical Sciences, Yarmouk University in Jordan. In his extensive research to collect the papers in this book, Dr. Hamarneh pursued original Arabic manuscripts in libraries throughout the world during a period of nearly thirty years. He passed away in Washington, D.C. on December 3, 2010.

Dr. Anees is an eminent academician who undertook this onerous commission of producing HEALTH SCIENCES IN EARLY ISLAM. Dr. Anees was born in Pakistan and undertook his initial education from Lahore. During his career he has acted as a consultant to the John Templeton Foundation, Personal Advisor to the Deputy Prime Minister of Malaysia, and was nominated for the Nobel Peace Prize in 2002. He founded the premier journal on Islam and the Muslim world, *Periodica Islamica*. He has advised the U.N. in various capacities on reproductive health in the Muslim World. Dr. Anees has been a prolific writer and contributor to major academic journals. He has published a number of seminal works a full list of which is available at <http://www.islamicresourcebank.org/bios/aneesmuna.pdf>.

The huge effort to bring this groundbreaking work, HEALTH SCIENCES IN EARLY ISLAM, into the digital realm has been made possible through the diligent work undertaken by Mr. Anjum Jaleel. Mr. Jaleel is responsible for bringing the entire Zahra Publications library into eBook format. His incredible dedication and hard work has made this work possible.

HEALTH SCIENCES IN EARLY ISLAM is a pioneering study of Islamic medicine that for the first time made available new chapters of knowledge in the history of healing sciences. This work was published in two volumes in 1983 and it is expected that the two eBook project will be

completed in 2014. This book project covers the development of Islamic Medicine between the 6th and 12th centuries A.D. Transcending mere medical historiography, this publication offers a unique and authoritative account of the philosophy, history, methodology and practice of the Islamic health sciences.

This work provides an exceptional opportunity to scholars, researchers and students in such diverse areas as Islamic Studies, Middle Eastern Affairs, History of Medicine and Biomedical Education. It offers unique insight into the history of Islamic medical education, Arab medical historiography, biographies of eminent physicians, pharmacology, surgery, surgical instrumentation, therapeutics and preventive medicine.

This major academic work on the medieval Islamic world, which produced some of the greatest medical thinkers in history and made major advances in surgery, is a necessary text for all interested in understanding the great contributions made during the 6th to the 12th centuries A.D. This work must be a necessary part of any major academic institution or library interested in the contribution of Islam to Health Sciences.

Zahra Publications looks forward to receiving feedback from the readers of this text and hopes to continue publishing major works on Islam digitally.

Book Description

HEALTH SCIENCES IN EARLY ISLAM is a pioneering study of Islamic medicine that opens up new chapters of knowledge in the history of the healing sciences. This two volume work covers the development of Islamic medicine between the 6th and 12th centuries A.D. Transcending mere medical historiography, this publication offers a unique and authoritative account of the philosophy, history, methodology and practice of the Islamic health sciences.

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About Sami K. Hamarneh

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FOREWORD

A Discourse on Health by Shaykh Fadhlalla Haeri

Man always seeks his own well-being. From the moment he is conscious of his existence he strives towards this end, attempting to improve his condition along a path of many diverse actions and circumstances. However, in order to attain ultimate well-being man must recognize that all these diverse occurrences must converge upon one state – a state of positive neutral consciousness.

In the same way as there is a direction in time moving from moment to moment, along a seemingly certain pattern, so there is a direction in the pursuit of this state of neutrality. Man's direction in the pursuit of health generally begins outwardly and moves inwardly. There is a parallel improvement in either condition. The less concern one has with outer physical health, the more one is free to attend to inner spiritual health; and that can only be achieved if one is fit and healthy.

We want to be free. Freedom, in fact, is another definition of this state of positive neutrality. Material freedom is sought by man so that he may survive and exist as a biological entity that has a prevailing influence over everything else. It is necessary for him to have outer well-being, but that alone is not sufficient in his quest for neutrality, because he is seeking something that is beyond his own horizon. How can he look at that horizon, let alone beyond it, if he is too preoccupied with his own immediate situation?

We are able to recognize the constant shifting from one extreme to another, from illness to wellness, yet we know there is a foundation of neutrality beyond this duality. In fact, the more we are in a state of stable neutrality, the more we see the extreme ends of the scale of duality. It is for this reason that the more the man of *tawhid* (divine unity) gains materially, the more he recognizes the necessity to debase himself in order to maintain a healthy balance. The man of wisdom also recognizes that the more he has genuinely debased himself, the more he will rise. This is the ecological reality.

Searching for longevity is a proof of the echo of everlastingness within man. But often this is misinterpreted and translated into a desire for perpetual youth. There is a contradiction in man's aspirations; he wants to have complete neutrality, yet he knows that every moment is

based on turmoil, for time arises out of dynamic movement and flux. It is through the light of his own consciousness that he may recognize the folly of this desire.

The man of wisdom recognizes that the solid foundation within him is beyond turmoil, because it is based on timelessness, on a cause that is unchanging. Our fixation with the outside is an indication that we are seeking the changeless, but this search lies in the wrong direction for the outside will always change. Our desire for perpetual life is a proof that we contain in us the essence of immortality. This desire, however, is perverted because it is impossible to preserve our bodies forever. Whether we like it or not, they exist in dynamic flux along the direction of time, from the womb to the tomb.

We have no choice but to seek health, and we should recognize that the purpose of outer health is to produce inner health, which cannot be maintained unless the immediate environment is in ecological balance with it. We would then realize that our immediate environment is not separate from the outer environment around us, from the overall environment, from the whole earth and from the whole universe. Hence we must recognize a universal health. If we start from the microcosmic health, we end up with the macrocosmic health. Therefore, if we want to be healthy we must want to heal those around us. Balanced outer health will eventually lead to inner health. If we maintain full outer health, we increase the possibility of inner health. For the inner self, conviction is its health, vigilance its wakefulness, indifference its slumber. Self-knowledge is its life, and self-ignorance its death. If we feed and nourish the self-knowledge, which is already ingrained in each individual, ignorance will vanish. The result will be complete harmony between the outer and the inner.

We find throughout history that a high degree of respect was always shown both to men of inner and outer knowledge. They were often combined in the same men, for those of inner knowledge were also endowed with much outer knowledge, including the knowledge of outer health. They were men who could nourish people's hearts and reassure them that this transitory existence is only an aspect of the endless existence of Reality, that there is One Cause behind all of these effects – Allah, from Whom everything emanates, by Whose Grace everything is supported, and to Whom everything will eventually be returned. This knowledge is connected with the state of equilibrium and neutrality which was mentioned earlier.

Islamic Medicine takes you into that state of neutrality. It is all based on the Qur'an, on that which is real and permanent, because we are all seeking permanency. Islamic Medicine is the

medicine that is going to cure us. The man of submission recognizes that this world is a laboratory into which we have come in order to learn the meaning of purity. It is another stage of growth within us. First there is growth in the womb of which we are unconscious, then there is growth outside the womb of which we are conscious. What we are conscious of is the problem; we may, for example, be conscious of nothing other than confusion. We cannot be separate from our cause. The effect has come from that cause. The cause permeates all and is closer to us than our jugular vein.

The seeker of reality views this world as a hospital in which he is a patient. Whether we like it or not, we are here to achieve ultimate well-being, which is to drown in the well of Oneness so that we see nothing other than the One Cause behind what appears to be confusion. The real *hakims* were seekers of Reality. They believed that life is from the Most Beneficent, the Most Glorious Creator, and that if we say there is nothing other than His generosity and His all-encompassing mercy, then we take wisdom wherever it comes so long as it is recognizable along the path of *Shari`ah*. They therefore collected outer knowledge from many lands – from Egypt, Greece, Rome, India, China – and unified it to obtain the best prescriptions.

These great men of Islamic Medicine had the strongest spiritual motivation for their work – they themselves wanted to be cured. They were striving for that state of equilibrium and they recognized that the only way they could reach their goal was by abandoning the so-called ‘self’ in the path of service. Their work was for them a vocation and an aspect of worship, rather than a profession. They wanted health for themselves, so they also wanted it for others. They were the instruments of the divine justice and love of the Creator, for by bringing people into outer health they enabled their patients to recognize that there is nothing higher than the Health-Giver.

The hearts of these practitioners were motivated by generosity and by the joy of serving others. They were not archivists who wanted to collect what everybody said and categorize it for the sole purpose of creating books. Their books served either to gather the information they themselves needed for their work or else to disseminate the knowledge to their students. Their knowledge and information was an integrated part of their life, unlike we today who talk about Islamic Studies yet do not live the teachings of Islam. We merely pretend to be the followers of the blessed Prophet, who prayed that Allah give him usable knowledge. Islam is about practicality. Islam is about living fully and joyfully here and now, while retaining that recognition that this existence is temporary and there is a next experience that is beyond time.

If we start from the premise that we, in this world, are moving along a unified direction towards a state of positive equilibrium, we can only be horrified by the current state of medical practice. We find that over the last few decades our doctors have moved more into the area of suppressing symptoms rather than treating the cause of our maladies. The use of ‘wonder drugs’ minimizes the human contact between doctor and patient, reducing the former’s role to little more than a dispenser. The arrogance of our medical profession has caused there to be a false emphasis on outer appearance. Everything looks beautiful – the teeth gleam, the hair shines, but if we touch them they fall to pieces because they are not real.

The reason for this movement towards suppression of the symptoms rather than treating the cause is that modern men of medicine do not see the ecological inter-connectedness of everything. This is why they fragment medicine into small individual disciplines. Furthermore, once the profit motive enters medicine it ceases to heal, for the patient’s overall cure can only come from those who recognize that they want to be cured themselves. The doctor must recognize that inherently he is sick and that his own and others’ ultimate objective must be the knowledge and recognition of the one and only Reality.

At all times man is at a loss. His lower tendencies are always there, dragging him down towards the animalistic levels within him, but he also knows that he contains a higher, divine consciousness which he wishes to reach. The way to that higher self is through the path of service. In the service of others he himself is spontaneously elevated; he moves into the realm of abandonment, into that positive neutrality. He recognizes experientially that the more he gives, the more will come to him. The more he is generous, the more the one and only generous Creator will shower him with blessings.

Allah in His Mercy wants to unify what is in us with what is outside us. If we say we believe in Allah, then Allah will afflict us to allow us to witness ourselves, to see whether we truly mean what we say and do what we say we will do. If a person claims to be adhering to the basic tenets of Islamic healing, he must himself profess the abandonment of Islam. If he is in that abandonment he will have total trust in Allah. If he is worried or unhappy, that is his own doing, for at that moment of concern, worry or unhappiness, he is not in a state of full abandonment.

The great *hakims* would often find the medicine close to where the illness lay. They believed that where there is the action there is also the reaction. There is always a solution close to every problem. These *hakims* went to the source of the problem, transforming it, rather than treating its

outer effect as happens more and more in our system of medicine today. Islamic Medicine is far more difficult to practice. It takes inspiration, perspiration and abandonment to reach the root of the problem and unify the cause with the effect.

Through the publication of *'Health Sciences in Early Islam'*, Noor Health Foundation hopes to increase the breadth of the platform from which it will serve. It is a platform based on the belief that no one in this creation is separate from the cause of their existence – every effect is a manifestation of its cause. We are all from the one and only Cause. We are all created by one Creator. We are all sustained by His mercy through diverse ways. The more we can share together on that platform of service and abandonment, under the umbrella of true submission and following in the footsteps of the blessed Prophet, the more we will have a safer and healthier path through this life. Those of us who are endowed with better health and more time and energy will be given more and more of these delights, provided we adhere to the path of abandonment and service.

We hope that this book will help lead to the practical revitalization of our heritage. This will only happen if we claim the knowledge of our forefathers in the correct way. If we inherit something whose value we do not fully comprehend we will end up only talking about it and relegating it to museums. This has hitherto been the fate of the Islamic Sciences, which is a contradiction of the spirit in which they first evolved. They were part of a unified approach to knowledge, derived from the inspirations of men of abandonment. They did not come about in the usual, acquisitive, categorizing manner. There is nothing wrong in categorization provided it is used as an instrument through which a desired objective may be achieved. Nowadays, however, the business of writing and researching has become an end in itself. This is why we find such a big difference between the academic arena and the field of action.

This book supports the ultimate goal of man, which is to live a life of spirituality, a life which is in every sense healthy. With this book, Noor Health Foundation hopes to create interest in a unified approach to the healing arts, and to move hearts to recognize the bad situation into which we have inadvertently fallen by ignorantly renouncing the path of those who knew, the path of the seekers of Reality who went before us.

May Allah bless all those who will benefit from our attempts. May Allah purify our intentions and those of our publishers, who have worked with us. May Allah increase the strength of all of those who will be involved in this endeavor along the one and only path of safe

conduct. May Allah show them that the knowledge of the way lies from within and that its boundaries are the most glorious. May Allah give us the protection so that we recognize the one and only Reality behind everything.

INTRODUCTION

History of Islamic Medicine – An Introduction

The explication of conceptual and methodological basis of Islamic Medicine as the record of its past achievements constitute a challenge to the historians of biomedical sciences. For nearly one thousand years, the form and the content of this medical system have been vigorously pursued, imbibed and practiced in the West – ranging from outright plagiarism of the original Arabic texts in the pre-Renaissance period to the late eighteenth-century studies of Muslim masters across the Western medical institutions. However, when it comes to Islamic Medicine, a curious mixture of silence or a grudging acknowledgement of the historical debt is all that is offered by the historians. Whether this fallacy is a manifestation of the prejudice against things Saracenic or a later attempt for the maintenance of cultural hegemony, intellectual fairness demands that historical justice should prevail.

Beginning with the early twelfth century *Hijra* (eighteenth century C.E.), Islamic Medicine showed a decline in much of the Muslim world, perhaps as a corollary of the colonial rule. The modern medical system, based on mechanistic models and characterized by divisive and fragmented strategies, gradually started taking roots. For a while, the modern medical technology appeared to be outshining the time-honored holistic healing approaches of Islamic Medicine. It must be remembered, however, that in spite of two long centuries of colonial rule with a concomitant sway of the modern biomedical technology, Islamic Medicine could not be wiped out from Muslim lands. In greater part of the rural settings, it still holds the prominence and is beginning to stage a comeback at conceptual and thematic levels, as adjudged by a bibliographical survey of the recent Muslim literature (see [A Select Bibliography on Islamic Medicine](#), this volume). Needless to say that a tremendous amount of intellectual groundwork, that spans from a redefinition of epistemological and methodological approaches to the development of appropriate biomedical technologies, is called for if Islamic Medicine is to resume its role as the greatest unifier of human knowledge.

Noor Health Foundation

In an attempt to find ways and means to revitalize interest in the historical role and futuristic applications of Islamic Medicine, the Foundation was incepted in the year 1402/1982. The

Foundation has sponsored a few modest projects, including the establishment of health clinics in the Muslim world, publication of preventive medical education material in vernacular languages, and the development of a depository of rare medical manuscripts for future research and reference. To further the cause of Muslim biomedical scholarship, the Foundation has sponsored publication of present work in the hope of making a contribution towards this great arena of Muslim endeavor.

NHF Monographs

The foundation has established a network of prominent Muslim biomedical who act in an editorial advisory capacity for the development of its program of scholarly publications. A list of members of the Editorial Board appears elsewhere in this volume. The present two-volume work, *Health Sciences in Early Islam*, is based on the collected papers of Sami Khalaf Hamarneh, Curator Emeritus, Division of Medical Sciences, The Smithsonian Institution, Washington, DC. The interest in publishing the present collection developed when this author learnt of Hamarneh's rather premature retirement from the Smithsonian Institution in 1979. First in Washington, DC, and later in Los Angeles, several meetings paved the way for this project. Hamarneh's preoccupation with the newly-founded Institute for the History of Arabic Science in Aleppo, Syria, delayed this project. However, once the Institute and its *Journal* got off the ground and the work was resumed, we realized that our search for a publisher was a futile one. Even Hamarneh's impeccable credentials for scholarly publishing did not do the trick! It was through Shaykh Fadhlalla Haeri's enthusiastic support that an agreement was reached to publish this collection as the premier volumes of *NHF Monographs*.

The papers included in the present collection were published over a period of more than two decades in various international journals. For the sake of uniformity of style, these papers underwent a long and tedious process of editing that involved extensive revisions, deletion of repetitious statements, and many appropriate additions. It must be pointed out that unlike other volumes of 'Collected Papers' that are no more than photo-mechanical reproductions of the original, these papers are distinguished by the following features:

1. Inclusion of *Hijra* dates (approximate) for quick comparison with the Common Era dates.
2. A standardized and uniform phonetic transliteration of Arabic words.

3. A total of eight subject groups with four groups to a volume, followed by the relevant papers in chronological order of original publication.
4. Individualized format with complete bibliographical and copyright information, constituting self-contained papers.
5. The use of standardized Arabic names of authors, i.e., instead of using an-Nafis for Ibn an-Nafis, a major linguistic fallacy, otherwise so prevalent in the Orientalistic literature, has been avoided.
6. Non-cumulative text citations to facilitate individual references for source material.
7. A uniform citation system with little or no abbreviations.

Those who cherish the fruits of human labor and are receptive to a shared cultural heritage, would find an immense wealth of information that has become available to us through Hamarneh's pioneering study of the original Arabic manuscripts. As an index of his life-long meticulous endeavor to dispel the common Western notions, these papers offer a refreshing view of Islamic Medicine. May Allah guide us all to the right path.

Munawar A. Anees

Director

Noor Health Foundation

San Antonio, Texas

A Select Bibliography on Islamic Medicine

Islamic Medicine appears to be gaining more patrons than ever before. Over the last three years, at least three international conferences were held: two in Kuwait, and one in the United States. The First International Conference on Islamic Medicine in Kuwait led to the formulation of the *Kuwait Document*, that was to serve as an equivalent to the Hippocratic Oath for Muslim medical professionals. In order that the recommendations of the First Conference are implemented, the International Organization of Islamic Medicine was incepted and the following year, in 1982, the second conference was held in Kuwait. A comparative study of the two conference proceedings indicates that the euphoria at the time of the first conference did fade away. It is yet to be seen what happens at the third conference scheduled to be held later this year¹ in Turkey. The American conference sponsored by the Islamic Medical Association of the United States and Canada too appeared to be euphoric as noted by the outcome reflected in the conference proceedings. The *Kuwait Document* fails to incorporate the norms of current medical practice in their entirety and hence, is far removed from meeting the challenge, say, posed by modern advances in molecular biology, recombinant research and reproductive biology. Instead of attempting to update the code of medical ethics in contemporary terms, it remains an outdated archival work – in that sense truly an equivalent of the Hippocratic Oath.

On the publishing scene, especially in the West, *Journal of Islamic Medical Association* (USA) has been able to sustain itself for more than a decade, though with irregular frequency and unpredictable quality. A proposed in-depth study of the history of Islamic Medicine is yet to see the light of day. Recently, Islamic Press Agency started a monthly from its London office: *Islamic World Medical Journal*. It differs from the latter only in the sense that a far greater number of papers are authored by the Western medical professionals, mostly British. Like its predecessor, *JIMA* (USA), what makes it ‘Islamic’ is the inclusion of one or two short papers on the history of Islamic Medicine or interpretation of the modern biomedical phenomenon in the light of the Qur’an and the Hadith. National medical associations such as those in Britain, Pakistan, or South Africa have not yet advanced beyond the level of in-house newsletters – ‘for members only.’

¹ i.e., 1983.

Recent history records a far greater success for the institutionalized work carried out single-handedly by Hamdard National Foundation in Pakistan. Through a vast network of clinics and a regular system of publications, the Foundation has played a major role in retaining some of the original flavor of Islamic Medicine. Pakistan is perhaps the only country where it is an officially recognized profession that enjoys support from the masses as well. A sister organization in India, Institute for the History of Medicine and Medical Research, has been engaged in similar activities.

The current interest to ‘patronize’ Islamic Medicine has inevitably given way to a greater volume of papers, proceedings and other publications. A recent bibliographical compilation by Z.M. Agha incorporates a number of works in Muslim-majority languages such as Arabic, Urdu, Turkish etc., which were left out in the previous works of either Hamarneh (1964) or Ebied (1971). Given the consolation of a renewed numerical ‘strength,’ what are the substantial gains over the last three or four decades of publishing that the said compilation attempts to cover?

In the course of present compilation, the bulk of citations were left out, not for reasons of space or time, but for demands of sanity. It became obvious that the majority of works were either fanciful attachment to the ‘glorious’ past of Islamic Medicine, or half-heartedly written ‘rejoinders’ for the attention of orientalists or philologists, like Manfred Ullmann, whose competence for medical writing is not documented by their training. The present compilation is, therefore, limited to Muslim authors who have either remained safe from these ‘pitfalls’ or have somehow attempted to construct a thematic or conceptual framework for Islamic Medicine in rather contemporary terms. Not that our opinion constitutes a denial of historical validity of the role of Islamic Medicine but the fact is that over-emphasis on the ‘bygone glory’ without well-documented studies on hundreds of thousands of Muslim medical manuscripts becomes self-defeating.

The present compilation strongly points to a dire scarcity of the material objectively elaborating the conceptual basis of Islamic Medicine that is there with its uniqueness and at once compatible with the medical realities of the day. Islamic Medicine is not limited to the rules for ablution or prohibition of pork. It goes far beyond that. In our quest for a viable system for the practice of Islamic Medicine, we must go to its theory – the Qur’an and the Sunnah. It is of little help to seek medical ‘facts’ from these two sources; what is to be sought are the normative guidelines and a way for their application. In a sense Islamic Medicine sums up the totality of

our way of life, an index of our quality of life. Its fabric is enmeshed in the Muslim society and culture. The future of Islamic Medicine rests with our abilities to evolve a balanced and harmonious framework – something that nourished it fourteen hundred years ago.

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MUNAWAR A. ANEES

A Brief Survey of Islamic Medicine During the Middle Ages

One of the noteworthy and fascinating aphorisms attributed to the Prophet of Islam is the saying, “*al-`Ilmu `ilman, `ilm al-adyan wa-`ilm al-abdan,*” equating the Importance of the study and practice of medicine with that of theology and Islamic jurisprudence. This and similar concepts, religious and social, gave an added impetus to the esteem of the medical profession and emphasized the intrinsic value of the healing arts giving the physician a respectable position in his community and within the learned circles. It was also Islam that emphasized the right of the human body to be taken care of by every believer who ought to provide it with its nourishment and to promote healthy living. This was indeed quoted from religious sources that God always provides natural cures for human ills at the right time and place, “*ma khalaq Allah ad-da’, illa wa-khalaqa lahu ad-dawa’*”.

The physician, in turn, was interested in, and appreciative of man’s relation to his environment. To him, health and ecology were closely related. He saw technology and economy in nature that produced nothing in vain. To the Muslim physician, God created everything for a good purpose. The physician-philosopher Ibn Rushd, observing the intricacy of the anatomy of the human body, declared that man’s faith in God will certainly be strengthened once he discovers and apprehends the wonders of the anatomy of the body and recognizes God’s incomprehensible wisdom in His creation of the human race. In view of his profession and status, the Muslim physician appreciated and acknowledged the perfection in the handiwork of God and the sagacity in arranging and designing the creation. Furthermore, in observing his environment, the Muslim physician and naturalist sought to find cures and remedies which nature provides for the healing of human physical ills. And indeed it was in Islam that pharmacy and pharmacology throughout the Middle Ages reached its highest expression, a climax far higher and wider than ever reached by their predecessors during the earlier Greco-Roman and Oriental civilizations.

Defining the Meaning and Principles of the Healing Art

Medicine was defined by Muslim physicians such as ar-Razi (250-312/865-925) and Ibn Sina (369-428/980-1037) in the following manner: that it is the art which is concerned with the preservation of good health, combating of diseases, and the restoration of health to the sick. It was early in the third/ninth century that most of the medical texts divided the healing art, for

purpose of classification, into two parts: theory and practice. Under the theory of medicine, the student and practitioner studied the elements, the humors of the body and their function, the faculties of body and soul, the spirits whether animal or vital, the organs and their utilities, and the temperaments. But under the practical part, the following branches were taught: therapeutics, including the use of simple and compounded drugs and medicinal recipes, bone setting, and minor surgery. It was also during this same third/ninth century that fundamental principles of the healing art were established in Arabic medicine, modified from Greek writings with important additions. These were mainly the six common principles of health and sickness, known erroneously in Latin as the six non-naturals. The Arabic version of these modified principles projects that if these causes that affect human constitution were properly and moderately applied then equilibrium will result and manifest itself in the good health that one maintains. However, if these major principles or any one of them were abnormally administered, applied or acquired, disequilibrium and imbalance in the human constitution take place and result in sickness. Interestingly, most of these principles that were seriously discussed and taught by the Muslim physicians in the Middle Ages are as important in the consideration of scientists in the health field today. Here are briefly the six principles:

1. Ambient air, for they sought clean air for the maintenance of good health. Indeed the writings of Muslim physicians repeatedly explain their awareness of the fact that polluted air and water are dangerous. Almost eleven hundred years ago, they emphasized a theory that is considered a contemporary topic in its importance. They perceived, and rightly so, that unpolluted air secures a needed element for maintaining healthy living while pollution is a poison to the living organism.
2. Regulation of food and drink intake, e.g., the moderation in diet. It was in Islam that in clear-cut statements diet was regarded as replenishment and nourishment for the body to compensate for losses because of work and other organs' activities and efforts – a concept which is still accepted in the modern science of nutrition.
3. Work and rest, and the need for moderation in both cases for maintaining good health.
4. Wakefulness and slumber, with insistence on moderation in human daily work input and the number of hours needed for sleeping each day. This seems an interesting consideration for valuing sleep over rest in view of modern concepts concerning the necessity of sleep with its different stages. Indeed, several Muslim physicians such as `Abd al-Latif al-

Baghdadi (557-629/1162-1232) defined sleep in a most rational manner, and spoke of its place regarding health and normal bodily function.

5. Evacuation and retention, including the use of such things as enemas, laxative and vomit-inducing drugs, and even bloodletting and the evacuation of body's so-called superfluities (sweat, urination, etc.).
6. Physiological affections and emotional reactions (*al-Ahdath an-Nafsaniyyah*). It is here also that we are indebted to the Islamic civilization in emphasizing the importance of what a Muslim physician termed 'the medicine of the soul,' (*at-Tibb ar-Ruhani*). On this topic, the renowned medical educator and clinician Abu Bakr Muhammad b. Zakariyya ar-Razi published a large book bearing the same title (translated and published in England in 1950 under the title *The Spiritual Physick of Rhazes* by A. J. Arberry). Ar-Razi first wrote his encyclopedic text *al-Mansuri*, on the various aspects of the healing art, the diseases and their cures as well as the preservation of physical health. It was soon discovered that a real need existed for a similar text on the ills of the soul and their treatment, and hence his second famous book on the medicine of the soul. These and other books by him were known in Latin and continued to be consulted by European practitioners up and far into the Renaissance.

As Islamic medicine matured with the works of ar-Razi and his contemporaries in the fourth/tenth century, new medical theories and concepts began to emerge as well. Here are the seven principles of health as ramified and detailed by ar-Razi, and arranged in the following order:

1. Moderation in work and rest, a fact realized in today's health education.
 2. Moderation in eating and drinking, a theory to which ar-Razi contributed materially. He, for example, in the face of much opposition, recommended giving the patient some freedom in choosing the diet he prefers and encouraged giving him balanced nourishing meals. The traditional concept had been to restrict the diet to an extreme. Ar-Razi called for relaxation in such rules and open-mindedness on the part of the practitioner by considering the human and nutritional importance of giving the patient a balanced diet.
 3. Elimination and evacuation of the body's superfluities including urination, sweating, and also bloodletting as a manner of treatment.
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4. Living and working in healthy dwelling places, suggesting the importance of a sanitary environment and residence where the individual spends the major part of his time. Here also one can secure clean and refreshing atmosphere at restful, beautiful surroundings and furnishings – matters that we consider important today as well.
5. Avoidance of contemplating, falling in, and experiencing successive evil happenings, especially before they become uncontrollable and gruesome.
6. Maintaining harmonious tendencies in regard to psychological ambitions, emotional conflicts, and their fundamental resolutions. In so doing one can avoid harmful emotional tendencies such as anger, unjustified fears, worries, guilt and inexcusable jealousy.
7. The acquisition of good, edifying and useful habits which become a part of healthy and productive daily living, giving impetus to greater achievements, instead of becoming a hindrance.

Islam and other Civilizations

In view of the generous hospitality and excellence in the Muslim character and because of the prudent and far reaching instructions of the Muslim caliphs, their conquering armies preserved and protected the cultural legacies of their subjects. They made excellent use of every talent and heritage that was not contrary to the teaching of their faith, or antagonistic to the Islamic noble spirit. The majority of early conquerors had not done that; yet, up to the present, it is regrettable that many history books and scholars speak of these feats as the products and tenants of unruly, blundering bedouin tribes! Destruction and ruins came in the aftermath of many invading armies from the ancient Assyrians and the classical Greco-Romans to the Germanic tribes that marred their history. But none of that was permitted by the Muslim caliphs. Their chronicles reveal a remarkable spirit of tolerance and farsightedness as they preserved the landmarks of human civilization, and carried forward its frontiers with meticulous and objective reverence to man's pursuit of happiness.

In the field of life sciences, the Muslims built upon the earlier legacies of the Indians, the Copts, the Syrians, the Romans, and mainly the Greeks. Nonetheless, they added innumerable theories, ideas, techniques, and valuable innovations, changes and novelties of the greatest importance. Medical education, it must be emphasized here, was practically and readily available to all segments of society. This is more significant when we realize that during the greater part of

this same medieval period, education of any kind, except theology, was restricted to the very few throughout the European continent. One had to be trained as a monk or a clergy to go to school or to be introduced to classical learning. In Islam, it was the actual privilege of every citizen, and the great works of learning, philosophy and science were available for everybody on a large scale. Education indeed was at an easy reach of every child who wished to obtain it.

In the medical field, furthermore, there is no better illustration than the very fascinating story of `Ali b. Ridwan al-Misri (d. 460/1068). `Ali b. Ridwan was born at Giza in Egypt near the end of the fourth/tenth century. Giza then was a small suburban village near Cairo – then the capital of the Fatimiyyah. He tells us in his autobiography that he went to school at the age of six. After the age of ten, he moved to the great city (meaning Cairo). There he completed his studies, up to the age of fourteen. Then he turned to the learning of medicine and philosophy – being then so closely related. Since he was short on money to pay for his expenses, and his family being poor, he worked part-time and went to school as well. These were tough days as our author recalls, but he was determined to obtain the best education he could get. He taught at an elementary school, possibly at a mosque. He also dabbled with astrology, and he assisted in medical matters so that he was able to make ends meet. He finally completed his studies and turned to the practice of the healing arts. At the age of thirty-two, he won a good reputation in being a competent and reliable physician. His practice brought him very adequate income, so that he devoted the rest of his time for his profession and in furthering his knowledge. Numerous other examples can be brought to bear on this matter as in the case of Ibn Sina, Ibn an-Nafis and others.

Medical Education in Islam

The healing arts were taught in three types of schools. Firstly, there was the private tutoring. In this category, we have many good examples, but we will only mention two. `Ali b. `Abbas al-Majusi (d. 384/995) is considered one of the greatest physicians of the fourth/tenth century. He authored a medical encyclopedia entitled *al-Maliki* or *Kamil as-Sina`ah at-Tibbiyyah* which was widely circulated not only in the Islamic world but in Europe as well after it was translated into Latin under the title *Liber Regius*. This famous physician and author repeatedly spoke of his teacher, Musa b. Sayyar, of whom he was very proud, calling him, ‘my teacher.’ Another example is that of Abu al-Faraj Ibn al-Quff (born in al-Karak, Jordan in 630/1233, and died in Damascus, 683/1285). He was the student of physician-historian Ibn Abi Usaybi`ah (d.

669/1271). He taught Ibn al-Quff the primary elements of the healing arts before the latter moved with his family to the Syrian capital to complete his medical studies and training.

Secondly, there were privately operated medical colleges founded and supported by eminent, highly reputed physician-educators. Ibn Masawayh, for example, started the first such medical institution at the `Abbasiyah capital. He gathered around him many students among them the translator-scholar Abu Zayd Hunayn b. Ishaq al-`Ibadi (d. 260/874) who is considered one of the founders of Arabic medicine in the third/ninth century. Abu Bakr Muhammad b. Zakariyyah ar-Razi is another good example. At his school, we are told by Muhammad Ibn an-Nadim that he seated his many students in circles. In the first circle he would seat the most advanced students, and those behind them in education in the second row, and so on. When the time for questions and answers came, he would ask first those in the outer circles. If they failed to give an answer he would turn to the inner circle and to the one nearest to him where his advanced students were seated. If they failed, then he would give the right answer. A third example is that of Abu Ja`far Ibn Abi al-Ash`ath of Mosul, Iraq (d. ca. 360/971), whose fame in medicine and pharmacology drew students from far and near to hear his lectures, and some of whom we know by name such as Abu al-`Abbas Ahmad al-Baladi. Finally, the example of Amin ad-Dawlah Ibn at-Tilmidh of Baghdad (d. 560/1165), whose school was one of the largest and most renowned of its kind at the time. For his students and others after them, he authored several books on medicine and therapeutics.

Thirdly, there was medical education at the hospitals which were often sponsored by the caliph or the state. For hospitals in Islam were the first model to develop the modern concept and function of true institutions for the care and cure of the sick, male and female. Hospitals with all their ramifications were foremost to be established under the aegis of the Muslim caliphs with male and female wards, among the surgical and medical patients. These hospitals were likewise operated with the scrutiny of separating patients, with fevers or contagious diseases, as well as the mentally disturbed. They were run, and possibly for the first time, exclusively by lay physicians and administrators, unlike other civilizations where the clergy were mostly in charge. Qualified men from every walk of life and every creed were involved in running such hospitals with no discrimination. These hospitals were also run in accordance with carefully planned regulations and administrative systems. Names of patients were registered at admission with age, history of case and address of residence. The patient was dressed with a special robe provided by

the hospital, while his own clothes and belongings were kept safely in closets provided for that purpose – just as modern hospitals function. His valuables were also safely kept for him, until his dismissal. In these hospitals, medical education was carried on, and many students sought theoretical and practical training at these institutions. A good example of that is Ibn Abi Usaybi`ah himself who was first trained at an-Nuri hospital in Damascus, and then attended an-Nasiri hospital in Cairo as well. Many prominent practitioners from al-Andalus came all the way to Cairo, Damascus or Baghdad to be trained at these hospitals and get more experience in the profession. Others, such as ar-Razi, came to Baghdad for similar purposes.

As for the kinds of hospitals, they were either privately owned, or the property of the state, founded and supported by rulers and caliphs. Of the latter, good examples are the `Aduhi hospital in Baghdad, the great an-Nuri hospital in Damascus, and al-Mansuri hospital in Cairo. Each one of them was built by a ruler, sponsored from the state's treasury and served the public free of charge – as they were very generously endowed. But the private hospitals, whether supported by individuals or community religious systems, nevertheless provided excellent health care. Patients had to pay part of the expenses. Mention also should be made of the special hospitals founded to serve armies at battlefields, or established in castles and military fortresses to care for military men and their families – similar in principle to military establishments of our time. Renowned physician-surgeons were selected to serve in these hospitals as we find in the case of Ibn al-Quff who first served at the `Ajlun fortress, before moving to Damascus to serve at its castle's hospital. Personally, I recently visited some of these castles to see the installation, and consider hospital establishments and halls in these premises. All types of hospitals mentioned above were quite often equipped with libraries, and lecture halls for teaching purposes and for study by the medical staff. Indeed there was genuine emphasis on continuing education so that the doctor can keep up with the needs and methods of practicing the profession, while improving his knowledge of the art.

It was the physician in Islam who encouraged midwifery and sanctioned the importance of health care to both mother and child while in so doing providing the best skill possible. A good example is that given in Abu al-Qasim az-Zahrawi's (d. ca. 404/1014) book on the healing art entitled *at-Tasrif liman `Ajiza `an at-Ta'lif*. In it, az-Zahrawi devoted a complete section to midwifery with instructions to midwives to perform their duties, and if needed, under the physician's supervision with utmost care and proficiency. The field of embryology developed on

these lines with tremendous advances as well in pediatrics. During the second half of the fourth/tenth century (ca. 360/971), the physician Abu Ja`far al-Jazzar of al-Qayrawan (in modern Tunisia) wrote one of the earliest known independent manuals on pediatrics with emphasis on how to care for babies and keep them and their mothers healthy, under the title, *Fi Siyasat as-Sibyan wa-Tadbirihim*. His contemporary, Sa`id Ibn `Arib in Cordoba (in modern Spain) wrote one of the finest texts on the same topic under the title *Tadbir al-Mawludin wal-Habul wal-Murdi`at* (completed about 354/965) during the reign of al-Hakam al-Mustansir.

In Islam a great emphasis was put on the importance of developing a cordial relationship between the doctor and his client. This explains the concept of the family doctor. It also upheld the doctrine of instructing the physician by visiting the patient's bedside, to observe the progress of his case, be well acquainted with his case history, his background and vocation, and thus to be able to diagnose and treat the case properly and skillfully.

In Arabic medical texts we find many clues suggesting the physician's involvement not only in the professional practice of his calling, but also of the part he played in the affairs of his community. They showed him as a socially concerned individual and enlightened citizen, who cared about what was going on in his environment. He was also thoroughly instructed regarding medical deontology and professional ethics.

It might be proper to conclude by presenting the following ethical instructions given by a fourth/tenth century physician for the purpose of instructing his colleagues, translated from the original Arabic. In it the author explains that the physician ought to be modest, virtuous, and merciful. He should not be slanderous, or addicted to liquor. He should speak no evil of men of repute in the community or be critical of their religious practices and commitments. He ought to be honest toward women and should not divulge the secrets of his patients, joke or make fun of others at improper places and times. He should avoid predicting whether the patient will live or die – facts that deserve serious consideration in our time. He should avoid being critical and speak well of his acquaintances, colleagues and clients. He should not be a money-grabber. He should dress in clean clothes, be dignified and groom his hair neatly – a note of timely interest. He ought not lose his temper easily when speaking with his patients or their folks, especially when they shower him with many questions. He should have a lot of patience, and his answers should be gentle. He should render the best professional service he can to his clients whether weak or strong, poor or rich, learned or illiterate and God will reward him for any medical help

he offers to his poor patients. He ought to refrain from joining the ungodly and the scoffers, and from sitting in their parties. Instead, he ought to befriend people of good reputation and the learned. If he were a family doctor and his clients invited another doctor as a consultant, he should not criticize his colleague, even if he disagrees with his diagnosis and recommendations.

How much these principles are needed today and how much we can learn from them as they seem to be very basic. The author goes on to explain that a family doctor, at such an event ought to explain to his patient's folks each point of view, the others and his, and their consequences. He then counsels with them as to the best course they should take, warning them against trying too many recommendations and using variations of medical recipes that might eventually be detrimental to the patient and endanger his very life. He should explain how such cases have taken place resulting in death, some due to the fact that drugs can be incompatible, and hence become injurious and poisonous.

It is advisable also that the physician should avoid prescribing potent drugs and poisons, or even mention such prescriptions before simple-minded folks. This seems deserving of consideration today where information, equipment, or tools in the hands of criminally inclined people can be very dangerous. Following the Hippocratic oath, the author continues to state that the physician ought not give potent drugs to pregnant women, or give abortion pills unless these are very necessary for the mother's health and safety, decided by the prescribing doctor himself. Even in this case, such medication should not be prescribed when the pregnancy is four months old or beyond – a timely recommendation of historical importance being a thousand years old displaying the caliber of learning among these Muslim practitioners. He further goes on to say that when the physician prescribes a remedy orally, he should make it clear that the patient understood the name exactly and should not entrust it to uneducated, dishonest apothecaries or *'Attarin*, but to those who are well qualified, honest and social-minded. He should observe that he speaks the truth as he sees it, and not hesitate to ask forgiveness if he erred. Above all, he should not attempt to revenge himself, but rather forgive and forget and be friendly and play the part of the peacemaker. If his assistant did something wrong, he ought not be harsh to rebuke him before others, but privately and cordially.

Another physician puts these principles in a nut-shell, in the following five principles:

1. The physician should be willing to forgive the wrongs of others.

2. He should be willing to counsel all.
3. He should be truthful, honest and objective.
4. He should be merciful and considerate of the needs of others.
5. He should aim to live uprightly, and morally clean being a good example to the others.

This was an attempt to shed some light on contributions to the life sciences, their theories and principles emanating from the Islamic civilization during the heyday of the Muslim caliphs. No doubt, the influence of Muslim physicians (*Hukama*) has been immeasurable upon human civilization in search of a healthier, happier and wholesome humanity. Any unbiased critic will surely give such commendable appraisals.

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The Life Sciences

'Life Sciences' is a modern term. It designates those highly structured disciplines that focus on the study of living organisms as a whole. It conveniently distinguishes them both from the physical sciences, which deal with inanimate matter, and from the arts and humanities. In a sense, therefore, it is misleading to apply this term to the early Islamic world, which was not characterized by the formal specialization of the present day. The 'life scientists' of that time were not simply zoologists or entomologists, pediatricians or veterinarians. The physician, for example, might also be a mathematician, a poet, an astronomer, a musician, a linguist, a chemist, a philosopher, or a theologian. Even in the practice of medicine he might be not only an internist, an oculist, and a surgeon, but also a hospital administrator, a psychiatrist, a pharmacist, a therapist, and a designer of medical facilities and equipment. Moreover, he might apply his knowledge of music, astrology, alchemy, or mathematics in an effort to increase his ability to choose and compound his cures. The great scientists of the period in the East were masters of many disciplines and typified 'the Renaissance man' in the Occident.

In retrospect, however, we recognize that a process of academic and occupational differentiation was going on in the Muslim world in all fields of human endeavor, including the natural sciences. The Muslim empire raised the arts, crafts, and sciences to a level of formal sophistication never achieved before and provided a foundation on which the modern sciences have grown.

The full flowering of the arts and sciences, and of the healing arts and natural history in particular, during the period of the Muslim empire is at least partially explained by the reverential and acquisitive attitudes characteristic of the Arab people from earliest days. In a monumental work on the classification of nations, *Tabaqat al-Umam*, the Toledan judge and historian Abu al-Qasim Sa'id al-Andalusi (d. 462/1070) describes the cultural attitudes that prevailed in Arabia before and shortly after the birth of Islam:

The Arabs prided themselves on advancing their philological skill, and on perfecting lexicology and etymology. They excelled in poetry and in oratory. In their contacts with and travels to neighboring countries, they developed unsimulated knowledge of people and lands. Possessing a natural tendency for eloquent speech, they were noted for their ability to memorize poetry, narrate stories, and retell chronologies. From repeated observations rather than scientific reasoning and

experimentation, they acquired some knowledge in astronomy, astrology, and meteorology, areas related to their modes of living. In early Islam, they focused on philologic sciences and Muslim jurisprudence. The only other science that was held in high esteem among them was the healing art, a profession acquired by very few, yet, because of the need for its services, appreciated by the majority.

After the spread of Islam and their military conquests, the Arabs assimilated the cultures of their more advanced subjects, incorporating, adapting, and making good use of every talent, skill and cultural advantage that was not hostile to their religion and spirit. In time, through contact, education, and vigorous translation activities, great advances were made in many fields – not least among them the life sciences (*As-Sina`ah at-Tibbiyyah*).

As rulers of a vast territory, encompassing many cultures, creeds and nations the Arabs were able to draw on diverse sources to advance their knowledge and practice of the healing arts. They utilized indigenous folk medicine as well as written treatises from the Syriac, Sanskrit, and Greek legacies, the latter being the most important. Examples of the cross-cultural interchanges that took place between the Arabs and their subject peoples are numerous. The Arab physician `Isa (Masih) b. Hakam of Damascus, in compiling his medical dissertation *al-Haruniyyah* (named after caliph Harun ar-Rashid, who died in 193/809), relied on Greek sources. A junior contemporary, `Ali b. Sahl Rabban at-Tabari, devoted a large section of his *Paradise of Wisdom* (completed in 235/850) to a description of Indian medicine, which he had extracted from Sanskrit sources. The physicians of the Bakhtishu and Masawayh families, who served the caliphs for over two centuries, contributed to the maturing of Arabic medicine by consulting Syriac treatises and writing books on Syriac medicine.

Internal and Clinical Medicine

Most of the branches of Arabic medicine were indebted to the efforts of Hunayn b. Ishaq al-`Ibadi (193-259/809-873) and his team of translators of third/ninth century. Together with his students and associates, Hunayn made important medical writings of the Greeks available in Arabic, either by direct translations from the Greek or through Syriac versions. In so doing he established a foundation for the development of Arabic medicine by devising a distinctive methodology, which was followed, modified, and perfected during the following century.

By the end of the third century *Hijrah*, the extant works of Hippocrates, Dioscorides, Galen, and Galen's commentators, including the last of the Byzantine physicians up to the first/seventh

century, became available to medical students and practitioners throughout the Islamic world. Digests, compendiums, and synopses based on the Greek classics were abundant in all areas of the life sciences. Hunayn himself wrote an introduction to the healing arts, *al-Masa'il fit-Tibb lil-Muta'allimin*, known in Latin as the *Vade Mecum* of Johannitius, which presented synopses of Greek precepts on the health sciences. It influenced medical teaching and practice not only in Islam but in Christendom as well.

By the close of the third/ninth century, a new star began to shine in Islamic medico-pharmaceutical circles, the physician Abu Bakr Muhammad b. Zakariyyah ar-Razi (250-312/865-925). Ar-Razi became the greatest clinician, pathologist, medical educator, alchemist, and philosopher of his time. His writings advanced the contemporary understanding of internal medicine substantially, and many of his ideas and original concepts regarding psychiatrics, the doctor-patient relationship, the diagnosis of diseases, chemotherapy, and methods of treatment remain valid today. His discourse on smallpox and measles, for example, gained him worldwide recognition. In fourteen chapters, ar-Razi dealt with the causes of smallpox, its diagnosis and treatment (even in its most virulent forms), its universal occurrences, precautions that should be taken against its spread, and the characteristics that distinguish it from measles. A skin rash occurs in both diseases, but ar-Razi identified the specific symptoms of smallpox as fever, headache, nose and skin itching, redness of the eyes and cheeks, and restlessness. He listed the more evident symptoms of measles, in addition to the appearance of spots, as perturbation, distress, and faintness – concepts accepted in present-day pathology. In his treatise on colic, ar-Razi differentiated its symptoms from those caused by kidney stones or the pains of ileus.

A ten-part treatise on clinical and internal medicine, *al-Kitab al-Mansuri*, dedicated by ar-Razi to his patron, Mansur b. Ishaq b. Ahmad b. Asad, and known in Latin as *Liber ad Almansorem* became a basic reference work. In it he discusses such varied subjects as general medical theories and definitions, diets and drugs and their effects on the human body, a regimen for preserving health, mother and child care, skin diseases, mouth hygiene, climatology and the effect of environment on health, and epidemiology and toxicology. In his comprehensive medical encyclopedia, *al-Hawi al-Kabir*, and his treatise on psychic therapy, *at-Tibb ar-Ruhani*, ar-Razi provided considerable insight into the methods, applications, and scope of internal, clinical, and psychiatric medicine, as well as the interpretation of general health precepts. Recognizing the

relationship between psyche and soma, he attempted to treat diseases of both mind (soul) and body.

Ar-Razi's worthy successor `Ali b. `Abbas al-Majusi (d. 383/994), in his *Liber Regius (al-Mallki)*, contributed important original observations on medical theories and diagnosis, including new concepts regarding the impact of environment on health, the nutritional value of diets, and the action of drugs on human beings. His system of codifying, classifying, and theorizing details captured the admiration of later practitioners in both East and West. His work was surpassed only by the elaborate *al-Qanun fit-Tibb (Canon of Medicine)* by Ibn Sina (Avicenna), the celebrated physician-philosopher (369-428/980-1037).

Another physician-philosopher and a reformer in matters related to public health and clean environment was al-Mukhtar b. `Abdun b. Butlan (d. 460/1068) of Baghdad. Ibn Butlan's *Taqwim as-Sihhah*, (on the preservation and restoration of good health), won him great prestige in medical circles during the Middle Ages. It was translated into Latin and was published repeatedly. Ibn Butlan elaborated on the six 'non-natural principles' that had been identified earlier by Hunayn: clean air, moderate diet and drink, rest and work, wakefulness and slumber, evacuation of superfluities, and emotional reactions and involvement. If these six principles are kept in equilibrium, he maintained, health results; if abused or imbalanced, sickness occurs. Ibn Butlan also recommended the utilization of fine music to lift the morale of patients and help speed their recovery.

After a short period in which the development of medical science seemed to level off in the East, new and vigorous medical activities took place in the central and western regions of the Islamic world. Ibn al-Jazzar (d. ca. 373/984) was a successful medical practitioner, therapist and author in al-Qayrawan in modern Tunisia. One of his most interesting publications was a book on the management and care of children from the moment of conception to adolescence. It includes numerous health tips to mothers and midwives. Ibn al-Jazzar also wrote on therapeutics, dietetic, and internal medicine, works that made him famous in Andalusia as elsewhere in Islam. They were translated into Latin and received much attention in European medical circles.

Ibn al-Jazzar's text on child care was preceded and surpassed only by an independent book on gynecology, embryology, and pediatrics by `Arib b. Sa`id of Cordoba (completed about 354/965). Ibn Sa`id's book was the most significant work written on this subject in any language up to the fourth/tenth century. He dedicated it to his patron, al-Hakam al-Mustansir (reigned 349-

365/961-976), a generous caliph who did much to promote science and the arts throughout his domain. Two of Ibn Sa`id's junior contemporaries and countrymen, Ibn Juljul and az-Zahrawi, also made major contributions to the advancement of Arabic medicine – in pharmacy and medical botany, in internal and clinical medicine, and in surgery.

The development of Arabic clinical medicine and therapeutics reached its peak in Andalusia, in the works of the physician-statesman Ibn Wafid (d. 460/1068) and in the medical writings, teaching, and practice of Ibn Zuhr (d. 558/1163), who was known in Latin as Avenzoar. In *at-Taysir*, his famous book on the diagnosis and treatment of diseases, Ibn Zuhr described, possibly for the first time in medical history, mediastinal abscesses as well as wet and dry pericarditis. He also emphasized medical experimentation, bedside clinical observation and treatment, and pathology. He even criticized Ibn Sina's *al-Qanun* for its almost total emphasis on theoretical concepts and philosophical reasoning at the expense of clinical, practical medicine. Ibn Zuhr's younger contemporary and close friend Ibn Rushd (518-594/1125-1198), who was known in the West as Averroes, was more of a philosopher and theologian than a physician. Nevertheless, he wrote two important medical books: *al-Kulliyat*, a text on general medical theories and precepts, which was translated into Latin in 652/1255 and printed independently in Venice in 886/1482; and a commentary on Ibn Sina's famous medical poem, *Canticum de Medicina (al-Urjuzah fit-Tibb)*.

Andalusia was the birthplace of Musa b. Maymun (528-600/1134-1204), who wrote on internal medicine, therapeutics, *materia medica*, and health and environment. His popularity, however, was not in Andalusia, where he grew up, but in Syria and Egypt under the Ayyubiyyah dynasty. His many publications, including extant manuscripts in the original Arabic as well as Hebrew versions of them, were recently edited and evaluated. It is recorded that Ibn Maymun's fame spread to Iraq, where it induced the physician naturalist `Abd al-Latif al-Baghdadi (557-628/1162-1231) to visit Egypt. The fact that the two physicians of their age were familiar with each other's work despite being separated by thousands of miles shows how extraordinarily well diffused scholarly knowledge was in early Islam, and how easy and wide was the transmission of intellectual progress.

Hospitals and Medical Education

It was in Islam, under the patronage of the Muslim caliphs, that hospitals were first established, and they flourished throughout the Muslim world. The early Muslim concept of the hospital became the prototype for the development of the modern hospital – an institution operated by private owners or by government and devoted to the promotion of health, the cure of diseases, and the teaching and expanding of medical knowledge. Within the Islamic world, from the beginning of the third/ninth century onward, hospitals were generously endowed from the state treasury and operated under lay administration and management. They served both men and women, in separate wards. In the fourth/tenth century, during the reign of al-Muqtadir (295-319/908-932), Sinan b. Thabit extended hospital services to meet the needs of neighboring rural areas, prisons, and the ‘inner city’ – a program that has only recently been adopted in the West.

Ibn Thabit’s contemporary ar-Razi considered hospitals of primary importance in providing practical training in the health professions and in disseminating health information. Late in the fourth/tenth century, the fame of al-`Adudi hospital in Baghdad had spread far and wide. This remarkable institution had twenty-four doctors on its staff and was equipped with lecture halls and a generously supported library. Students from the eastern and western regions of the Islamic world traveled hundreds of miles to study at al-`Adudi, and its graduate physicians were world-famous. As a result of its influence, new hospitals were constructed and older hospitals were reorganized in larger cities throughout the Muslim world.

In the sixth/twelfth and seventh/thirteenth centuries, hospitals in Syria and Egypt had achieved such high levels of performance that travelers and historians regarded them as one of the treasures of Muslim civilization. They attracted gifted students and the best medical educators, and enjoyed rich endowments and generous patronage. They were reconstructed in elegant, spacious buildings, equipped with comfortable lecture halls, extensive libraries, well-stocked pharmacy shops, and efficient laboratories, where medications could be freshly prepared and dispensed.

Ibn Abi Usaybi`ah, the greatest medical historian of early Islam, was educated at two of the most famous hospitals of the time: an-Nuri in Damascus and an-Nasiri in Cairo. In his writings he eloquently described hospital activities that he had been able to observe and compare firsthand.

Ophthalmology and Eye Diseases

In the hot and dusty plains of the Middle East, endemic diseases of the eye, such as trachoma, hydatid, cataract and ophthalmia, were usually prevalent. This accounts for the extraordinary progress made by Muslim physicians in the field of ophthalmology. Through daily practice and gradually improved techniques and performances, physicians and oculists attained a level of proficiency in ophthalmic science never reached by the ancient and classical sages. Their literary contributions were admired and copied throughout Europe and were not surpassed anywhere in the world until the eleventh/seventeenth century.

Among Arabic authors, Hunayn b. Ishaq was perhaps the first to write a systematic manual on ophthalmology, complete with diagrams. His work was elaborated upon by later authors and has survived up to the present time. In ten treatises, written between 225/840 and 245/860 and completed by his student and nephew, Hubaysh, Hunayn discussed the anatomy of the eye, brain, and optic nerves and the physiology, diseases, and treatment of the eye. Although he copied extensively from Greek works, he added many new, personal observations. Writing early in the fourth/ tenth century, ar-Razi was possibly the first to describe pupillary reflexes.

Arabic progress in ophthalmology reached a peak about the year 390/1000 in the work of `Ali b. `Isa, an oculist of Baghdad. His book, *Dhakhirat al-Kahhalin (A Thesaurus for Ophthalmologists)*, was a comprehensive summary of all the achievements of the past. His contemporary `Ammar b. `Ali al-Mawsili was the first to introduce the technique of suction removal of the cataract in order to avoid the 'aqueous calamity'. He devised and used a hollow needle for the purpose, a technique revived in 1262/1846 by a French doctor, Blanchet. This high level of performance was continued in the work of Ibn al-Haytham (Alhazen) (d. 431/1040), and a century later in *al-Murshid*, a guide to the oculist written by Muhammad b. Qassum b. Aslam al-Ghafiqi of Andalusia. Interestingly, al-Ghafiqi illustrated his manual with pictures of the surgical instruments he used in performing eye operations, a practice begun by the surgeon az-Zahrawi (d. 403/1013).

The medical revival that occurred during the Ayyubiyyah dynasty continued under the Mamluks. This is evident in the work of Khalifah b. Abu al-Mahasin of Aleppo, Syria, whose writings (completed 654/1257), include a useful introduction to eye surgery and descriptions of eye operations, as well as diagrams and drawings of surgical instruments – also in the book, *Nur al-`Uyun (Light of the Eyes)*, completed in 696/1297 by the oculist Salah ad-Din b. Yusuf of

Hamah, Syria. The last great ophthalmologist of the Arabic period was Ibn al-Akfani ash-Shadhili of Egypt, who died of the Black Death in 749/1349. His work, *Kashf ar-Rayn fi Ahwal al-`Ayn* was a summary clarification of all existing knowledge about the eye in the Middle East in his time.

Surgery, Anatomy, and Physiology

The Muslim physician-philosopher Ibn Rushd prudently stated that ‘whosoever becomes fully familiar with human anatomy and physiology, his faith in God will increase.’ This statement explains why surgery was accepted by the Arabs from the early days of Islam. Moreover, Muslim surgeons were among the first to use narcotic and sedative drugs in operations: Islam teaches that God has provided man with a great variety of natural remedies to cure his ills. It is man’s obligation to identify them and to use them with skill and compassion.

During the third/ninth century, Hunayn translated the works of Galen on anatomy and surgery, and ar-Razi devoted large sections to this art in his larger medical encyclopedias, *al-Mansuri* and *al-Hawi*. But al-Majusi, or Haly `Abbas (d. 383/994), is considered the first great theorist on anatomy and physiology in Arabic medicine. His *Liber Regius* was the first Islamic work to deal with surgery in detail, and he was the first to use the tourniquet to prevent arterial bleeding.

The greatest achievements in medieval surgery, however, are attributed to az-Zahrawi of Muslim Spain (about 328-403/940-1013). An important part of his medical encyclopedia, *at-Tasrif*, deals with obstetrics, pediatrics, and midwifery, as well as with general human anatomy. The last treatise is devoted to surgery – including cauterization, the treatment of wounds, the extracting of arrows, oral hygiene, and the setting of bones in simple and compound fractures. He used antiseptics in the treatment of wounds and skin injuries; devised sutures from animal intestines, silk, wool, and other substances; and developed techniques to widen urinary passages and explore body cavities surgically. His surgery contained about two hundred surgical instruments that he himself had designed and had depicted in his writings. Such instruments, with modifications, were later used by many surgeons in Christendom as well as in Islam.

Az-Zahrawi’s discussion of mother and child health and the profession of midwifery is of particular interest in the history of nursing. His text implies the existence of a flourishing profession of nurses and midwives in general practice, a fact that may be explained by the

reluctance of many families to seek the assistance of male doctors in normal childbirth. Skilled physicians and obstetricians, such as az-Zahrawi, instructed and trained midwives so that they could carry on their duties with competence.

The continuation of warfare, especially during the period of the Crusades, and the revival of learning under the Ayyubiyah resulted in major improvements in surgical practices in Syria and Egypt. Therefore, the study of anatomy and physiology was given greater emphasis by such physician-educators as Ibn Maymun and al-Baghdadi. During the reign of the Mamluks in Egypt, Ibn an-Nafis (ca. 606-686/1210-1288) wrote a very important text on anatomy and physiology as a commentary on Ibn Sina's *al-Qanun*. In terms of originality, the commentary surpasses the text itself. It contains the first clear and detailed description of the pulmonary circulation of the blood and several original observations on comparative anatomy. Ibn an-Nafis' contemporary Ibn al-Quff (630-684/1233-1286), in his manual on the surgical art, gave a comprehensive description of surgical operations and treatment of bodily injuries. He explained the function of the capillaries and the action of cardiac valves in the veins and in the heart chambers.

Zoology and Veterinary Medicine

The Arab tribes of the Arabian Peninsula had developed a way of life that made them extremely reliant on domesticated animals for survival. Harsh environmental conditions in the Arabian heartland, a nomadic and semi nomadic mode of existence, and an economy based largely on trade and travel produced an unusually strong interest in the care and feeding of animals for food, by-products, and transportation. The spread of Islam, the outward movement of the Arab people, the obligations of conquest, and the formalization of an Arab-Islamic culture raised this basic interest in animal husbandry to the level of a science.

The first comprehensive zoological study of animals in Arabic was *al-Hayawan* by al-Jahiz (d. 255/869). Written in an interesting and eloquent literary style, it covers animal life in Iraq and in neighboring countries, describing the kinds of animals, their characteristics and behavior, and their diseases and treatment. Several other works in this field deal with narrower topics, such as sheep, camels, or wild animals. The most comprehensive work in the field, *Hayat at-Hayawan (The Life of Animals)*, was written by the Egyptian philosopher-theologian Kamal ad-Din ad-Damiri (d. 808/1406). Ad-Damiri arranged and discussed animals in alphabetical order, listing their characteristics, qualities, and habits, as well as the medicinal values of their organs as

mentioned in folk medicine. It is worth noting that this work, like a number of other Arabic texts on animals and natural history, contains rudimentary concepts of evolutionary theory, including the doctrine of survival of the fittest.

In the early centuries of Islam, several important manuals on veterinary medicine were published in Arabic for the use of the farrier. During the third/ninth century, the philologist Ibn Qurayb al Asma`i and his contemporaries produced several praiseworthy texts on lexicography and natural history that provide a wealth of information of zoological interest. But the first systematic book on horsemanship and the art of the farrier, *al-Furusiyyah wal-Khayl*, was written by Muhammad b. Akhi Hizam around 246/861. It discusses the behavior and characteristics of horses, as well as diseases and treatment. Several similar texts followed, many of them containing beautiful illustrations of horses and other domestic animals, depicted with meticulous attention to anatomical accuracy.

The greatest medieval work on veterinary medicine is the comprehensive manual *Kamil as-Sina`atayn* by Abu Bakr al-Baytar of Cairo (d. 740/1340), who was the groom of King an-Nasir Muhammad. This book covers animal husbandry, breeding, variations in wild and domestic animals, horsemanship, and knighthood and contains a section on birds, especially those domesticated in Egypt and Syria. Al-Baytar devoted a major part of his work to a discussion of animal diseases and to the methods and drugs used in treatment. As in many similar texts written in this period, there are also passages dealing with the use of animal organs in therapeutics, a tradition dating back to Aristotle and other Greek figures.

Pharmacy and Pharmacology

Pharmacy, as a recognized profession, is an Islamic institution. Under Islam, it became an independent science – separate from, yet cooperating with, medicine. It was practiced by skilled and trained specialists and pharmacists. It achieved this status about 184/801, under the patronage of the `Abbasiyyah caliphs. The first privately owned and managed pharmacy shops were opened in the early third/ninth century in Baghdad, the `Abbasiyyah capital, where drugs and spices from Asia and Africa were readily available and where the proximity of military installations increased the need for medication. Within a short period of time, pharmacy shops sprang up in other large cities of the Islamic world.

Pharmaceutical preparations were manufactured and distributed commercially in the marketplace and dispensed by physicians and pharmacists in a variety of forms: ointments, electuaries, conserves, troches, pills, elixirs, confections, tinctures, suppositories, and inhalations. Formulas for these skillfully prepared medications were included in Arabic texts, unofficial pharmacopoeias, and medical pandects. In time they were included in European pharmaceutical texts, thereby influencing herbals and formularies up to modern times.

Sabur b. Sahl (d. 255/869) was the author of the first known formulary in Islam. It contained many recipes and medications in several pharmaceutical forms for a variety of ailments. Many other compendiums followed, among which were a treatise on pharmacy by ar-Razi and Books II and V of Ibn Sina's *al-Qanun*. But the most important text on pharmacy and *materia medica* by far was *as-Saydanah fit-Tibb* by Abu ar-Rayhan al-Biruni (d. 443/1052). The author gave the most detailed definition of pharmacy and of the function and duties of the pharmacist that had yet been written. He also defined pharmacology and other branches of the healing arts in which professionals work together as a team to achieve the best results towards good well being.

About a century thereafter, Ibn at-Tilmidh wrote *al-Aqrabadhin*, a pharmaceutical text explaining how to prepare and prescribe a wide variety of medications. This text became the basic reference for practicing pharmacists in private shops as well as in hospital dispensaries. Some of these hospitals owned tracts of land reserved for the cultivation of medicinal plants, similar to the botanical gardens that later became popular in the West. Fresh, naturally grown products from these gardens were compounded in remedies dispensed for the cure of diseases.

Interest in natural products and ecology was a corollary to the Muslim belief that God provides for the creatures He has created. In nature, God provides the right recipes and remedies for man's ailments, when and where they are most needed. Natural medications are tokens of God's generous attitude toward human beings, His way of enriching their lives and providing for their needs. This belief motivated Muslim farmers, naturalists, herbalists, pharmacists, and physicians to seek remedies in nature, rather than in complicated synthetic drugs prepared in laboratories.

The contributions of Muslims in analyzing the effects of drugs on human beings and animals far exceeded the work done by the ancients in this area. The Muslims discovered many new, simple drugs in their crude forms and gave detailed descriptions of their geographical origins, their physical properties, and the methods of their applications. They also skillfully described the

various pharmaceutical forms of the remedies used and the techniques employed in their manufacture. Their advances in pharmacology and pharmacy were matched by substantial achievements in such related fields as botany, zoology, and mineralogy.

Many Muslim practitioners experimented with drugs in order to learn more about their effect on human beings. Several experiments with drugs and diets that were found useful in treating certain ailments were reported in notebook collections of case histories, sometimes known as *al-Mujarrabat*, which were used in medical schools. They were copied by later authors, for better and more uniformed cures. Other manuals of the period included charts, diagrams, and tables and dealt with drugs and diseases in special categories, listing the causes and symptoms of diseases, the seasons of the year in which they occur, and the dosages of drugs administered. Others included mathematical calculations concerning the potency of drugs and the recommended dosages according to age, sex, and the severity of the sickness. Several physicians prescribed and compounded their own medications from recipes they formulated. They gave each remedy a specific name, which often indicated the pharmacological action it would produce – a practice usually followed with modern patent medicines in the West. In their experimentation Muslim authors frequently used a single drug in the treatment of each ailment in order to determine its precise effect. Polypharmacy and the use of compounded recipes played, in practice, a determining factor in therapy.

Increasing incidents of accidental and premeditated poisoning gave impetus to the science of toxicology in Islam. Kings, rulers, and men of wealth dreaded the possibility of poisoning through intrigues or by envious enemies. Court physicians and advisors were encouraged to write on the subject and to recommend precautionary measures, as well as supply candid information. Toxicological manuals and treatises swelled with descriptions of potent drugs found in nature and with prescriptions for specific and universal antidotes. They reported cases of poisoning by means of taste, smell, touch, and sight and gave advice on how to guard against them. Tradition has it that the great theriac – the universal antidote – was devised by the ancient Greeks and perfected in the recipe formulated and recommended by Galen. Galen's treatise on the subject was translated into Arabic, first by Yuhanna b. Batriq and almost half a century later by Hunayn. The theriac, as well as other antidotes, was transmitted from these two versions of theriacs and was adopted, with modifications, in several Arabic formulas; some celebrated recipes contain more than sixty different ingredients. The introduction of Indian toxicology and the proliferation

of Arabic herbals and pharmaceutical formularies resulted in further modifications up to the seventh/thirteenth century, when Arab theriacs were introduced to the West. Physicians and apothecaries of the period were fascinated by the ‘miraculous’ effects of such compounds. Because precision in preparation of these drugs is so important, a tradition of formal demonstration developed in the West. Kings, lords, physicians, and dignitaries in major European cities attended public ceremonies in which large batches of these universal antidotes were compounded, prepared, and certified. They were sold with a guarantee of excellence at exorbitant prices up to the twelfth/eighteenth century. Ironically, just as warfare promoted advances in surgery, fear of assassination by poison enlarged Arabic pharmacopoeias, increased toxicological data, and enriched the fund of knowledge in medical botany, mineralogy, ecology, and therapeutics.

Medical Botany and Therapeutics

Physicians and pharmacists in Islam devoted much attention to locating *materia medica* in the three natural kingdoms – plants, animals, and minerals. In their studies of *materia medica*, the Arabs developed a system of classification and investigation based primarily on the five books of Dioscorides, which were completed about 65 CE. They also borrowed from Greek, Indian and Syriac sources, however. Certain concepts and some descriptions of simple drugs came from such places as India and the Far East, which explains why Arabic *materia medica* abounds in terminology adopted from Turkish, Sindhi, Berber, Sanskrit, Greek, and other languages and dialects.

In the third/ninth century, Abu Hanifah ad-Dinawari accumulated impressive data on the medicinal plants known in pre-Islamic Arabia as well as on many others that entered the Arabic vocabulary two centuries thereafter. More new words and terminology can be found in the works of Ibn Abu al-Ash`ath in the fourth/tenth century, Ibn Wafid and al-Biruni in the fifth/eleventh, al-Ghafiqi in the sixth/twelfth, and Ibn al-Baytar in the seventh/thirteenth. All these authors included substantial amounts of original information as well as data borrowed from other cultures.

Agricultural Science and Husbandry

The legacies of the Greeks and the Nabataeans, as well as indigenous traditions, were among the most influential factors in developing agricultural science in Islam. The famous Arabic manual

al-Filahah ar-Rumiyyah is a translation of a Greek text on agriculture. About 291/904, Ibn Wahshiyyah wrote his widely circulated book *al-Filahah an-Nabatiyyah*, which, according to his introductory remarks, is a translation from an old text on agriculture based on ancient Nabataean (Aramaic) writings. As Islam expanded, agricultural and horticultural activities flourished, and several detailed manuals were written in Arabic, not only in the eastern regions of the Islamic world but in Andalusia as well.

One of the most important and widely read books on the subject to be written in Andalusia was completed by Ibn al-Bassal of Toledo in the second half of the fifth/eleventh century. It was edited with a Spanish translation and notations under the title *Libro de Agriculture* in 1955. An even more widely recognized text was the sixth/twelfth century *Kitab al-Filahah*, by another Andalusian, Ibn al-`Awwam of Seville. It was translated into both Spanish and French in the thirteenth/nineteenth century. Topics covered in detail in these texts include medicinal plants, species of plants, soil, farming techniques, husbandry, methods of cultivation, tillage, irrigation, agronomy, share-cropping, gardening and landscaping, plant sex life, and fertilization.

Similar activity flourished in Syria, Iraq, and Egypt during the same period and continued to the end of the eighth/fourteenth century. In southern Arabia, *Bughyat al-Fallahin*, a manual for farmers published during the eighth/fourteenth century under the Rasuliyyah dynasty, includes data compiled from earlier works on agriculture and significant additional information on plants, irrigation, and agronomy in Yemen. Some of the agricultural texts also include astrological advice concerning the days, seasons, and locations that would prove most favorable for sowing seeds and harvesting crops.

Alchemy and Astrology

From the fourth/tenth century to the present time, the origins of alchemy, the true authorship of the Latin and Arabic alchemical writings attributed to Jabir b. Hayyan al-Azdi (known in the West as Geber), and even the historical existence of this man have been matters of controversy. Some historians believe that Jabir was a name assumed by a number of anonymous authors and that there was no such historical figure. Others believe that he was a real person, born in Kufah in Iraq, who became a Sufi Muslim and served at the `Abbasiyyah capital, where he was esteemed as a pioneer alchemist, experimenting in the transmutation of lesser metals into silver and gold.

On the basis of available evidence, it seems reasonable to believe that Jabir did exist and that at least some of the writings bearing his name, such as the book of *ar-Rahmah*, are genuine. Whether or not this is so, it is a fact that Arabic alchemy was alive and flourishing by the end of the second/eighth century and that Arab alchemists made substantial, voluminous, and influential literary contributions up to the eighth/fourteenth century and beyond.

By the third/ninth century Arab alchemists were reportedly organized into a sort of guild, a group quite distinct from pharmacists and physicians. Their connections less than a century later with the fraternity of *Ikhwan as-Safa* (The Brethren of Purity) and with the type of mysticism and occultism associated with their writings and life style seem highly probable.

Although the occult art of alchemy, which sought ways to transmute base matter into precious metals and to compound the elixir of life, was alluring to a great many sophisticates, it had many opponents throughout the Islamic period. Some of its antagonists thought that the claims of the alchemists were in fundamental contradiction to Muslim beliefs, despite the attempts of some alchemists to justify their pursuits on religious grounds. The naturalist al-Jahiz and the philosopher Abu Yusuf al-Kindi were among its staunchest critics. Ibn Sina was a moderate opponent of the theory that base metals could be changed into gold. `Abd al-Latif al-Baghdadi believed in alchemy early in life, but as he grew older he came to consider its theories corrupting to its adherents and became critical of its followers.

Ar-Razi, however, was a strong supporter of alchemy and a defender of its claims. Fortunately, his approach to alchemy was experimental, rational, and scientific, so that his work actually enhanced alchemy's image. His writings established the foundation for empirical Arabic chemistry, experimental chemotherapy, and objective alchemical procedures. He also described the tools and utensils used in alchemical laboratories, in his recently republished two books: *as-Sirr* and *Sirr al-Asrar*.

Several important alchemists after ar-Razi continued to search for the 'philosopher's stone', which would turn base metals into gold, and further enriched alchemical literature with their writings. Among them were Abu Maslamah Muhammad al-Majriti of Andalusia (d. first half of the fifth/eleventh century), Abu al-Hasan b. Arfa` Ra`sahu (d. in Fez, Morocco, 593/1197), Abu al-Qasim Muhammad al-`Iraqi of Baghdad who flourished in the sixth/twelfth century, and the prolific author `Ali b. Aidamur al-Jildaki (d. 743/1343). Being extremely secretive, possibly because of their repeated trials and failures, these alchemists wrote about their work in highly

symbolic, mystical terms, employing arcane jargon almost unintelligible to outsiders and filling their books with figurative and ambiguous expressions, flowery poetry, ornate phrases, and mysterious anecdotes.

Yet, in their search for the ‘cultivation of gold,’ alchemists made many contributions to the science of chemistry. They invented many laboratory utensils and improved many others, such as the crucible, alembic, and the retort. They also advanced such chemical techniques and operations as distillation, filtration, straining, calcination, crystallization, and the preparation of chemical elements and compounds. In addition, they improved the manufacture of ceramics, glass, soaps, and perfumes. Because of their belief in the continuance of matter, alchemists contributed significantly to the objectivity of experimentation, to the use of weights and balances, and to the concept of proportional unification of metals.

Unfortunately, alchemy was more akin to the art of astrology than it was to the traditional experimental sciences. The practice of astrology actually antedates alchemy in the Near East, and it is very closely related to the science of astronomy, although many today associate it only with horoscopy and the prediction of future events. Because astrology concerns itself so much with the effects of universal forces on the life and welfare of people, it must be treated as a ‘life science’ – at least as it was generally practiced throughout the Middle Ages.

The ancient idea that planetary bodies can affect health and well-being associated astrology with medicine. Astrology affirmed the belief that physical sympathy makes earthly things dependent on the movements of celestial bodies; that the virtually incorruptible stars rule over corruptible terrestrial things. Astrologers thought that the position of the seven planets within the zodiac at any time affects human beings. The twelve signs of the zodiac were divided into three groups: the four elements (fire, earth, air, and water); the four humors (blood, phlegm, black bile, and yellow bile); the four qualities of temperature and humidity (cold, hot, moist, and dry). This division was accepted as a primary concept in Greco-Arab medicine.

At the `Abbasiyyah capital, al-Kindi predicted the duration of the dynasty from astrological interpretations, and he considered the twelve signs of the zodiac in his therapeutics. His student Abu Ma`shar, known in Latin as Albumasar, wrote extensively about constellations, birth dates, and horoscopy. Abu Bakr Ahmad b. Wahshiyyah concerned himself with the secrets of the planets, alchemy, sorcery, and magic and promoted witchcraft. In the fifth/eleventh century, Ibn Jazlah and al-Biruni believed in rational astrological interpretations, and Ibn Butlan diagnosed

and treated diseases in accordance with the occurrences of zodiacal signs. During the sixth/twelfth century, Ibn at-Tilmidh in Baghdad and Ibn Zuhr in Andalusia insisted that the position of the planets determines the proper time to perform certain surgical operations, even bloodletting. Their writings record anecdotes involving astrological interpretations that influenced their decisions in diagnosing and treating diseases. They also believed in the healing powers of plants that resembled the ailing organs they were intended to cure. With the decline of Arabic civilization during the European Middle Ages, astrology degenerated into sorcery and witchcraft. In modern times, however, it has been revived in the West as a serious 'science'.

Summary

Islamic culture, including its contributions to the life sciences, reached its highest stage of development between the third/ninth and the fifth/eleventh centuries and experienced a number of major revivals during the sixth/twelfth, seventh/thirteenth and eighth/fourteenth centuries. During this period the West was just beginning to awaken from the Dark Ages. From the sixth/twelfth century to the Renaissance, via translation and copying activities in Spain, Sicily, Italy, and Syria, the bulk of Arabic writings in all fields was made available in Latin and the vernaculars. Despite the poor quality of translation and scholarship that prevailed in the West at that time, these Latin and other versions revived the spirit of learning in Western Europe during the Middle Ages and up to the Renaissance.

Muslim authors, as a result of the translation of their works into Latin and the vernaculars, became widely known under Latinized names: Rhazes for ar-Razi, Avicenna for Ibn Sina, Averroes for Ibn Rushd, and so on. Their books were widely read and frequently cited and quoted by writers in the West. In the life sciences, Muslim authors not only preserved the classical achievements of the ancients but also added new and original data to the fund of human knowledge, thereby contributing to the well-being of humankind everywhere.

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Understanding of the Qur'an is made accessible with easy reference to key issues concerning life, and the path of Islam.

The Story of Creation in the Qur'an

Shaykh Fadhlalla Haeri

An exposition of the Qur'anic verses relating to the nature of physical phenomena, including the origins of the universe, the nature of light, matter, space and time, and the evolution of biological and sentient beings.

Sufism & Islamic Psychology and Philosophy

Beginning's End

Shaykh Fadhlalla Haeri

This is a contemporary outlook on Sufi sciences of self knowledge, exposing the challenge of our modern lifestyle that is out of balance.

Cosmology of the Self

Shaykh Fadhlalla Haeri

Islamic teachings of *Tawheed* (Unity) with insights into the human self: understanding the inner landscape is essential foundation for progress on the path of knowledge.

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Shaykh Fadhlalla Haeri

A lucid exposition of the extensive body of Islamic thought on the issue of free will and determinism.

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Shaykh Fadhlalla Haeri

This book offers revelations and spiritual teachings that map a basic path towards wholesome living without forgetting death: cultivating a constant awareness of one's dual nature.

Leaves from a Sufi Journal

Shaykh Fadhlalla Haeri

A unique collection of articles presenting an outstanding introduction to the areas of Sufism and original Islamic teachings.

The Elements of Sufism

Shaykh Fadhlalla Haeri

Sufism is the heart of Islam. This introduction describes its origins, practices, historical background and its spread throughout the world.

The Journey of the Self

Shaykh Fadhlalla Haeri

After introducing the basic model of the self, there follows a simple yet complete outline of the self's emergence, development, sustenance, and growth toward its highest potential.

The Sufi Way to Self-Unfoldment

Shaykh Fadhlalla Haeri

Unfolding inner meanings of the Islamic ritual practices towards the intended ultimate purpose to live a life honorable and fearless, with no darkness, ignorance or abuse.

Witnessing Perfection

Shaykh Fadhlalla Haeri

Delves into the universal question of Deity and the purpose of life. Durable contentment is a result of 'perfected vision'.

Practices & Teachings of Islam

Calling Allah by His Most Beautiful Names

Shaykh Fadhlalla Haeri

Attributes or Qualities resonate from their Majestic and Beautiful Higher Realm into the heart of the active seeker, and through it back into the world.

Fasting in Islam

Shaykh Fadhlalla Haeri

This is a comprehensive guide to fasting in all its aspects, with a description of fasting in different faith traditions, its spiritual benefits, rules and regulations.

Prophetic Traditions in Islam: On the Authority of the Family of the Prophet

Shaykh Fadhlalla Haeri

Offers a comprehensive selection of Islamic teachings arranged according to topics dealing with belief and worship, moral, social and spiritual values.

The Wisdom (Hikam) of Ibn `Ata`allah: Translation and Commentary

Translation & Commentary by Shaykh Fadhlalla Haeri

These aphorisms of Ibn `Ata`Allah, a Shadili Shaykh, reveal the breadth and depth of an enlightened being who reflects divine unity and inner transformation through worship.

The Inner Meanings of Worship in Islam: A Personal Selection of Guidance for the Wayfarer

Shaykh Fadhlalla Haeri

Here is guidance for those who journey along this path, from the Qur'an, the Prophet's traditions, narrations from the *Ahl al-Bayt*, and seminal works from among the *Ahl al-Tasawwuf* of all schools of thought.

The Lantern of The Path

Imam Ja`far Al-Sadiq (Translated By Shaykh Fadhlalla Haeri)

Each one of the ninety-nine chapter of this book is a threshold to the next, guiding the reader through the broad spectrum of ageless wisdom, like a lantern along the path of reality.

The Pilgrimage of Islam

Shaykh Fadhlalla Haeri

This is a specialized book on spiritual journeying, offering the sincere seeker keys to inner transformation.

The Sayings & Wisdom of Imam `Ali

Compiled By: Shaykh Fadhlalla Haeri

Translated By: Asadullah ad-Dhaakir Yate

A selection of this great man's sayings gathered together from authentic and reliable sources. They have been carefully translated into modern English.

Transformative Worship in Islam: Experiencing Perfection

Shaykh Fadhlalla Haeri with Muna H. Bilgrami

This book uniquely bridges the traditional practices and beliefs, culture and language of Islam with the transformative spiritual states described by the Sufis and Gnostics.

Talks & Courses

Ask Course ONE: The Sufi Map of the Self

Shaykh Fadhlalla Haeri

This workbook explores the entire cosmology of the self through time, and maps the evolution of the self from before birth through life, death and beyond.

Ask Course TWO: The Prophetic Way of Life

Shaykh Fadhlalla Haeri

This workbook explores how the code of ethics that govern religious practice and the Prophetic ways are in fact transformational tools to enlightened awakening.

Friday Discourses: Volume 1

Shaykh Fadhlalla Haeri

The Shaykh addresses many topics that influence Muslims at the core of what it means to be a Muslim in today's global village.

Songs of Iman on the Roads of Pakistan

Shaykh Fadhlalla Haeri

A series of talks given on the divergence between 'faith' and 'unbelief' during a tour of the country in 1982 which becomes a reflection of the condition occurring in the rest of the world today.

Poetry, Aphorisms & Inspirational

101 Helpful Illusions

Shaykh Fadhlalla Haeri

Everything in creation has a purpose relevant to ultimate spiritual Truth. This book highlights natural veils to be transcended by disciplined courage, wisdom and insight.

Beyond Windows

Shaykh Fadhlalla Haeri

Offering moving and profound insights of compassion and spirituality through these anthologies of connections between slave self and Eternal Lord.

Bursts of Silence

Shaykh Fadhlalla Haeri

Inspired aphorisms provide keys to doors of inner knowledge, as well as antidotes to distraction and confusion.

Pointers to Presence

Shaykh Fadhlalla Haeri

A collection of aphorisms providing insights into consciousness and are pointers to spiritual awakening.

Ripples of Light

Shaykh Fadhlalla Haeri

Inspired aphorisms which become remedies for hearts that seek the truth.

Sound Waves

Shaykh Fadhlalla Haeri

A collection of aphorisms that help us reflect and discover the intricate connection between self and soul.

Sublime Gems: Selected Teachings of Shaykh Abd al-Qadir al-Jilani

Shaykh Abd al-Qadir al-Jilani

A collection of extracted spiritual nourishment from Shaykh Abd al-Qadir al-Jilani's existing works.

Autobiography

Son of Karbala

Shaykh Fadhlalla Haeri

The atmosphere of an Iraq in transition is brought to life and used as a backdrop for the Shaykh's own personal quest for self-discovery and spiritual truth.

Health Sciences and Islamic History

Health Sciences in Early Islam – Volumes 1 & 2

Collected Papers By: Sami K. Hamarneh

Edited By: Munawar A. Anees

Foreword By: Shaykh Fadhlalla Haeri

Health Sciences in Early Islam is a pioneering study of Islamic medicine that opens up new chapters of knowledge in the history of the healing sciences. This two volume work covers the development of Islamic medicine between the 6th and 12th centuries A.D.