



1401 AH—1981 AC

THE INTERNATIONAL INSTITUTE
OF ISLAMIC THOUGHT

ISSUES IN CONTEMPORARY ISLAMIC THOUGHT (15)

Proceedings of the
IIIT Lunar Calendar Conference

(1407 A.H. / 1987 A.C.)

Edited by

Imad-ad-Dean Ahmad

The Editor

Imad-ad-Dean Ahmad



Imad-ad-Dean Ahmad is a Ph.D. astronomer who has been actively involved in the issue of moonsightings and the Islamic calendar since the 1980's. Born in 1948 of Palestinian parents, Dr. Ahmad was raised in Pennsylvania. He graduated *cum laude* from Harvard in 1970 and in 1975 obtained a Ph.D. in astrophysics from the University of Arizona. Dr. Ahmad has done postdoctoral work in astronomy at Harvard, the University of Maryland, and under contract to Goddard Space Flight Center and for private firms. He is currently president of his own research firm, Imad-ad-Dean, Inc.

Since the mid-1980s Dr. Ahmad has worked primarily in the area of Islamic studies, building on his lifetime interest in religion and science. In 1987, he was the organizer of the IIIT Islamic Lunar Calendar Conference. Currently, he is president of the Minaret of Freedom Institute, an Islamic free-market think tank and an adjunct professor at Johns Hopkins University's School for Advanced International Studies and at the University of Maryland, where he teaches an honors course on "Religion and Progress: Islamic Science, Politics, and Economics." He also teaches classes in religion and ethics at the Islamic Weekend School at Tilden Jr. High School in Bethesda. In addition, he is president of the Islamic-American Zakat Foundation, serves as Muslim Chaplain at the Clifton T. Perkins Hospital in Jessup, Maryland, and leads a Qur'an study group at the Dar-adh-Dhikr mosque in Bethesda.

In 1992, Dr. Ahmad published his first book, *Signs in the Heavens: A Muslim Astronomer's Perspective on Religion and Science*. He presented a talk on this subject at the 1994 Vatican Conference on the Inspiration of Astronomical Phenomena on World Culture sponsored by the Vatican Observatory. His other books are *Islam and the Discovery of Freedom*, an annotated version of Rose Wilder Lane's classic on the history of liberty, and *Islam and the West: A Dialog*, in which he co-edited a series of roundtable discussions between American experts on Islam and Muslim intellectuals and activists.

**PROCEEDINGS OF THE IIIT
LUNAR CALENDAR CONFERENCE**

First Edition
(1408 A.H. / 1988 A.C.)

Second Edition
(1419 A.H. / 1998 A.C.)

**PROCEEDINGS OF THE
IIIT LUNAR CALENDAR CONFERENCE**

**Held at the
International Institute of Islamic Thought
Shawwal 9–10, 1407 A.H. / June 6–7, 1987 A.C.**

Edited by Imad-ad-Dean Ahmad

**The International Institute of Islamic Thought
Herndon, Virginia USA**

Issues in Contemporary Islamic Thought (15)

©1919 AH/1998 AC by
The International Institute of Islamic Thought
P.O. Box 669
Herndon, VA 20170-0669, U.S.A
Tel: (703) 471-1746 Fax (703) 471-3922

Library of Congress Cataloging-in-Publication Data

IIIT Lunar Calendar Conference (1407/1987; International
Institute of Islamic Thought)
Proceedings of IIIT Lunar Calendar Conference held at the
International Institute of Islamic Thought, Herndon, VA., 9-10
Shawwāl, 1407/6-7 June, 1987 A.C.

1. Calendar, Islamic—Congresses. 2. Calendar—Congresses.
I. Ahmad, Imad-ad-Dean, 1948-II. Title.
CE59.I37 1987 529'.327 88-23046
ISBN 0-912463-22-8

Printed in the United States of America by International Graphics
10710 Tucker Street, Beltsville, Maryland 20705-2223 USA
Tel: (301) 595-5999 Fax: (301) 595-5888
Email: igfx@aol.com

Foreword

Consciousness of time is an essential part of a Muslim's consciousness of being on earth. A Muslim is aware of the temporal parameters of birth and death and the future of the Hereafter. Between the birth-death extremities, time is the medium of the Islamicity of a Muslim. For a Muslim, temporal existence is not an amorphous concept, rather, it is a means of performing the most essential duties of an Islamic life. *Ṣalāh* (worship) and *ṣiyām* (fasting) are rendered impossible without the awareness and accurate measurement of time.

When God created the planetary system, He made the accurate measurement of time possible. People around the globe use the sun and the moon as their foci for the measurement of time. The ingenuity of considering time as a function of regular planetary body movement has stood the test of time. In fact, the gigantic strides in technology in recent time has not questioned the validity of this idea. What has happened though, is that the technological revolution has provided far more accurate tools in observing and measuring the movement of planetary bodies which translates into greater accuracy in time measurement. Similarly, a technological revolution in communication has made the transfer of the knowledge of time determination accessible to a degree that could not be thought possible earlier in human history.

Greater accuracy in time measurement and expanding world communication poses a challenge to the implementation of the *Shari'ah*. Since the performance of Islamic duties rests on time observation and measurement, how does today's greater accuracy affect the formulation and observance of the *Shari'ah*? The most important challenge facing today's Muslims is how to implement the *Shari'ah*—formulated in a prescientific world—according to methods implemented in a society undergoing scientific revolution. For example, the *'Īd* (festival) days at the end of *Ramaḍān* and the 10th of *Dhu al Hijjah* are determined by the sighting of the crescent moon that marks the beginning of a new lunar month. Both days are occasions for Muslim celebrations wherever they may be. In

recent times, ironically, both occasions have become points of division and disunity in the world Muslim community, as different communities and even sub-communities use varying means for determining their occurrences. Instead of generating a sense of unity and purpose, these days have become catalysts of tension and division in the Muslim community, especially with Muslim minorities in the West. Some of the blame must be born by Muslims who are reluctant to deal with present reality. It is no longer possible for communities to celebrate the 'Id irrespective of another distant community. Communication has shrunk the world and made movement and exchange of information too easy to be ignored.

This conference set itself the task of approaching and uncovering the issues of time observation and measurement in the scientific age. In particular, it attempted to formulate the juridical (*shar'ī*) questions of the observation and measurement of time in astronomical terms. From there, the conference had to open the discussion for formulating a *shar'ī* measurement of time in a scientific age. The conference actually did all this and more. It clarified the issues and distinguished itself as the first step toward the final solution. The papers in this volume testify to the high standard maintained in the conference. In fact, the overwhelming success of this conference prepared the ground for an international conference which further probed the solution of this vexing problem. The results of that conference are summarized in the Afterword. It is with pride and honor that the IIIT presents this volume to mark the achievement of the conference.

International Institute of Islamic Thought

Herndon, Virginia, USA

Shawwal, 1408 A.H. / June, 1988 A.C.

Revised Rabi'u al-Awwal, 1419 A.H. / July, 1998 A.C.

Preface

This volume is the proceedings of the lunar calendar conference held at the International Institute of Islamic Thought (IIIT) auditorium in Herndon, VA, in June 1987. Sponsored by the IIIT, it was attended by over two dozen participants principally from North America.

The purpose of the conference was to bring together the latest scientific facts with the questions germane to Islamic calendar construction. Considerable effort was exerted to limit discussion to scientific aspects of the problem and to avoid prejudicing the outcome with disagreements among the *fuqahā'* (Muslim jurists) regarding purely juridical questions. Nonetheless, the scientific results will be of great interest to the *fuqahā'*.

The conference was a success in terms of the high quality of the scientific papers presented and in the fact that the participants were able to announce a unanimous statement on the scientific questions (the final chapter). One of the most important conclusions reached at the conference is that scientific agreement alone is insufficient to formulate a successful global Islamic calendar—some conventions regarding matters which are not questions of scientific fact must also be adopted. By following the conclusions presented in the statement that concludes this volume, the conventions used by the many Islamic communities can be made consistent and free of scientific errors while still allowing differences. It is our hope that the scientific principles adopted at this conference will be supplemented by the adoption of a single set of conventions by the *fuqahā'* at a conference in the near future.

I am pleased to thank Dr. Ṭāhā Jābir al 'Alwānī of IIIT for his support and enthusiasm for this project. I am grateful to Dr. Sayyid Muhammad Syeed, Director of Academic Outreach at the Institute for assuming responsibility of coordinating the efforts between myself and the IIIT. I am also thankful to Muhammad Bashir of IIIT for his hard work with the nuts and bolts of making the conference run smoothly,

and to my wife, Frances Eddy, for her secretarial assistance in editing these proceedings. Thanks are due to all the participants for their efforts in the struggle to attain knowledge. Above all, I am grateful to Allah (be He glorified and exalted) for creating the moon-earth-sun system and giving us the capacity to make use of it. I pray that He aid us in fulfilling that capacity in the best way.

Imad-ad-Dean Ahmad

Conference Coordinator

Shawwāl 1408 A.H. / June 1988 A.C.

Contents

- Foreword
Preface
Contributors
0. Introductory Remarks
Tāhā J. Al-'Alwānī
 1. Lunar Calendar Conference Overview
Imad-ad-Dean Ahmad
 2. State of the Art of Islamic (Lunar) Calendar Calculations: An Overview
Mohammad Ilyas
 3. Lunar Islamic Calendar: Issues and Answers
Omar Afzal
 4. A Review of the Principles of the Islamic Calendar and a Proposal for Establishing a Reliable International Islamic Calendar
Abdur Rahim Khan
 5. Internationalization of New Moon Sightings for the Islamic Lunar Month
Hussein Kamal Eddine
 6. A Physical Overview of the New Moon Lunar Phase
Ali Kyrala
 7. Computer Assisted Calculations to Help Determine the Beginning of Islamic Months
Ahmad S. Massasati
 8. A Study on Establishing an International Lunar Calendar
Fakhreddine Karray
 9. Calculating and Observing the Crescent Moon
LeRoy E. Doggett & P. Kenneth Seidelmann
 10. An Algorithm for Predicting the Visibility of the Lunar Crescent
Bradley E. Schaefer
 11. Unanimous Statement of Astronomers Participating in the IIIT Lunar Calendar Conference
Ahmad, Eddine, Ilyas, Doggett, Karray, Kyrala, Massasati, & Schaefer
 12. Afterword
Imad-ad-Dean Ahmad

Contributors

Imad-ad-Dean Ahmad is a Ph.D. astronomer at Imad-ad-Dean, Inc. who has contracted to NASA/Goddard Space Flight Center and is author of *Signs in the Heavens: A Muslim Astronomer's Perspective on Religion and Science*.

Omar Afzal is head of the Committee for Crescent Sighting, based in Ithaca, NY.

Tāhā Jābir Al-'Alwānī, President of the School for Islamic and Social Sciences.

Leroy E. Doggett was and **P. Kenneth Seidelman** is an astronomer at the U.S. Naval Observatory.

Muhammad Ilyas is an astronomer at the Universiti Sains Malaysia and author of *A Modern Guide to Astronomical Calculations of Islamic Calendar, Times and Qibla*.

Hussein Kamal Eddine is an astronomer who has published four books related to the question of the lunar calendar problem.

Fakhreddine Karray is an astronomer at the University of Illinois.

Abdur Rahim Khan is a student of the lunar calendar with special interest in the problems at high latitudes.

Ali Kyrala was a physicist at Arizona State University.

Ahmad S. Massasati is the author of a computer program for calculation of the the lunar calendar.

Bradley E. Schaefer is an astronomer at Yale University.

INTRODUCTORY REMARKS

Ṭāhā J. al 'Alwānī

Praise be to Allah, the Cherisher and Sustainer of the Worlds. The Blessings and Peace of Allah be upon Muhammad, the last of His messengers, and on his followers until the Day of Judgement.

Peace, compassion, and blessings of God be upon all of you.

It gives me pleasure to welcome this assembly of distinguished scholars on behalf of the International Institute of Islamic Thought, which is honored by the convening of this important scientific seminar. We thank you all for accepting our invitation and acknowledge your research contributions to this seminar, and we recognize the inconveniences that most of you underwent to get here. I express special appreciation to Dr. Imad-ad-Dean Ahmad, who shouldered the burden of coordinating this symposium—the fruits of which are eagerly anticipated by specialists in the field—from the time it was conceived until it became a reality.

This symposium deals with an important topic. While recognizing the scientific undertakings and excellent research presented by outstanding participants, we stress the importance of scientific commentary and discussion throughout the proceedings. Honest and open discussion is indispensable to finding solutions for the major issues addressed by the symposium and is vital to arriving at a unanimously approved scientific formulation—convincing to specialists in the field—of an Islamic calendar. Such a calendar is vital to the organization of the life of the *ummah*, making it active and bringing it out of stagnation. Man has discovered the path of progress only after his recognition of the importance of measuring time. Civilization rests on three pillars: man, resources, and the calculation of time. If a nation fails to give appropriate recognition to any of the three, it is doomed to lapse into backwardness and decadence. God the Exalted has entrusted man with the

mandate of vicegerency on the earth so that he may build, seek truth, do justice, diffuse good, and appreciate the beauty of the vast universe.

God has willed that there be cycles of power and civilization. At a particular juncture of history, our planet beheld the rise of the best nation evolved for mankind—an *ummah* justly balanced, a witness over the peoples, a civilization that fused progress, truth, righteousness, and beauty in a manner unmatched before or since in the history of humanity. The *ummah* claimed no monopoly on any of these values, nor did it deny them to other peoples. Scientific secrecy was unknown at the zenith of its society. On the contrary, the *ummah's* science, culture, and achievements were accessible to all nations. The *ummah* made its schools, universities, and health available to other peoples to such an extent that the enlightenment enjoyed by its civilization spread across the globe. Subsequently, the *ummah* slipped into a vortex of crises and was stricken by intellectual malaise. The result has been cultural stagnation, scientific backwardness, and social decadence until, in this century, the *ummah* has come to rest at its lowest point. Certainly the *ummah* has lost much, but the world has lost even more by the *ummah's* decadence and backwardness. It is inconceivable that such losses can be remedied without the *ummah* regaining its vitality and legitimacy in today's world community.

We are gathered here to lay an important brick in the *ummah's* new edifice—a scientifically developed, Islamic calendar worthy of approval by all Muslims. This will afford real civilizational dimensions and finality to the hitherto unfinished argument over an Islamic calendar that was begun early in Islamic history. This time there will be the addition of further scientific data and technological insight, permeated by the spirituality of Islam—a spirituality that relates everything to the Creator of life and humanity, thereby protecting man from vanity, knowledge from deviation, and civilization from pitfalls. Within this well-balanced civilizational framework we gather today—Muslims and non-Muslims, technicians and social scientists—to discuss this important issue. With the purpose of expounding the significance of our meeting and our target, I would like to present the following points.

The Qur'an was revealed to an Arab prophet in an Arab environment. The earliest vanguard of Islam were Arabs. They were generally thought to be capable of neither calculation nor writing—though the discovery in the peninsula of ancient relics and evidence from certain Qur'anic texts obviously suggest the need to amend this theory. Nevertheless, the Arabs defi-

nity did not achieve any degree of systematic knowledge in the science of astronomy. It is probable that they identified a number of stars, classified them, verified their times of rising and setting, and adopted their own methods of drawing astronomical diagrams. They also identified certain planets and followed the movements of the moon, and related all of these things to issues of human life. Furthermore, they were highly concerned with calculating the passage of years—even if only in a primitive fashion, due to total dependence on observation with the naked eye. The calendars left by the Makkans, as well as other relics from the days of *Jāhiliyyah* (the pre-Islamic era), reveal their knowledge of the lunar year. It seems, however, that due to their unenlightenment they subjected calculation of time to their own interests, like fools who waste their knowledge by being oblivious of its worth. Thus, for instance, they adopted the method known as *al nasi'* (transposing), thereby mishandling the calendar by progression, regression, omission, or inclusion of dates at will. Though there is abundant mention of *al nasi'* in exegesis, we may safely state that it implies the mishandling of "time issues" in favor of self-interest. The Arabs then attained a method of time calculation with which to relate lunar and solar months. At some point, they surmised that calculation of their pilgrimages and feasts on the basis of the lunar year would cause these to occur alternately in summer and winter, resulting in disadvantages in both travel and trade. Deciding that adherence to the lunar calendar would damage their interests, the Arabs preferred to harmonize their religious and trade interests by adopting the solar calendar. But because the solar year exceeds the lunar by 10 days, 21.2 hours, they had also to adopt a "leap year" system. They calculated this leap year as consisting of 13 months and rescheduled pilgrimage seasons and the sacred (*ḥarām*) months in accordance with times of breezy, fine weather. Thus pilgrimage, for instance, occurred one year in *Dhu al Hijjah*, another year in *Ṣafar*. The Arabs imagined that, by so doing, they were coordinating their commercial interests with their religious events and recreational travel in a way that would ensure the occurrence of all in days of mild weather. I shall not elaborate further on the details of the customs related to this issue, since these are better described in pre-Islamic Arabic poetry and narrative.

Islam has established a relationship between man and astronomy in a way that affects a type of ideological education for humanity. There are Qur'anic verses that call for contemplation of the greatness of the Creator as reflected in the universe, the extent of which is beyond human imagination. Man

beholds stars in their orbits traveling across the heavens with impeccable precision in their times of rising and setting and their dates of appearance and disappearance. Planets revolve about them with perfect timing. The whole scene is one in which man senses his diminutiveness, as well as the bounty and the glory of creation. He certainly observes the astonishing precision of the movements of celestial bodies, the vast number of which defy his ability to count despite all his science and skill in calculation. Modern astronomy, we all know, describes clusters of galaxies, each consisting of billions of solar systems, traveling in the endlessness of space at astounding speeds in every direction—a glorious spectacle that reflects the infinite majesty of the Creator and demands our contemplation. Man scans aspects of this glory whenever darkness casts its mantle over the earth, aspects represented by the pulsating stars adorning the firmament to which he turns his vision once and again, never to witness a flaw. He beholds the sunrise every morning and sunset every evening. He witnesses the rising and setting of the moon in changing times, yet still with unfailing precision. There are stars in the firmament that act as beacons to guide him on land and sea:

وَهُوَ الَّذِي جَعَلَ لَكُمُ النُّجُومَ لِتَهْتَدُوا بِهَا فِي ظُلُمَاتِ اللَّيْلِ وَالنَّهَارِ قَدْ فَصَّلْنَا الْآيَاتِ لِقَوْمٍ يَعْلَمُونَ

It is He Who maketh the stars (as beacons) for you, that ye may guide yourselves with their help through the dark spaces of land and seas. (6:97)

وَسَخَّرَ لَكُمُ اللَّيْلَ وَالنَّهَارَ وَالشَّمْسَ وَالْقَمَرَ وَالنُّجُومَ مُسَخَّرَاتٍ بِأَمْرِهِ إِنَّ فِي ذَلِكَ لآيَاتٍ لِقَوْمٍ يَعْلَمُونَ

And the stars are in subjection by His Command: verily in this are signs for men who are wise. (16:12)

فَلَا أُقْسِمُ بِمَوَاقِعِ النُّجُومِ وَإِنَّهُ لَقَسَمٌ لَوْ تَعْلَمُونَ عَظِيمٌ

Furthermore, I call to witness the placing of stars (in the firmament). And that is a mighty adjuration, if ye but knew. (56:75-76)

وَالشَّمْسُ وَالْقَمَرُ كُلٌّ فِي فَلَكٍ يَسْبَحُونَ

And the sun and the moon: all (the celestial bodies) swim along, each in its orbit (21:33)

Man's sense of wonder at the glory of his Creator deepens when he studies the star systems with their revolving planets, the galaxies each with billions of such systems, the galactic clusters—many of them still beyond the

reach of modern astronomy in spite of its sophisticated methods of measurement (including measurement of the speed of light) and its technically advanced telescopes. All this cosmic structure is sustained with a flawlessness that defies the very imagination, all without pillars or girders:

خَلَقَ السَّمَاوَاتِ بِغَيْرِ عَمَدٍ تَرَوْنَهَا وَأَلْقَى فِي الْأَرْضِ رَوَاسِيَ

He created the Heavens without any pillars that ye can see; He set on the earth mountains standing firm . . . (31:10)

This grandeur inspired scholars of ontology (*tawhīd*) to draw attention to the profound significance of Qur'anic verses stating astronomical facts as expressive of the glory and unity of the Creator:

إِنَّ فِي خَلْقِ السَّمَاوَاتِ وَالْأَرْضِ وَاخْتِلَافِ اللَّيْلِ وَالنَّهَارِ لآيَاتٍ لِّأُولِي الْأَلْبَابِ

Behold! In the creation of the heavens and the earth and the alternation of night and day, there are indeed Signs for men of understanding. (3:190)

Ontological and astronomical studies are often interwoven in a way that realizes certain aspects of the ideological orientation of man. This point is authenticated in the words of such scholars as al Ghazālī, al Rāzī, Ibn Ḥazm al Andalusī, and 'Aḍud al Dīn al 'Ijī, to name a few. Al Muṭṭahhir ibn Ṭāhir al Maqdisī summed up clearly the ontological theory that the movements of celestial bodies in their orbits necessitate the existence of a Mover of limitless power. The consistency of such movement is a clue that time does not in any way affect this Mover—that He is permanent, unlimited in might and ability, imperishable, incorruptible, totally other than His creatures, perfect, and unseizable by slumber or sleep.

The worship enjoined by Islam is regulated by both solar and lunar timing. Worship (*ṣalāh*), for instance, is performed on the basis of solar time:

أَقِمِ الصَّلَاةَ لِذُلُوكِ الشَّمْسِ إِلَى غَسَقِ اللَّيْلِ وَقُرْآنَ الْفَجْرِ

Establish regular prayers at the sun's decline till the darkness of the night, and the Qur'an at dawn. (17:78)

وَسَبِّحْ بِحَمْدِ رَبِّكَ قَبْلَ طُلُوعِ الشَّمْسِ وَقَبْلَ غُرُوبِهَا

And celebrate the praises of thy Lord, before the rising of the sun and before its setting. (20:130)

Pilgrimage (*hajj*), fasting (*ṣawm*), and almsgiving (*zakāh*) are all regulated by lunar time:

يَسْأَلُونَكَ عَنِ الْاِهْلَةِ قُلْ هِيَ مَوَاقِيْتُ لِلنَّاسِ وَالْحَجِّ

They ask thee concerning the new moons; say: They are but signs to make fixed periods of time in the (affairs of) men and for pilgrimage. (2:189)

شَهْرُ رَمَضَانَ الَّذِي أُنزِلَ فِيهِ الْقُرْآنُ هُدًى لِّلنَّاسِ وَبَيِّنَاتٍ مِّنَ الْهُدَى وَالْفُرْقَانِ فَمَنْ شَهِدَ مِنْكُمُ الشَّهْرَ فَلْيَصُمْهُ

Ramadan is the (month) in which was sent down the Qur'an as a guide to Mankind, also clear (signs) for guidance and judgment (between right and wrong). So everyone of you who is present (at his home) during the month should spend it in fasting. (2:185)

Zakāh is connected with the lunar year. There are Islamic personal laws that are based on lunar months and years, such as a woman's waiting period (*'iddah*) of three menstruations after final breaking-off of marital relations.

وَالْمُطَلَّقَاتُ يَتَرَبَّصْنَ بِأَنْفُسِهِنَّ ثَلَاثَةَ قُرُوءٍ

Divorced women shall wait concerning themselves for three monthly periods. (2:228)

وَالْوَالِدَاتُ يُرْضِعْنَ أَوْلَادَهُنَّ حَوْلَيْنِ كَامِلَيْنِ

The mothers shall give suck to their offspring for two whole years . . . (2:233)

Thus Islam has given calculation and precision of timing special importance as one of the characteristics of Islamic civilization. From its very beginnings, Islam provided principles for establishment of a precise calendar with which to uproot the deceitful practices of *jāhiliyyah*. Following are illustrative instances. The number of months was finalized:

إِنَّ عِدَّةَ الشُّهُورِ عِنْدَ اللَّهِ اثْنَا عَشَرَ شَهْرًا فِي كِتَابِ اللَّهِ يَوْمَ خَلَقَ السَّمَاوَاتِ وَالْأَرْضَ مِنْهَا أَرْبَعَةٌ حُرْمٌ ذَلِكَ الدِّينُ الْقَيِّمُ فَلَا تَظْلِمُوا فِيهِنَّ أَنْفُسَكُمْ وَقَاتِلُوا الْمُشْرِكِينَ

The number of months in the sight of Allah is twelve (in a year), so ordained by Him the day He created the Heavens and the earth; of them

four are sacred: that is the straight usage. So wrong not yourselves therein, and fight the pagans. (9:36)

Al Nasi' was abolished:

إِنَّمَا النَّسِيءُ زِيَادَةٌ فِي الْكُفْرِ يُضِلُّ بِهِ الَّذِينَ كَفَرُوا يُحِلُّونَهُ عَامًا وَيُحَرِّمُونَهُ عَامًا لِيُؤْاطِقُوا عِدَّةَ مَا حَرَّمَ اللَّهُ فَيُحِلُّوا مَا حَرَّمَ اللَّهُ زَيْنَ لَهُمْ سُوءَ أَعْمَالِهِمْ وَاللَّهُ لَا يَهْدِي الْقَوْمَ الْكَافِرِينَ

Verily the transporting (of a prohibited month) is an addition to unbelief: the unbelievers are led to wrong thereby, for they make it lawful one year and forbidden another year, in order to adjust the number of months forbidden by Allah and make such forbidden ones lawful. The evil of their course seems pleasing to them. But Allah guides not those who reject faith. (9:37)

The Prophet said, "The number of months as ordained by Allah is twelve (in a year), of which four are sacred, three sequential (*Dhu al Qi'dah*, *Dhu al Hijjah*, *Muharram*) and one, *Rajab*, between *Jumada al 'Ula* and *Sha'ban*." The Prophet also proclaimed, "*al Nasi'* is an addition to unbelief."

Because of the close relationship between *fiqh* and astronomy, and in the hope that a joint seminar of *fuqahā'* and astronomers will be convened in the near future, we should here expound the attitudes of classical and modern *fuqahā'* toward specific astronomical issues related to *fiqh*—such as the legal status of *ru'yah* (witnessing of the new moon), i.e., whether it is an act of worship or a mere legal tenant. There is also the concept among the *fuqahā'* of contradiction between *ru'yah* and astronomical calculation. I shall elaborate on the factors underlying these attitudes and will end with suggested solutions to some problems.

The question is, why have classical—and in general also modern—*fuqahā'* rejected, or at least been suspicious of, astronomical calculations? The answer is two-sided: classical and modern. The classical *fuqahā'* have based their position on the following assumptions:

1. That certitude of the *ru'yah*, or its equivalent, is realized by either a legal or a factual indication. The factual is eyewitness testimony; the legal is counting 30 days for the lunar month. These are seen as the only sure ways of ascertaining the beginning of a lunar month.
2. That dependence on calculation alone would end in *al nasi'*, a practice adopted in the *jāhiliyyah* and rejected by Islam.

3. That astronomical calculation would result in a shortening of the lunar month, since astronomers (so the *fuqahā'* contend) always calculate the lunar month as consisting of 29 days, 12 hours, 44 minutes. The *fuqahā'* calculate it as either 29 or 30 days, a fact leading to the conviction that their difference with the astronomers is basically one of lunar month definition
4. That astronomical calculations are based on mere speculation about the crescent and not on its actual presence after sunset.
5. That, to astronomers, the common commencement of the lunar month occurs at the moment immediately following termination of the moon's fourth quarter. This, the *fuqahā'* argue, could occur at any moment—day or night. Such calculation is insupportable to them since, according to the *Shari'ah*, the commencement of the lunar month is signaled solely by the *ru'yah* of the new moon on the western horizon in favorable weather conditions by an eyewitness after termination of the fourth lunar quarter. Many among the classical *fuqahā'* hold that the legal grounds for the initiation of fasting (*siyām*) Ramadan should be either the *ru'yah* of the new moon on the 29th day of the lunar month of Sha'ban or—if this is not feasible—the counting of 30 days for a full month of Sha'ban. This, to them, is an instance of basing an injunction on a legal cause. A legally acceptable cause should never be overlooked in favor of a legally insupportable one such as that utilized by astronomers. The substitution should, beyond doubt, better fulfill legal requirements.
6. The *fuqahā'* have always tended to confuse astronomical instructional calculation (*'ilm al hisāb al falakī wa al ta'līmī*), as the discipline was designated up to the seventh century A.H., with astrology (*'ilm al hay'ah al raṣdī*, study of the signs of the Zodiac), which is concerned with the influence of planetary movement on people and events. There are several historical reasons for this view among the classical *fuqahā'*—reasons related to the development of various disciplines and philosophies, as well as to methods of research characteristics of their votaries. Because of this, the *fuqahā'* fear adoption of astrology or astrological statements—a matter categorically rejected by *Shari'ah*.
7. The classical *fuqahā'* tend to follow strictly what is specified by *Shari'ah* as principles underlying an enjoined act of worship. Any disregard of such binding principles in one area, such as *ru'yah*—they hold—would justify similar conduct in another, such as testimony in court.
8. The classical *fuqahā'* prefer more feasible forms of performance of legal matters: here, eyewitness sighting of the new moon. For these reasons, the classical *fuqahā'* have—with near consensus among them—rejected astronomical calculation and its findings. Ibn Taymiyah, as well as other jurists, asserted this view and regarded as illicit dependence on calculation in matters pertaining to *ṣawm* (fasting) and *fiṭr* (breaking of fasting). This view is further attested by many of Ibn Taymiyah's *fatawā* (juridical judgements). He confirmed the consensus among jurists of the first three centuries A.H.

concerning this issue and stated that the first legal statements in favor of calculation were made by a very limited number of jurists after the year 300 A.H. He and other jurists well versed in the issue invariably commented unfavorably on those dissenting from their view, the most eminent of whom was Ibn Surayh.

Such were the reasons I offered for the classical *fuqahā's* rejection of astronomical calculation in relation to the *ru'yah*. Underlying the attitudes of the modern *fuqahā'* are factors similar to those observed above, with the addition of:

1. Complete, or near complete, ignorance of astronomy—especially its latest development—the rule being that people reject that with which they are unfamiliar.
2. The rejection of astronomical calculation has become, over the course of centuries, part of the culture and traditions of the *ummah*.
3. Contradictions, whether real or illusory, between the outcome of calculation and *ru'yah*, due to a host of factors, many of which have been investigated by you.
4. The fact that the *ummah* is at present torn into nation states, with affiliations and political concerns that influence the issue.
5. Disagreement over the beginnings and endings of lunar months among those countries that do adopt calculation.

Following are some suggestions that may be useful in resolving the issue.

1. To render a certain amount of astronomical information familiar to students of Islamic sciences as part of their studies in order to assist in improving the image of astronomy.
2. To seek an agreement between the *fuqaha'* and the astronomers about the definition of the terms "beginning" and "end" of the lunar month, as well as about the determination—and exchange—of terminology in this specific area of study.
3. Then to attempt establishment of a comprehensive lunar calendar that is in keeping with the mutually approved definitions to be universally adopted.
4. To render juridical concepts related to the issue understandable to astronomers and to get them to grasp the applicational importance of astronomical findings in legal questions.
5. Astronomers—or a certain faction thereof—should discontinue hasty popularization of some of their findings, since haste may involve pitfalls caused by flaws in methodology and means of research.
6. To reject sorcery, imposture, and hearsay about signs of the Zodiac and reading the future, all of which have been much popularized by the mass media. The adverse effects of such practices on the minds of people should be

exposed and should be shown to have no connection whatsoever with astronomy.

7. To defuse pressures unrelated to legal and scientific aspects of the controversy—such as the argument for *ummah's* unity—and to concentrate on technical aspects.

Many of you have inquired into whether *ru'yah* that decides the commencement or termination of *ṣawm* (fasting) is an actual act of worship or a mere legal rationale. The *ru'yah* in this case is the legal rationale of a definite act of worship, viz. *ṣawm*. According to the Ḥadīth, "Fast at the sighting of [the new moon] and terminate [the month of] fasting at the sighting of it." Similar to this is the *ru'yah* of the declining sun from its zenith until the times for the fullest darkness as an indication of the times for the enjoined prayers. "Establish regular prayers at the sun's decline." Thus the decline of the sun signals times of prayer, while sighting of the new moon of Ramaḍān signals the onset of *ṣawm*. Any method of the *ru'yah* in a legal issue that is beyond the possibility of error suffices for a decision of the related legal issue. Priority, however, should be given to adoption of the methods specified by the *Sharī'ah*. To develop, improve, and protect such methods from erring is the duty of every Muslim. Their underlying wisdom should be consistently clarified. I should state that, were consistent contradiction between *ru'yah* and astronomical calculation to be proven beyond a doubt, jurists would face a dilemma. Islamic jurisprudence has related many legal questions to *ru'yah* (literally, "seeing"). It is encountered in most areas of *fiqh*, e.g. *mu'āmalāt* (daily transactions), criminal law, and enjoined acts of worship. Thus, for instance, rejection of evidence given by a witness who meets legal requirements and who is of flawless character is dangerous because it implies a nullification of the very principle of legal evidence by witnesses, or at least weakens its application in an arena in which it is crucial.

Juridically, there is nothing against utilizing astronomical methods to investigate the genuineness of a *ru'yah*. If eyewitness testimony is confirmed by astronomical calculations, the situation would be one of aggregate clues from different sources validating the issue at hand. If, on the other hand, the *ru'yah* witness hesitates and withdraws his evidence, or if the evidence is proven to be imaginary or obviously false, the issue is decided by nullification of that evidence. But to categorically reject the testimony of an eyewitness solely on grounds of incongruence with astronomical calculations is unreasonable and has its hazards. Nevertheless, a

questionnaire answered by eyewitnesses may assist in determination of the authenticity or falsehood of their evidence. Whoever discusses this issue in writing or in public speech should do so bearing in mind its specific framework and the civilizational perspective within which it should be scrutinized. A practice that should be revived is that of collective *ru'yah* in Muslim population centers and in Muslim countries generally, in order to accumulate evidence from trustworthy eyewitnesses in areas where visibility of the new moon is more probable.

The science of astronomy is regarded by Muslims with the highest esteem. Muhammad ibn Jābir al Baṭṭānī—one of the top twenty astronomers known in the history of human civilization—said:

[Astronomy] has a well-earned place among disciplines for its tremendous share in helping man calculate years and months, provide accurate time, mark seasons, observe increase and decrease in duration of days and nights, watch locations and eclipses of the sun and the moon, witness the movements of planets in their faring in alternating places and signs. Much more may be added by it through study and scrutiny that invariably leads to further proof and knowledge of the greatness, wisdom, and power of the Creator.

Astronomy, like other disciplines, was nurtured by Islamic faith and civilization, in the shade of altars of worship. Muslims—whether Arabs, Persians, or Indians—preserved whatever studies were there in the legacy. They even translated astronomical works from other nations, such as the Greeks and Romans. They speculated, studied, and contributed to astronomy. They introduced various methods into the discipline until it matured at the hands of its numerous Muslim votaries and emerged as a discipline with its own branches, methodology, and relationships to such other disciplines as ontology, *fiqh*, and medicine. It is unanimously recognized by specialists that it was Muslims who corrected most errors perpetrated by other nations in astronomical considerations up to the dawn of the European renaissance. They developed astronomy and contributed outstanding additions to it, including new inferences in various matters as well as new methods. In fact, Muslims were the first to utilize the inductive method in astronomy and to sift the discipline from the fraudulence of astrology. Had the *ummah* been spared the lapse that struck it, had the intellectual malaise not prevailed over its entire life, had its present scientific backwardness not existed, man might have established space science long ago.

Disciplines branch off to keep abreast of intellectual advancement and civilizational progress. One discipline often divides into totally new sections, of which some develop into disciplines of their own, a cycle that often recurs. Any student of human legacy may observe that, in the past, certain disciplines or parts thereof had appellations that were later discarded in favor of other titles in the framework of other disciplines as a result of the development of human knowledge. An outstanding instance is the science that is the topic of our symposium. It was first known in our legacy as the science of "the contour" (*'ilm al hay'ah*). Then, after several centuries, its specialists used four different designations: "the science of stars" (*'ilm al nujūm*), "star craft" (*ṣinā'at al nujūm*), "the science of astrology" (*'ilm al tanjīm*), and "trade of astrology" (*ṣinā'at al tanjīm*). To scholars of the legacy, astronomy had two major divisions:

- knowledge of the special contours, their complexities and natures; and
- knowledge of the influence of planets and their signs on man. A specialist in the discipline was called an "astronomer" (*ḥakīm*), "connoisseur" (*ahkāmī*) astrologer (*munajjim*), or "master of contours" (*'ālim al hay'ah*).

Al Farabi (d. 339 A.H. / 950 A.C.), in his classification of disciplines, divided (*'ilm al hay'ah*) into two parts. The first includes astronomical studies that cover methodology and tools utilized in studying orbits and movements of stars, as well as weather forecasting and time measurement. The second part is mathematical and involves the methodology of establishing calendars and collecting astronomical data by mathematical calculation on the basis of well-established astronomical theories of time calculation to ensure maximum precision. Al Farabi stated that whatever data from watching the firmament relates to the future are more appropriately included in studies of the human psyche. If we accept this suggestion from al Farabi, such study should be related to the present-day science of psychology. Al Farabi asserted that mathematical astronomy (*'ilm al hay'ah al ḥisābī*) is the part of the discipline that is worthy of the designation "science." The other part, the study of stars, is nearer to conjecture and divination by birds and stones. Al Farabi divided the studies of "informative" astronomy (*'ilm al nujūm al ta'līmī*) into three sections, the third being concerned with the study of inhabited and uninhabited regions and the division of the former into areas. The same section included the study of the influence of movements of the stars and earth on times and places of rising and setting and on differences in duration of days. Ibn Rushd (d. 595 A.H./ 1198 A.C.) designated the part of astronomy studying movements of the stars as

“experimental” (*ṣinā'at al nujūm al tajrībiyyah*). He termed the mathematical part “informative” astronomy (*ṣinā'at al nujūm al ta'limiyyah*). Astronomy, as we have mentioned, developed at the hands of Muslim scholars and had relationships with other disciplines. Then their development of it came to a standstill due to the intellectual malaise of the *ummah*, the stagnation of its science and creativity, the transformation of the Muslim mind from innovation and scholarship to deterioration and mimicry. The last of the Muslim votaries of astronomy may have been Fakhr al Din al Razi (d. 606 A.H./ 1228 A.C.), regarded as one of the last encyclopedic scholars, who excelled in many disciplines and stamped each with everlasting influence.

But after an age of academic achievement, the Muslim intellect staggered in every field of knowledge. Matters of astronomy became so mixed with those of astrology that the layman could hardly differentiate the two. Jurists limited their academic activities primarily to areas of direct interest to them. Academe became mere memorization of the contents of books as means to the realization of material gain and the occupation of coveted posts. There appeared individuals combining knowledge of the fundamentals of astronomy with astrology. They did not use their mathematical charts to study the stars, the planets, their movements and times of cycles, or to collect calendrical data; instead, they used their mathematical charts to study what pagan nations claimed about the influence of planets—singly or combined—on man, civilization, and nations. They indulged in fortune telling. It is well known that all heavenly religions are averse to such claims and practices, which are not in keeping with reality and scientific fact. As a result, some claimants to knowledge of *fiqh* condemned astronomy as a prohibited discipline and warned against adopting its findings. Such acceptance, they argued, would be tantamount to accepting the frauds of astrology. This led Muslims to revert in matters related to worship—particularly the *ru'yah* of new moons for the commencement of lunar months—to dependence on eyewitness testimony or on 30-days counting to the exclusion of every other method.

In the European intellectual revival of the Age of Enlightenment, Western scholars started to translate man's legacy in astronomy, including the Arab's contribution, into their own native languages, thereby initiating a new development cycle for astronomy. Today, we are witnessing dramatic progress in the discipline. Fields of astronomical studies have widened in a way that only you as specialists would know about. Certainly

we have not invited you to this seminar in order to lecture you in your own specialization. We invited you in order to avail ourselves of your knowledge and experience dealing with one of the important issues facing the *ummah*.

Our primary duty is to try to contribute to the present renaissance of civilization and knowledge and to disseminate the benefits thereof for the good of mankind. It is the highest calling of intellectuals to resist the backwardness, poverty, illiteracy, and sickness that afflict two-thirds of the world's population so as to help humanity overcome these maladies. To achieve such purposes, a firm cultural and intellectual foundation as well as favorable conditions are required to make possible the transfer of civilization to backward areas of the world and their help their people's progress. This will help preserve the present civilization and protect it from factors of decadence that have already started to infect it.

Having studied the current condition of the *ummah*, we have come to the conclusion that it suffers from a paralyzing intellectual malaise, sparking cultural maladies that have left the *ummah* in an abyss of backwardness. In that abyss, the individual has lost his self-respect and is no longer looked upon as the creature entrusted with vicegerency on the earth. As a backward individual, he has lost all sense of the value of time as a factor in production. There is, as well, the disappointing failure to utilize his resources, which is all too obvious to observers. Any attempt to put the *ummah* back on the road of civilization and progress should be founded on correcting this intellectual malaise and its sinister impact on culture and knowledge. Next, priority should be given to asserting the value of the individual's esteem for his role and his human rights. Important also is realization of the value of time—of precise time calculation and its use in establishing an Islamic calendar.

The establishment of such a calendar is a cultural issue concerned not only with religious affairs but also with restoration of the *ummah's* awareness of the factor of time and calculation in building up a civilization. The *ummah*, we remember, was at one time the builder of world civilization and the bearer of its banner. To establish the Islamic calendar on firm ground we need to, first, formulate specific recommendations on the methodology and second, study the major stumbling blocks to establishing the calendar and utilizing it. Those stumbling blocks—or issues—may be summarized as follows. They should be studied thoroughly.

1. Contradictions in the statements and calculations of astronomers. This includes disagreement on the meaning of terminology, differences in methods of calculation, and differences in means and tools of observation and follow up. These should be studied with a view to identifying causes of inadequacy to reach correct and consistent results.
2. Occasional discrepancies between calculations and facts, including errors in times of rising and setting and in places and degrees of latitude and longitude.
3. Unifying methods of calculation and realizing agreement among astronomers about the least erroneous of those methods.
4. Finding ways to harmonize the findings of calculation with eyewitness testimony.
5. Generating the *ummah's* awareness of the importance of establishing an Islamic calendar and the required methodology to achieve this purpose.
6. Finding ways to overcome the intellectual, cultural, and juridical obstacles to utilization of the calendar and to adoption of the methodology leading to its establishment.

We realize that *ru'yah* of the new moon is not in itself an act of worship and that neither is observing the movement of the sun by shadow lengths to ascertain prayer times. We all calculate hours for work without objection because the *ummah* is convinced of the precision of such calculation and because it does not contradict reality. Accumulating scientific data required for the establishment of a comprehensive calendar and agreeing about such data and methods of its collection are the major issues we hope you will resolve. If this hope is fulfilled, then an Islamic calendar will only be a question of time.

About This Book

This volume brings together both the elementary scientific facts that any lunar calendar formulation cannot ignore and a summary of the pressing scientific questions of particular interest to the Islamic calendar. Scientific aspects of the problem are thoroughly reviewed without prejudicing the argument in purely Islamic juridical questions and differences. The results are of great significance to both Islamic scholars and the general Muslim public.

The papers presented are of a high scientific quality and are followed by a unanimous statement of the professional astronomers on the scientific questions. If these conclusions are followed, the varying sets of conventions used by different Islamic populations can be made self-consistent and free from scientific errors, even if they still differ from each other. This new edition allows the correction of errors in the first edition, makes the style more uniform among the papers, and improves the articles' graphs and figures. It aims to serve as an effective tool for addressing the calendrical issues that motivated the conference more than being merely an historical record. A new Afterword summarizes refinements in the scientific issues that have taken place in the ten years since the conference, many of which were prompted by the work presented here.

ISBN: 978-0-91246-322-3

