

# Preserving The Foundations of Modern Medicine Through the Traditions of Ibn Sīnā (980-1037 AD)

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## Abstract

**Four challenges face educators and leaders of medicine at the turn of the 21st century and third millennium.**

**Professionalism - The foundation of the profession must continue to rest in universities and academic health centers.**

**Education - Global networks of communication must be developed to facilitate the sharing of high quality information.**

**Quality of care - Principles of quality management and health service delivery must be designed to ensure quality in health at an affordable cost.**

**Social values - Human rights, tolerance, and respect for others must be perceived as core values in medicine for the preservation of health and the continuation of scientific progress.**

Similar challenges confronted ibn Sīnā at the beginning of the second millennium and William Osler, 100 years ago. A review of these issues may offer guidance to us as we confront similar challenges in the context of current-day realities in medicine and health care.

**Key words: Ibn Sīnā, health care reform, professionalism, medical education, Islamic medical renaissance, social values in medicine.**

It is a great honor to give this lecture, which commemorates the remarkable contributions of 'Abū 'Alī al-Husīn ibn 'Abdullāh ibn Sīnā to the continuation and advancement of medical science (Figure 1). Born in 980, near Bukhara, in the central Asian country of Uzbekistan, ibn

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Sīnā was the foremost medical scholar, philosopher, and educator in the world at the beginning of the second millennium 1000 years ago.

As we approach the dawn of the third millennium, like ibn Sīnā, we are confronted by those age old questions -- "What are we? Where do we come from? Where are we going?"

It will be our challenge, as it was his, to articulate a vision of our profession that will ensure its continuing success as it serves human society for the next 1000 years.

I believe that we must meet four challenges if we are to be successful.

## Professionalism

The foundation of the medical profession has been anchored in universities and academic health centers for the past 200 years. Who will be the stewards and guardians of the medicine 100 and 1000 years from now? Will medicine retain its academic base, or will it be driven by bottom-line

profit and loss statements, managed and owned by for-profit corporations, governmental agencies, or insurance companies? It is my belief that the foundation of the medical profession must continue to rest in the academic domains of humanism and science as it has, more or less, since the time of Aristotle.

### Education

A revolution in technology is opening a period of vast new capacity for communication. We must establish global networks of communication in medicine that will support the accurate sharing of high quality information in order to nurture the continuing renaissance of discovery and progress in science begun in the 18th and 19th centuries.

### Quality of Care

There is a vast difference in quality of care between rich and poor regions and communities. These differences will impede economic growth and political stability as the interdependence of the global economy grows. Principles of quality management and health service delivery must be designed and implemented to ensure quality in health care at affordable cost throughout the world. It cannot be lost on us here in Jordan today, that the people of this country have universal access to care and health insurance.

### Social Values

The health of a people is dependent on social values, political stability, and economics. Human rights, tolerance, and respect for others must be preserved as core values for medicine in the years that lie ahead.

These are the four challenges that lie before us. If ibn Sīnā were to drop by, to join us today, I believe that he would laugh at our foibles and observe that we certainly are living in interesting times. "My times were very different," he might note, "but the questions, they are always the same" because, "science is a synonym of wisdom and philosophy that yields knowledge that is certain by virtue of its insight into causes."

As a poet, he might then recite the opening verse of the "Rubā'īyyāt" of his successor, 'Umar al-Khayyām.<sup>1</sup>

"Awake! for morning in the bowl of night  
Has flung the stone that puts the stars to flight  
And lo! the hunter of the east has caught  
The sultan's turret in a noose of light."

He might then quickly add that it was Aristotle, not a hunter of the East, who provided the guiding light for his career, which was in its ascendancy in the year 1000. On leaving us, he might add, "Oh, by the way -- you may want to reread Aristotle. He certainly helped me to formulate a vision for my times." Let us look at the career of ibn Sīnā and how he approached the issues of his time as they relate to the four challenges I have identified.

Radical geopolitical changes had transformed the ancient Greco-Roman Christian world of the 7th century. William Osler observed that, "Within a century, the [Islamic]



Figure 1. 'Abu 'Ali al-Husin ibn 'Abdullah ibn Sina (980-1037), (Reproduced from Osler, WO, *The Evolution of Modern Medicine*. Figure 38. New Haven, Connecticut: Yale University Press, 1923).

Crescent had swept from Arabia through the Eastern Empire, over Egypt, North Africa, and over Spain in the West, and the fate of Western Europe hung in the balance before the gates of Tours in 732."<sup>2</sup> Within only 100 years, most of the ancient Greco-Roman world had been transformed into a far-reaching Islamic society.

Before the Islamic era, the great library in Alexandria had been destroyed for the third time, and there was a great fear that the knowledge of Greek and Roman civilization, including medicine, would be lost.

Fortunately, as the forces of expansion settled down, the leaders of this new Islamic Empire shifted their energies to the preservation of knowledge and the building of a renaissance in learning, which extended from the year 800 to 1224. Greek and Roman literature was translated into Syriac, Aramaic, Persian, and Arabic including the works of Hippocrates, Aristotle, and Galen. Libraries were rebuilt and served as centers of learning and intellectual discourse

(Figure 2). Literature, poetry, and music were given a central priority throughout this Islamic society extending from Baghdad in the eastern Caliphate to "Qurtubah" (Cordoba) and "Tulaytilah" (Toledo) in the western Caliphate (Figure 3). Grammar schools, medical schools, and hospitals were established and a premium was placed on education. By the birth of ibn Sīnā in 980, every 12-year-old child in Baghdad could read and write. Physicians, scientists, and literary scholars were included in the Caliph's Court and intellectual discourse was intense and widespread.<sup>3</sup>

Ibn Sīnā pursued learning and knowledge from his early childhood. A precocious student, he had memorized the Qur'ān by age 8 and completed his medical studies by age 16.<sup>4,5</sup> The writings and principles of Aristotle inspired him to undertake a broad review of the knowledge and science of his time.<sup>6</sup> They served as an evidence-based approach to describing reality and included:

- a philosophical methodology
- critical approach to doctrines
- discussion of doctrinal difficulties
- use of deductive reasoning to discover truth
- acquisition of knowledge by natural means
- analytical empiricism - stressing experience
- and a metaphysical focus on the primacy of the individual

All were constructed within an optimistic, not a fatalistic, vision of life and nature.

### Professionalism

These Aristotelian principles provided ibn Sīnā with an orderly method for categorizing the knowledge and human interactions in his time, 1500 years later. By documenting and categorizing the domain of science and the foundations of medicine, he strengthened the alignment of medicine as a profession with science and scholarship that was based on deductive logic and reality. In his role as a philosopher and scholar, he identified eight principles of natural science.<sup>6</sup>

1. The science of general principles; science is a synonym of wisdom or philosophy; it yields knowledge that is certain by virtue of its insight into causes.

2. The science of heaven and the world; it studies the celestial and terrestrial bodies of which the universe is composed.

3. The science of generation and corruption; the perpetuation of species despite the disappearance of individuals.

4. The science of meteorology, which investigates the elements before their mixture: shooting stars, clouds, rain, thunder.

5. The science of minerals, which is the sequel to meteorology.

6. The science of plants.

7. The science of animals.

8. The science of the soul or psychology.

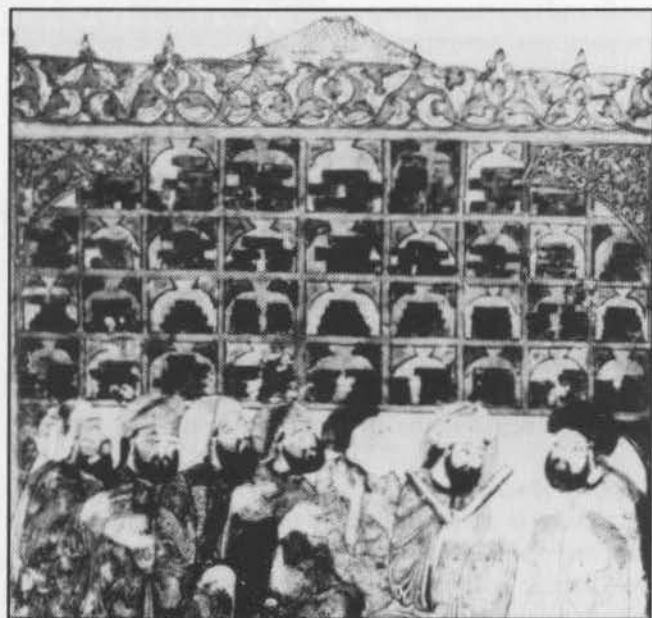


Figure 2. Scholars reading in a library (Reproduced from Hourani, AH, A History of the Arab Peoples. Cambridge: The Belknap Press of Harvard University Press, 1991).

He studied these areas extensively and published books, essays and/or poems on each. Through the study of minerals, astronomy, and geography he was the first to describe geological sciences. He also described the four sciences of mathematics as being constituted by arithmetic, geometry based on Euclid's theorems, geography and astronomy, and the science of music.

Ibn Sīnā identified seven subordinate sciences. Medicine was described as the science that seeks to learn principles of the human body and its condition in health and sickness. Other subordinated sciences included astrology and alchemy; both of which he refuted in his writings.

The clarification and perspective that ibn Sīnā's principles provided, updated Aristotle's definition of philosophy and metaphysics. They formally established a science-based foundation for the study and practice of medicine.

### Education

Ibn Sīnā addressed the second challenge in education and communications in a major way. There was a widespread fear at the end of the first millennium that knowledge from Greco-Roman antiquity would be lost. Ibn Sīnā voraciously studied the books and manuscripts rescued by the translators and scholars who had preceded him by two and three generations. He organized this knowledge into an orderly rational framework that facilitated scholarship.

Ibn Sīnā addressed medical education and communication boldly. He undertook the Aristotelian, as well as Herculean, task of writing "al-Qānūn" (the canon), a treatise on medicine, which comprehensively described all known medical science (Figure 4). The work was written over 15 years. It was the *Index Medicus* of its time and also served as a standard text for medical education in the

Islamic empire and throughout Europe for more than 600 years.

Illustrations in the Iuntas edition of the canon, published in Venice in 1595, reveal different forms of treatment used 1000 years ago; many of which harkened back 1000-2000 years to Greek and Roman times and include spinal manipulation, moxibustion (a form of hot packs), and surgery (Figures 5a - d).

The canon was intended to be published with a companion volume of clinical cases which unfortunately, was lost. The great Muslim surgeon of Andalusia, 'Abul-Qāsim al-Zahrāwī, a contemporary of ibn Sīnā, described extensive clinical experience in his *Treatise on Surgery and Instruments*, which may be used as an example of clinical case studies from this time.<sup>7</sup> For example in Book One, Chapter 28, "a true liver abscess is described, and with it an instrument for opening it that is quite specific and peculiar to al-Zahrāwī (Albucasis). This figure is very interesting. It depicts a trocar that is not merely a trocar used hot as a cautery, but also a cannula to pass it through. No previous author had put forward anything like this. While al-Zahrāwī suggests evacuating the pus, and using a remarkable instrument for this, he advises his readers not to undertake it unless experienced, and even then, he says, it is better left alone."<sup>7</sup>

The canon of ibn Sīnā was translated into Latin repeatedly, and into Hebrew and English. The impact of this text was still evident to Louis Pasteur and Robert Koch when they consulted on the cholera epidemic of 1883 in Alexandria, Egypt.

At the dawn of book binding and printing, ibn Sīnā was remarkably successful in advancing education through the creation of the first great text of medicine. It guided and influenced medical education and practice for more than 600 years.

### Quality

Quality of care was inherent in the Aristotelian principles on which ibn Sīnā based most of his life's work. Deductive reasoning and careful study led him to reject the nonscience based dogmas of astrology and alchemy as irrelevant to medicine. In treating and counseling his patients, he adhered to the principles of medical science and to principles laid down in the Qur'ān, coupled with good human intuition. Thus, the combination of humanism and science formed the basis for quality in the care of his patients.

### Social Values

Social values were widely respected during these early times. Many of the translators and early teachers of medicine were Christian Arabs (Nestorians or Syrians). Ibn Sina was a very devout Muslim and within the courts of the Caliphs there were also physicians of Jewish and many other faiths. This tolerance brought the brightest scholars together and led to a remarkable flourishing of intellectual discourse, discovery and culture.



Figure 3. Poetry reading in a garden (Reproduced from Hourani, AH, *A History of the Arab Peoples*. Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 1991).

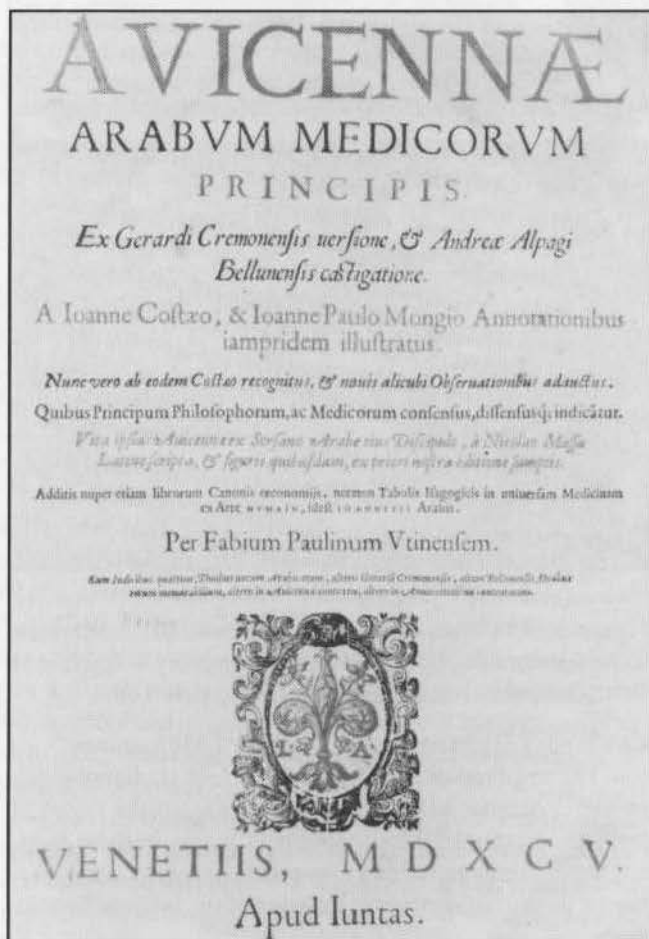


Figure 4. "Al-Qānūn" by ibn Sīnā (*Arabum Medicorum - Principis*. Apud Iuntas, Venice, Italy 1595). Courtesy of the Boston Medical Library.



Figure 5a-d. Forms of medical treatment: a. consultation b. manipulation c. moxibustion, and d. surgery (Reproduced from al-Qānūn, Iuntas Edition, Venice, Italy 1595).

**Challenges for Medicine in the Third Millennium**

The response of ibn Sinā to these four challenges may provide guidance to us today as we envision the future of medicine in the third millennium. Change in these modern times seems to occur at an ever quickening pace; perhaps a pace only rivaled by the pace of the Islamic Renaissance.

**Professionalism**

The foundations of the profession are once again subject to upheaval. While the patronage of the court and kingdom supported ibn Sinā 1000 years ago, by the 19th

and early 20th century, the foundation for medical humanism and science was well established in academia. William Osler, for example, served out his entire career as a professor at four different universities. Today the foundation of clinical medicine is in danger of becoming corporative and stripped from its traditional roots. Health care consultants describe medicine as a commodity owned by mega corporations and traded on the stock markets of the world.

There are two developments that we must recognize as we buttress the foundations of the profession in humanism and science. The first is the counter-reformation in health care, which at the present time is counteracting the technological advances of the past 100 years. Issues of patients' rights, bioethics, in-vitro fertilization, transplantation, right-to-life, physician-assisted suicide and alternative medicine dominate the press and health care debates in hospitals and courts of law. These are, and will be, the voices of medical humanism in the 21st century.

Simultaneously, we stand on the threshold of a revolutionary change in the science of medicine from organ and tissue based concepts of pathophysiology and treatment to molecular and genetic concepts. The U.S. Human Genome Project illustrates this vast new horizon for medicine.<sup>8</sup> Launched in 1990, the goal of this project is to develop genetic maps to study how diseases are inherited in families, and to create physical maps to locate the genes involved in disease and normal human development. A third objective is to provide a detailed description of the order of the nucleotide bases in DNA, known as sequencing, by the year 2005.

Colon cancer is an example of the impact of molecular genetics on a common illness. It was one of the first diseases to be described in molecular terms. Colon cancer results from mutations in at least four to five different genes, which appear to govern the progression from cell hyperplasia to polyp formation to invasive cancer.<sup>9</sup> Future treatments almost certainly will be focused on modifying these genetic predeterminants. This project now is being pursued in more than 20 laboratories in countries throughout the world. Its studies ultimately will revolutionize medical therapeutics and greatly increase our ability to prevent serious and costly diseases.

The application of science to meet the needs of people must be guided by a combination of the philosophical traditions of humanism and the rigorous disciplines of basic and applied scientific research that reside together only in academia and our universities, and not in corporate board rooms.

#### *Education-Communication Technology*

Electronic communications technology is going to change education as profoundly as the invention of books and printing did at the time of, and shortly after, ibn Sīnā's generation at the beginning of the second millennium. Dr. Jerome A Osheroff, senior information management consultant at the American College of Physicians, has noted that, "The capacity for groups of people from around the globe to share ideas in a rapid, convenient, and inexpensive way is one of the remarkable aspects of the Internet phenomenon. It is reported that an amount of text equivalent to 800 novels, each 400 pages long, is posted each day to one system of Internet discussion groups."<sup>10</sup> Electronic communication on the Internet has created a global network that eliminates distance as a major obstacle for collaboration. Unfortunately, much of the medical information in this forum at the present time is inaccurate, inappropriate,

and based on limited evidence. Thus, like ibn Sīnā, we too, are faced with Herculean tasks.

First, we must not drown in the deluge of unsubstantiated and often false information being spread through the Internet. Second, we must establish standards for information quality and, finally, facilitate the process of accessing and using this information to improve patient care.

The American College of Physicians is developing the highest quality medical information and curriculum for the Internet through its PIER Project, which will set standards for quality and serve as an educational resource throughout the world. It is potentially an undertaking of the magnitude of ibn Sīnā's canon and, hopefully, its impact will be as long lasting. This project will require vision, perspective, and practical utility, coupled with a capacity for continuous updating and quality control.

#### *Quality Management*

Quality management and performance measurement are more relevant now than at any other time in the history of medicine. Like never before, if we are not careful, we can hurt, rather than help, large numbers of people because of the power of our diagnostic and therapeutic interventions.

Quality in medicine is closely tied to the realities of today. Let us look at the quality of end-of-life care, for example, through our historical paradigm.

Ibn Sīnā diagnosed his own "mortal" illness almost 1000 years ago. He retired to his home in 1036, gave away all of his possessions and immersed himself in the Qur'ān, his poetry, and his Islamic faith. Death during his time, lay in the domain of faith, not medicine.

William Osler summed up his philosophy for the profession 100 years ago in the watchword, equanimitas. To be good-natured, to not expect too much of others, to exercise restraint as you watch over your patients, like the vigilant watchman, being a part of, yet apart from, his flock, was Osler's meaning of this term. Death was part of, but not subject to, medical treatment in his time.

Quality management is now an important part of end-of-life care. Today, we struggle to define death because we can abort it, prolong it, and if not careful, destroy the quality of a person's final days by defying it. The management of death through palliative care has become an important and integral part of clinical practice. Quality end-of-life care demands a thorough knowledge of the science of pain management and of medical and nutritional support, coupled with a deep understanding of the principles and practices of medical humanism.

Quality management may also be focused on many other aspects of care, on infant mortality, immunizations, or hospital discharge planning. It may also measure quality and performance in hospitals and networks of many agencies. The Joint Commission for the Accreditation of Health Care Organizations has introduced standards and performance measures on all aspects of health care.<sup>11</sup> Its goal is to help physicians and health care organizations improve their performance. Criteria for measuring quality have been

developed to measure outcomes of care. The Hedis Quality Measures are an example of one such set of criteria:

Childhood immunization rate; cholesterol screening; mammography screening; cervical cancer screening; prenatal care in the first trimester; diabetic retinal examination; well-child visits, ages 4-6; well-child visits, ages 7-12; well-adolescent visits, ages 13-18.

Outliers in performance can be identified. This information can then be used to improve quality of care throughout the institution or the entire network. As we develop health care standards for quality, we will be combining objective measurements of performance with humanistic dimensions of care. The future quality of medicine and all aspects of health care will depend on the success of these endeavors.

### Social Values

Establish and preserve social values that support the health and security, as well as the primacy and sanctity of the individual for both the doctor and the patient. The quality of medicine in the third millennium will depend on the continuing respect for social values. I would like to conclude this *ibn Sīnā* Memorial Lecture by mentioning three important social values that will be essential for success of medicine in the future.

A well-balanced life is essential for a physician to be successful. David Seegal, MD, professor at the College of Physicians and Surgeons of Columbia University and mentor for a generation of medical students, described the vital components of this balance in his paradigm of the "Happy Apple" (Figure 6). A successful career requires an equal measure of work, love, play, and worship (Tolstoy's tetrad), coupled with good doses of fulfilled potential and equanimity. In considering this paradigm, it is remarkable how well it fits the successful lives of *ibn Sīnā* and William Osler, preeminent physicians of 1000 and 100 years ago. It is every bit as good a formula for success today, as well.

Secondly, medical chauvinism, those petty conflicts and competitions that Osler described, continue to ripple through medical societies and institutions.<sup>12</sup> They are *passé*. Good competition in health promotes progress; backbiting chauvinism is demeaning and destructive. It is the free sharing and exchange of knowledge that provides the strongest impetus for discovery and progress. This is the cornerstone of the profession. This sharing can occur, however, only if the third social value is respected most of all.

This most important social value is tolerance. *Ibn Sīnā* was educated by, and worked with, Christians, Muslims, Jews, and Zoroastrians throughout his career. Abba Eban, the Israeli diplomat, noted in his autobiography that there have been only two periods when Jewish culture truly flourished.<sup>13</sup> The first, and greatest, was during the 400 years of the Islamic Renaissance, and the second was after the migration of many Jewish people to America. "How could this be?" I wondered. I wrote Dr. Murad Wilfried Hoffman, the world-renowned Islamic scholar who provided me with a guiding insight into one of the major reasons for the

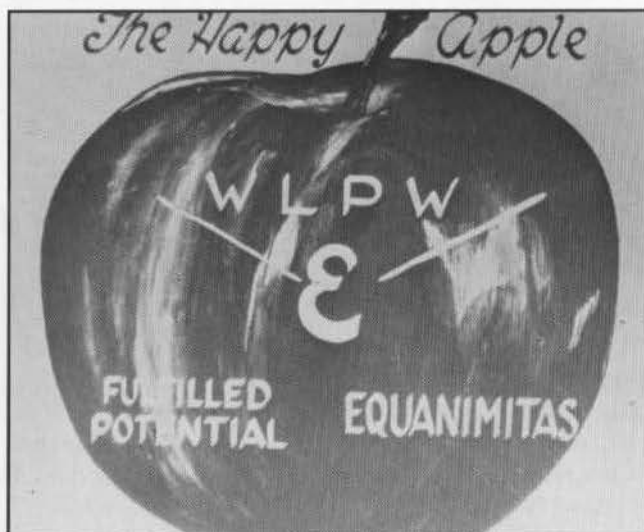


Figure 6. "Happy Apple" Paradigm for a Successful Medical Career (David Seegal, MD, 1963).

success of the Islamic Renaissance 1000 years ago. Professor Hoffman said, "The assertion that Islam is the religion of tolerance *par excellence*, often seems incomprehensible to Western observers. And yet it is true.<sup>14</sup> The Qur'an constantly holds up to its believers that the differences between men, not only in terms of color, wealth, race and languages, are natural."<sup>15,16</sup> The Qur'an even describes ideological and religious pluralism as God-given:

"And if God had so willed, surely He could have made you one single community, but (He willed otherwise) in order to try you in what He gave you. Therefore, strive, as in a race with each other, in doing good deeds."<sup>17</sup>

This congress and our common heritage in the humanities and science, give us a wonderful opportunity to create a vision for the future of medicine in the tradition of *ibn Sīnā*:

- to work together and build enduring foundations for medicine in the universities of the future.
- to create a global network of communication to support education and health care throughout the world.
- to establish standards for quality and performance measures that advance clinical practice and protect the individual.
- to support the continued respect of those social values that have led to the greatest discoveries and progress over the past millennium.
- and to fulfill the prophets' wish and God's command to collaborate, support and to vie with each other in doing good deeds.

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