Ibn Sina, Abu ?Ali Al-Husayn Ibn ?Abdallah, also known as Avicenna | Encyclopedia.com

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also known as **Avicenna** (*b*. Afshana, near Bukhara, central Aisa [now Uzbek S.S.R.], 980; *d*. Hamadan, Persia [now ran], 1037)

Philosophy, science, medicine.

Displaying an extraordinary precocity, Ibn Sīnā rapidly mastered contemporary knowledge of the various sciences and, at the age of sixteen, began to practice medicine. He also was active in the political life of his time. After serving as jurist at Korkanj, teacher of science at Gorgan, and administrator at Rayy and at Hamadān, he was named vizier of Shams al-Dawla. In addition to his government service he found time for an equally demanding scientific career. He died of a mysterious illness, apparently a colic that was badly treated; he may, however, have been poisoned by one of his servants. During the celebration of the nation' s millennium, Iran erected an imposing mausoleum over his tomb at Hamadān.

Ibn Sīnā wrote extensively in a number of widely divergent fields; his bibliography comprises nearly 270 titles. Among them is an autobiography that was completed by his disciple al-Jūzjānī.

Ibn Sīnā's major philosophical work is *Al-Shīfa* ("The Cure" [of ignorance]), an immense four-part encyclopedia; logic, corresponding very closely to Aristotle's Organon; physics; mathematics (geometry, arithmetic, music, and astronomy); and metaphysics. He also wrote a compendium of this work called *al-Najāt,* as well as several other general accounts of his philosophy, including *al-Hidāya, 'Uyūn al-hikma,* and, in Persian. *Dānish Nāma-i 'Alā'i*. One of his last books is *al-Ishārāt wa'l-tanbīhāt,* whcih has been translated into French by A. M. Goichon, as *Livre des directives et remarques* (Beirut-Paris, 1951). There is also an English translation by Parviz Morewedge (London, 1973) of the section on metaphysics of the *Dānish Nāma*. His writings on symbolic knowledge include *Hayy ibn Yaqzān*.

Philosophy and Science Ibn Sīnā was influenced in philosophy and science by three important currents of thought that he brought together in an original synthesis. These were the Koran and its accompanying theological elaborations (concerning theodicy, cosmogony, anthropology, and eschatology); science (geocentricism, Greek astronomy, the circular motion of the heavenly spheres, the hierarchy of the cosmos, and the theory of the four elements); and philosophy, specifically, an Aristotelianism heavily laden with elements of Neoplatonism stemming mainly from Plotinus (via Aristotle's *Pseudo Theology*) and Proclus (*De causis*) to which were joined some aspects of the Persian tradition.

Metaphisics. Ibn Sīnā's, metaphisics is founded on a theory of necessary emanation *(fayd)* and progressive descent. The scheme begins with the One or God, necessarily existing per se; in him essence and existence are identical. From him emanate the celestial world, consisting of the bodies, souls, and Intelligences of the sphere—sbeings that, in themselves, are merely possible but that are made necessary by God—and the sublunar world, containing the mineral, vegetable, and animal knigdoms. In all creatures essence is distinct form existence, and the sublunar world belongs to the realm of the possible.

According to the Plotinian scheme of return to the origin, the entire cosmos is animated by an impulse that leads it toward God through the intermediary of the separate Intelligences. The immediate origin of human souls is the Intelligence of the lunar sphere, the separate Intellect or *dator formarum (wāhib al-suwar),* which is the supreme object of happiness for man. Creation in the sense of *fayd* is necessary and eternal, and it takes place by means of the separate Intelligences (the angels).

Ibn Sīnā sought to integrate all aspects of science and religion in a grand metaphysical vision. With this vision he attempted to explain the formation of the universe as well as to elucidate the problems of evil, prayer, providence, prophecies, miracles, and marvels. Also within its scope fall problems relating to the organization of the state in accord with religious law and the question of the ultimate destiny of man.

Physics and Cosmology. Ibn Sīnā's conception of science derives from the physics and cosmology of his time and, thus, from Greek science. His understanding and elaboration of this body of knowledge may be outlined as follows *(see al-Najāt,* Cairo edition).

Physics is the study of natural bodies (*jism*) and of movement. On several occasions Ibn Sīnā refutes at length the atomistic conception of body and of reality in general, advocating instead continuity and hylomorphism. In his view, body consists of a

material substance that acts as a subject *(mahall)* and of a form *(sūra)* that inheres in the matter. The relationship of matter to form is like that of bronze to a statue.

The common characteristic of all bodies with respect to form is that they have three dimensions. The latter do not exist *in actu* in the body, although they may be assumed to be in it. Therefore, they do not enter into the constitution of matter and are not part of its definition.

Matter, which cannot exist without form, is homogeneous and can receive all possible forms. Matter possesses a first form, the substantial or corporeal form, which is three-dimensionality, the property of having three dimensions. With the substantial form there are others, such as quantity, quality, and place—in, fact, the Aristotelian categories. (These are the "accidents," or *a'rād.)* There is also an external principle that ensures the union of matter and form.

Natural bodies possess two kinds of perfection, primary and secondary. The external principle ensures the secondary perfections through the intervention of powers placed in the body: the primary perfections and certain principles from which the secondary perfections emanate. These secondary perfections include actions.

The powers implanted in natural bodies are of three types. Those of the first type extend through out bodies and preserve the latter's perfections, forms, natural places, and actions. If the bodies are removed from their natural places or somehow lose their forms or natural modes, the powers return them to their previous condition and maintain them in it. This occurs by imposition *(bi-taskhīr)*, without the intervention of knowledge, reflection, or voluntary intention (*qasd ikhtiyārī*). These powers are called natural. They are the principle per se of the movements per se of bodies and of their states of rest–and, indeed, of all their perfections. No naturla body is without them.

The second type of powers acts on bodies by means of instruments or organs to move them or maintain them at rest, or to preserve their specific essence. Certain implanted powers of the second type act in a permanent fashion involving neither choice nor knowledge—as in the vegetative soul. Others may act or not act, and they can perceive what is agreeable and what is harmful—as in the animal soul. Others comprehend the realities of things by way of reflection and research—as in the human soul.

The third type of powers achieve the same result without instruments by a will oriented in one single way—as in the celestial soul.

Properties associated with natural bodies are movement and rest, time, place, the vacuum, finitude and infinity, contact, continuity, and sequence.

Movement. Movement *(al-haraka)* is an act and a primary perfection of a thing that exists insofar as it is potential. It exists in a time between pure potentiality and pure act. Movement is not something stable and accomplished; thus it can be conceived only as something that can grow or diminish. It is therefore not found in substances, for the generation of substance occurs *in instanti* and not through a movement. Instead, motion is found in quantity, which can exist in greater or lesser degree and which gives rise to increase *(numuww)* and decrease *(duhbūl)* as well as to rarefaction *(altakhalkhul)* and condensation *(tadākhul)*. In the course of these changes the body does not lose its continuity. Movement can likewise be found per se in quality, place (locomotion, for example), and position (rotation, for example).

Rest is the absence of movement in that which has the potential of moving; it is not simply pure negation.

All motion in a body exists only through a cause distinct from the body itself; no movement exists for the body per se. Movement must be attributed exclusively to the cause. This cause is either outside the body, in which case the body is said to move not by itself *(lā bi-dhātihi)* or else it is in the body, in which case the latter is said to move perse (mutaharrik bi-dlātihi). This cause can sometimes move and sometimes not move; then the body is said to move by choice (*bilikhtiyār*). Or it can move all the time, and the body cannot be devoid of motion; in that case it is said to be "in motion by nature" *(mutaharrik bil-tab'a)*. The latter movement can be of two kinds: either the body can be moved by imposition *(bil taskhīr)* its cause moving it without volition, whereby it is said to be in motion "by nature" *(bil-tabī'a)* it is or moved by will and intention, whereby it is said to be in motion through the action of the celestial soul.

In general, that which the nature of a thing requires per se cannot be separated from the thing; otherwise its nature becomes corrupted. Movement can be separated from a moving body without that body's becoming corrupted. Movement, therefore, is never required by the nature of a moving body. Hence, if a natural body is in motion, it is not in its natural state and is seeking to return to that state and to remain at rest in it. Its removal from its natural place occurs through violence *(bil-qasr)* Consequently, all unforced movement (brought about by nature) is a flight "by nature" from a state that is not suitable to the body in question.

This movement is straight if the body is not in its natural place, because it is due to a "natural inclination" *(mayl tabīʿī)* that seeks the shortest path. Hence, local circular motion does not derive from nature *('an al-tabī'a)*.

Circular motion, accordingly, is never violent. Its principle or origin is a soul—that is, a power moving by choice or will. The circular motion of the stars, too, derives from a soul.

There cannot be an indivisible local movement, as the partisans of atomism claim—either at some maximum or at some minimum velocity.

Movement can be considered in terms of genus, species, or number; and it can be more or less rapid. The opposition between movement and rest is a relationship of privation.

Time, Space, and Infinity Time is the measure of circular motion with respect to "before" and "after", band not with respect to distance. Place is the inner surface of an enveloping body at the point of contact with the outer surface of the body that it envelops. A vacuum does not exist, not is there a dimension that is not located in some material substance.

There can be no infinite continuous quantity existing as a whole and having a position. Nor can there be an infinite ordered number *('adad murattab al-dhāt),* just as there can be no power possessing infinite force *(al-shidda)* Further, it is impossible for a power characterized by either infinite duration or infinte number to be divided and shared, even *per accidens*.

The universe is full because a vacuum does not exist. The outer sphere, that of the fixed stars, envelops all that exists. The stars and their spheres move on the inside of this sphere with an eternal circular motion. A knowledge of the relation between the center of the universe (which is also the center of the earth) and the sphere of the fixed stars makes it possible to determine, for every part of the universe, an absolute "up" (toward the sphere of the fixed stars) and an absolute "down" (toward the center of the earth).

Every body is necessarily located in space. By their position (up or down) spaces differentiate bodies with respect to direction. Bodies enveloped by other bodies have places. Every natural body has its own natural place.

Composite bodies are formed by "welding" *(iltihām),* a process that does not take place directly between bodies but by the intermediary of sensible qualities. There are four primary sensible qualities that effect such unions: heat, cold, moisture, and dryness. Heat and cold react upon each other in altering bodies and are called the active powers. The other two are passive powers.

The simple bodies that form composite bodies are characterized by a particular combination of these four powers. Every body must contain one active and one passive quality. Accordingly, there are four simple bodies: fire (hot and dry), water (hot and wet), earth (cold and wet), and air (cold and dry).

The natural place of corruptible beings is the sublunar sphere, and that of incorruptible bodies is the supralunar world. The latter are not composed of the four elements, and their spheres are neither light nor heavy.

In Ibn Sīnā's view, the different combinations of the four elements and their qualities, together with the motion of the spheres (which disposes matter to receive forms), are sufficient to explain the formation of the corruptible bodies in the sublunar world: minerals, stones, and metals; plants; animals; and man, who, through his body, belongs to the physical world.

Classification of the Science. On the basis of these general physical principles (which he treated extensively in the first book of physics in the *Shifā')* and in accord with his metaphysics of being. Ibn Sīnā elaborated a broad theory of science as wisdom. This approach allowed him to classify organically the spectrum of sciences known in his time. (On this point see his short treatise on the division of the sciences, the essentials of which are outlined below.)

According to the ancient meaning of the term, science is a synonym of wisdom or philosophy; it yields knowledge that is certain by virtue of its insight into causes. It can be either practical or speculative. Practical science acquires knowledge with a view toward acting upon it, while the goal of speculative science is to obtain certain knowledge of beings whose existence does not depend on human action.

Practical science, which pertains to human conduct, does not concern us here. Speculative science consists of three parts, established according to the relation of their objects to matter and motion. The first part is physical science *('ilm altabi'a);* existence and definition of its object are linked with matter and with motion. The second is mathematical science, the object of which is linked with matter only in its concrete existence—matter does not enter into its definition. The object of the third branch, metaphysics, is independent of matter in both its existence and its definition.

Logic, at once an art and a science, is an instrument of science. Ibn Sīnā's view, the subject, with which he deals at length in the *Shifā',* includes the entire Organon of Aristotle.

Natural science or physics consists of eight principal sciences and seven subordinate sciences. The principal sciences are the following:

1. The science of general principles (presented above), which is the subject of the *Kitāb sam' al-kiyān (Physike akroasis)* or *Kitāb al-samā' al-tabī'i*

2. The science of heaven and the world *(alsamā' wal-'ālam)* which studies the celestial and terrestrial bodies of which the universe is composed, as well as the four elements and their move ments.

3. The science of generation and corruption *(alkawn wal-fasād)*. This field treats the generation of the primary elements, their interaction, the way in which God links earthly things with those in heaven, and the perpetuation of species despite the disappearance of individuals.

4. The science of meteorology *(al-āthār al- 'ul-wiyya)* which investigates the elements before their mixture, the various types of motion, rarefaction, dilatation, and the atmospheric phenomena influenced by the heavens: shooting stars, clouds, rain, thunder.

5.The science of minerals *(Kitāb al-ma 'ādin)* which is the sequel to meteorology.

6. The science of plants.

7. The science of animals *('ilm tabā'i 'al-ha yawān)*.

8. The science of the soul, or psychology *(Kitābal-nafs)* Ibn Sīnā treated this subject in book VI of the section on Physics in the *Shifā'* which, under the title of *De anima* or *Liber sextus naturalium,* enjoyed an extraordinary success in the Latin Middle Ages.

The subordinate sciences are the following:

1. Medicine *(al-tibb)* which seeks to learn the principles of the human body and its condition in health and in sickness. Ibn Sīnā's immense encyclopedia on this subject, the *Canon of Medicine,* became a classic.

2. Astrology *(ahkām al-unjūm)* For Ibn Sīnā astrology is only a probable science (*taskhmīnī*) It attempts, from a knowledge of the configuration of the stars, their reciprocal distances, and their positions in the zodiac, to predict the conditions in the sublunar world—the future of men and nations. Ibn Sina wrote an epistle refuting the claims of the astrologers.

3. Physiognomy *('ilm al-firāsa)* Ibn Sīnā wrote nothing on this subject; the works attributed to him are apocryphal.

4. Oneiromancy, the science of divination by means of dreams *('ilm al-ta'bir)*.

5. The science of talismans *('ilm al-tilsmāt)* "of which the goal is to mix the celestial forces with the forces of certain terrestrial bodies so as to give rise to an extraordinary action in the world here below."

6. Theurgy *('ilm al-nīranjāt),* the goal of which is to mix the forces of terrestrial substances in such a way as to produce extraordinary effects. In the last chapters of his *Ishārāt,* Ibn Sīnā attempts to explain in a rational manner "the secrets of prodigies" and extraordinary actions and, more generally, the relationships between the microcosm and the macrocosm.

7. Alchemy *(al-kimyā')* Ibn Sīnā studied the philosophical and scientific foundations of this subject and even undertook alchemical experiments. His conclusion regarding its validity, however, is negative, as can be seen from his epistle on alchemy (now available in French in G. C. Anawati, "Avicenne et l'aclchimie," in *Atti dei convegni. Fondazione Alessandro Volta* [Rome 1971], 285–341).

The mathematical sciences consist of four principal sciences and four subordinate sciences. The principal ones (which Ibn Sīnā discusses in the *Shifā'*) are listed below:

1. The science of numbers, or arithmetic *('ilm al-'adad)*.

2. Geometry *('ilm al-handasa)* which in Ibn Sīnā's account is based on the theorems of Euclid.

3. Geography and astronomy *('ilm al-hay'a)* based on Ptolemy's *Almagest*.

4. The science of music.

The subordinate mathematical sciences are the following:

1. Hindu computation and algebra (included under arithmetic)

2. Mechanics *(ilm al-hiyal al-mutaharrika)*, traction by means of weights (jarr al-athqāl), the science of weights and balances, the science of specialized instruments, optics (‘*ilm al’ manāzir wal-mirāya*), and hydraulics (‘*ilm naql al-miyāh*) (all considered part of geometry).

3. The making of astronomical tables and calendars (*ilm al-zījāt wal taqāwīm*)(placed unde astronomy).

4. The use of foreign instruments, such as the organ (the domain of music).

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Medicine. Perhaps it would be appropiate to judge the medical works of Ibn Sīnā in a comparative statement: Among the two *hukamā’* (physician philosophers) Ibn Sīnā was the better philosopher and al Rāzī (Rhazes; *d*. 925 or 935) was the better physician. In compiling his encyclopedia *al-Qānūn* (“Canon”) Ibn *Sīnā* borrowed extensively form al Rāzī’s *al-Hāwī* (“Continens”) In his autobiography, Ibn Sīnā states that he wrote the beginning of *al-Qānūn* at Gorgan; that part of it was later written at Rayy (near modern Teheran), which was al-Rāzī’s birthplace (from which his *nisba* is derived); and that it was completed at Hamadān. This book (Ibn Sīnā’s major medical work, in about one million words) was very well received by physicians, who favored it over alRāzī’s al Hawi. over ‘Ali Ibn al-‘Abbās’(Haly Abbas: d. 994) *Kāmil al-sinā‘ a al tibbiyya* (“Complete Art of Medicine”), and even over Galen’s works. (Ibn Sīnā and other eminent physicians were honored in their time by the title Jālīnūs al-Islām, “Galen of Islam.”)

In Córdoba, however, Ibn Zuhr (*d*. 1131). His son, the eminent practitioner Ibn Zuhr (Avenzoar; d. 1162), and Ibn Rushd (Averroës; *d*. 1198) critibitterly. *al-Qānūn* (“Principles [or Code] of Laws”) bitterly. Some writers suggested that it was complete and sufficient, and could not be imporved by additions from other sources. This attitude toward the authority of books kept Arabic medicine (until its decline) and, to a certain degree, early medieval medicine in Europe (which relied in part on Latin translations of Arabic books) in a static condition. Ibn Sīnā, however, was not to blame; physicians who lacked a critical turn of mind and preferred the authority of books and the use of logic to reach conclusions, rather than resort to experiments and observations, were responsible for that status quo. Al-Rāzī’s progressive traditions—his refusal to accept statements unverified by experiments, his notion of control experiments, clinical observations, and criticism of Galen and other authorities—were overshadowed by Ibn Sīnā’s beautifully presented al-Qānun, which was divided into five books.

Book, I, al-Kulliyyāt (“Generalities”), the most complicated books, was treated in some ten commentaries, one of whcih was written by Ibn al-Nafīs (book I of his *Sharh al-Qānūn,* in which he described the pulomonary circulation). *Al-Kulliyyāt* contains four *funūn* (treatises). The first treatise is a study of the foru elements; fire, air, water, and earth, reactions between whcih form the tempeaments (those particular properties of the four humores: blood, bile, black bile, and phlegm). The four humors intermix in certain proportions, resulting in the homogeneous organs (simple organs), the anatomy of whcih is included in the first treatise of book I. Ibn Sīnā ends the first treatise with an account of forces: the psychic force, with the brain as its center: the natural force concerned with the preservation of the human being, centered in the liver and the testicles; the animal force (with the heart as its center), which controls the pneuma affecting the senses and locomotion. The second treatise is on etiology and symptoms. The third is on hygiene, the causes of health and sickness, and the inevitability of death. The fourth treatise of book I deals with a classification of the modes of therapy, a general survey of treatment by regimes and diets, principles and rules of the administration of cathartic and emetic drugs, and the rules of evacuation, admnistration of enemas, liniments, and formentations. An account is also given of the manipulation of cuppings, cautery, bloodletting, and general surgical treatments.

Book II (“Materia Medica”) of *al-Qānūn* divided into two sections: a general account of physical properties of drugs (qualities, virtues, and modes of preservation) and a list of drugs, arranged alphabetically (in which the virtues of each drug are given).

Book III (“Head-to-Toe Diseasees”) begins with diseases of the brain, followed by those of the nerves, the eye, and the ear, and ends with pains of the joints, sciatica, and diseases of the nails. Anatomical accounts of heterogeneous organs (compound organs) also are given. The anatomy of *al-Qānūn* is divided between book I and book III Ibn al-Nafīs assembled the anatomy of *al-Qānūn* in his commentaries *Sharh tashrīh al-Qānūn,* and in book I of his *Sharh al-Qānūn).*

Book IV (“Diseases That Are not Specific to Certain Organs”) contains details of fevers, their classification, genera, and symptoms, as well as accounts of prognoses, crises, and critical days, and all the principles deemed essential for diagnosis and therapy. This is followed by a study of abscesses, pustules, orthopedics, wounds, poisons, and venomous creatures, orthopedics, wounds, poisons, and venomous creatures. The book concludes with diseases of the hair and studie sin obesity and emaciataion.

Book V (“Compound Drugs”) presents accounts of theriacs, troches, electuaries, cathartic drugs, pills, and liniments and their medicinal applications

The rich information provided in *al-Qānūn* invited numerous physicians (until the nineteenth century) to write commentaries and marginal notes, while others chose to extract epitomes that became very popular among physicians and medical students. In addition to *al-Qānūn* Ibn Sīnā wrote about forty medical works, most of which are preserved in manuscripts. These works (some are poems) also led renowned physician-philosophers to write their own commentaries.

Al-Qānūn was translated into Latin (Milan, 1473; Padua, 1476, 1479; Venice 1482, 1486) by Gerard of Cremona, and was a textbook at the universities of Montpellier and Louvain until 1650. Gerard also translated *Urjūza fi’ al-tibb (Canticum de medicina seu liber de medicina in compendium reducta)* Andrea Alpago (*d*.1520) acquired his fame as a translator of Ibn Sīnā’s works, including *Ahkām al-adwiya al-qalbiyya (De viribus cordis seu de medicamentis cordialis), Daf‘ al-madārr alkulliyya…(Liber liberationis seu removendis nocumentis, quae accedunt in regimine sanitatis), and al-Fusūl (Aphorismi).*

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