A History of Muslim Philosophy

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Chapter LVI

NATURAL HISTORY

A

Inasmuch as the sciences studied in any traditional civilization, that is, one
based upon a divine revelation, depend upon the metaphysical and reli-
gious bases of that civilization, Muslim sciences have always echoed and
reflected the central Islamic doctrine of unity (hakīda). Just as the Islamic
religious and moral sciences have been formed and returned to the idea of
divine unity, the natural sciences have tried to discover the interrelation
of all created beings. It is a general feature of all medieval cosmological sciences
that they seek to express the "unity of all that exists." Especially in the
Muslim natural sciences this goal has been central, and the idea of the unity
of nature and the interconnectedness of all parts of the universe has remained
as a complement to and necessary consequence of the oneness of the Creator.

Since the most legitimate and meaningful way of studying a science is with
respect to its ultimate aim and from the point of view of those who have
cultivated it, we shall best understand the Muslim sciences if we keep in mind
that their primary aim, unlike that of the modern natural sciences which are
only analytical and quantitatively, has been to arrive at the unity lying behind
the veil of multiplicity of natural forms by a synthetic and qualitative study
of nature. This search for unity is clearly manifested in a general science like natural
history. As studied by the Muslims, natural history covers a large number
of fields and includes not only such subjects as geology, botany, zoology,

1 By cosmological sciences we mean all sciences dealing with the cosmos, includ-
ing the natural sciences. The traditional sciences should, properly speaking, be
divided into the metaphysical, dealing with God and suprasensible realities, and
the cosmological, dealing with beings in the cosmos. See T. Burckhardt, "Nature de

2 See Seyyed Hossein Naseer, introduction to the section on "Muslim Sciences" in
the Mentor Foundations of Scientific Thought, Vol. II, Signet Books, New York,
in press). In his famous "Atīd al-Mukthāfi (The Wonders of Creation)," also
Yahya Zakariya al-Qurānī writes that the presence of divine wisdom in every atom
of the universe and in all forms of multiplicity is itself a proof of divine unity,
and quotes the famous verse: "La kullu khallat, la kullu tawīl, la kullu wābī
tawīl" (that His sign exists in all things is a proof of His unity).

3 But in this chapter we are concerned only with botany and zoology.

4 The medieval Christian scientists had a similar aim in view when they sought
to observe the vestigio des in natura.

5 Our argument does not seek to make knowledge subservient to action. Know-
ledge is always superior to action in the Islamic perspective as is indicated by
such sayings of the Prophet as "One hour of meditation is better than a thousand
works of charity," or "The ink of the scholar is more valuable than the blood of the
one who fights the Holy War." What we wish to show is that in Islam a mental
activity for its own sake, divorced from the spiritual and religious needs of man
on the one hand and from his social needs on the other, has never been encouraged.
to learn moral and spiritual lessons from the phenomena of nature is, therefore, legitimate from the point of view of Islam because it is spiritually meaningful and fulfills a need, whereas finding the weight of a certain leaf of a tree to be so many grams from this point of view is secondary and unimportant inquiry unless it leads to higher knowledge. The modern criticism of Muslim natural historians on this point is, therefore, unjust and based on a misapprehension of their point of view.

There is yet another aspect of Muslim natural history which is difficult to understand from the modern point of view. It is the description of strange animals and plants and magical properties of nature which the medieval authors seem to have recorded so credulously. One finds similar accounts in ancient books like Pliny's Historia Naturalis. The creatures described in these texts, which appear strange today, are of several types. One type is of strange animals, especially sea animals, which could certainly have existed but later became very rare of which, or extinct and the description of which seems fantastic now for they can no longer be observed. Another type is of animals and plants like the dragon, unicorn, mandrake, which originally had symbolic meaning only. The symbolism of which in certain cases was forgotten that they came to be erroneously described as living creatures. Perhaps, the apparent frequency of "strange" phenomena within nature and the innocence with which medieval authors recorded them, it must be noted that the minds of those people were not as "hardened" as those of the moderns, and that nature in turn was not taken to be so "dissolute" as "corrupted" and far separated from its psychic aspect as now. Therefore, while reading ancient and medieval texts it should be kept in mind that just as the people of those ages, like the people of certain parts of Asia, Africa, and America today, regarded nature from a point of view different from that of modern science, nature also revealed an aspect of itself to them different from that which it reveals to those moderns whose mental constitution is no longer capable of receiving nature's more subtle elements. There is, of course, much misinformation due to narrative and exaggerated style characteristic of the poetic mind of many Muslims. But, on the whole much of the contents of Muslim natural history can be understood in terms either of direct observation of physical realities or of symbolism, i.e., the description of the subtle aspects of nature. The reality of which is not in any way affected because the modern

6 Many medieval authors, especially certain alchemists, were quite aware of animal and plant symbolism and were conscious of what they were writing. It is difficult for many to conceive of the possibility that nature and its laws may not always be the same, but there is no logical or scientific reason to prove that they have been uniform. In fact, uniformity is one of the assumptions upon which the historical aspects of modern sciences are based. On the other hand, sacred texts and metaphysical doctrines point to the "cyclic" change both in nature and in man's psychic and material structure. R. Carmen, The Reign of Quantity and the Signs of the Times, Lane & Co., London, 1953, and F. Schon, Les Stations de la Sagesse, La Barque du Soliel, Paris, 1958, pp. 119 ff.

7 Types of writings which contain material on natural history, particularly on plants and animals that form the centre of our interest in this chapter, are quite diverse. Muslim authors have rarely had a taste for over-specialization so that one finds a discussion of the plant and the animal kingdoms not only in scientific texts but also in literary, historical, philosophical, and theological works. More specially, the sources for natural history include the writings of historians, geographers and travellers, physicians, alchemists, philosophers, encyclopedists, cosmographers, moralists, theologians, and Sufis, and, of course, authors writing specifically on the subject of natural history. The Turāt al-Rasul w-mulāk, the universal history of Tabari, the Kitāb al-Buldān, the book of countries of Yaqub al-Mansur, the Kitāb al-Buldān of Maqrizi, the Muruj al-Dhabāb and Kitāb al-Tansō, al-Iṣḥāṣ al-Maṣūdī, the Turāt al-Rasul w-mulāk of Juvaini, and the geography of Abu 'Abd Allah Ibn al-Iṣḥāṣ, all dealing with history and geography, contain valuable sections on natural history. Moreover, they provide, on the one hand, the perspective of time in the light of which Muslims have viewed the life of all creatures, a time stretching between the creation and the final annihilation of the universe on the Last Day, and, on the other, they mention the geographical setting, the seven climates, and other terrestrial conditions which form the matrix of natural history. They demonstrate, further, how closely the study of plants and animals is bound up with that of the other parts of the universe, both terrestrial and celestial, and how the history of nature is intrinsically related with the history of man as well as with sacred history. Another source for the knowledge of natural history comes from the many books of travel which survive from that period of Islamic history when the Muslim world was still more or less united and travelling from one place to another was easy. The accounts of the travels of Abu al-Hasan al-Maghrībi, Ibn Jubair, for general information regarding those and other authors whose names are to follow, see G. Sanzio, Introduction to the History of Science, Vols. I to III, Williams and Wilkins Co., Baltimore, 1927-48; A. Miehe, Les sciences arabes et son rôle dans l'évolution scientifique mondiale, E. J. Brill, Leiden, 1929; B. Carre de Vaux, Les penseurs de l'Islam, Libraire Paul Geuthner, Paris, 1921-27, Vols. II and IV. Among the texts mentioned above, the Muruj al-Dhabāb (Prairies of Gold) translated into English by Springer, W. H. Allen Co., London, 1841, especially offers useful material on the historical and geographical framework of natural history.

8 Muslim natural historians not only divided the earth into several climates, each with its own flora and fauna in conformity with its particular geographical conditions, but further assigned each climate to a particular planet which acted as the archetypal or "guardian angel" for that particular climate. For an example of this astrological theory, see the Rasul II of the Ikhwan al-Safa, Cairo, 1926, I, pp. 116 ff., and P. Duchem, Le système du monde, Vol. II, A. Hermann et fils, Paris, 1914, pp. 267 ff.
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Biruni, Naṣr b. Ḥusayn, and ibn Bāṭrīlah, to mention a few names, provide a wealth of information on plants and animals which these men observed themselves or the accounts of which they heard from others. The interpretation which they gave to their observations varied greatly, depending on their knowledge and experience as travellers. One often finds simple description as in the case of Maqrizi, or detailed physical observation and inference based upon it as in the case of Biruni, or philosophical and metaphysical reflection upon natural forms as is found in the writings of Naṣr b. Ḥusayn.

Besides these land travellers, there were several ocean travellers like Sulamīn b. Ibrahīm, who in the third/fourth century journeyed by sea to the coast of China and described many of the wonders of the Indian Ocean and the Chinese coast, and Shāhāb al-Dīn ibn Ṣafī al-Dīn, Sulamīn b. Mahrāb, and Fīrūz b. Jāhmīn, who in the ninth/tenth and tenth/eleventh centuries travelled extensively through the Mediterranean Sea and Indian Ocean and gave a detailed description of these areas. The accounts of sea animals found in books of natural history and the fables of the sea encountered so often in Arabic literature, Sindibād Nāmeh, and other collections of stories, both Arabic and Persian, were originally taken from the accounts of the sea travels of merchants, adventurers, and occasionally military men who roamed the then known extremities of the world.

Another source of natural history, considered from quite another aspect of our subject, is medicine. Muslim medicine, the heir both to the Greek and to the Indian science of medicine, has always had a general theory of living beings; nearly all medical treatises have included in their introduction a general description of the constitution (mawsil) of animals, which provides a major source of information for the internal structure of animals and the functioning of their organs. Moreover, since much of the treatment of diseases in Muslim medicine is based on plants, medical books have usually contained sections on pharmacology treating of the medical properties of plants. In fact, one may say that, apart from the metaphysical and philosophic study of plants and animals, most of Muslim research in botany and zoology has been in the service of pharmacology, agriculture, medicine, and animal husbandry. The important medical treatises like Alī al-Ṭabarī’s Fīrūzī’s Aṣrance (The Paradise of Wisdom), Muhammad Zakariyya Rāzī’s Al-Bārī (Continent), and ibn Sīnā’s Qāfūn (Canon) contain important chapters on zoology and botany.

Alchemy, a subject closely allied to medicine and botany in ancient times and later identified more with the study of the mineral kingdom, has also much to contribute to natural history. In Chinese alchemy we find a close link between the elixir and the plant life; certain modern scholars have even suggested that the Arabic word kāsim itself, from which the English word alchemy is derived, comes from the Chinese Chien-Tao, meaning the gold-making juice of a plant. Whatever the validity of this theory may be, there is no doubt that plant and animal symbolism has a major role to play in alchemy as the writings of so many alchemists like Jābir b. Ḥaṣān or in the Western world Flamel and Basil Valentine demonstrate. In Muslim alchemy certain authors like Jābir have written specific treatises on plants and animals dealing with their hidden and "occult" qualities. Authors writing on the esoteric sciences (al-kāsim al-mubaddaḥ), like Jābir, Ǧams al-Dīn al-Bīnī, and Jīdāki have all written treatises dealing with the psychotic and symbolic aspects of both plants and animals and their influence on man’s physical, psychic, and spiritual life.

The philosophers have also treated plants and animals in their general consideration of the world of "generation and corruption," to use the terminology of Aristotle. It must be kept in mind that medieval philosophy is based upon the idea of hierarchy and the chain of Being which begins from the One and through the angelic and intellectual orders descends to material manifestations, to rise once again through the mineral, plant, and animal kingdoms to the origin of all things. The philosophers, especially the systematic Peripatetics (Maṣḥīyyīn), therefore, have always entered into a discussion of plants and animals from the point of view of their place in the great chain of Being. We find examples of this type of discussion not only in the Peripatetics like Fīqrī, ibn Ṣina, and ibn Ṣahl but also in the philosophers of the Illuminationist (tābrīgī) school like Subkawārī Ṣaḥāli b. Muḥammad and Muhammad Ṣaḥāli b. Muḥammad. The most detailed and profound scientific account of plants and animals in these philosophical treatises appears in ibn Sīnā’s Shīrī (Saḥifain), the greatest encyclopedia of philosophy and sciences ever written by one man. Here, ibn Ṣina deals not only with the place of plants and animals in the cosmic hierarchy but also with their morphology, genetics, and growth. Sections seven and eight of the Shīrī on natural philosophy (Tābrīgī) are among the most important pages of medieval natural history.

Writings similar to the Shīrī in the universality of their subject-matter, but not so strictly systematized, are a number of encyclopedias which have been popular from the very early centuries of Islam. We find an early example of these in the Book of Treasures (Kitāb al-żawādat) written at the end of the second Islamic century. More important works are the Rauṣūfī of the Ḥukmā

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14 See P. Krom, Jābir b. Ḥaṣān, 2 Vols., Imprimerie de l’Institut Français d’Archéologie Orientale, Cairo, 1945-43.
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al-Šafīʿa containing a wealth of information on plants and also on animals drawn from Indian, Persian, and Greek sources and integrated into a vast metaphysical and philosophical panorama. Also of great importance for natural history is the encyclopedia of Mansūrī al-Qazwīnī entitled Nasab al-Qulūb (Delights of the Heart), written in Persian in the eight/eighteenth century, which includes sections on plants and animals. Other works of this kind include the Kitāb al-Awāliʾ (Book of Primordial Knowledge) and al-Nujbat al-Usūm al-Mahimmah li ʿUlitun Jamsak (the encyclopedia of sciences) of Abū al-Raḥmān al-Sayyyūtī, the ninth/tenth-century historian, and the Kāf li al-Zaqāmī (The Clearing of Doubts) of Ḥājjī Ḥasanī dealing mostly with scholars of all types including scientists of the medieval period. All these encyclopedias contain some sections on plants and animals while some like the Nasab al-Qulūb and the Rāsaʾil have large chapters devoted specifically to natural history.

Works on cosmography are in a way similar to encyclopedias, but usually they do not cover as many subjects. Moreover, they are concerned more directly with the creation of the world and its subsequent development as well as with the wonders of nature. This genre of writing became popular especially during the later centuries, the most famous examples being the Aʿjāb al-Maḥkāmāt (The Wonders of Creation) of Abū Yaḥyā Zakariyyā al-Qazwīnī and the Nujbat al-Dahr (Choice of the Times) of ʿAbūn ʿAbd Allāh al-Din al-Dimashqī, both written in the seventh/thirteenth century. These works represent a combination of natural history and mythology and provide an excellent example of the attitude of the Muslim mind, which takes nature to be as displaying at every turn the power and wisdom of the Creator.

To mention all the sources for natural history, one should include the moral, theological, and sulfatic texts in which the life and qualities of plants and animals are studied with the aim of learning a moral and spiritual lesson from them. Such use of natural history, particularly of the life of animals, is very frequent in Oriental literature as for example in the Kullah wa Dinmāh, the Sādah Nāmah of Firdausī, the Thousand and One Nights, and the Gāzīhān of Ṣādī. Likewise, in certain theological texts animals are discussed in the light of their moral virtues. The famous Kitāb al-Hayasaʾ (Book of Animals) of al-Jābirī is above all a theological and moral discussion about animals. In Sufi

14 An interesting section of the Rāsaʾīl dealing with the discussion between man and animals has been translated into English as Dialogue between Man and the Animals, by J. Pratt, W. H. Allen Co., London, 1869.
16 This famous book of tales about the animals is the Sukriti Panchatattora translated into Pahlavi and later into Arabic by ibn al-Muqaffa. Various versions of it in Arabic and Persian lies Anawṣr al-Nabāṭī of Husain Waʿl Kahlīq have remained very popular throughout the centuries.
17 This genre of writing has continued to recent times. A work called Inṣād wa Rauḥāt (Men and Animals) by Ḥājjī Muḥṣīr al-Suḥawī written during

the last century, treating of the moral and spiritual qualities of animals, is still widely used by Persian preachers in their sermons.

By “exclusive” we do not mean so strict a limitation of the subject as is found in a modern text-book on botany or zoology. Muslim scientists have been too closely united to permit a complete separation of one subject from another so that in nearly every book dealing with plants and animals there are references to other sciences as well as to philosophy and theology.

18 Ibn Khaldīn in referring to this book writes that “people learned the sciences of sovereignty from the work and developed its manifold branches” (Musnad Imām, tr. F. Roseenthal, Passport, New York, 1932, Vol. III, p. 556). Many Western historians have refused to believe that ibn Washqīyaḥ could know anything about the Babylonian civilization and therefore consider his claim to be a forgery.
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survived. Among later writings in which pharmacology and botany proper are combined, the most famous works are the Kitāb al-Adwar al-Mufradah (The Book of Simple Drugs) of Abu Ja'far al-Qahligi, the writings of the seventh/eighth-century Andalusi author, Ibn al-Bail, the best of all Muslim botanists, and the Hadis al-Asyqar fi Sharh Manzilat al-Udhk wa-al-'Appir (Garden of Flowers in the Explanation of the Character of Herbs and Drugs) of the tenth/eleventh-century Moroccan author, Qasim al-Ghassani.

In zoology, the Manadh al-Haywa (The Benefits of Animals) by Abu Sa'id Bakhtitah, and the treatises on various wild and domestic animals by Anma'i are among the earliest works on animals. To this early period belongs also the Kitāb al-Haywa (Book of Animals) of al-Jahiz, the celebrated Muslim theologian and philologist. Being one of the most famous works of Arabic literature, this book, written in the third/ninth century, combines the account of the life of animals with tales, anecdotes, theological discussions, and frequent quotations from Arabic poetry. The sources of this book include the Qur'an, the hadith, and Arabic poetry, especially pre-Islamic, and it is by far the most comprehensive work of its kind in Arabic literature and has, therefore, been taught and studied extensively since the date of its composition.

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The philosophical point of view in terms of which plants and animals have been studied by the great majority of the above-mentioned authors is nearly the same and is one derived mostly from the Greeks, particularly from Aristotle. According to this view, the universe is divided into two parts: the heavens and the world of change or generation and corruption; the latter occupies the

substantial region. This region is made of four elements, fire, air, water, and earth. arranged in concentric spheres with fire at the highest and earth at the lowest sphere. These elements combine in various ratios and when a correct proportion is reached, one of the faculties of the world-soul or nature, as some authors have called it, joins them together into a nexus, and by this wedding, minerals, plants, and animals come into being, each having been brought about by the coming into play of a new faculty of the world-soul or, as some have called it, a new soul. All the kingdoms of nature are, therefore, united in having been made of the same four elements and given life by souls or faculties which belong to the same single power called the world-soul or nature running through all the arteries and veins of the universe.

As minerals, plants, and animals lie in the hierarchical order of Being, they also come into existence by means of causes which are dependent upon other orders of creation, although these causes may appear to be hidden. The causes are the four already mentioned by Aristotle, namely, the material, the formal, the efficient, and the final. The material cause for plants consist of the four elements; the formal cause, the set of planetary influences symbolizing various cosmic intelligences and forces which are instrumental in supplying the efficient cause; the efficient cause, nature or the world-soul; and the final cause, which last is their use by animals as food. The causes for animals are the same except that their final cause is their use by man.


This sixth/seventh-century Maghrabi botanist has given some of the most detailed descriptions of plants found anywhere in Muslims botanical literature.

His two most important books are the Kitab al-Jami’ fi al-Adwar al-Mufradah (The Complete Book of Simple Drugs), dealing with the classification of plants, and Kitab al-Maghr bi al-Adwar al-Mufradah (The Incomplete Book of Simple Drugs), dealing with the medical properties of plants.
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The plants have the powers of the mineral soul (rūḥ ṣawīfūṣyakh) as well as those of the vegetative soul (al-nafs al-nabūtībīyakh) which is possessed of the three faculties of feeding (ḥabqāyyakh), growth (naimāyyakh), and reproduction (insawīlīrākh). The animals in turn possess all the faculties of the mineral and vegetative souls as well as the powers of motion (muḥārārīkh) and comprehension (mudīrīkh). The animal faculties may be summarized as follows:

- Power of lust (ẓakāhyakh)
- Power of motion (muḥārārīkh)
- Power of desire (ḥabqāyyakh)
- Power of anger (ẓakāhyakh)

Animal soul

- Power of motion of body (ṣiqālākh)
- Power of comprehension (mudīrīkh)

Subscribing to the view that all things are alive and that plants and animals have souls of their own, Muslim natural historians have tried to understand the behaviour of these creatures in terms of the faculties stated above and, thus, averred many of the difficulties of the post-Cartesian view which regards plants and animals as "machines."

The classification of plants and animals is closely allied with the study of their faculties and is based in certain cases upon the hierarchy of the powers of the soul mentioned above. Muslim authors have followed several principles of classification, some drawn from Aristotle, especially in the case of animals, and some devised by themselves.

Qualities and virtues. It is only by realizing that there are among men a few sages and saints who in their spiritual realization fulfill the purpose of the whole of creation, that animals finally agree to submit to man. See the "Dispute between Man and the Animals."

31 The most thorough discussion of the vegetative and animal souls appears in the sixth part of the Tabībūqṭ of the Šīrāzī ibn Sīnā where he deals in detail with all the faculties of plants and animals and their functions. C. F. Bakker, La psychologie d'Avicenne, Editions de l'Académie Tchecchoslovate des Sciences, Prague, 1926, Ibn Sīnā and also most other authors writing on the faculties of the vegetative and animal souls derived many of their ideas from the De Anima of Aristotle. The Ḫūrān, however, enumerate the faculties somewhat differently: as attraction, fixation, digestion, repulsion, nutrition, formation, etc. growths.

32 For a summary of Ibn Sīnā's views on the souls and their faculties see E. Gibbon, "Les soucis grecs-arabes de l'Augustinisme avicennien." Archivs d'Histoirre Doctroale et Littérature du Moyen Âge, IV, 1929, pp. 5-149.

33 In general, the Muslims depended more upon the Greeks in the study of animals than that of plants. Whereas Aristotle's works on animals were studied extensively, the botany of Thesophonetas was nearly completed. Muslim authors had already created a science of plants drawing their terminology mostly from the Qurān and Arabic poetry before the first important Greek text on plants, that is, the famous work of Dioscorides, was translated into Arabic.

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The plants have been divided usually into trees, shrubs, grass, and those intermediate between trees and shrubs and shrubs and grass. A most extensive division of this discussion is found in the seventh section of the Tabībūqṭ of the Šīrāzī where each type is clearly defined; for example, the tree is defined as a plant which stands on its stem or trunk, the shrub the stem of which spreads over the earth, and the grass or herb that which has no stem. Ibn Sīnā divides plants also according to the climates of regional territories in which they grow, that is, of the desert, of the semi-tropical regions, etc.

In Mustafla Qaswini's Nakāt al-Qulūb a distinction is made between trees of which only the leaves and fruit are renewed yearly and the seed-bearing plants of which everything changes every year except the roots. The trees are divided into those that bear fruit and those that do not. Furthermore, the seed-bearing plants are divided into the four classes of alimentary (gūmrūkūkh):

(i) those which are daily used for food and create one of the four humours (dībīyakh)—cold, warm, dry, or moist—that soon becomes a part of the body;
(ii) medicines and spices only a little of which can be eaten for medicinal purposes and which are mostly cold and wet; (iii) perfumes (mathmāwīkh) which have a good colour and are derived mostly from flowers; and (iv) miscellaneous plants in which the qualities of aliments and medicines are present but in a lesser degree.

Most authors dealing with the classification of plants also treat of their morphology. We find an extensive treatment of this kind in the Šīrāzī where ibn Sīnā divides the parts of plants into primary and secondary organs. The primary or essential organs are root, trunk, branches, bark, wood, and pith or core and the secondary organs, fruit, leaves, and blossoms. In a somewhat different manner, the Ḫūrān al-Safā divide the plant into nine parts—root, vessel, branch, bough, leaves, colour, fruit, shell, and germ—and hold that only perfect plants possess all the nine of them.

Both ibn Sīnā and the Ḫūrān make continuous comparison of plants with the animal world, in the case of the Ḫūrān as well as in the case of many later authors comparison is also made with the celestial bodies so as to draw attention to the symbolic correspondence existing between various cosmic orders.

34 See the botanical section of the Nakāt al-Qulūb, Šīrāzī, Bombay, 1311/1933, pp. 87 ff., where sixty-nine fruit-bearing trees and sixty-six fruitless ones are described. See the biological order Qaswini, like many other Muslim natural historians, gives not only the description of a tree, the quality of its fruit and its wood and the location where it is found, but also its medicinal uses, its nature, that is, whether hot or cold, dry or moist, and its appearance in literature and sacred books. As for seed-bearing plants, Qaswini follows a similar procedure, describing altogether 280 kinds, each class arranged alphabetically.

35 The famous scientist and compiler, Birānī gives a good example of this astrological correspondence. He writes: "The various organs of a plant are distributed to different planets. Thus the stem of a tree is appropriated to the Sun; the roots to Saturn; the thorns, twigs, and barks to Mars; the flowers to Venus; the
In their comparisons of plants with animals, Muslim authors were quite aware of the presence of male and female parts of plants which in most cases are united in the same plant but which in higher plants like the palm become differentiated. Ibn Sīna draws an analogy between seeds of plants and eggs of birds each of which has a centre that is the source of life and a periphery which provides food for the new generation. Likewise, he compares the growth of the branch of a tree from the trunk with the birth of a new generation in the animal world.

In the classification and description of plants, one can hardly fail to mention Ibn al-Bayḍāwī, the greatest of the Muslim botanists. Basing himself on the Kitāb al-Āzāmī and other previous authors like Dioscorides and Galen and making many observations of his own, he described extremely carefully over 1,400 plants from Andalusia, his homeland, as well as from the rest of the Islamic world. Furthermore, in the Kitāb al-Majdūlī, following the example of Ibn Sīna’s Qānūn, he gave the medical uses of these plants. The influence of Ibn al-Bayḍāwī was felt everywhere within the Islamic world from Morocco to India. Three centuries later, the Moroccan botanist, al-Qasimi, was to give the best classification of plants found anywhere in Muslim literature, drawing mostly upon the information accumulated by Ibn al-Bayḍāwī.

In the study of animals, like that of plants, interest evolved around the constitution of plants and their classification and description. The temperament (māṣūj) of animals including man was studied in the light of the qualities and nature of which the other kingdoms are possessed. Their relation with the bodily humours may diagrammatically be represented as follows.

![Diagram of the Four Temperaments and Humors]

The animal constitution has been understood in terms of the equilibrium of the four humours each of which is connected with a particular internal organ. The organs in turn have been studied in the light of their function of preserving internal equilibrium. Likewise, the effect of plants both as food and as medicine upon animals has been considered with respect to their nature, that is, coldness, moisture, etc., which the two kingdoms share in common. This is one example of the underlying unity in terms of which the diversities of nature have been understood.

fruit to Jupiter; the leaves to the Moon; and the seed to Mercury. (Elements of Astrology, tr. R. Romsey Wright, Lonac & Co., London, 1934, p. 230).

The correspondence between plants or animals and the planets is a not to show actual "influence" as is done in contemporary astrology which is only a residue of the real subject known by the same name in medieval times. It is to show rather that the physical world is a symbol of the intelligible world, that is an analogy between the archetypes symbolized by the planets and their earthly shadows which are the physical forms.

This is a schematization of ideas presented in Ibn Sīna’s medical poem as well as in the Qānūn to which we have already referred. Pathology based on the doctrine of humours is a heritage from the Hippocratic tradition of medicine as systematized by Galen.
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of it in the Raud'î of the Ikhwân where animals are divided into three classes: those that are most complete, which conceive their young, suckle them, and foster them; those which do not perform such functions but lay at the female and lay eggs and hatch them; and those which do none of the above things and come into being in putrefaction. More elaborate classifications of the same type are found in the writings of ibn Sina, ibn Rughî, and many later commentators of the ʿIthārî which contain a detailed discussion of animals.

A rather general definition of animals including the jinn48 and man is given by Qarqunî in his ʿAlâs al-Mukhtabî. He divides animals into seven classes. First, there is man who possesses a rational soul (nafs satîqah) and whose body is a miniature model of the universe, a microcosm, each part of which has a spiritual meaning and purpose. For example, he stands erect because of his spiritual aspiration to transcend physical existence, and his head is round because of the perfection of the spherical figure. The second type is of the jinn who are composed of fire and appear in many forms. As Qarqunî writes, God created angels from the light of fire, jinn from its blaze, and devils from its smoke. The jinn occupied the earth before the coming of man, that is, the fall of Adam, and had their own religion and prophets; but because of corruption God sent angels to purify the earth, and they were dispensed to remote islands. Satan or Iblîs is himself from this species of animals.49

After the jinn come the beasts of burden like the horse, then cattle like cows, then wild beasts, then birds, and finally insects and reptiles. Qarqunî has further a section on "strange" animals which are primarily mythological and symbolical and finally a chapter on angels, their forms, functions, and colours.50

In the description of animals, there is no book in Muslim writings that is as complete as Dâmidî's Ḥayât al-Makmalî in which he is concerned with the traits, instincts, and psychology of animals and their use, medical and spiritual, for man. Following ibn al-Baṭṭaṣr, by whom he was influenced, he classifies animals alphabetically and then gives their description, drawing on Aristotle, the natural historians, theologians, exoteric writers like ʿIbâd b.-Dîn al-Bûnî, Arabic poetry, and the Qur'ān and the Ḥadîth. In his description he often refers to the symbolic character of animals, like the royal quality of the lion, and, as is characteristic of similar descriptive works of natural history, intertwines the spiritual as well as the physical study of nature.51

48 They may be said to symbolize psychic forces.

49 A similar account is to be found in the Raud'î of the Ikhwân.

50 We see in Qarqunî's writings a good example of the borrowing from the natural and supernatural order to which we have already referred. His description of the colours and forms of animals and angels served as an inspiration for later Persian miniature artists.

51 Dâmidî also interrupts his discussion of animals at several points in order to write about Islamic history, prayers based on the divine names, the science of ʿujûr (symbolism of letters), and other subjects.

In discussing the classification and morphology of plants and animals a comparison may be made between the traditional concept of gradation and the modern notion of evolution. There is no doubt that many Muslim authors like Birânî and the Ikhwân were quite aware of the meaning of fossils and of the fact that during other periods of the history of the earth flora and fauna of a different kind existed on the earth. Moreover, the idea of the gradation of Being or the passage of the One Spirit through all the realms of nature has been expressed by many philosophers and Sufis.52

Some thinkers, especially the Maghârib philosophers, envisage, like Aristotle, the gradation of fixed spheres, while the Ibrâhîm philosophers connect, like Plato, this gradation of spheres with the conception of archetypes to the transcendental "world of ideas." There is yet another school of thinkers (al-Jâki, the Ikhwân al-Safa, ibn Miskawayh, Ja’il al-Dîn Rûmî, etc.), whatever their persuasion otherwise, who believe in the continuous self-development of Being from stage to stage—a position nearest to the present-day theory of evolution.

The tradition of Muslim natural history upon which we have touched briefly has had a past going back to the first Islamic century. During this long history it absorbed much of the Greek and certain of the Indian and Persian sciences and created a science which was in every way superior to what had preceded it, except the biological studies by Aristotle. This tradition was to develop as a properly Muslim science, that is, one based upon the particular genius of the Islamic perspective which is centred upon unity. This tradition is manifest in Muslim natural history in many ways, for example in the vision of the unity of nature and interrelation of all things, which Muslim natural historians asserted so often in affirming the presence of the signs of God in nature and in the study of plants and animals for the purpose of seeing divine wisdom therein.

This tradition, especially that part of it which preceded the seventh/thirteenth century, was to have a profound influence on Latin Christianity and on the formation of the science of natural history in medieval times. It is well known how much seventh/thirteenth-century authors like Albertus Magnus and Roger Bacon were indebted to it and how even during the Renaissance men like Paracelsus and Agrippa were constrained to draw largely on Muslim sources. In the Orient, this tradition has continued until the present century although in a much weakened form after the ninth/fifteenth century. Scholars in India and Persia as well as those in the Maghârib have continued to study nature as the unified handiwork of God in order to discover His wisdom, to see "His sign upon the horizon" as the Qur'ān states, and to learn spiritual lessons from it. Only in following this spirit has this
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tradition of natural history been able to be an integral aspect of Muslim learning and remain in harmony and conformity with the spiritual and intellectual perspective of Islam.

BIBLIOGRAPHY


Chapter LXVII

MEDICINE

A INTRODUCTORY

It was not until nearly a hundred years after the conquest and consolidation of their empire that the Muslims turned their minds towards creative pursuits. It is remarkable in this context to find how quickly they directed their activities to productive pluggens and prolific pens. Soon the Muslim Empire extended from Andalusia to the Indus, and its various parts vied with one another in producing intellectual giants in every branch of art and science. Nearly half a century ago Fonsah enumerated no less than one hundred and fifty-one works on Persian medicine alone during this period and Max Meyendorff says that "the treasure-houses of Islamic science are just beginning to be opened. In Constantinople alone there are more than eighty mosque libraries containing tens of thousands of manuscripts. In Cairo, Damascus, Mopul, Baghdad, as well as in Persia and India there are other collections.... Even the catalogue of the Escorial Library in Spain which contains a part of the wisdom of Western Islam is not yet complete." The subject of Muslim medicine is so vast that in the following pages only a bird's-eye view of it can be given.

For a proper appraisal of the Muslim contribution to medical science it is important to ascertain its position in Arabia at the birth of Islam. The country, as everyone knows, was at the time torn by intercourse wars and famines. Ignorance was abysmal and education non-existent. The city surgeons (jarruḥ) cauterized wounds, sustained in war, or applied obscurant ointments as healing balms, and the village apothecary administered simples for simple ailments. People generally were living under most unhygienic conditions. Such was the dismal medical background when the Prophet of Islam started preaching. Early in his career he said that knowledge was of two kinds, that of religions and that of the bodies (i.e., of medicine). Inspired by the Qur'ānic injunction, he preached moderation in all walks of life. Realizing the miserable lack of medical facilities, he advocated prophylactic measures as is evident from the following.

Su'dī, the great Persian poet, philosopher, and traveller, relates the story of an eminent Persian Physician who was sent by the Persian king to the Prophet to minister to his own as well as to his followers' needs. For a long time after the physician's arrival in Mecca no one called on him or sought his treatment. Driven by envy he approached the Holy Prophet and complained of his forced odium. The Prophet's reply was: "Those people do not eat until they are hungry nor drink until thirsty and then cease eating while a desire for food still remains." That must be the reason for their perfect health, said the physician. But medicine was not the Prophet's mission. He had dedicated himself to the moral and spiritual uplift of humanity at large. Winwood Reade says, "Muhammad's career is the best example that can be given of the influence of the individual in human history. That single man created the glory of his nation and spread his language over half the earth. The words which he preached to jeping crowds are now being studied by scholars in