

ABŪ RAYHĀN AL-BĪRŪNĪ AND HIS "PHARMACOGNOSY"

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The year 1973 was the 1000th anniversary of the birth of the great Khwārasmian scientist Abū Rayhān Al-Bīrūnī, one of the most brilliant and outstanding minds in the history of world science.

He lived and worked in the epoch of the supremacy of feudal despotism and Islamic ideology, which suppressed free-thinking and true scientific creation. In spite of this, Bīrūnī devoted his whole life and his whole talent to the service of science and progress, and by his achievements in certain fields of knowledge he succeeded in outstripping his contemporaries by several centuries.

A study of the surviving works of this remarkable scientist has made it possible for research workers to establish his enormous output in the history of the development of the physicomathematical sciences and



Abū Rayhān Al-Bīrūnī

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has given birth to a voluminous literature about them. However, not all Bīrūnī's works that have come down to us have been studied to the same extent, and some of them still remain in the form of poorly accessible manuscripts. Among this type of production, the most considerable both with respect to its contents and its bulk is his last work "Kitab al-saydala fi'l-tibb" ("Book of pharmacognosy in medicine").

"Pharmacognosy" has come down to us in a single manuscript discovered in 1927 at Bursa (Turkey). In 1932, the well-known historian of Eastern medicine M. Meyerhof published Bīrūnī's foreword in the Arabic original with a German translation,* and in 1941 in India a symposium appeared under the name "Bīrūnī's picture of the world" which included extracts from four of Bīrūnī's works, including "Pharmacognosy."†

At the present time, we have prepared a complete translation of "Pharmacognosy" into Russian with a scientific commentary; its publication coincides with the jubilee of the scientist.

The results of an investigation of this work have shown that it forms a valuable source for the history of pharmacognosy in the East of the Middle Ages and its author is one of the founders of this science in central Asia.

At this period, pharmacognosy was developing as the first stage of medical science, i.e., anyone who devoted himself to medicine had first of all to master the necessary knowledge of drugs. But, in addition to this, in the words of Bīrūnī, it also existed as an independent science, and in this case it was considered a handmaiden (in the old terminology "instrument") of medicine but not part of it.‡

Bīrūnī gives a clear and concrete definition of this discipline. "Pharmacognosy," he writes, "is the science of simple drugs according to their families, species, and their best forms, and also a comparison of composite drugs according to their written formulations or according to directions of an investigator worthy of trust and operating correctly."** Hence, the tasks of the pharmacognosist are to collect drugs, to select their best varieties, and to prepare composite drugs according to known formulations. But it is primarily doctors who must deal with the development of theoretical questions of pharmacognosy and with its enrichment with new agents. "It is befitting for doctors," says Bīrūnī, "to attempt to improve this art, to raise it on the wings of theory and practice, and to entrust it to reliable pharmacognosists in order to render them a service similar to the services of doctor-scientists."††

Then Bīrūnī particularly emphasizes the great importance of tradition in this field, both written and oral. "In pharmacognosy, imitation and information by report dominate and ascent in it takes place with the aid of studies with experts. Then long practice [is necessary] so that the forms of drugs and their type and properties are impressed in the nature [of the pharmacognosist] so that he does not become confused in distinguishing one [drug] from another."‡‡

This approach to pharmacognosy is also reflected in the nature of the structure of Bīrūnī's book. The author attempts to collect in it all the information existing in the literature on each of the drugs considered.

To write this book, Bīrūnī used numerous sources written over almost a millenium and a half by scientists of such regions as central Asia, Iran, Afghanistan, India, the Arabian countries, Asia Minor, Greece, and the Roman Empire. The total number of authors that he mentions reaches 250, including, in addition to doctors and pharmacognosists, natural scientists, philosophers, geographers, travellers, historians, philologists, and poets.

The voluminous material collected by Bīrūnī for "Pharmacognosy" permits the statement that it gives the most complete idea of the state of pharmacognosy and botany at that time.

*Max Meyerhof, *Das Vorwort zur Drogenkunde des Beruni, Quellen und Studien zur Geschichte der Naturwissenschaften und der Medizin*, Vol. 3, Berlin (1932), pp. 1-52 [157-208].

†Bīrūnī's *Picture of the World*, Ed. A. Zeki Validi Togan, *Memoirs of the Archaeological Survey of India*, No. 53, New Delhi (1941).

‡Manuscript of "Pharmacognosy," sheet 2b.

***Ibid.*, sheet 5b.

††Manuscript of "Pharmacognosy," sheet 6b.

‡‡*Ibid.*, sheet 2b-3a. As M. Levey correctly observes, the majority of modern historians of Eastern pharmacognosy have neglected the continuous oral tradition present here, while taking this factor into account may lead to some new conclusions relating to the sources of the origin and development of pharmacognosy in the East. *The Medical Formulary or Aqrabadin of al-Kindi*. Translated with a study of its *materia medica* by M. Levey. Madison, 1966, pp. 20, 22.

The drugs then used in medical practice were obtained from plants, animals, and minerals. But the overwhelming majority of them were obtained from plants. Of the 1116 paragraphs in the "Pharmacognosy," medicinal plants, their individual parts and organs, and also the products of their isolation, are described in almost 880; the total number of plant species mentioned in the book is about 750, the number of mineral substances 107, and animal substances 101. In addition, about 30 names of complex agents (mainly antidotes, some types of medicinal foods, etc.) are also given.

In contrast to other works on pharmacognosy, Bīrūnī's book contains almost no information on the properties and effects of the substances described and their use in medical practice. Particular attention is devoted in it to the determination of the substance described, i.e., to showing what it is, from what plant or animal it is obtained, what the characteristics are that indicate its purity and high quality, etc. As is well known, in works of ancient authors and those of the Middle Ages the descriptions of plants and animals and also of the products obtained from them are frequently incomplete, which makes it difficult to recognize them. Biruni frequently points this out. For example, in § 85 in giving quotations from an anonymous author in which it is stated that "Uksiius is the herb from which brooms are made," Bīrūnī remarks: "Such an explanation is useless, since the herbs for brooms are different in different places."

This type of deficiency in the descriptions is supplemented by drawings of plants and animals. Apparently, in Bīrūnī's time the main works on pharmacognosy were already provided with such illustrations. In the preface to "Pharmacognosy" he states that he had available a list of the works of Dioscorides in which descriptions of plants were accompanied by illustrations of them.

In the definition of medicinal plants and other substances, Bīrūnī paid great attention to their names in various languages. Consequently, the discussion and explanation of the existing synonyms of drugs was one of the main tasks which he faced in writing "Pharmacognosy." In the medical and other scientific literature of this time there was an enormous number of foreign names of drugs the correct significance of which was known to by no means all doctors and pharmacognosists. The situation was complicated still further by the fact that one and the same drug had different names in different places or, conversely, one and the same name in different places could denote completely different things; all this not infrequently led to confusion.

Bīrūnī, realizing fully the importance of this problem, collected and explained about 4500 Arabic, Greek, Syrian, Indian, Persian, Khwārasmian, Sogdianian, Turkish, and other names of plants, animals, minerals, and products obtained from them and this made an invaluable contribution to the systematization of the drug terminology of his epoch. These synonyms are also important for modern historians of pharmacognosy in the East; they provide the possibility of a more accurate determination of many medicinal plants and other substances used in the medical practice of that time.

Bīrūnī obtained more accurate information on some drugs by oral questioning, which he mentions in many paragraphs of the book. To the material collected from written and oral sources he added the results of his own observations which he performed for many years in various countries: in central Asia, Iran, Afghanistan, and India. Consequently, it is natural that Bīrūnī's personal contribution mainly relates to the drugs produced at that time in the countries mentioned. In § 975 he wrote: "In Khwārasm and Bukhara there is a tree which grows densely and has a yellow trunk; it has red sour-bitter fruit. Its bark, which has a reddish yellow color, is taken and for beauty arrows without heads are wrapped in it. It is called barud, and in Bukhara makhlab." In § 108: "I have seen this plant [i.e., a nettle] in Jurjāniyya along the roads and on the banks of rivers. If it comes into contact with the skin, it causes burning and itching.... In Jurjāniyya I heard that a food is prepared from it." In § 515: "In the mountains of Afghanistan [is found] a wild olive with small fruit which is put into oil; it is called shvana." In § 200: "[Betel] is a leaf similar to a mulberry leaf. [The Indians] contrive to carry it in the fresh form from the southern shores of India into the remote corners of the country. [Betel] leaf is rolled up and immersed in slated lime, and is chewed after food.... It makes the breath pleasant and strengthens the gums."

He described some drugs directly in the writing of "Pharmacognosy," and prepared them, for which his assistant was the Ghaznian physician Abu Hamid an-Nakhsha'i.

On the basis of his personal observations on plants and animals, Bīrūnī frequently criticizes the opinions of other authors and introduces corrections into their descriptions. For example, in § 13 on the citron, concerning which one author states that on one and the same tree there are pitted and smooth fruit, the pitted fruit having sour flesh and the smooth fruit sweet flesh, Bīrūnī observes: "However, a check does not show the correctness of this [statement]: all citrons obtained from Tabaristan are pitted and with protuberances, while those that grow in Jurjāniyya are smooth and compact, but the flesh of both is sour."

In describing some plant or animal, Bīrūnī sometimes gives interesting stories about them, and in some paragraphs he recalls cases that he himself has observed. Some of Bīrūnī's observations are of interest also from the point of view of the history of science. For example, the ancient Greeks regarded kermes as a diseased growth of the cochineal oak, while Bīrūnī knew that it was an insect.

The scientist devotes particular attention to the question of the replacement of certain drugs by others. This had very great importance at that time since a required drug could not be found everywhere or always. In view of this, he wrote special treatises on substitutes.

In addition, in all compilations on pharmacognosy, after the description of a drug its substitutes are given, and the very same thing was done in Bīrūnī's book. But Bīrūnī, in contrast to other authors, did not limit himself to this but devoted a special chapter in his preface to an explanation of some theoretical aspects of substitution. He considered the statements of ancient authors and those contemporaneous with him on substitutes to be insufficient. In his opinion, any substitute for a definite drug may be of use for some particular disease if it is used, for example, in the form of a foodstuff, while when rubbed in or used by some other method against another disease it no longer shows this effect. Consequently, Bīrūnī recommends above all to take the site of use of the substitute into account, i.e., whether it is made in the form of foods, drugs, embrocations, compresses, fumigating agents, etc. "Few people," he concludes, "pay attention to this art and therefore [the substitute] does not produce a result and is imperfect." Great attention was always devoted to determining the area of distribution of medicinal plants. In this respect, too, "Pharmacognosy" contains rich material – it very frequently gives the geographic points where particular plants and animals grow and minerals are obtained. The facts given in the book show that the agents described in it were produced or imported from the following regions: Central Asia, Afghanistan, Iran, Mesopotamia, Arabia, Africa, India, Ceylon, China, Tibet, Nepal, Burma, Cambodia, the Malaya archipelago, Armenia, Azerbaidzhan, Asia Minor, Greece, the islands of the Mediterranean Sea, Italy, and Spain. From this type of information in the book it is possible to obtain a definite idea of the regions where certain cultivated plants were grown at all (bread grains, fruit and other trees, vines, vegetables, etc.).

All that has been said above shows that "Pharmacognosy" is a valuable memorial to Eastern pharmacognosy of the Middle Ages, giving the most complete idea of the drugs known at that time.

Its detailed studied will permit the elucidation of the origins of many substances used in modern medical practice. And, finally, on the basis of the information collected by Bīrūnī valuable but forgotten medicinal plants, to which the attention of pharmacologists is now being directed to an ever-increasing extent, may be found.