

# A(I)RAZY [Rhazes] (c842 - c932 AD)\*

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## ABSTRACT

*In the words of Sarton, A(I)Razy was perhaps the greatest clinician of all times. Originally from Rayy, he became the Chief Physician of the famous Bagdad Hospital.*

*His contributions in the basic sciences include his description of the recurrent laryngeal nerve, the reaction of the pupil to light, the conditioned reflex theory, congenital contagion, mercurial ointment and the investigation of mercurial purgatives.*

*In clinical medicine he was the first to differentiate between measles and small pox; he described brain abscess following otitis, incompetence of the aortic valve, neuropathic bladder due to spinal cord tumor, allergic rhinitis and scrotal gangrene.*

*In management, he was the first to mention non-metallic catheters, the use of catgut in surgical operations, patellectomy for comminuted fractures of the patella and hot moist compresses to cover the intestines in abdominal surgery.*

*He left 237 works which include the following:*

*AlKinnash alFakhir.*

*The book on small pox and measles translated into Latin at least 6 times, the latest being the Gottingen edition of 1781; also into Greek, French, English and Persian.*

*Medical Treatise "al Mansury" (Liber Almansoris) went into at least 10 Latin editions - was still part of the medical curriculum of the University of Frankfurt in 1588.*

*A medical encyclopedia "AlHawy" (Continens) was translated into Latin in 1280 and had at least 5 Latin editions.*

## Key Words:

Arabic Medicine, History of Arabic Medicine, History of Medicine, Rhazes, Al Razy.

## INTRODUCTION

In one of the most remarkable and unique historical events, the Arabs of the Jahiliyya, who were surrounded by sand and the sea, were suddenly awakened by a momentous faith which thrust them on the stage of history overflowing the confines of the desert and overrunning the Sassanid Empire to the East, the Roman Empire to the North, North Africa to the West and Spain across the Pillars of Hercules — known since as Jabal Tariq (Gibraltar) — and reaching the very heart of Europe, to Poitiers in France.

After less than a hundred years and following so much energy spent over this military miracle, one could well ask what would be the consequences of this new invasion by a nomadic race that had crumbled down the boundaries of the civilized nations of the

Earth, shook their existence and shattered them to pieces?

Despite their simple nomadic origins, the Arabs diligently and successfully developed the propitious climate for the creation of a new splendid civilization.

By the end of the ninth century, all the knowledge, culture and intellectual heritage of the Greeks, Persians, Indians and Romans that had accumulated during centuries of human development, was translated into Arabic with great zeal and enthusiasm, and then was assimilated with an unexpected aptitude into a coherent Islamic Civilization worthy of the admiration of posterity.

After its nomadic, epic and juvenile adolescence, this gigantic and momentous movement, armed with the genuinely democratic and most noble faith of Islam, and with a passion for science, soon entered resolutely into the virile age of intellectual greatness.

Medicine remained one of the main streams of this vigorous cultural achievement. The standard bearers of Medicine were a chain of eminent and distinguished physicians who bloomed under the protection of a most democratic atmosphere into perseverant, famous, productive and first rate scholars who wrote

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the brightest, noblest and most glorious pages of medical history. They blossomed into a most beautiful garden.

A(l)Razy was not only one of these giants but he was the culmination and the crowning personality of this gigantic effort that had its origins only 200 years previously in Mecca. He is the most beautiful flower in the garden.

Time does not allow us but to pick, from the vast and varied field of Islamic Medicine, this unique flower with myriads of scents, colors and echoes.

## BIOGRAPHY

Abu Bakr Muhammad ibn Zakariyya A(l)Razy was "the greatest and most original" (Browne) of all Islamic physicians "and one of the most prolific." Undoubtedly, he is not only the greatest clinician in Arabic Medicine, but, in the words of Sarton, "perhaps the greatest clinician of all times."

A(l)Razy was born in 850 (or 841 or 842), in the town of Rayy where his brother and relatives lived. Rayy is about 20 miles South of Teheran.

Early in life, music was his chief interest. In his youth he became proficient in lute playing. Later on he devoted himself to philosophy, literature and poetry. He even worked for some time, as a money changer. Ammar believes that copyists have confused the Arabic word "Sayrafa," which means money changing, with the word "Saydana," which stands for pharmacy; so that one ought to read "pharmacist" instead of money changer.

A(l)Razy's interest in medicine was aroused later in life when he was 30 or 40 years old, by his conversations with an old pharmacist at the Bagdad Hospital.

A(l)Razy's medical teacher was Abu(a)lHasan Aly ibn Rabn Sahl a(l)Tabary who had embraced Islam before the birth of a(l)Razy and who had finished writing his textbook of medicine "Firdaws alHikmat" in 850 AD just around the time of a(l)Razy's birth.

In no time A(l)Razy became the Physician in Chief of the Rayy Hospital. It was the custom of the time to include prospective physicians in a hospital educational program which had both a didactic and a clinical component. The hospital patients, who were all gratuitously treated, were first examined by medical students, then by the immediate understudies of the Chief. If the case presented any educational merit, a diagnostic dilemma or a management difficulty, it was presented to A(l)Razy and discussed at grand rounds. This program resembles to a great degree the present residency system followed in accredited hospitals in the United States of America.

After sometime at Rayy, A(l)Razy was appointed Physician in Chief to the famous Hospital of Bagdad, in the reign of alMuktafy ( 902-907 ). Out of a hundred prominent applicants a(l)Razy was chosen to

this most prestigious and coveted medical post in the whole Caliphate.

He is reported to have even been consulted about the site where the Adudy Hospital was to be founded. A(l)Razy is reputed to have hung sheep carcasses in the various quarters of the capital and chose the spot where the meat showed the least decomposition [25]. The actual founding of the Adudy Hospital of Bagdad occurred however in 982 AD, ie almost 50 years after the death of A(l)Razy. If the story about a(l)Razy's participation is fictitious, it goes to show how famous a(l)Razy was; if it is true, it may relate to the founding of another hospital in Bagdad; several hospitals were opened in Bagdad during a(l)Razy's life time; we know of five such hospitals (cf table of 1)[20].

Table I

Name of Hospital	Date of foundation
Baramky	?
Aly ibn Isn	914
alMuqtadir	918
Sayyidat	918
Ibn alPurat	927

Not much is known about the physical appearance of a(l)Razy except that he had a large head.

He was always busy either with patients or teaching his numerous students who had students of their own; or else he would be sitting in his study writing.

With his patients, he was generous and kind, especially with the poor.

He corresponded with the eminent scientists of his time as is shown by many of his letters.

He was remarkable for his extensive and wide knowledge of the medical works of his predecessors.

His clinical experience was unexcelled. His diagnosis was clever and smart; his management was sure and skillful. He had a tremendous reputation and his counsel was sought after by the poor as well as the rich.

In his old age, his vision began to fail due to the development of cataract. Various historians have attributed his cataract to different episodes of his life. One theory ascribes his cataract to his work in chemical experiments that could have resulted in the production of nociferous fumes. Another theory propounds the dietary origin of the cararact; a(l)Razy liked black beans and was in the habit of consuming large quantities of them. A third theory surmises that Sultan Mansur a(l)Samany, who was angered by the inability of A(l)Razy to turn base metals into gold,

ordered that he be hit on the head with his book until the book shreaded to pieces! Some of these theories seem too fantastic to be true; but whatever was the cause of his cataract, we know that he refused to have it operated because, in one version, he asked the ophthalmologist about the anatomy of the eye and the ophthalmologist could not even give him the number of the eye's layers; in another version, a(l)Razy had stated: "I have seen enough of this world." He did not seem to care to see more of it.

As his vision continued to deteriorate and fail, he returned to his native town and soon died at the ripe age of 90 years.

He left several works, the most important of which was his unfinished encyclopedia "alHawy." For once, Fate had turned on the generosity of History. A(l)Razy's sister and one of his students, Ibn al Hamid by name, were responsible for this rare event. The sister had the serenity and perhaps also the need, and Ibn al Hamid had the vision and the wisdom to prevail on her and to buy the unfinished manuscript. It is by this happy double stroke of luck that we can enjoy to-day and relish reading the immortal alHawy.

#### **WORKS of A(l)Razy**

A(l)Razy was a voluminous writer. His bibliography includes 143 titles and in some works of reference this number goes up to 237.

#### **AlHawy**

The most famous of a(l)Razy's works is AlHawy which means "The comprehensive". It is an enormous medical encyclopedia in 24 volumes. It is the greatest, the most important, the most extensive and the most encyclopedic of his works. It is a post-humous work, probably compiled by his students, from the unfinished notes and papers which a(l)Razy left after his death and which were probably meant for his own use.

In alHawy, a(l)Razy brings together in one work, all the medical knowledge of the Greeks, the Persians and the Hindus, plus his own vast experience. AlHawy is a compendium of all that had been written in Medicine up to that time in all countries.

Not all versions of the book have the same chapter sequence but most have the following books: Neurology, Ophthalmology, Ear Nose and Throat, Pulmonology, Cardiology, Gastroenterology, Obesity, Lactation, Nephrology and Urology, Elephantiasis, Rheumatology, General Medicine, Fevers etc. . .

In alHawy a(l)Razy quotes several Greek works which are not known to have been translated into Arabic. The only way that he could have reviewed them would be in the original Greek. This is the reason we are led to presume that a(l)Razy knew Greek.

AlMajusy, writing 55 years after the death of a(l)Razy, stated that there were only two complete copies of alHawy; in his words, the Hawy is

"... very comprehensive, in that it contains everything necessary for the student of medicine to know in remedying diseases and ailment. . . The material is unsystematically compiled. It lacks the classification necessary for scientific work, which is expected from so eminent an author. It seems to me, knowing the author as I do, that he intended one of two things: either that the work be a repository file for his own use, fearing that something might happen to his other works and in that case the Hawy might then suffice for all; or he may have intended it to remain as a register of his achievement with the expectation of resuming its revision and classification later on. Something must have hindered him, and death terminated his life too soon for the completion of the task."

Even today, no complete manuscript exists, only incomplete versions adorn the libraries of Escorial, Oxford, Munchen, Leningrad, Berlin and the SIHML. Ammar believes that because of its enormous proportions, the Hawy has frightened and scared away even the assiduous copyists and has surpassed the resources of all but the richest bibliophiles.

In alHawy are found a series of about 40 clinical observations, complete with the name of the patient, the symptoms, the diagnosis, the treatments and the results. Here is a sample of a(l)Razy's clinical notes:

"Abdullah ibn Sawada used to suffer from attacks of mixed fever, sometimes quotidian, sometimes tertian, sometimes quartan, and sometimes recurring every six days. These attacks were preceded by slight rigor, and micturition was very frequent. It is my opinion that either these excesses of fever would turn into quartan, or that there was ulceration of the kidneys. Only a short while elapsed before the patient passed pus in the urine. Thereupon, I informed him that these feverish attacks would not recur, and so it was.

The only thing which prevented me at first from being definite that the patient was suffering from ulceration of the kidneys was that he had previously suffered from tertian and other mixed types of fever, and this to some extent confirmed my suspicion that this mixed fever might be from inflammatory processes which would tend to become quartan when they waxed stronger.

Moreover the patient did not complain to me that his loins felt like a weight depending from him when he stood up; and I neglected to ask him about this. The frequent micturition also should have strengthened my suspicion of ulceration of the kidneys . . .

So when he passed the pus I administered to him diuretics until the urine became free of pus, after which I treated him with terra sigillata, Boswellia thurifera, and dragon's blood, and

his sickness left him, and he was quickly and completely cured in about two months. That the ulceration was slight was indicated by the fact that he did not complain at first of weight in the loins. After he passed pus, however, I inquired of him whether he had experienced this symptom and he replied in the affirmative. Had the ulceration been extensive, he would of his own accord have complained of this symptom. That the pus was evacuated quickly indicated a limited ulceration. The other physicians whom he consulted besides myself, however, did not understand the case at all, even after the patient had passed pus in the urine."

This is an example of the case reports where a(l)Razy emphasizes the history, the symptoms and the signs of a disease, then discusses the differential diagnosis so well that he has been considered as one of the greatest clinicians of all time.

A(l)Hawy has been abridged by Ibn Ishaq, the vizir of Abdu(l)Rahman a(l)Nasir. Another abbreviated copy, done in the 12th century, is found in Florence.

AlHawy was translated into Latin as "Continens," in the year 1279, under the auspices of Charles I of Anjou, the King of Naples, by the Sicilian physician Faraj ibn Salim, known in the West as Fararious Faragut, who relates: "... this book remained unknown for a long time until the most christian King Charles, King of Jerusalem and of Sicily, stricken by its fame and conscious that this work could be useful to him and to all christians, wanted to combine to his warring activities the cult of liberal studies and had it translated. To obtain the book, he sent a solemn delegation to the King of Tunis accompanied by a trusted and worthy man who was skillful in both Arabic and Latin and thus ignited the torch of translation. He had it reviewed by his own physicians and by other physicians from Naples and from Salerno giving them ample time for the review. All, with a common voice, agreed to praise both the translator and the translation."

Five Latin editions are known. The first was published in Brescia in 1486 by J. Brittanico, its title was "Liber dictus Elhavi;" the second, third and fifth were published in Venice in 1529, 1542 and 1562 respectively.

The book was still on the curriculum of the Faculty of Medicine at the University of Montpellier in 1643 [14].

A(l)Hawy has been recently published in the original Arabic by Da'iratul Ma'arif, Othamaniyya University, Hyderabad, Dacca, India, 1963-1971.

**alMansury**

alMansury was dedicated to Abu Salih Mansur ibn Ishaq (Nuh in another version) a(l)Samany (d 975 AD), the ruler of Khurasan, hence its name. It consists of ten books:

- Book one Physiology and Anatomy
- Book two Temperaments
- Book three Diet and simple drugs
- Book four Public Health
- Book five Dermatology and cosmetics
- Book six Diet for travellers
- Book seven Surgery
- Book eight Toxicology
- Book nine Treatment of diseases
- Book ten Fevers

a(l)Mansury is devoid of the originality manifest in a(l)Hawy and is based largely on Greek science.

It was translated into Latin by Gerardo Cremona (1140-1187) as (Liber [ad] Almansoris or Almansorem). The Latin version was first published in Milano in 1481 and subsequently was frequently republished (Venice 1483, 1490, 1493, 1497). The ninth book (Nonus Almansoris) was especially popular and was often published apart (Lyon 1490 by Jean de Tournemire). An Arabic Latin edition was issued by JJ Reiske at Halle in 1776. The book went into a total of ten Latin editions.

Many well known medical men of the Latin West have written commentaries on a(l)Mansury, using it frequently as a textbook for the teaching of their students. The book was still part of the medical curriculum at the University of Tübingen until the 15th century and at the University of Frankfurt in 1588.

The section on Ophthalmology was translated into German by W. Brunner "Die Augenheilkunde des Rhazes" (Diss, Berlin, 1900). The first book was translated into French and published by P de Konig in "Trois traites d'anatomie arabe" (844 p, Leyden, 1903).

The book was never published in Arabic.

**alFakhir**

AlFakhir (The Splendid or Precious) is, I believe, alKunnash alFakhir, a copy of which is found in the Sami I Haddad Memorial Library under No. 12. This is a book on therapeutics and includes what had already been written by previous authors with references and what a(l)Razy himself has to say. It is written in such good Arabic that the unaware reader cannot suspect the Persian origin of its author. The etiology and the symptomatology of the diseases are briefly mentioned but the treatment is discussed at length. The book has two parts and as was usual at the time, the author starts with diseases of the head and goes down to the foot. Here is an abbreviated form of the contents:

Part One	Part Two
Head	Hepatospenology
Hair	Ascites
Headache	The diarrheas
Memory	Hemorrhoids
Coma	Parasitology
Sleep	Herniology

Mania	Urology
Melancholia	Rheumatology
Seizures	Varicose veins
Facial paralysis	Dermatology
Ophthalmology	Hemorrhage
Audiology	Sexology
Rhinology	Obesity
Dentistry	Obstetrics and Gynecology
Laryngology	Pediatrics
Chest Diseases	Toxicology and bites
Cardiology	Fevers
Gastroenterology	Small-pox and measles

#### Urolithiasis

A(l)Razy's book on renal and vesical lithiasis was translated into French and published by de Konig in Leyde in 1886 or 1896.

#### Allergic rhinitis

This monograph describes the attacks of coryza, rhinitis and sneezing in a patient who developed these symptoms when the roses bloom and at no other time. This is actually the first mention and the first description of allergic rhinitis. In the treatment, a(l)Razy advises a vaporiser in which is put camomille, absente or mentha aquatica [21].

In the prevention of this condition a(l)Razy lists a series of don'ts, a long list of things to avoid including the following:

- smelling the blooming roses
- dying of the hair
- pouring cold water on the head
- uncovering the head in cold weather
- tightening the collar around the neck
- sleeping on a low pillow

This pamphlet was mentioned by alBayruny in the bibliography of a(l)Razy as number 38: "a(l)Zukam ind shammihi alward" which can be translated as "Rhinitis from smelling roses." Ibn aby Usaybi'a mentions it as "a(l)Nazla waqt alward" which can be translated as "Coryza when the roses bloom." The pamphlet has survived on folios 79b,3-80b,8 of a manuscript by Ibn Serapion entitled "alFusul almubimma fy Tibb alimma" under number Cod.Hunt 461 at Oxford. Ibn Serapion mentions Ibn Syna but is himself unknown. The pamphlet was recently published under the title "alBalkhy's roses coryza" in 1977 [24,43].

The patient is no less a person than Abu Zayd alBalkhy who is remembered not only from a(l)Razy's description of his hay fever but also on his own merits since he was a great scholar himself and the father of Arabic geography [8, 27, 46]. alBalkhy was the same age as a(l)Razy, he was born in 850 in Shamistiayan near Balkh, came to Bagdad as a young man and remained the student of alKindy for eight years. He later became the secretary to the Amir of Maru, Ahmad ibn Sahl (918-919). He was a fruitful writer, a philosopher,

a historian and a geographer. He left 54 books and pamphlets among which are the following:

- 1) Suwar alAqalyn (on Geography) which remained the quarry from which all subsequent geographers profited such as alAstakhry and Ibn Hawkal [13, 32, 35, 52]
- 2) The qualities of mathematicians Masalith alAbdan wa alAnfus [6]

#### Bur' a(l)Sa'at

Bur' a(l)Sa'at, which means diseases that are cured in an hour or less, was translated into French and published by P Guigues in Beyrouth in 1904. Several Arabic editions are available.

#### A book on quackery

It was translated into German and published by Steinschneider in Virch Arch vols 36 & 37.

#### Arcandorum liber

This is a book on chemistry, it contains a list of 25 pieces of chemical apparatus (cf Sarton p 609).

#### Kitab alAsrar

This book was translated into Latin by G Cremona and became the chief source of chemical knowledge in the Middle Ages until it was superseded in the 14th century by Ibn Jabir's book [51].

#### On Plague

De pestilentia or De peste is another of a(l)Razy's books.

#### alJudary wal Hasba

alJudary wal Hasba (De variolis et morbilis) on small-pox and measles, is a(l)Razy's most original work. It is the first monograph ever written on the subject. In it, a(l)Razy gives the first lucid and rational account of small-pox which was hitherto confused with measles or, according to another theory, had not yet been observed nor described.

The book establishes a(l)Razy as one of the keenest original thinkers and one of the greatest clinicians. A(l)Razy attributed the etiology of small-pox to a ferment in the blood, something like must in wine. This is the first suggestion of the fermentation theory of disease which was later expounded by Pasteur. The heart, a(l)Razy adds, spreads this ferment by way of the blood, through the arteries, to the whole body. This is the first intimation, not only of a blood borne disease, but also of the fact that a(l)Razy seems to have understood that the role of the heart was to circulate the blood.

Max Neuberger has written: "The book is regarded by all, and rightly so, as a masterpiece of Arabic medical literature. As the first known monograph on small-pox, it has an important place in the history of epidemiology, and show us that a(l)Razy was a cons-

cientious physician, free of dogmatic prejudice. In this book, we see the first great clinical observation concerning exanthematous and eruptive diseases along with remarkable hygienic rules such as the placement of the patient in a warm atmosphere with sustained prophylactic measures for the eyes, the mouth and the nasal cavities."

The book was translated into Latin by G Valla. The first Latin edition appeared in Venice in 1498. Other subsequent Latin editions appeared in Basel (1529, 1544).

The book was translated into Greek by Jacques Goupyl and published in Paris in 1548.

Latin editions also appeared in Strasburg (1549), Venice (1565) and London (1747).

The original Latin translation was later revised by Reverend Dr. Thomas Hunt. This revised Latin translation was used by J Theobald to prepare the first English translation (London, 1749).

The book was translated into French by Jacques Paulet (Paris, 1763).

An Arabic and Latin edition was published by John Channing in London, in 1766, in 290 p.

The last Latin edition was that of Gottingen (1781).

A second English translation, by William A Greenhill, was published by the Sydenham Society in London in 1847 or 1848.

A second French translation, by Lucien Leclerc and Lenoir was published by Baillères, Paris, 1866.

Cornelius van Dyck published the original Arabic version in London in 1866 and again in Beirut in 1872.

A German translation, by Karl Opitz, was published in Leipzig in 1911 in "Klassiker der Medizin."

A Persian translation was prepared by Najmabadi and published with the original Arabic and with commentaries and annotations in Teheran in 1965.

This monograph was published, in one language or another, a total of 35 times in less than 350 years.

#### Medical textbooks

a(l)Razy wrote several other books on general medicine, however, they did not survive the ravages of the centuries. We only know their titles:

alMudkhal	(The Introduction)
alKafy	(The Sufficient)
alJami	(The Compendium)
alMuluky	(The Royal) was dedicated to Amir Aly son of the sovereign of Tabaristan

#### Neurology

This book was mentioned by Ibn Juljul

#### a(l)Tibb a(l)Ruhany

The title of the book means the medicine of the soul; it contains discussions on the philosophy of medicine.

#### Pediatrics

This book is probably the first textbook on Pediatrics ever written [37]. The original Arabic text has been lost, but the book is preserved in its Latin translation which was first printed in 1481. The book has also been translated into German and English. An Italian translation was published in 1959.

#### APHORISMS

The aphorisms of a(l)Razy have never been collected; they are still scattered in his writings. Here are some of them:

A patient should limit himself to only one physician in whom he has confidence, because he is more often right than wrong. But he who goes to many physicians, shall fall into their compounded errors.

A competent physician and a compliant patient shorten the duration of the disease.

Treat not with drugs what you can treat with diet; do not use compound drugs when you can use simple ones.

The physician should aspire to cure his patient more than to take his money; he should also prefer the treatment of the poor rather than the treatment of the rich.

The physician should persuade his patient that he will get better and should always entertain in him the hope of a cure even if the issue is in doubt; because the reaction of the soma depends on the frame of the psyche.

What one reads has much less value than the actual clinical experience of a thinking and reasoning physician.

#### CONTRIBUTIONS [19]

In the field of cosmology, a(l)Razy propounded that the earth is spherical, that it rotates around an axis passing through its two poles, and that it is smaller than the sun and larger than the moon.

In the basic sciences, he investigated the problem of specific gravity by means of the hydraulic balance, which he called almizan a(l)taby'y.

In anatomy, he was the first to describe the laryngeal branch of the recurrent laryngeal nerve; "this nerve, he notes, is sometimes double on the right side" [12 p 200, 17 p 69, 29 p 133].

In physiology, he anticipated Sherrington's conditioned reflex theory (cf his book "Habit which becomes natural" [15]). He also was the first to recognise the pupillary reaction to light [15].

In epidemiology, he was the first to describe congenital contagion [29 p 97].

In pharmacology, he applied his chemical knowledge to medicine. He was instrumental in the introduction of mercurial ointments to the pharmacopeia [11 p 72]. His name thus survived in two preparations: white lead ointment known in the Middle Ages as "Album Rhasis" and certain eye trochisci known as

“Trochiscus Rhasis” or as “Arab soap” [15].

His most important contribution in this field, to my mind at least, is the introduction of oral mercurial purgatives after careful experimental investigation on the monkey. He wrote:

“As to pure mercury, it gives rise to intense abdominal and intestinal pain, but leaves the body as it entered it, especially if the subject takes exercise, I therefore believe it not to be very pernicious. I gave it to a monkey that I had at my house and he twisted himself about, clenched his teeth and pressed his hands against his belly.” [Mansury Bk 8 p 42 quoted by Cumston p 205, cf ref 29 p 107].

Calomel and especially sublimate were found to be very dangerous and very active poisons. They cause very sharp abdominal pains, colic and bloody stools.

To dentistry, a(l)Razy devoted seven chapters of his *alKunnash alFakhir* in which he advocates mouth hygiene and teeth brushing and recommends several toothpastes, one of which sounds very appealing, as it contains, among other ingredients, thyme, ginger, tamarix and lily water; he discusses toothache and its various remedies, halitosis, its causes and treatment; as well as tooth decay, and the various affections of the gums [23, 26].

a(l)Razy was a very careful and astute observer who recorded the interesting and unusual cases he saw, a custom that has directly influenced Arnold of Villanova (d 1312), Guy de Chauliac (d 1368) and Sydenham (1624-1689) [17]. As an example, here is the summary of a very baffling neurological case [Hawy 16 296]:

“Half the body of Abu Nusayr was warm and the other half as cold as ice; no pulse could be felt in the cold half, whereas in the warm half, the pulse was rapid; the neck muscles were contracted in the cold half and there was severe enophthalmos”

This brief summary by a(l)Razy shows a mind that is alert to the unusual as well as an exactness in clinical description remarkable for an author of the tenth century. What is the exact diagnosis in this case is difficult to say, but one has to entertain the possibility of an embolus of the subclavian artery, a Pancoast syndrome or an occlusion of the posterior cerebellar artery [21].

A(l)Razy not only developed the concept of psychosomatic interrelationship but also practiced it in his daily work. Called to see the Prince of Bukhara one day, he found him the prey of a psychosomatic affection preventing him from standing up. He took him to a public bath, poured warm water on him and all of a sudden threatened the Prince with a big dagger. Angry and frightened, the Prince jumped to his feet, a(l)Razy fled and ran away. Subsequently, the grateful Prince sent a(l)Razy many presents and an annual gift of 1000 dinars [1].

In surgery, only a few of his contributions will be mentioned. He was the first to mention the use of non-metallic catheters [17]. He introduced the all important use of animal gut as a ligature in surgical operations (Hawy vol 16 p 18, and ref 19); and the use of hot moist compresses to cover the intestines during abdominal operations (Hawy 16 208).

He advised patellectomy for comminuted fractures of the patella 1000 years before Brooke popularised the procedure in 1937 [Hawy 13 210].

He described bladder paralysis caused by a spinal cord tumor in a man called Qattan (Hawy 16 194).

He was the first to give several very clear and detailed descriptions of scrotal gangrene [Hawy folios 237 & 270], 1000 years before it was described again by Fournier (1832-1914) whose name is presently attached to the condition.

In clinical medicine, he was the first to describe brain abscess following otitis [Hawy vol. 16 p 191-192]; he reported one of the first cases of aortic valve incompetence [29] and he was one of the first to describe the hepatorenal syndrome [Hawy 16 207].

## EPILOGUE

Such is the man, his works, his contributions and his influence. He belongs to the Persian heritage, to the Islamic heritage, to the Arabic heritage, and to humanity at large without distinction of race, color, language or religion.

For almost fifty years now, the portrait of this great Muslim physician adorns the Chapel at Princeton University [18]. A stained glass window in the narthex or vestibule of the Chapel depicts a(l)Razy writing the title and the first introductory words of his masterpiece, *alHawy*. His is one of the very few Muslim figures which appear in the Christian Churches. The artistic work was executed by Charles J Conring of Boston and was donated by Mrs. Mary Ludington McKeen, of Omaha, in memory of her brother, Dr. Paul H Ludington, Dr. Ludington graduated from Princeton in 1894 and later became a member of the faculty of the College of Medicine of the University of Nebraska. During his life he had formed an admiration for the work of a(l)Razy.

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