

THE INFLUENCE OF AVICENNA'S SCHOOL
OF MEDICINE ON WESTERN MEDICINE

ENCYCLOPEDIST, PHILOSOPHER, PHYSICIAN, MATHEMATICIAN,
ASTRONOMER, THE MOST FAMOUS SCIENTIST OF ISLAM AND ONE
OF THE MOST FAMOUS OF ALL RACES, PLACES, AND TIMES, (1).

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The Canon of Medicine-Al-Qanun-fit-Tebb by Avicenna (980-1037) is a comprehensive yet concise description of medicine of its time. The Canon was translated into Latin by Gerard of Cremona in the twelfth century, and was reprinted for fifteen times. Literally, Canon is a series of principles. A principle, as has been defined, is "something preceding which carries a positive effect upon the consequence". Hence, Canon is not an encyclopedia of medicine of his time, but a code of fundamental and general scientific principles. (2)

The Latin translation of the Canon placed this book among the most prominent medical text of European Universities of the twelfth century. At Montpellier, France, a great center of medical studies, the Canon was regarded

as the principle text upto 1950. At Universities of Leipzig and Tubingen upto 1981. Vienna upto 1592, Frankfurt-on-oder upto 1598, and Louvain upto 1650 Canon was included in their respective medical curricular.(2)

Dr. Cameron Gruner, the English scientist and physician has stated:

"A study of the Canon of Medicine of Avicenna for over forty year, guided by a simple key, has brought an undiminished admiration for this work, now about a thousand years old, and still in use in the East.(3).

One should always bear in mind that the Canon is not a complete account of what Avicenna knew of medicine. This book, however lengthy, contains fundamental medical principles. And what his pupils learned from him was much greater than what has come in the Canon.(2)

A deep insight into the medical system of Avicenna reveals the close relationship between his approach and that of modern medicine. In this regard, it is possible to say that modern medicine is the continuation of Avicenna's system of medicine.(3)

Avicenna in Canon stated that medicine is a branch of knowledge which should be differentiated from religious believes and/or superstitions. His entire knowledge of organs and their functions was based upon observation and analysis. In Canon causes, symptoms, preventions, and treatments of disease are discussed by scientific methods of inquiry based upon reasoning.(2)

In his teaching, Avicenna incorporated a scientific method of inquiry based upon reasoning, placing heavy emphasis upon basic medical sciences. In this regard, he wrote in the introduction to Canon:

I (Avicenna) believe that at the beginning, the pupils should learn the general principles of medicine, both in theory and in practice. The general principles affecting simple drugs and their individual properties should then be described. Next, the analysis of diseases which affect different organs will precede the methods of keeping these organs in sound health. To satisfy this, we must first study anatomy and physiology of these organs, (3).

Avicenna's system of medicine is built upon physics, metaphysics, and mathematics. Avicenna carefully avoided a contradiction of reality. In his writings Avicenna has also referred to intuition* which he regards as being part of the cognitive domain of the self. (2)

In Canon the concept of four causes; namely the elements,** temperaments, humors, and faculties has been derived from philosophy,*** physics, and biology of the ancient time. This in fact has led to the confusion and misunderstandings of modern physicians who try to read and interpret the Canon. This should be taken into consi-

* The knowledge obtained without recourse to inference or reasoning, in rote or instructive knowledge. (4)

** Concerning the elements and the natures, it must be remembered that in medicine as in physics and alchemy, they must not be thought of simply the fire, air, water, and earth found in nature, nor the cold, heat, dryness, and humidity man feels during the various seasons of the year. Rather are they the principle of the gross elements and qualities called by the same names in daily language. (5)

*** Philosophy is the knowledge of the facts of creatures to the human ability and in general is twofold: One practical philosophy and the other theoretical. Theoretical philosophy has three branches: metaphysics or first philosophy which deals with the Prime Mover; intermediary philosophy which deals with mathematics; and physics or natural philosophy, which deals with material objects. (6)

deration that Avicenna's system of medicine as expressed in the Canon for his age, is built upon the physical and philosophical hypotheses of his time. Today, it is necessary to examine these hypotheses in the light of modern sciences. No doubt that the advances in different branches of sciences will lead to the better understanding of the material covered in the Canon. A careful study of this ancient work reveals a surprising range of knowledge out of which many ideas for productive research can be drawn. (2)

This paper is an attempt to assess the system of Avicenna's medicine and other ancient Iranian physicians in comparison with modern medicine, in respect to the fundamental concepts of aetiology and temperaments.

Aetiology

In modern medicine aetiology has been defined as: "The cause of disease and disorder as determined by medical diagnosis". (7) and "The study or theory of the factors that cause disease and the method of their introduction to the host; the sum of knowledge regarding causes." (8)

Modern medicine believes in the unity of mind and body and has found a close interaction between human body

and the environment in which he lives. With the help of Aristotelian causes, Avicenna described in the Canon what is now found through modern science. Aristotle believed that complete knowledge of a thing is only possible if we learn about its "material cause" That is what the thing is made of, secondly the "efficient cause" which moulds it. Thirdly the "formal cause" which determines its shape and quality, and, fourthly the "final cause" the purpose for which the thing is made. with the concept of four causes and their interactions Avicenna not only established the unity between organs and their functions, but also established the interaction between body and outer environment in appropriate space time relationship.

(9)

Accordingly, in spite of anatomical border lines between different organs, they all related to one another. In terms of anatomy for example, heart is an isolated organ. To Avicenna the heart is a part of a force which controls the entire body. Incorporating the old and modern knowledge, one can say that the physical heart, with its blood and blood vessels and the automatic nervous system including its centers in hypothalamus, are on great functional unit whose operation encompasses the entire body. (3)

It is with the help of these concepts that Avicenna fundamentally referred to every illness of a person as being a cause of:

1. Inheritance-The stuff or material the person is made. of.

2. Temperaments-The structure and the strength of the faculties a person possesses.

3. Outer factors influencing the person
4. The nature of the individuals efforts utilized to maintain his life function.

Temperaments

In modern medicine, temperaments have been defined as principle mould which composite the special individual psychological stimulus.(10) Another definition of temperaments is descriptive: By temperaments, man will understand the concept of psychological action or reaction and its manifestation in human behavior.(11) Dorland's medical dictionary defines temperaments as, special physical and psychological characteristics of an individual. (8) The different types of temperaments are as follow:

Bilious temperament: the person with bilious temperament is characterized by dark or yellow complexion, dark hair, and slow or moderate blood circulation.(8) Another characteristics of persons with bilious temperament is their highly emotional susceptibility and its sudden halt. These people are very quick and hasty in handling people. But they do not remain in this state for long period of time. They have explosive reactions.(11)

Phlegmatic temperament: People with phlegmatic temperament have fair but not ruddy complexion, light color hair, a general softness of tissues. According to the ancient(old) physiologists this characteristic is found to be due to a predominance of lymph or phlegm in the system.(8) People with phlegmatic temperaments are indifferent and even apathetic and very seldom are affected by outside stimulus. They are cold and emotionless.(11)

Atrabilious (Melancholic) Temperament: In people

with atrabilious temperament black bile (which was supposed to be secreted by the spleen) prevails upon the body causing melancholic disposition. Excessive melancholic temperament will result in a state of hypochondriasis.

(8) People with melancholic temperament are inclined to depression. One of the characteristics of these people is that they always see and remember the negative side of life with deep depression. (11)

Sanguine (Sanguinous) temperament: People with this type of temperament have fair and ruddy complexion, yellow, red, or light hair color, bulky body, full veins and an active pulse all indicating the excess supply of blood. (8) People with sanguine temperament are known by their instability in their emotions. For these people happiness and sadness are two extremes between which they are constantly moving emotionally. (11)

Nervous temperament: In these people nerves and the central nervous system, brain, is prevailed upon body. (8)

W.H. Sheldon has categorized different types of temperaments as Ectomorphic, Mesomorphic, and Endomorphic. (12) Kretschmer has made another classification as Pyknic, Asthenic, and Athletic. (13) Edward Sprangers has recognized the following temperaments:

1- Theoretical man: He thinks to know, he investigates to find out the facts, he wants to know what it is behind these apparent incidences. Max Plank is an example of this kind of people.

2- Aesthetician: For him aesthetics has the highest value, like artists. Hans Pfizner is an example of this kind of man.

3- Economist: He looks at problems as an economical

and profit making phenomenon. Robert Bosch falls into this category.

4- Social man: He is inclined to maintain an equilibrium in his relations. Albert Schweitzer falls into this category.

5- Authoritative man: These people are highly motivated to acquire power and are inclined to accomplish their wishes by authority. Benito Mussolini falls into this category.

6- Religious man: His entire religious perception is to find the highest moral values. Martin Buler is an example of this kind of man. (11)

Robert Hegglin, after presenting the fundamental scientific works of Kretschmer, accepted the importance of the certain factors involved in human mould for psychopaths. (14) Kretschmer's ideas can be summarized as follow:
(11)

KRETSCHMER'S CONSTITUTIONAL TYPES

Body Structure		Characters	
	Healthy	Intermediary	Illness
Leptosomatic	Schizothym	Schizoid	Schizophrenic
Pyknic	Cyclothymic	Cycloid	Manic-Depressive
Athletic	Viscous	Viscous- Meaning Epileptoid	Epileptic

In previous pages a summary of some modern theories of temperaments was briefly described. We will now attempt to state this theory as presented by the ancient philosophers and scientists.

Temperament is a quality of the human body found as a mixture of elements and principle particles. It means that temperament is an association and mingling of the elements. (15)

Avicenna defines temperament as interaction of opposing qualities of elements*. In order to secure the maximum and intimate contact with one another, the elements di-

* The Elements are: Water, earth, fire and air. The concept drawn from the Elements; that is, two opposite energies-heat and cold from fire and air-and also two opposite qualities such as dryness and moisture from earth and water drawn from mass, entered into medicine as a fundamental hypothesis. In fact Avicenna used physics of his time to explain and interpret most of the biologically and physiologically complicated phenomena of the body. For the importance of the Elements, Sir Arthur Eddington a Cambridge university professor in astronomy and a leader of the Relativity Theory, stated: If we do a careful inquiry with physical instruments over time, place, mass, light and color, all substances and things which are so real and tangible seem so clear and distinct from each other, that we will finally find the four elements in them: (9).

vide into particles. Whenever the qualities of these particles produce an effect upon each other, a new pattern of qualities is generated which includes all the particles of all the elements. Since the qualities of the elements namely cold, heat, dryness, and moisture are four, then the temperament of a newly organized or disintegrating body is the result of these qualities.(3)

Mahmoud-Ibn-Mohamad-Ibn-Omar Chaghmini in *Qanuncheh* defines temperament in the following manner: When the elements are mixed together in such manner as to affect one another in their full potential powers, in fact opposing each other and decreasing the effect of one another, there emerges a new pattern of quality which is equally distributed through out the particles of the compound. This compound quality is called temperament.(16)

The quality of the human temperament is innate as the strengths or weaknesses of its faculties are innate. Temperament, however, undergoes the temporary changes due to the effects such as food, climate, rest, exercise, sleep, and psychological emotion. The temperaments, as defined above are divided into sixteen types. Four others have two of their qualities influencing the other two. The temperament of an individual is compared to the temperament of a balanced person only under normal conditions. Since the skin, specially the skin of the finger tips, is the most balanced, touching is, therefore, considered to be the best instrument of perception. But the entire body is examined by all the five senses. So that the whole body, i.e. pulse, sensation, types of hair, sleep, work, affections, color of excrement, urine, etc. are all examined to complete the diagnosis.(9) Temperame-

nt, as defined above, carries a synthetic concept which is an indication of the physical and physiological qualities in terms of mass and energy. This concept is highly important for a clinician who utilizes these in terms of physiology, psychology, and also diagnosis and treatment of diseases. (3)

For further understanding of temperament according to the ancient and modern concepts, we will present and discuss the following table.

As illustrated in the Table, the description of the various constitutions of man is not restricted to Avicenna. It has its roots in the tridosha theory of Charak and Sushruta of India* and the humoral theory of Hippocrates and Galen. It is also sufficiently broad to cover various structural, physiological, and functional approaches made by Hurst, Jung, Kretschmer, Sheldon, Danielopolu, Eppinger and Hess, Pearson and Wyllie.

* The oldest medical schools such as "Susruta" and "Ateria", according to the Indian traditions, (the accuracy of this date was confirmed by Vedas) were established about 600 B.C. At that time there were two great universities in India, Benares in the east, Takshilla in the west. Ateria taught at Takshilla and Susruta taught at Benares. Susruta's book was outstanding in its own time. This book is specially important from the surgical point of view, explaining some surgical operations such as cataract, hernia repair, caesarean section, bladder stone removal etc. It also contains the oldest interpretation about plastic surgery, and the use of magnets in surgery as well as a detailed explanation of how to train skilled

THEORIES ON TEMPERAMENT THROUGHOUT CENTURIES (3)

Charak, sushruta(500B.C.)	Vata	Pitta	Kapha	
Hippocrates(460-337B.C.)	Apoplectic		Phlegmatic	Phthisical
Galen(138-200A.C.)	Sanguineous	Choleric		Melancholic
Avicenna(980-1037)	Hot & moist	Hot & dry	Cold & moist	Cold & Dry
Halle Husson(1821)	Temperaments Partial	Cephalique	Abdominale	Thoracique
Rotam(1828)	Type musculaire	Cerebral	Digestif	Respiratoire
Carus(1853)	Athletic	Cerebral	Phlegmatic	Asthenic
Laycock (1862)	Sanguineous	Bilious	Phlematic	Indancholic
Eppinger(1917)& Hers (1931)		Sympatheti- cotonic	Vagotonic	
Danielopolu(1920)	Amphotonic	Sympathetic- cotonic	Vagotonic	Amphohypotonic
Jung(1923)	Extrovert			Introvert
Kretschmer(1926)	Athletic		Pyknic	Leptosome
Hurst(1927)	Hyperasthenic	Hyposthenic	Gall bladder diathesis	Asthma& Migraine
Pavlov(1849-1935)	Lively	Impetuous	Calm	Weak
Pearson & Wyllie(1935)		Neuroar- thritic	Lymphatic	
Sheldon(1940)	Mesomorph	Ectomorph	Endomorph	Ectomorph
Petersen(1946)			Pyknic	Leptosome
Vannier(1952)	Carbonic	Phosphotic		Fluoric
Books & Mueller(1966)	Uric acid		Cholestrol	

surgeons. Some sections of the book speak about anatomy, physiology, pathology, midwifery and pediatrics. There is also a diagnostic explanation of a few diseases which might be mistaken with other (such as diabetes). The book gives the names of about 700 medicinal herbs; most of which are either bezoars or soporifics.

Special attention is paid to instructions in bathing and eating (9).

It may be noted that Galen's concept of the four humors leaves no room for the purely functional changes. Hess's and Eppinger's concepts are limited to only two types: Sympathetic and parasympathetic. These types of temperaments which Reimann shows, are identifiable with hot, cold, dry, and moist temperaments: (9)

VAGOTONIA

"Wet" type with increased oral, nasal, bronchial and other secretions

Low temperature

Low basal metabolism

Low blood pressure

Low pulse

increased peristalsis

Vaso-dilatation

SYMPATHEICOTONIA

"dry" type with decreased Secretions

High temperature

High basal metabolism

High blood pressure

High pulse

decreased peristalsis

Vaso-constriction

The clinical classification of Carus and physiological classification of Danielopolu correspond to the four temperaments of Canon. Pavlov, who worked on conditioned reflex, found twenty-four types of nervous systems. He also found in man four types of temperaments which are

quite identical with the ancient classification of temperament into the phlegmatic, sanguine, bilious, and melancholic. According to Pavlov weakness of excitation and inhibition* is an indication of melancholic temperament. Strong excitation and weak inhibition is bilious

*Absolute or slight opposition or prevention of an activity or the process of contradictions and contrariety between incongruous motives.

temperament. Strong excitation with strong inhibition explains phlegmatic and sanguine types of temperament according to their degree of mobility. Since Pavlov's four "types" corresponds with the four temperaments in Canon, it is hoped that science will soon be able to measure the heat, cold, dryness, and moisture of the body and find a pattern of correlation between excitation and inhibition with heat, cold, and mobility and resistance with moisture and dryness. (9)

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