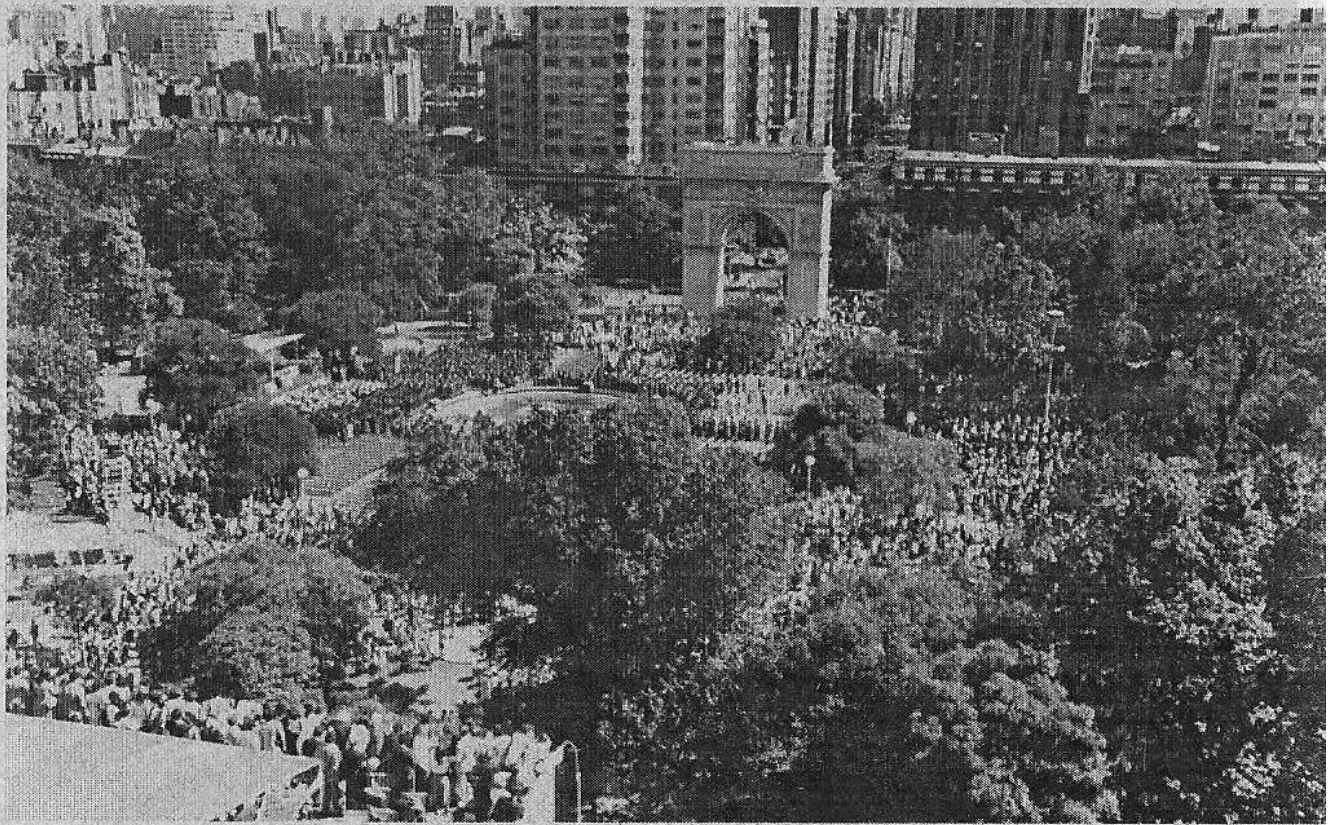


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Historian
Department of History
New York University
53 Washington Square South, 7th Floor
New York, NY 10012

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Medieval Arabic medicine is characterized by a mingling of what the ancient Greeks considered natural science and philosophy. These disciplines attempted to understand the physical world and its properties, and the meaning of humanity, respectively. This interplay of intellectual systems created a unique academic atmosphere, especially regarding how logic, treatises, systemic thinking and medical practice were conducted and valued. By examining works of three Islamic physicians of the tenth and eleventh centuries, it is possible to assess the differing methods on constructing new ideas with respect to systematized medicine. Persian physician Abū 'Alī al-Husayn ibn 'Abd Allāh ibn Sīnā al-Balkhī (ibn Sina), Egyptian physician Abu'l Hasan Ali ibn Ridwan Al-Misri (ibn Ridwan), and Persian physician Abū Bakr Muhammad ibn Zakarīya al-Rāzi (al Razi) each left a prolific body of texts from which several philosophies regarding medicine and intellectualism can be inferred. Since none of the doctors are in precise agreement about how to interpret past medical sources or how to modify the practice of medicine for the future, yet all substantiate their claims using varying syllogistic systems, analyzing their texts provides invaluable insight into how socially prominent scholars regarded man's ability to reason.

Medicine is a system founded on logic; it is dependent on known predicates from which conclusions (such as a diagnosis) can be drawn. The ability to draw conclusions from established truths was the heart of medicine as a system. Generally, predicates were drawn from the postulates and conclusions of earlier physicians. However the texts of ibn Sina, ibn Ridwan and al Razi indicate that medical knowledge was schematized in such a way that individual physicians had a greater source basis than only the works of previous doctors. Not only were they in dialogue with the past's doctrine, evaluating its validity when contemporary evidence challenged it, but they also added, modified or simply accepted the established medical system based on their own clinical experiences and intuition. While ibn Sina explicitly comments on the nature of drawing conclusions from established predicates and from personal experience, ibn Ridwan's and al Razi's texts describe differing methods on how predicates and logical systems were practiced and regarded.

Ibn Sina, ibn Ridwan and al Razi are all in agreement that for a man to be a physician or an intellectual, he must have a strong knowledge of ancient texts. It was vital for a physician's practice and reputation to be thoroughly familiar with the works of Galen, Hippocrates, Dioscorides and such Greek doctors who had outlined the humoral system of medicine, which was the accepted method of assessing and dealing with disease.¹ Where the Arabic doctors differ, however, is in how the ancient texts are to be interpreted, in how to apply their lessons to the practice of medicine, and finally, in the extent to which the texts represent authority and "truth." Although these differences may

Adam Blumenberg is currently a junior at the College of Arts and Science. His historical interests focus on medieval monkishness and Arabic medicine. His other interests include filmmaking, photography, science fiction and building contraptions. After graduation, he plans to attend graduate school for medieval history and then go to medical school.

seem personal or subjective, they actually arise from their varying interpretations of how to construct and think about a logical syllogism. The individual physician had to make a choice as to what would be his bias with regards to sources for predicates. This choice and bias can be thought of as the physician's intuition.

Islamic intellectualism is continuous with that of the Ancient Greeks.

Philosophers like Plato and Aristotle gave precedents for how to construct an argument using logic. The most basic tenet of a logical argument is the syllogism, by which a conclusion is interpolated from a major and a minor predicate. For example: disease is caused by an imbalance of bodily fluids (major predicate); Joey has melancholy (minor predicate); thus, Joey has an imbalance of bodily fluids (conclusion). As ibn Sina wrote, "logic is that science in which may be seen the state of knowing the unknown by the known."² What he means is that known information implies unknown information. In this case, we can learn the causality of Joey's disorder from two other pieces of knowledge.

Logic and rational thinking were considered not only very useful, but also the defining portion of the human psyche. Al Razi wrote a treatise called the *Spiritual Physick*³, which was intended to help an individual achieve a "reformation of [his] soul's character"⁴ by convincing the man to stifle all passion and try to conduct his life rationally. Al Razi's interpretation of "reason" and "rational" can be thought of as an individual's natural inclination to apply logic to a situation. He claims that god prefers man to beasts, and thus has given reason to humans to provide for mankind "every advantage."⁵ Clearly this means that al Razi considers logic to be an advantage for man; he qualifies this by describing how man has the "faculty of will" and the ability to "release action ... after deliberation"⁶ as opposed to acting without first considering the results. The ability to reason allows a person to control his own life by means of thought, as opposed to simply following animalistic impulses. Al Razi believes reason to be the most unique attribute of humanity: the ability to forecast an unknowable future from a known present. Accordingly, logic is not only common to all humans, but cultivating one's ability to reason is of the foremost philosophical importance, as it elevates the individual to a higher level.

Al Razi describes a dualistic system in which the rational man is beset by passion. He claims that passion distracts from all that is good and leads a person into unfavorable appetites such as anger, gluttony and sexual intercourse. He continues that these are the enemies of the soul and lower a person to a bestial state. Al Razi writes "to reign and suppress the passion is an obligation according to every opinion, in the view of every reasoning man, and according to every religion."⁷ Thus he invokes not only the beliefs of every rational person, but also the ultimate authority of god in disparaging the enemy of reason. He claims that since passion leads into unfavorable appetites, blocking it off stops other vices from growing; thus rational thinking is the best virtue because it protects from all evils.⁸ He concludes his praise of logic by saying that since the end result of reason is "treating all men justly,"⁹ if everyone were to employ reason, the earth would be a much more humane place for man. In his defense of reason, al Razi has made the argument that not only is logic a wonderful and divine gift and therefore beautiful as an end in itself, but also that the opposite of reason leads a person into a dreadful state of being. Al Razi has demonstrated his point both by direct positive reasoning to establish reason as a virtue, and also by scorning its opposite.

Al Razi's utter defense of reason and condemnation of passion indicates his philosophy about his profession: a physician who is well versed in science, logic and philosophy must serve as a proxy for his patients who might be more susceptible to passion. This reflects his motive for writing the *Spiritual Physick*: al Razi hopes that the book will inspire those who read it to think more critically about their own lives. Thus al Razi's opinion of logic is apparent; it is useful towards the goal of making individual people better. Since he is both a physician and a philosopher it is fair to say that he means this both physically and spiritually—by employing logic to improve one's behavior he can become a more perfect person.

Although logic is incredibly useful in a variety of situations, thinking about logic logically is problematical. For example, while al Razi's praise of logic is clear, it does not reflect the varying opinions of every intellectual. The Ancient Greeks were divided regarding how to think of logic: Aristotle considered it a creative art, the Stoics considered it a branch of philosophy, and the Peripatetics considered it an instrument of thought.¹⁰ The Islamic physicians agreed most with the Platonists however, interpreting logic as both a function of philosophy and an instrument of science.

Returning to the basic syllogism, a few flaws are evident. If a universal truth (universal) is known, individual observations and truths (particulars) can be inferred deductively. The most fundamental problem however, is the source and validity of the universal. The Ancients often circumvented this issue, for example the Empiricists rejected the system by which predicates were established, preferring to draw conclusions simply from observations.¹¹ They understood that an observation is relatively objective, while an idea to explain the observation is fabricated by a human being. An example of the questionable nature of predicates is thus: in the earlier syllogism about Joey having melancholy as a result of an imbalance in his humors, the predicates only imply the conclusions if they themselves are true. The statement "Joey has melancholy" can be assessed as true or false by simply observing Joey. The statement "disease is caused by an imbalance of bodily fluids" cannot be so easily assessed. Although the above statement was a truism in the context of medieval medicine, this is only so because it was thoroughly established centuries previously by the authors of the Greek medical canon. Although physicians did not directly question the actuality of the humoral system of medicine, ibn Sina did demonstrate how logic fails to construct a universal from one or more particulars.

He argues that there are only two methods of arriving at a piece of truth, induction and observation.¹² Although these allow for a great deal of particulars to be assessed, it is impossible to extrapolate a universal with absolute certainty. For example, a man can observe that humans, dogs, cats, goldfish, rodents and all other animals he has ever seen chew with their lower jaw, and from this information extrapolate that all animals chew with their lower jaw. Although this is true for every creature he has encountered, it is not true for the crocodile and thus the universal does not hold.

Ibn Sina explicates this rift between a particular and a universal when he asks "if there is no reason why between the predicate and the subject, then how is the relation between them made evident?" By asking this question, he demonstrates how coming to a universal by means of particulars would be a tautological argument; the universal is a unifying theory of particulars and thus *is* the "reason why." Using a universal to prove itself true is illogical because it would rely on the universal to have already been proven

true. The syllogism would be characterized by the statement, "A is true because A is true." This is circular logic and is not an adequate proof.

Ibn Sina, following the Empiricists, is aware of the problem that a single man cannot know every particular and thus cannot base a universal solely on individual observances.¹³ What he finds most problematic about this is that such an admission is intellectually paralyzing; if one cannot imagine a system that unites the qualities of different particulars, then one cannot comment on anything he has not directly observed. This is especially difficult for ibn Sina because he is a physician and must treat and assess all sorts of maladies in a practical setting. To remedy this, he proposes that universals be established via induction:

Induction is a universal judgment, [which is made] ... with reference to the particulars of that universal, either all of them, in which case there is the "perfect induction" or most of them, in which case there is the "accepted induction." Thus induction is like judging the middle term through the major term, because of the existence of the major term in the minor term.¹⁴

What he is describing is the acceptance of a universal based on imperfect or incomplete evidence. He asserts that although every particular cannot be known, knowing enough to consistently be able to point to a single universal is enough to accept that universal as practically true. This is the form he refers to as "accepted induction," meaning that the universal is held true out of convention more than out of verifiable proof. Also, although the particulars do not imply causality, they do demonstrate a correlation from which a theory as to causality can be formed. Although this approach is relied upon for practical reasons and convention, it is not arbitrary. Ultimately accepted induction is necessary because it allows intellectuals to progress and move forward in postulating ideas and using logic. Although ibn Sina concedes that taking this leap of faith is unscientific, he recognizes the necessity of accepting an inductive conclusion in avoiding intellectual paralysis.

Al Razi provides a brilliant example of conducting medicine by accepted induction as evidenced by his *Casebook*.¹⁵ The *Casebook* summarizes the illnesses and treatments of over 900 patients from onset of symptoms until point of crisis (usually death).¹⁶ No attempt is made at diagnosing the cause of illness, and often no treatment is prescribed.¹⁷ This indicates that al Razi is keeping records of his patients' conditions so that he can establish trends as to their prognoses and further the body of medical knowledge. This is the definition of accepted induction as set forth by ibn Sina; al Razi is examining the particular symptoms and results of his patients' illnesses and from these he extrapolates trends. Thus when a patient comes in with symptoms he has chronicled in the *Casebook*, al Razi merely has to look at what has happened in the past to predict results. Although such a record book is certainly very useful to al Razi's practice, it is nevertheless a conventional tool and not an instrument of pure logic.

While the ancient medical system was arguably only a conventional tool for a physician's practice, there is no evidence that this was entirely acknowledged. Al Razi seems to distinguish between convention as approximating a scientific truth and convention for its own sake. He recounts an experience in which he argues with a student of rhetoric about the value of convention:

[The student] had considerable competence in grammar, lexicography and poetry. ... [My colleague said to me] "Ask this lad here some questions relating to the elements of the 'necessary' sciences. He is one of those who think that they who are skilled in lexicography can answer any inquiry that is put to them. I said, "Tell me about the sciences—are they necessary or conventional?" ... he at once blurted out, "all the sciences are conventional." ... then I asked him, "Take the case of the man who knows that the moon will be eclipsed on such-and-such a night...—is his knowledge of this correct only because people conventionally adopt these opinions?" "No" he answered...[after further argument] I proceeded to show him how he had contradicted himself and how his argument fell to pieces.¹⁸

Al Razi makes the point that rhetoric and eloquence are not a substitute for truth. He scornfully describes the student as believing that wisdom

consist[s] solely of grammar, poetry [and] correctness of speech ... [he is] quite unaware that philosophers do not count a single one of these subjects as wisdom...[the philosopher's] idea of a wise man is he who knows the ... rules of logical demonstration.¹⁹

These passages give great insight into how al Razi regards the nature of logic. He sneers at the rhetorician for believing he can make an untrue statement appear true by cunning tricks of grammar that simply mimic logic. By ridiculing the student, al Razi simultaneously acknowledges that there is a structured logical protocol that must be followed, and also that there are improper ways of coming to a logical conclusion. He gives the example of an eclipse which is predicted then later verified; al Razi claims that the principles by which the eclipse was predicted cannot simply be a human convention for there would be no results if this were the case. Thus al Razi illustrates how the science of astronomy is independently and objectively confirmed. He knows that if science were simply conventional, it would be useless because it could not achieve real results: a customary value, if arbitrary, cannot be considered science. Although this may seem to contradict al Razi's use of accepted induction with regards to his *Casebook*, he is able to draw fairly accurate predictions based on the observances in this text and thus it is not an arbitrary convention.

Ibn Sina's idea of accepted induction and al Razi's use of the *Casebook* could be considered convention to the extent that they are imperfectly proven conclusions that physicians use as if true. However predictions can be drawn from these conclusions and therefore they provide a workable system. In a practical sense, this is ultimately more important than the manner by which a universal was discovered; accepting these values releases the physicians from intellectual paralysis and allows them to actually practice medicine.

Although inducted universals from contemporary observation was an important pillar of the body of medical knowledge, the primary source of universals was the Greek medical canon. However assessing the extent to which physicians considered it "truism"

is difficult. Galen and other ancients had delineated a very precise physical system for the mechanism of health and disease in the human body. Health was considered a state of equilibrium, balancing the four humors—blood, phlegm, yellow bile and black bile. The humors correspond to the four elements (fire, water, air, earth) and interact with the environment's four qualities (hot, cold, wet, dry).²⁰ The system worked intuitively. For example, if a patient suffered from a malady caused by an overabundance of yellow bile, the physician knew that he would simply have to decrease the amount of yellow bile. To do this he might prescribe food rich in water, which was the opposite element of fire, which corresponds to yellow bile. Thus, theoretically, the amount of yellow bile would return to its proper level.

Regardless of the accuracy of the humoral system, it was invaluable to medieval culture because it allowed a physician to make a diagnosis, prognosis and plan of treatment. Even so, a physician's reputation ultimately depended more on his ability to prognose the result of an illness than on his ability to treat it effectively.²¹ Essentially a physician was not expected to cure a disease, but to predict whether a patient would live, and if so with what lasting morbidities. This means two things: (1) the more experience a physician has → the better he can prognose illnesses he has seen → the better the physician, and (2) the more a physician knows the medical literature → the better he can prognose an illness he has never seen → the better the physician. These points again reveal the two methods of arriving at a truth; the first point reveals the inductive mode of thinking in which observed trends are analyzed and generalities drawn from particulars. The second indicates a stricter syllogistic system in which the major predicates (drawn from the Galenic system) are given and the minor predicates (the symptoms of the disease) are observed, thus allowing a conclusion to be drawn. As such, the physician's reputation and practice were dependent both on personal experience and on knowledge of the ancient texts. Al Razi and ibn Ridwan differ on how to value these two methods of conducting their medical practices.

Al Razi was perhaps the most famous and prolific medieval Arabic physician with a strong understanding of the medical canon as well as immeasurable personal experience with treating illness. He was not only an important practicing physician however, but also a key figure in continuing the Greek literary tradition. Al Razi translated and transcribed many of the Greek texts into Arabic so that he and other physicians could better learn from the ancient masters.²² What is particularly notable however, is that in copying Galen's treatises al Razi corrected Galen and added his own commentaries.²³ This is very significant because it demonstrates that al Razi was in dialogue with past physicians as opposed to simply accepting their words as truisms. This was not necessarily a standard approach however, as is seen by ibn Ridwan's criticism of al Razi for transmitting Galen with modification and commentary.²⁴ This demonstrates rivaling interpretations of how to assess the validity of established predicates. Although al Razi never denied the Galenical system, he did not accept the entirety of it as a single truth. Ibn Ridwan's stance on the issue is murkier. While it is clear that al Razi appreciated the Galenical system even though his experience necessitated some modification of it, ibn Ridwan appears to have a more resolute stance on keeping the whole system intact.

Ibn Ridwan is very opposed to novel ideas that contradict the established system. He examines and debunks a treatise on why Egyptian air is unhealthy written by Tunisian physician al Jazzar, demonstrating that al Jazzar has misunderstood not only the

conditions in Egypt, but also the words of Hippocrates. In his polemic against al Jazzar, ibn Ridwan writes:

Al Jazzar said: "The air of Egypt during most of the year is similar to the air of autumn in its coldness, dryness, and variation." [However] this is different from what is actually perceived during the entire year. The air of Egypt is always damp in the autumn and other seasons as well. Ibn al Jazzar supported his statement by reports that created *an illusion of truth for the listener*.²⁵ Among these reports is the assertion of Hippocrates: "When there is at any time of the year a day that is at one time hot and another time cold, expect the occurrence of autumnal illnesses." Ibn al Jazzar said in this chapter: "Most of the illnesses of the Egyptians are autumnal." This is wrong. ...

Also, most of the illnesses of the Egyptians are not illnesses of the black bile ... these illnesses are the least frequent.²⁶

This critique of al Jazzar's scientific method is very telling. Ibn Ridwan demonstrates that al Jazzar not only misinterpreted Egyptian diseases as maladies of black bile, but also that he improperly used a Hippocratic text to establish this conclusion. Ibn Ridwan quoted al Jazzar describing Egyptian air as cold dry and varied, then relating the air to Hippocrates' description of unhealthy air caused by alternations between hot and cold. Ibn Ridwan shows how this comparison is un-equivalent, and also that the type of disease observed in Egypt does not actually support al Jazzar's description. Ibn Ridwan goes as far as to write "The statements of ibn al-Jazzar are contrary to the statements of the Ancients, and this is quite unthinkable."²⁷ While the passage in which ibn Ridwan debunks al Jazzar's conclusions is fairly clinical and straightforward, describing al Jazzar's method as "unthinkable" demonstrates the extent to which ibn Ridwan detests such reasoning. Even more than for being incorrect in his diagnosis, ibn Ridwan cannot tolerate that al Jazzar misinterpreted the words of the ancients. Thus ibn Ridwan's passage signifies not only the extent of competition between physicians for reputation, but also an utter reliance on the Greek canon for predicates.

Clearly ibn Ridwan greatly esteems the wisdom of the Greek physicians, but when his argument against deviating from their teachings is coupled with his criticism of those who even comment and correct the ancients with their own knowledge, his stance on the transmission of universals is apparent. Ibn Ridwan not only believes that the systems delineated by the ancients must be followed with precision, but that they must be transmitted to future generations uncorrupted. Although this is in opposition to al Razi's more interpretive approach to the Galenic system, it is important not to pigeonhole these physicians into opposing categories. Even though al Razi and ibn Ridwan wrote texts which imply their respective theories on how medicine ought to be practiced, evidence as to how medicine actually was practiced differs.

Although there is a great tradition of detail in describing surgical procedures in extant medical texts, there is evidence that many procedures were rarely performed, even when they were appropriate for a disease. For example, physician Zahrawi abstained from performing a potentially life saving procedure as delineated by the Greeks when he refused to drill a hole to release the fluid from a hydrocephalic child's head. Zahrawi wrote that he "preferred not to undertake the operation."²⁸ This is notable because here

Zahrawi accepts the theories of the ancients, however decides not to put them to use. Another example is that ancient sources state that a tracheotomy could save a patient from asphyxiation.²⁹ However, Arabic physicians regarded this operation as incredibly risky because theoretically it could lead to fatal hemorrhaging. Thus although the procedure was recommended by ancient sources, physicians like al Razi and Zahrawi considered it too dangerous to actually perform.³⁰ However since the physicians evidently never attempted the procedure themselves either, their noncompliance with the advice of the ancients is all the more telling. The physicians consciously decided to depart from the guidance of the Greeks while simultaneously not relying on direct personal experience. As clearly demonstrated, men like al Razi were vested in reason and it would seem illogical for him to endanger a patient's life against ancient advice and with no direct experience as a guide. However this apparent discrepancy is reconciled by the idea that al Razi probably read texts regarding throat blood vessels or has had analogous experiences. The implication is that al Razi assessed the tracheotomy as too dangerous to perform based on a greater system: the ancient sources and his own experience give him an intuitive sense of medicine, which effectively transcends the predicates of the system. By synthesizing the different methods of attaining bases for systematized medicine, al Razi and the other physicians created a body of knowledge that amounts to far more than a mere combination of "old" and "new" ideas. By combining their own observations and the words of the Ancients, the physicians created a unique body of medical knowledge.

Medieval Arabic medicine was a system founded on logic and based on observation and the knowledge of the ancient Greeks. However the evidence of physicians like al Razi, ibn Ridwan and ibn Sina indicates that these doctors had a grasp on medicine that went beyond mere observation and compliance with the truisms of the past. Medicine, although regimented and somewhat regulated by intellectual protocols, was practiced as an individual physician's synthesis of a great deal of knowledge. The doctors neither threw out nor simply accepted the facts as given, but rather assessed situations and weighed opposing pieces of evidence. Although experience and study were the two major sources from which a physician would make decisions, ultimately he had to interpret these predicates and choose which predicates were more accurate. This decision is derived from the physician's personal intuition; his understanding of how to assess his own observations and the findings of past colleagues allows him to decide what actions to take.

The textual and intellectual framework of medieval Arabic medicine is related to a greater medieval system of thinking. By assessing how physicians regarded their own scholarship and their place in intellectual continuity, one can analogize to other scholarly fields such as philosophy, astronomy, and mathematics. Perhaps more interestingly however, are the implications about a human being's drive to know what cannot be known absolutely. Ibn Sina realized that the first principles of a body of knowledge are inevitably accepted true, not proven true. Yet even with an imperfect foundation, medicine was a complicated intellectual system with a vast body of knowledge attached to it. In the end, this means that despite having to begin from a flawed base, the ancients and medievals were still able to craft a fantastic and workable system of knowledge.

Notes

- ¹ Alvarez-Millan, Cristina, "Graeco-Roman Case Histories and their Influence on Medieval Islamic Clinical Accounts," *Society for the Social History of Medicine* 12 (1999), 20.
- ² Afnan, Soheil, *Avicenna His Life and Works*, (London, 1958) p. 85
- ³ Abu Bakr Muhammad ibn Zakariya al-Razi, *The Spiritual Physick of Rhazes*, trans. Arthur J. Arberry (London, 1950).
- ⁴ *Spiritual Physick* 22
- ⁵ *Ibid.*, 20
- ⁶ *Ibid.*, 22
- ⁷ *Ibid.*, 33
- ⁸ *Ibid.*, 35
- ⁹ *Ibid.*, 101
- ¹⁰ Avicenna p. 83
- ¹¹ Dols, Michael, *Medieval Islamic Medicine*, (Los Angeles, 1984) p. 21
- ¹² McGinnis, Jon, "Scientific Methodologies in Medieval Islam," *Journal of the History of Philosophy* 41 (2003), p. 307
- ¹³ *Scientific Methodologies* p. 310
- ¹⁴ *Ibid.*, 309
- ¹⁵ *Graeco-Roman Case Histories* p. 34
- ¹⁶ *Ibid.*, loc. cit.
- ¹⁷ *Ibid.*, loc. cit.
- ¹⁸ *Spiritual Physick* pps. 45-47
- ¹⁹ *Ibid.*, 45
- ²⁰ *Medieval Islamic Medicine* p. 10
- ²¹ *Graeco-Roman Case Histories* p. 24
- ²² *Ibid.*, 37
- ²³ *Ibid.*, 37
- ²⁴ *Medieval Islamic Medicine* p. 64
- ²⁵ Italics added for emphasis
- ²⁶ *Medieval Islamic Medicine* p. 99
- ²⁷ *Ibid.*, 102
- ²⁸ Savage-Smith, Emilie, "The Practice of Surgery in Islamic Lands: Myth and Reality," *Society for the Social History of Medicine* 13 (2000), p. 310
- ²⁹ *Ibid.*, 310
- ³⁰ *Ibid.*, 310