CHAPTER TWO

Learned Man and Woman in Antiquity and the Middle Ages

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In ancient and medieval societies, certain individuals were able to distinguish themselves *as learned* and to ensure that evidence, or narratives, of their learning survived to our time. In order to understand who these individuals were from a historical perspective, we should consider broadly the nature of the learning they controlled as well as give some description, where possible, of who these people actually were—how they lived, what kinds of stories circulated about them, and how they transmitted their learning.

What was meant by *learned* was different in different times and places. For example, the learned man might be seen as the goal of a general Buddhist monastic education, or as the successful candidate of civil examinations, who had mastered an appropriate interpretation of the Confucian classics (Elman 2000; Lee 2000, 111–70; Scharfe 2002, 158–9). Stories of the mathematician Archimedes (c. 250–212 BCE) were used to illustrate the learning that Roman conquerors could inherit from Greek scholars (Jaeger 2013). For Sanskrit grammarians, the pinnacle of learning was represented by the brahmans of Āryāvarta, who understood correct speech through an innate genius (Pollock 1985, 505). In all cases, however, the learned were those who had mastered something that we can call knowledge, or science, taken broadly. Often, however, the content of this theoretical knowledge was far removed from current forms. Lists of medieval Indian or Islamic sciences often include a number of transliterated terms—the implication being that these designate fields of knowledge are so alien to our current concepts that they cannot be fully conveyed by simple modern expressions.

The Sanskrit term *śāstra*—meaning rules, treatise, or knowledge—includes many concepts that are similar to what we mean by knowledge, or science, but others that are fairly divergent. *Śāstra* is divided, first, between *śruti*, heard texts, such as the Vedic hymns, mantras and various theological works, and *smṛti*, remembered texts, such as rules of behavior and other fields of knowledge. Lists of shastric teachings include subjects like the *Vedas* and *Upavedas*, history (*itihāsaveda*), statecraft (*arthaśāstra*),

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weapons and war (*dhanurveda*), music, medicine (*āyurveda)*, logic or philosophy (*ānvīkṣikī*), Sanskrit grammar, metrics, astronomy/astrology, sacrificial procedures, economics (*vārttā*), cooking, erotology, law (*daṇḍanīti*), and so on. In general, the primary goal of *śāstra* was to regulate correct behavior. Just as some texts give us rules for solving mathematical problems, other texts give us rules for lovemaking. There is hardly a discernible difference between normative and descriptive knowledge (Pollock 1985, 2011; Scharfe 2002, 13–17).

Although the divisions and categorizations of the sciences were different for different individuals, in medieval Arabic discourse the most essential branch of knowledge (*ʿilm*) was that of the religious sciences, such as exegesis of the Qurʾān (*tafsīr*), study of the traditions of the prophet Muammad (*ḥadīth*), jurisprudence (*fiqh*), and rational theology (*kalām*). There were also fields that were sometimes described as educational, such as calculation, grammar and metrics, animal husbandry, and history. Finally, there were the sciences known as rational, ancient, and sometimes foreign, such as late Platonic or Aristotelian philosophy (*falsafa*), logic, arithmetic, geometry, astronomy, and medicine. Among these fields, however, we also find some disciplines that were produced within Islamic societies, as algebra (*ḥisāb al-jabr wa'l-muqābala*), timekeeping (*ʿilm al-mīqāt*), and cosmography or structural astronomy (*ʿilm al-hayʾa*). Even scholars who are best known to us as mathematicians or physicians, however, were often known in their own times as masters and scholars of the religious sciences (Rosenthal 1975, 54–70; Brentjes 2008; Brentjes 2014, 95).

Potentially more deceptive, however, are those fields that the Greeks designated by words that are the source of terms that we still use to name modern disciplines. Our physics has almost nothing to do with ancient studies of *phusis*—the essence of natural, and especially living, things. The word *mathēmatikē* was used to designate studies in harmonics, sundial construction, and astrology as well as number theory and geometry. *Philosophia* encompassed many things that we still understand as philosophy—such as ethics, political theory, and logic—but it also had broader meanings. It could designate a general inquiry into the life worth living, including spiritual practices, as well as more technical fields such as medicine or the mathematical sciences (Feke 2014; Tolsa 2014, 458).

All of these terms—*śāstra*, *ʿilm*, *philosophia*—must be understood first and foremost in the cultural context in which they arose. They also, however, meant something general, like knowledge, or *science*—when by "science" we mean an account of the things that we think we know.

For more recent historical periods, we generally regard a study of an individual's lived experience as essential to fully understanding the content of their thought. For pre-modern periods, however, our sources are often insufficiently detailed to elucidate this background. Even in the few cases where we have a rich source basis for discussing an individual's life, the authors of our sources were often motivated by other interests than that of conveying to us a complete picture of the lived experience of the subject at hand. Stories of learned men were sometimes related in order to develop a picture of an estimable life, or in order to provide moral lessons (Fancy 2013, 21–22; Jaeger 2013). We might be told about the learning of certain women so as to boost our estimation of the houses to which they belonged (Azad 2013, 81). In such cases, the roles of learned individuals can be analyzed both as narrative and as lived experience, although the two may in fact be different.

We also have cases of individuals who are known as learned but who left no texts, either intentionally, such as Pythagoras (late sixth–early fifth century BCE), or through the accidents of history, such as Hypatia (mid fourth–early fifth century CE). Here, all that remains to us are stories, which themselves change over time. The early Pythagoras was a sage who traveled to the east and brought back to the Greek colonies a love of wisdom and knowledge of an upright way of life (Zhmud 2012, 30–60). The later Pythagoras was a miracle-worker, who personified a righteous life and taught his followers the mathematical mysteries of the universe (O'Meara 1989). In the early sources, Hypatia appears as teacher of both pagans and Christians, who exemplified a broad-minded virtue, whereas in later sources she became a trope to depict conflicts between forms of knowledge that emphasize reason and others that emphasize faith (Dzielska 1995).

Finally, learned individuals were sometimes regarded as identical with the texts they left. A striking example is that of Euclid (early third century BCE), about whom we know almost nothing aside from the mathematical texts attributed to him. Whoever Euclid was, or whatever he thought, must be grasped through these texts and their connections to other texts. For ancient and medieval readers, however, a similar perspective was sometimes also taken towards authors whose life circumstances were recorded. For example, although accounts of the life of Aristotle (384–322 BCE) were known, these were rarely used as a means to analyze his thought. For most readers in the ancient and medieval periods, Aristotle was simply encountered *as his works*—but, of course, different readers had access to different texts, and read them in different ways. In this chapter, I will describe a number of examples of learned individuals in the ancient and medieval periods, sometimes with regard to their lived experience, sometimes through the stories that were told about them, and sometimes through the writings that they left.

Greek Mathematicians in the Hellenic Cities

Although we have no direct evidence for the activities of learned mathematicians of the classical Hellenic period (c. 500–c. 300 CE), it appears that they sought to distinguish their work both from practical traditions of mathematics that went back to Egypt and Babylonia, and from that of other groups of intellectuals, like philosophers and sophists. Nevertheless, it is clear that during this early period mathematicians never formed a professional group who earned their living through developing and teaching their mathematical skills, although some of them apparently did earn a living teaching mathematics (Asper 2003).

Indeed, although those mathematicians that we know anything about all came from privileged backgrounds, they appear to have performed diverse social roles. Archytas (mid-fifth–mid-fourth century BCE) was a statesman and a general; Hippocrates of Chios (mid-fifth century BCE) was a wealthy merchant; while Eudoxus (mid-fourth century BCE) was a legislator and a philosopher with many students. Nevertheless, the respect accorded to mathematicians in philosophical and literary texts indicates that they were able to secure a place for themselves in learned high culture, even if they had no institutionalized role in society (Netz 1997; Netz 2002).

We know almost nothing about the ways in which early mathematicians learned their discipline or how this might have been related to education in the philosophical

schools. Nevertheless, it seems likely that Greek mathematicians most often worked alone, not in research groups or schools. Of course, there are some exceptions to this. In Athens, there were small groups of mathematicians who worked together, or at least on related problems. Some of these, such as Eudoxus, then returned to their homes and founded schools of mathematical and philosophical instruction. There were also peripheral schools, of which a striking example was the group at Cyzicus (Sedley 1976).

Families of Scholars in Persian and Hellenistic Uruk

Excavations of the ruins of the ancient Mesopotamian city of Uruk have given us direct evidence for the scholarly activity of a number of learned families, in the form of clay tablets written and owned by these scholars. While the city underwent major political transitions from Persian rule under the Achaemenids (c. 485–c. 330 BCE) and Greek rule under the Selucids (c. 330–c. 125 BCE), clans of scholars who could trace their lineages back for centuries continued the traditional scribal practices of their houses, integrating new methods in mathematical astronomy and predictive astrology with their performances of the ancient rites (Rochberg 2004, chapter 6; Beaulieu 2006; Robson 2008, chapter 8; Steele 2011).

They had a number of different titles, such as "scribe (*ṭupšar*) of *Enūma Anu Enlil* (a canonical omen text)," incantation priest (*āšipu*), or lamentation priest (*kalû*), but the evidence of the clay tablets that they wrote, or owned, indicates that the men of these families practiced a broad range of scholarly activities. Two families who lived successively in the same house during the Persian period owned tablets covering various omens, medical prescriptions and incantations, rituals and magic, hymns and literature, astronomy/astrology, mathematics, and the earliest-known tablet of predictive mathematical astronomy. During the Hellenistic period, we have a wealth of tablets mentioning four interrelated families. The tablets from these families deal with omens and rituals, incantations and lamentations, medical and magical astrology, horoscopic astrology, and predictive mathematical astronomy. As well as their responsibilities in preparing for and performing various rites, the men of these families also carried out other scribal functions, such as writing and witnessing legal and financial documents (Robson 2008, 229–50).

It appears from the evidence that these scholars formed a tight-knit, professional community. Their families intermarried, and by working together to train each successive generation they managed to keep their learning within the confines of these narrow circles for centuries. The fact that the colophons of a number of tablets describe the contents as secret, or exclusive, indicates that these scribal traditions were carefully guarded within certain family groups. Tablets that list correlations between astronomical signs and parts of rare animals may have been a kind of code for medicinal remedies based on astrological reasoning. Through such means, scribal and priestly families could insure their elite status as "learned" through many generations (Rochberg 2004, 211–13; Steele 2011, 335–8).

It was almost certainly members of these scholarly families, probably in Babylon and Uruk, who developed the sophisticated methods of predicting the behavior of the moon and the planets known as Babylonian mathematical astronomy (Neugebauer 1975, book 2; Ossendrijver 2012). The motivations for the production of this

predictive apparatus probably came from the cult duties of these scholars and the needs of their temples. The priests of these families were charged with performing various rites in conjunction with meaningful celestial events, and with enacting rituals for warding off the ill tidings of certain omens. As the methods of mathematical astronomy developed, they were able to determine with considerable confidence when these events would occur and to predict beforehand when certain omens would appear. This secret knowledge allowed them, and them alone, to fulfill their sacred duties.

Scholars as Clients in Warring States to Early Han China

The transition from the Warring States to the formation of the first empires, Qin and Han, was a period of great social and political change. During this time, scholars both produced many of the concepts that would later assume a central place in Chinese intellectual activity, and they developed the idealized narratives of their own role in society.

Throughout the Warring States period (mid-fifth century–211 BCE), gentleman-scholars (*shi* 士) sought out patronage as clients, or guests (*ke* 客) at local courts. In this, they competed not only with each other, but also with a broad spectrum of probably more useful, and certainly more entertaining guests, such as a man who was an expert in the art of assassination, or one who could crow like a rooster. The primary role of scribes (*shi* 史) and scholarly retainers appears to have been that of determining the timing and format of ritual practices, and performing key roles in the rituals themselves. Some scholarly retainers, known as *ru* 儒, also educated the youth of noble houses in high culture, ethics and rituals (Cook 1995; Lee 2000, 108–10; Lloyd and Sivin 2002, 22–32).

Rulers accumulated retainers, however, not in order to promote scholarly research or education, but in order to increase their own prestige. Nevertheless, some rulers gathered together such large numbers of scholars that they created renowned centers of leaning. One of these was the Duke Huan of Qi, who is said to have appointed some from among his learned guests to serve as ministers in his government. Another famous example is that of Lu Buwei who, as chancellor of Qin, reportedly collected some 3000 guests. In this position, he oversaw the production of the encyclopedic *Springs and Autumns of Master Lu*.

This is the social background in which the ideas that later formed the basis of the Chinese cosmological synthesis were originally generated (Lloyd and Sivin 2002, 253–71). Although many different concepts were advanced and circulated during this period, some of these came to be understood as fundamental—such as *qi* 氣, an active principle of all matter; *yin–yang* 陰陽, used to explain polarities of opposites and complementaries; and the *five phases* (*wu-xing* 五行), a conceptual scheme used to describe interactions and relationships. It is important to recognize, however, that these concepts only became canonical in later re-readings of the ancient sources, and many related concepts that were introduced in the Warring States period were not further expounded in later texts (Cook 2013; Lo 2013).

In the Qin and early Han periods (211 BCE–c. 100 BCE), certain ritualists were able to convince the state to allow the teaching of only their preferred classics. Lineages of masters and disciples formed around the transmission of certain texts—usually, in the form of bundles of bamboo strips, which were treated as venerated material objects,

sometimes gifted to rulers, or interred with the dead. During this period, the term *ru* came to designate those lineages that focused on transmitting the Confucian classics. In the Han, procedures were developed for selecting and qualifying individuals from these groups, on the basis of their mastery of the classical texts, to serve as salaried functionaries (*boshi* 博士) in the state bureaucracy—such as advisors, diplomats, historians, astronomers, and so on (Zufferey 1998; Lloyd and Sivin 2002, 32–42).

In these contexts, scholars generally addressed their works to rulers and sought to establish a place for themselves as minsters in the imperial bureaucracy.

A Roman Physician and a Roman Mathematician

Two scholars who became profoundly influential in their respective fields, Claudius Ptolemy (early to mid-second century CE) and Galen of Pergamum (129–ca 215), were contemporaries during the height of the Roman empire—a time of flourishing intellectual activity. Both were natives of Greek-speaking cities in the eastern part of the empire, most likely Roman citizens, and both were highly productive authors of original treatises. Although they worked in different areas—medicine and mathematics—their cultural outlook and philosophical approach was similar in many ways (Lehoux 2012, 6–8, 109–11). They were both members of a small, highly literate segment of society; they had been well educated in the mathematical and philosophical sciences; they appear to have become increasingly disillusioned with school-based philosophy, which they characterized as involving endless debate; and yet, nevertheless, throughout their lives, they continued to situate their own work within a broader conception of philosophy as the pursuit of a life worth living.

Because of Galen's habit of filling his writings with personal anecdotes, we are rather well-informed about the details of his life. A native of Pergamum, Galen came from a wealthy family of builders and architects. Following a private education in letters, mathematics, and philosophy, he pursued a medical education in Alexandria, the most important center of technical learning in the Greek-speaking empire. He then worked for a while as physician to a gladiatorial troupe in Pergamum and then went on to spend much of his career in Rome and the western empire, where he attended to the health of emperors and their heirs, and mixed with both the learned and the powerful (Nutton 2013, 222–35).

Galen practiced an erudite type of medicine. Although he certainly made careful observations, carried out some experiments, and dissected animals for audiences of the Roman elite, his primary approach was theoretical, and one of his most common modes of exposition was commentary on, and critique of, the work of his predecessors. He also attempted, however, to produce a kind of demonstration in medicine, modeled on mathematical proof. In particular, he often spoke of "analysis," by which he meant the use of theory to construct physical objects that performed certain functions, such as sundials or architectural features, that would be proven by actual use. On the whole, however, Galen's medical theorizing was not able to achieve the standard he set for it. Hence, he utilized narratives of his abilities in philosophy and the mathematical sciences to argue for his general scholarly competence as compared to that of his rivals.

In contrast, we know few of the details of Ptolemy's life. From later sources, we learn that he spent most of his time in Canopus, a suburb of Alexandria, perhaps

in a temple of Osiris (Jones 2005, 64). Ptolemy, however, unlike Galen, does not use stories of his own life as part of his rhetorical strategy. In the rare cases where he speaks of himself in the first person, it is usually to refer to an observation that he claims to have actually made. For the most part, his authorial voice is that of the Greek mathematician, which uses the first person only as a stylistic trope.

Nevertheless, by examining the internal context of his writings, we can see how his attitude towards philosophy and his scholarship changed over time. In his early writings, his approach was almost purely theoretical and sometimes addressed only towards the philosophical concerns of his predecessors. As his career progressed, however, he began to place more emphasis on an empirical basis for knowledge and to relegate discussions of general philosophy to introductions and asides. Nevertheless, he continued to situate his work within the broader context of philosophy as theoretical knowledge and to argue that the exact sciences provided a template for true philosophy (Feke and Jones 2010; Tolsa 2014; Feke 2014).

This comparison exemplifies a tendency for the lived experience of the practitioner to play different roles in the rhetorical strategies of different disciplines. Galen created an image of his medical authority by referring to his education and actual experiences, which put him in position to develop the kinds of knowledge that he claimed. Ptolemy, on the other hand, created a sense of certainty by removing himself from the text and appealing to universally accepted principles and using mathematical methods to derive new knowledge from this foundation.

Contexts of Scholarship in Sanskrit Sciences

Just as we have seen that the relationship between the text and its context may be differently construed in the same time and culture, but in the different intellectual endeavors of medicine and mathematics, so, in different cultural arenas, lived experience may be addressed in a variety of ways. In Sanskrit scholarly writings, as in Greek mathematical texts, the individual author tends to disappear into the discourse, so that we have nearly "all text and no context" (Ganeri 2008, 553).

In order to develop a picture of how these scholars lived, we can study the various social settings in which learning was transmitted and developed, such as in monasteries and temples, Buddhist centers of general learning, training in caste occupations (*jāti*), or court positions and appointments. But we can rarely be certain of the biographical details of any particular author that we are reading (Scharfe 2002, 132–93; Plofker 2009, 178–81).

This lack of obvious context, however, also points us towards a fundamental preoccupation of the tradition. Authors of Sanskrit texts sought to associate themselves with a particular *śāstra*, which was conceived of not as a science maturing over time, but as a sort of "pre-existent, codified theoretical paradigm for activity" (Pollock 1985, 508). The process of producing treatises and commentaries was usually construed as one of rediscovery, not invention—even in cases where the rediscovered knowledge may strike us as novel. Little weight is given to the lived experience of the author as the locus of knowledge, whereas the texts themselves, as passed down from antiquity, are both the core field of inquiry and the primary source of knowledge (Pollock 1985; Ganeri 2008).

Translators and Other Scholars in Abbasid Baghdad

Under the Abbasid Caliphs—from al-Manṣūr (r. 714–775 CE) to al-Mutawakkil (r. 847–861 CE) and beyond—a cultural project of great significance was carried out in Baghdad. During this period, scholars were paid to study, translate, assimilate, and develop the technical knowledge found in Persian, Indian, Syriac, and, especially, Greek texts. Although the motivations for this movement—whether deriving from administrative needs of the Umayyad Caliphate or imperial ideologies of the Abbasid Caliphate—are not certain, it is clear that this cultural activity involved an unprecedented number of scholars in projects of synthesizing what they could find of the world's accumulated knowledge and using this as a basis on which to open up new avenues of approach (Gutas 1998, 28–120; Saliba 2007, 27–72; Dallal 2010, 13–16).

The Baghdadi translators and scholars came from diverse linguistic and religious backgrounds, and their work was patronized by a range of social groups in the higher strata of Abbasid society. Although the most culturally crucial support came from the Caliphs themselves and their families, other groups actually funded a larger number of translation projects and provided the vital intellectual motivations that made this work possible. Among these we should include the courtiers and companions of the Caliphs and other princes, the heads of warrior families that acted as military leaders and governors, state functionaries in the Abbasid administration, and leading physicians and scholars who commissioned translations of important works in their fields in order to further their own research and teaching agendas (Gutas 1998, 121–50).

The work of translating and studying these difficult texts was often carried out in loose groups of collaborators and competitors, most of whom were also experts in the fields transmitted by the treatises they studied. As this work progressed, the translations became more accurate and intelligible, so that the same work was often translated and corrected multiple times—sometimes by the same scholar.

Probably the most famous of these groups was that of Ḥunayn ibn Isḥāq (809–873 CE) and his students and colleagues, particularly Ḥubaysh (mid to late ninth century) and ʿĪsā ibn Yaḥyā (893–974), all of whom were both translators and learned physicians. Together they translated Greek medical works, including almost all of Galen's corpus, into Arabic or Syriac. Through this process, they became known for the development of a new translation style that involved fully understanding the intended meaning of the source language and then rendering that meaning with natural expressions in the target language, and in the process developing Arabic medical terminology on an intuitive basis (Rosenthal 1975, 20–21; Gutas 1998, 144–5).

Another important group was that which formed around al-Kindī (c. 800 – c. 870), sometimes known as "the philosopher (*failasūf*) of the Arabs." This group concentrated on the works of Plato, Aristotle, and the theological writings of the late ancient Platonic philosophers who had developed creative methods of reinterpreting authors like Plato, Aristotle, and Ptolemy in order to create a new synthesis of their often incompatible views. The motivation of al-Kindī and his associates in creating these translations and epitomes was, no doubt, a desire for new information and arguments in their project of creating a Neoplatonic philosophy that was compatible with what they took to be the tenets of Islam (Gutas 1998, 145–7).

The few detailed reports of this activity in our sources indicate that the translation of difficult technical works was often a complicated process—taking place over many years through repeated study of manuscript sources, involving a number of different individuals with various technical strengths.

Mandarins and Calendar Reform

One of the most conspicuous features of the landscape of scholarship in ancient and medieval China was the imperial bureaucracy, which drew its staff from a pool of the successful candidates of an elaborate system of civil service examinations (Elman 2000; Lee 2000, 111–70). Among the many ministries of these imperial systems were various astronomical bureaux, which were tasked with producing a state calendar that predicted the positions of the sun and moon, eclipses, certain planetary phenomena, and various aspects of divination, such as days that would be lucky or unlucky for certain undertakings—a sort of ephemeris or almanac. Despite the fact that these bureaux were generally staffed with fairly low-level functionaries, because the emperor was responsible for everything under the heavens, their activity was a matter of state importance (Lloyd 2002, 34–5; Sivin 2009, 35–8).

The astronomical bureaux oversaw activities in both mathematical calendrical studies (*lifa* 曆法) and in astronomy/astrology (*tianwen* 天文). Calendrical studies involved the use of observations and mathematical methods in the production of astronomical tables and canons of algorithms that reduced the determination of an annual calendrical almanac to a series of mechanical steps. Astrology involved finding various patterns in the heavens, making and recording observations of ominous phenomena and interpreting their import.

For a variety of different reasons—ranging from real or perceived technical deficiencies in the current system, through the need to legitimate regime or policy changes, to the personal goals of emperors or ministers—these calendrical systems were subject to numerous reforms (*gaili* 改曆). From the first century BCE to the middle of the eighteenth century, we have at least basic information about some hundred systems, of which around fifty were used throughout history to determine official ephemerides (Sivin 2009, 37–56). These reforms sometimes involved reshuffling the staff in the various ministries, or the development of a new directive in addition to the existing ones. In some cases, a new observatory was built to collect new data. In all cases, however, the motivations for these reforms went well beyond the practical needs of predicting astronomical events and regulating the calendar. These reforms helped to legitimize the imperial system and confirmed the role of the bureaucracy in assisting the emperor to carry out the mandate of heaven (Cullen 1993; Sivin 1995, 19–21; Sivin 2009).

Salaried Scholars in Damascus

Under the Ayyubids (mid-twelfth to mid-fourteenth century), Damascus experienced a resurgence as a political and intellectual center, and its cultural significance in scholarly circles continued even after the political capital of the region had moved to Cairo under Mamluk rule (mid-thirteenth to early sixteenth century). During this period, scholars from across the Islamic sphere came to Damascus to study,

to teach for a while, or to settle into a life of salaried scholarship (Gilbert 1980, 107–11).

The mechanism underlying these changes was originally the use of the charitable foundation (*waqf*) to secure property for religious purposes. Many of these endowments established stipends (*manṣab*) for both students and teachers, often at a law college (*madrasa*), a house of instruction in the traditions of the Prophet (*dār al-ḥadīth*), or one of a variety of Sufi institutions. This gradual proliferation of stipends facilitated competition among the scholarly elite, and provided a mechanism for increasing numbers of men to earn a living as a result of their knowledge (Gilbert 1980, 113–26; Chamberlain 1994, 51–68; Hallaq 2009, 142–6).

Madrasas, however, were not purely colleges, and the stipends that they supported for lecturers and readers were not purely for teaching posts. Madrasas also served a range of extra-educational purposes, such as providing places of worship and burial, housing employees of the postal system (*barīd*), incarcerating prisoners, providing for the poor, and accumulating and securing household wealth. The terms of a stipend might dictate that certain subjects be taught, but this was often not enforceable, and the majority of stipends were free of formal constraints. Moreover, successful scholars often held stipends from a number of different institutions, including occasionally from an institution in a different city, such as Cairo. Madrasas had no corporate identity, granted no degrees, and had no fixed curriculum. Rather, they acted as an institutional nexus that brought together masters and students in the transmission of knowledge, which remained a fundamentally private process (Chamberlain 1994, chapter 2).

The core of medieval Damascene education was the relationship between the individual master (*shaykh*) and the student (Chamberlain 1994, chapter 4). Young people sought the companionship of a certain master, not enrollment at a particular school or institution. Teachers might be chosen as much for their manner of living and moral qualities as for their scholarly accomplishments, and the most important thing was that they be well-regarded as a link in a significant transmission of knowledge. Masters educated by reading texts with students—often accompanied by their own commentaries, lecturing—often in the form of an oral presentation of their own commentaries, and correcting their students' work in copying and memorizing these texts. Students who had sufficiently understood their master's ideas or texts could receive a written certificate (*ijāza*) to present legal opinions or to transmit certain texts. These practices established chains of transmissions of knowledge from one individual to another (*isnād*, *asnād*), which themselves became objects of study (Chamberlain 1994, 140–50; Brentjes 2002, 61).

In these circles, the religious sciences were always the core of scholarly activities, but some scholars also worked in, and transmitted, the rational or ancient sciences, such as logic, arithmetic and algebra, medicine, geometry, astronomy, and late Platonic and Aristotelian philosophy (Chamberlain 1994, 82–7; Brentjes 2002). The motivations for practicing and studying these fields were probably usually personal, based on interest and ability, but may sometimes have derived from career goals such as holding a position at a hospital or as timekeeper of a mosque (*muwaqqit*). For medieval Damascenes, however, the goal was mastery of many fields and even those who we regard as having contributed most significantly to medicine or the mathematical sciences are also praised in the biographical sources for their legal and religious scholarship.

Scholarly Women in the Ancient and Medieval Periods

Although our sources for the details of ancient and medieval scholars are often inadequate, a comparison of the numbers of men and women scholars in our sources show that very few women scholars left clear evidence of their activity (Netz 2002, 197; Plofker 2009, 180; Azad 2013, 57; Pomeroy 2013, 1). There are various reasons that could be advanced to explain this lack of information, and we cannot now be certain what the actual percentages of women scholars were at any given time and place. Nevertheless, these numbers are almost certainly indicative of real hurdles that women faced in leading a life of scholarship and making their work known.

With this general proviso, however, there were certain social settings that were more productive of woman scholars than others. For example, women were generally not active in areas that involved official, or semi-official, professionalization, such as the Chinese civil service examination system or the competition for stipendiary posts in medieval Islamic societies. In private settings, however, women of means could achieve a high level of learning. And religious orders and institutions often afforded women environments in which they could engage actively with scholarship.

Along with well-known examples, such as Rābiʿa al-ʿAdawiyya al-Qaysiyya (717–801 CE) or Hildegard of Bingen (1098–1179 CE), there is evidence that certain religious orders fostered women scholars. Some of the Daoist sects were said to have been founded by women, and some certainly included women in key roles. Women were ordinated into the clergy, they taught, and they produced texts on the *way* (*dao* 道) and inner alchemy (Despeux 1990; Despeux 2000). In the Hellenic cities, the rites of female divinities were generally overseen by female officials, and in this capacity learned priestesses could attain civic recognition, and some political power (Connelly 2007). It seems that in these special surroundings women were more readily able to circumvent some of the obstacles of social and economic pressures and family obligations that otherwise often complicated their pursuit of learning.

Of course, there is also evidence for learned women outside of the context of religious orders. A number of famous literary authors were women. For example, two classics of Japanese literature were written at the beginning of the eleventh century by Sei Shōnagon and Murasaki Shikibu. Woman scholars are sometimes mentioned in Greco-Roman sources, without drawing particular attention to the fact that they are women. Porphyry (mid to late third century BCE) discusses the work of Ptolemaïs (third century BCE to first century CE), a harmonic theorist, and Pappus addresses himself to Pandrosion (both late third to early fourth century CE), a mathematical scholar (Levin 2009, 229–40; Bernard 2003). Biographical discussions of the prominent families of medieval Islamic cities often included accounts of learned women. They were usually scholars of the religious sciences, but in this regard they were no different from the men (Azad 2013).

Even in these cases, however, the sources often depict a close connection between woman scholars and a spiritual mode of life. One of the largest collections of learned writings by women from Greco-Roman sources come from the Pythagoreans (Pomeroy 2013). Although the Pythagoreans were not a religious order, they certainly advocated a spiritual mode of life, including detailed disciplines and rites. Perhaps the most famous woman scholar of Greco-Roman antiquity, Hypatia of Alexandria, also illustrates this tendency (Dzielska 1995). Hypatia was a philosopher, mathematical

scholar and respected teacher of the youths of elite Alexandrian families. Her philosophical leanings, however, were those of late Platonism, a highly spiritual school, and her students wrote of her as a moral and spiritual guide. Along with her intellectual accomplishments, she was extolled for her virtues, especially that of temperance (*sōphrosunē*).

In many of these cases, women were able to mobilize narratives of traditionally feminine virtues—such as temperance, modesty, or chastity—in order to create a socially sanctioned space in which they could engage in serious scholarship.

Conclusion

As even this short survey of examples shows, very little of a general nature can be said about learned individuals of pre-modern periods. Who these people were, how they distinguished themselves as learned, and the roles they played within their societies was rather diverse even within the same times and cultures and quite different across larger geographic and temporal spans. Nevertheless, it is clear that an understanding of the role of learned individuals within their societies is inseparable from an articulation of the types of knowledge that they produced. By taking a narrow view it has sometimes appeared that an ancient or medieval author was the first to see some aspect of the world in essentially the same way that we do—that is, that they *discovered* it. For example, if we read only a few theorems of Euclid or a few passages of Ibn al-Nafīs, we might convince ourselves that Euclid's approach to geometry was the same as ours or that al-Nafīs gave an account of pulmonary transit that accords with our current understanding. But when we take a wider perspective and fit these fragments into a more coherent picture, as articulated in the works and practices for which we have evidence, it becomes clear that many aspects both of their knowledge claims and of their methods for producing knowledge do not accord with modern forms. In this way, we see that the discoveries that we attribute to them fit into a different network of beliefs and practices than any which we currently have, and hence they cannot be understood as straightforwardly equivalent to knowledge claims that we might make. In order to understand the learning, and the achievements, of past scholars, we must articulate their ideas in the various contexts that shaped them, and which they in turn shaped.

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