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Medicine as Science

Scientific theory and epistemology are normally reckoned as the great discovery of the Greeks. Thales, Euclid, Hippocrates, Aristotle, and many other thinkers from Greece and Asia Minor are considered to have launched a great intellectual revolution, which created a specific kind of "scientific" thinking. This revolution is thought to be the basis for modern science, and especially natural sciences. The intellectual potential of Babylonian thinkers, on the other hand, with their own type of wisdom, is evaluated in very different terms: Babylonians are usually thought to have hardly indulged in theory but limited themselves to pragmatic and practical speculation about the physical world, without reference to hypothetical generalizations or methodological rules. Within the realm of medicine, for instance, Babylonians are known to have had no "theory of humors," as had the Greeks, and Babylonians saw diseases as being caused by demons and magical agents. This naturally has led to the conclusion that Babylonian medicine was unscientific, or at least less scientific than that of the Greeks.

It is true that Babylonian thinkers have left us no theoretical works among the many thousands of surviving cuneiform tablets from Mesopotamia; philosophy was simply not a Babylonian literary genre. This does not mean, however, that philosophical arguments were unknown to Babylonian scribal schools or scholars, but that philosophical writing was not part of the cuneiform repertoire. On the other hand, it is hardly conceivable that a complicated system of medicine like that used in Babylonia could have functioned devoid of theory. The problem is how to recognize and disinter Babylonian epistemology and theory from within the array of sources at our disposal.

The view taken here is that "theory" within an ancient context requires three necessary preconditions, in order to identify what we would consider to be rational but non-technological thinking. These three preconditions are: *imagination*, *deductive logic*, and *observation*. Let us take each in turn.

Imagination: Ancient science sought to find a general explanation for natural occurrences, with one general aim, namely to reduce the impression of randomness of what happens around us. There were countless numbers of events which imparted a feeling of "randomness" (in the way that quantum physics uses this term) among ancient peoples, such as movements of stars, changes in weather and climate, infinite variations and changes among flora and fauna, etc. The structure of this universal explanation is ambitious, namely the search for the simple (and generally valid) clarification of an endless number of happenings being brought about by a limited number of causes. In this way, the overwhelming randomness of the universe can be reduced to a relatively few factors.

Deductive logic: Babylonian epistemology bases itself upon logical deduction in which general patterns can be inferred from a myriad of details. A typical example of this kind of deduction can be seen in the relationship between the protasis and apodosis clauses of omens. The basic formulation of all Babylonian omens is, "if so-and-so happens, then so-and-so *can* result" (see Rochberg 2004: 257–9). Omens offer a strategy for counteracting a notion of randomness by reducing a great many "signs" into a relatively small number of results; even if gods ultimately control what happens, the patterns of signs or omens limit the number of possible explanations for otherwise seemingly random events.

As soon as one can find probable connections between, for example, a celestial event and corresponding incidents on earth, one can establish a system of quasi-causality for many different phenomena, thereby explaining otherwise seemingly arbitrary and haphazard occurrences. This is why Babylonian scholars developed a "database" of omens and signs in a system designed to infer and predict what would happen in the future based upon previous experience. If omen A was associated with event B at some time in the past, inference would suggest that the reoccurrence of A *might* lead to the reoccurrence of B. From a modern perspective, the entire logic is fallacious, and we would dismiss the association of two seemingly unrelated events as the fallacy of "post hoc ergo propter hoc," namely the fallacy of assuming that where two events are in sequence the second is caused by the first.[6] Nevertheless, we must admit that this type of deductive logic in Babylonia was not entirely without

purpose, since establishing a relationship between data and inference is after all the beginning of methodical and scientific thinking.

Observation: In order for "observation" to qualify as a tool of science, the process must be formalized and calibrated. Rather than casual viewing, scientific observation must be periodic and regular with results being recorded. Babylonian scholars systematically collected an enormous quantity of data and information about the world around them, organized into relatively simple classifications, listing ordinary household objects, plants, stones, stars, as well as gods and illnesses; other lists recorded all kinds of ominous events in the world, based upon movements of celestial bodies and birds, climate and weather patterns, the shape and appearance of internal organs of animals, and much more. Classification and taxonomy are crucial ways of bringing order into a seemingly chaotic universe (see Veldhuis 1997: 2–8).

A large part of scientific thinking concerns observations of actions and reactions in the natural world, although ancient man had virtually no instrumentation or technology available to him (apart from simple measuring tools) in order to try to establish causality between two reacting phenomena. One of the main characteristics of ancient scientific thinking is the general failure of ancient savants to validate the results or conclusions of others. Claims were never systematically checked, but everything was based upon the authority of the claimant. This was as true of the Greco-Roman world as in the Orient; a common rhetorical device used by the Romans in courts of law was to discount the observations of others by questioning the authority of the person making the observation, rather than by checking the facts,[7] a technique also employed by Galen.

"Scientific" Medicine

The three characteristics – *imagination*, *deductive logic,* and *observation* – are postulated as the essential intellectual basis for all ancient science, whether in Babylon or Athens. These same three prerequisites to scientific thinking are also to be found within the framework of Babylonian medicine, although in somewhat different forms.[8] We would redefine these three intellectual characteristics within Babylonian medicine in the following categories.

First, the function of *imagination* corresponds within Babylonian medicine to a related factor: magic. One might qualify this statement somewhat: the function of imagination corresponds to any phenomenon

within Babylonian medicine which we would call "magic." We have already referred to the problem of "randomness," which needed to be addressed by Babylonian as well as every other system of ancient medicine. Magic offered a solution. There were and still are obvious questions relating to randomness, such as "Why am I sick and not my neighbor?" "Why do I have pain in my head/stomach/foot, and nowhere else?" "Why this illness and not some other?" "What has caused this illness?" The countless number of possibilities can be dramatically reduced by what we call "magic."

The system worked as follows: in the Babylonian view of the world, gods decided all matters dealing with human fate. Babylonian scholars grounded much of their scientific knowledge in an ancient belief system incorporating magic, in which illnesses were ultimately caused by demons or angry gods, or perhaps indirectly caused by these same factors through, for example, ingesting bewitched foodstuffs. This belief system formed a useful general background explanation for the ultimate causes of illness, which the patient could readily accept. This general explanation of illness, however, would never be expounded as theory per se in any Babylonian tractate. On the other hand, in comparison with the Greek theory of "humors," the Babylonian idea of demons as invisible bearers of disease conforms in some ways more closely to modern notions of bacteria and viruses. Babylonian medicine in this respect may not be less rational than a Greek conception that disease was caused by internal bodily imbalances.

In fact, Greek schools of medicine held contradictory views concerning the causes of illness.[9] Hippocrates was not the only doctor in town. In contrast to the Hippocratics, the ancient Greek world knew other philosophies of medicine, such as Methodists and Empiricists, who argued that the search for causes of disease was a distraction preventing the physician from investigating a proper cure. According to this opposing view, an effective cure was much more valuable than philosophical speculation about the potential causes of disease. In certain respects, the Methodists correctly evaluated the limitations of ancient medicine by insisting on a more practical approach to healing, pointing out that a philosophical theory of disease had only limited application to the actual healing of patients. Surprisingly, the Methodists, in the second century BC, introduced into the Greco-Roman world a type of medical practice which more-or-less resembled that of contemporary Babylonia, which concentrated on practice and recipes to the exclusion of theory. The growth of these anti-Hippocratic medical philosophies may have coincided with an increased general skepticism in the Roman world, as

exemplified by the rise of the Skeptic school of philosophy, as well as fitting in with a general objection to all things Greek, as forcefully expounded by Cato the Elder (Nutton 2004: 148, 162). As Owsei Temkin observes, "the methodist sect, because of its practical orientation and disdain of complicated theories, appealed to the temper of the Roman people" (Temkin 1956: xxix).

The role of *deductive logic* and analogy in Babylonian medical thinking (our second category) needs further clarification. Beyond a general notion of ultimate causation of disease as a result of divine disfavor or simply fate, Babylonian medicine developed its own system for relating diseases to symptoms in a quasi-causal relationship. The logic was essentially the same as that for numerous types of Babylonian omens, as discussed above, and a formal system of recording omens and potents was adopted by Babylonian medicine for diagnosis and prognosis (Oppenheim 1977: 224). In effect, symptoms became omens. The omen apodoses were prognostic, used to determine whether the patient would continue to live or die, and if the latter, when? After three days? Four days? Within a month?

There is a difference, however, between medical prognostic omens and all other types of omens. The difference is that the connection between the protasis and apodosis of medical prognostic omens is based upon a reality not to be found in other types of omen literature (Oppenheim 1977: 294). In other words, in the case of medical omens, results were potentially capable of being substantiated or refuted. Ancient physicians, for instance, were capable of estimating for how long a certain fever was likely to last, or how life-threatening or dangerous a certain infection was likely to be, simply by repeated experience of observing fevers of the same type. The "post hoc ergo propter hoc" fallacy of other types of omens cannot be applied in the same way to the medical omens, since the connection between data and inferences was likely to be more realistic, and one could note what actually *happened* after the occurrence of a sign, symptom, or "omen." In other words, medical omens could reflect real observations of "action-reaction" situations, the connection between disease as a cause (of changes in the body) and symptom as a sign (of changes in the body), while other types of omens could not make the same claim to causality.[10]

This brings us to our third point, namely *observation* as a function of epistemology. Since actual instruments (e.g. thermometers and stethoscopes) were unavailable then, ancient physicians were entirely dependent upon observation.[11] Within the framework of medicine, we must include an additional factor, namely "experience," best understood in the
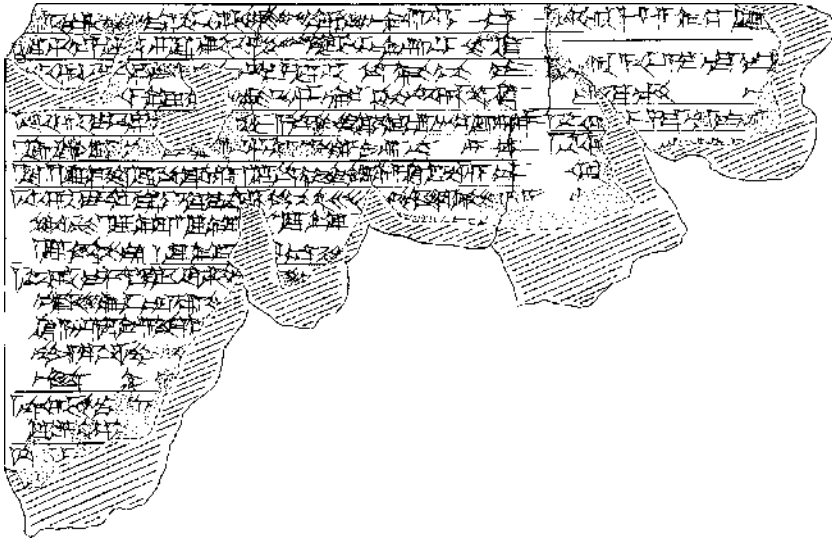
Figure 1.1   Medical tablet from Babylon mentioning Hammurapi's mother (BM 41293+44866; copy M. J. Geller)

French equivalent term *expérience* also denoting "experiment." As Roger French comments regarding Alexandrian medicine, "experience was now not only a question of personal observation, but the experience of others, which could be read in books."[12] We need to explore how this combination of "observation" and "experience" actually functioned.

A medical tablet from Babylon, dated roughly to the latter half of the first millennium BC, has an unusual opening line in what is otherwise quite an ordinary medical recipe for eye disease (see Figure 1.1). The tablet begins with the line, "[If] Hammurapi's mother suffered from eye disease …".[13] The *Vorlage* of this tablet was obviously broken at this point, as noted by the scribe himself, and the actual symptoms ascribed to Hammurabi's mother were not preserved at the time the tablet was copied.[14] The rest of the tablet contains eye-disease recipes which are known from other Late Assyrian and Late Babylonian sources (see Fincke 2000: 86–91). The scribe himself was no doubt copying from an older manuscript containing eye-disease recipes, but whether the original manuscript was actually from the time of Hammurabi himself is doubtful. Why should this tablet refer to Hammurabi's mother, who lived some 1500 years before this tablet was being copied? The most likely explanation is that the scribe was referring back to a celebrated case of eye disease which was recorded and remembered in a much later era. A similar

case of retrospective attribution of medical recipes to a venerable old tradition occurs in an unusual colophon of a tablet devoted to fever occurring in the brain. The colophon reads:

> Proven and tested salves and poultices, fit for use, from the mouth of ancient antediluvian sages from Šuruppak, which Enlil-muballiṭ, sage (*apkallu*) of Nippur, left (to posterity) in the second year of Enlil-bani, king of Isin.[15] (*AMT* 105; see Hunger 1968: No. 533)

Although the tablet itself is not earlier than the eighth century BC, the poultice is attributed to oral transmitted medical lore dating back to c. 1860 BC, more than a millennium earlier, and ultimately to mythological sages from before the Flood;[16] nothing could be more authoritative. This particular colophon goes further in stating that experience gathered over a very long period of time, from ancient experts to contemporary physicians, makes these poultices tried and true. In the absence of clinical trials, generations of usage of drugs effectively acted as a filter to determine which drugs were effective (and which not).[17]

There is nothing particularly unusual about a medical tablet colophon claiming that a recipe is "tried and tested," although we are not given any indication of the testing process.[18] Occasionally tablets attest to the effectiveness of the drugs mentioned, such as an Assur tablet serving as the equivalent of a modern Physician's Desk Reference listing various measures of common drugs, with the following appended note:

> This lotion is effective and tested against jaundice and hepatitis. Lotion of oils (for) "sun-fever." (*BAM* 186: 10–13 [cuneiform text only])

We have no way of knowing what exactly is meant by "effective and tested," except the authority of the well-known Assur *mašmaššu*, Kiṣir-Assur, who "hastily excerpted" the recipe and wrote the tablet. What we have here is a good example of "experience," in which the scholar or physician brings to mind an earlier successful formula or treatment, which was noted and recorded. Vivian Nutton has found a similar approach within Greek medicine:

> Case histories, the codified record of previous success, played an important role, providing a wider data bank for future use. The Empiricists were particularly keen on recording information on drugs and their effectiveness. … The weakness of experience … was that it dealt only with the past: when faced with an apparently new condition or new circumstances … the Empiricist doctor had to start effectively from scratch and resort to a

method of trial and error. Such criticism was countered by the principle that, having observed carefully the conditions of any case, the doctor should choose whatever therapy had worked in "similar" circumstances. (Nutton 2004: 148)

Academic Medicine

Babylonian science in the latter half of the first millennium BC formed an integral part of the school curriculum (Gesche 2001: 213–16; Hunger 1976) and these disciplines were characterized by large collections of data which were then studied and analyzed, in an attempt to explain many aspects of the physical world. Although mathematics, astronomy and astrology, medicine, magic, and divination do not all conform to our modern notions of "science," they nevertheless need to be perceived in terms of their methodologies and how they assembled data, as well as their applications to everyday life.

We wonder whether Babylonians, in the course of collecting data on physical and perceived phenomena of their world, could have invented a rudimentary "scientific method" which might be comparable to scientific thinking today (Rochberg 2004: 96f.); the same question has been directed towards Greek science (Russo 2004: 21ff.). Babylonians for most of their history inhabited a world which was mostly devoid of technology, and the symbiosis of mechanics and science came later. Babylonians had few instruments for measurements or calculation, and virtually no telescopes or microscopes, or navigational instruments.

Of course technology is not a *sine qua non* for scientific thinking, since mental models can be used as tools for investigating physics, as has been demonstrated for Greek science (Renn and Damerow 2007), and for Babylonian mathematics (Damerow 2007). In the same way, we can investigate Babylonian "sciences" (including medicine, magic, and divination) as intellectual disciplines, with one caveat. We will impose a rule of thumb, that the more "mathematical" a Babylonian discipline tends to be, the more "scientific" in our modern sense. Let us give a few examples below.

Mathematics, on *a priori* grounds, yields the best results as a scientific form of thinking. Although it has usually been understood that Babylonians developed little in the way of mathematical theorems or hypotheses, recent studies have shown that Babylonian scholars certainly understood and taught mathematics in a way which showed that they grasped the rudiments of Euclidian mathematics long before Euclid (Friberg 2007; but see Robson 2008: 281f.).

The next important burst of scientific discovery occurred before the middle of the first millennium BC, when astronomers in Babylon began to make much more accurate charts of the movements of stars and planets in relation to each other and to the sun and moon, to the extent that accurate predictions became possible. In this regard, complex calculations of heavenly phenomena became increasingly important and moved mathematics on from its close association with algebraic geometry, with its origin in surveying of fields. The need to have mathematics serve the needs of astronomy may have given it a vital boost and even generated a new interest in mathematics, after the heyday of mathematics in the Old Babylonian period of the second millennium BC. This dramatic change in the need for new types of calculations can easily go unnoticed, since we have no mathematical or school texts which are designed to illustrate the logic of mathematical astronomy. Furthermore, the study of mathematics appears to have gone into decline by the mid-second millennium BC, lying dormant for nearly a millennium.

By the mid-first millennium BC mathematical astronomy had become fundamental. Its calculations were basic tools of astronomy and served to kick-start mathematics within the school curriculum once again. Significant Babylonian advances in astronomy began taking place, based on an essential mathematical component, to provide accurate predictions of the movements of the moon, constellations, and planets, as well as eclipses. The zodiac first appears in Achaemenid Babylonia and was adopted by Greek astrology. Aside from mathematics, astronomical data was gathered by daily observation of the heavens, recorded in "astronomical diaries" providing information about the moon, sun, and planets, solstices and equinoxes, meteors and comets, the weather, market prices of certain commodities, the height of the Euphrates, and occasionally a significant historic event on the day, usually involving the king. The calculations of time intervals used in the diaries were probably based on the use of a water-clock, and the diaries are remarkable for the accuracy of the recorded data.

Materia Medica

The combination of observation and experience certainly benefited Babylonian therapy, which governed the use of plants and drugs in medical recipes. The epistemological question is how Babylonian scholars managed to recognize the chemical effects of plants, without the benefit of laboratories or clinical trials. Nevertheless, they studied, listed, and

categorized plants and minerals under a specific classification system, which they labeled with the Akkadian word *šiknu*, meaning "nature" or "character," e.g. "the *šiknu* of a plant/stone is …".[19] This term *šiknu* is significant since the Greeks used the term *physis*, "nature," in a similar sense, although such terminology is by no means universal in other systems of ancient medicine.[20]

The question therefore remains, how Babylonians could have discovered the effective properties of plants and minerals and what effect they would have upon the human body. That the Babylonians did indeed have some idea of what changes plants and minerals were capable of producing in the body can be seen from Akkadian therapeutic texts themselves, which distinguish between "simple" and "complex" recipes. A "simple" is a recipe which employs a single-ingredient drug against a single illness.[21] We also find, on the other hand, numerous cases of complex recipes composed of combinations of plants, minerals, and other ingredients, used as panaceas against one or more diseases.

We are far from understanding Babylonian medical recipes because we can only identify with accuracy relatively few of the ingredients. The dosage and amounts of the drugs also remain unclear to us. Hence, for the moment, drafting a proper taxonomy of Babylonian drugs is a hopeless enterprise, nor can adequate comparisons be made with the works of Dioscorides and Theophrastus, in which plant and mineral names are much better understood than those of their Babylonian counterparts.[22] Nevertheless, some general features of Babylonian recipes can be noted. Babylonian physicians made clear typological distinctions between recipes aimed at specific ailments. For example, rectal-disease texts employed much more oil in recipes, while kidney-disease texts employed more minerals, and eye-disease recipes used more salves. Babylonian physicians had worked out a system for the use of simple and complex drugs, which we do not yet fully comprehend.[23]

The great bulk of Babylonian medical recipes are concerned with pharmacological methods of alleviating symptoms, and there is quite a variety of methods for drugs to be administered. One of the most effective methods of administering drugs was through fumigation, by which drugs were inhaled and could rapidly be absorbed into the bloodstream.

The *materia medica* of Babylonian recipes consisted of trees and plant matter (seeds, roots, sprouts, leaves, fruit, branches, even wood), grains such as barley and flour, and various spices and vegetables. There was a

variety of liquids into which drugs could be dissolved, such as water, milk, fish brine, sesame oil, and urine, and in some cases drugs were filtered and distilled; alcohol (beer and wine) were excellent agents for dissolving drugs. In many cases, drugs could be mixed with animal products such as sheep fat and lard, and less regularly in fish brine, blood, and bone marrow. Some exotic animal products were also used as *materia medica*, such as mongoose blood, turtle and mussel shells, and other animal viscera. Mineral stones could also be ground up, and the recipes call for animal or even human excrement (e.g. bat guano), but such *Dreckapotheke* have been shown to be secret names for ordinary plants (Köcher 1995).

Once the plants or other items have been gathered, there is a long list of how they must be treated and used to make up the recipes themselves: *materia medica* need to be "taken" in the first instance (i.e. gathered or selected), then weighed, washed, immersed, dried and desiccated, roasted and burned, crushed, pounded, cut up, beaten, diced, chopped, grated, pulverized, sifted, pressed out, soaked and dissolved, kneaded, stirred, sprinkled, saturated, spread, blended and mixed, poured out into vessels, warmed up and heated in an oven, cooked and boiled, and finally cooled. Each of these actions is governed by a rich and varied medical technical vocabulary (see Goltz 1974: index), with parallels in Greek medical recipes. Drugs, consisting mostly of plants and minerals, were prepared in the form of potions, salves, powders, pills, tampons, and pessaries, to be ingested, rubbed onto the body, applied as a bandage, or inserted into the anus, urethra, ears, or vagina through lubricated copper tubes or reeds. Not only was there a large variety of drugs, but there was an equally important variety of ways in which drugs could be utilized, in both simples and compound recipes.

Anatomical Science

Anatomy posed serious problems, even for experienced doctors, since neither Babylonians nor Hippocratics engaged in dissection or autopsy on human corpses. Babylonians, like Greeks, had little actual knowledge of workings of the internal anatomy, except for that gleaned from comparisons with animal physiognomy. Only in the third century BC did Greek scholars in Alexandria, Herophilus and Erasistratos,[24] indulge in human vivisection, but this revolutionary approach to medicine was short-lived.[25]

Egypt, of course, had a clear potential advantage in the field of anatomical knowledge, due to the practice of mummification, in which the main internal organs were extracted and placed into canopic jars. This does not mean, however, that such knowledge was widespread or even generally appreciated. Judging from the extant Egyptian medical corpus, it is far from clear whether funerary experts mummifying bodies transmitted the fruits of their anatomical experience to Egyptian doctors (Nunn 1996: 43f., 65), and in any case embalming had little to do with medicine in Egypt (von Staden 1998: 29). In general, prior to the third century BC no scholars in antiquity had any real understanding of internal human anatomy.

In Babylonia, much more was known about the internal anatomy of sheep than humans, judging by the very precise terminology for internal sheep organs that can be found in divination texts. Although we have no single Akkadian word specifically designating the human heart,[26] Babylonian diviners identified no less than eight different areas of a sheep's heart (see Geller 2007: 188f.). Moreover, there is no clear evidence that diviners and physicians ever compared notes during the formative periods when Babylonian medicine was taking shape, in the Old Babylonian period in the first half of the second millennium BC. By the Hellenistic period, exorcists became the scholars responsible for copying and recording divination texts (Robson 2008: 241f.), but this knowledge does not seem to have spurred on any new Babylonian studies of human anatomy. Nevertheless, despite the fact that the physician's observations were limited to the external anatomy of his patients, the combination of observation and experience led to some impressive results. Physicians were able to observe cases of "action-reaction," namely what specific changes came about in the body which were caused by disease.[27]

Medical Predictions

By the mid-first millennium BC, the increased ability of Babylonian astronomers to make accurate predictions had a putative influence upon other sciences as well. The problem with other disciplines, such as medicine or magic, was the lack of any real mathematical basis for predictions regarding the physical and mental health of patients. Medics and magicians tried to introduce astral medicine and astral magic into their own calculations, hoping that the accuracy of predicting the appearance of planets might transfer over into predicting the onslaught or course of disease. Although previously celestial divination and omens had traditionally

focused on the changing positions of constellations and planets, or the sun and moon, to make general predictions about plagues or epidemics, the new astral medicine relied upon the zodiac and more accurate predictions of celestial motion to try to determine which specific diseases and treatments in individual patients were likely to be affected by celestial phenomena.

To determine the "scientific quotient" of Babylonian medicine, based upon our rule of thumb about a mathematical component, we should look at aspects of Babylonian medicine which demonstrate rudimentary scientific thinking, unaided by instruments. Babylonian healers were adept at observing symptoms of patients and recording them scrupulously. One of the staples of Babylonian therapy, the lengthy list of symptoms comprising the so-called Diagnostic Handbook (Labat 1951; Heeßel 2000), allows us but few insights into ancient disease taxonomy, since symptoms were not assigned to the diseases which generated them, but rather to the parts of the human body which exhibited these symptoms. There is virtually no evidence that symptom lists were compiled from case histories, but they were largely a conglomeration of symptoms drawn from many different patients, for the purpose of describing disease in general and not illnesses associated with any single individual. Nevertheless, in terms of scientific thinking the Diagnostic Handbook represents one method for collecting and analyzing data, even if the underlying assumptions of the process do not conform to modern notions of diagnosis.[28]

Three examples of diagnostic texts will help to illustrate these texts, with the first being an example of symptoms taken from the temples of the head:

> If (a man's) temples are under pressure and he is hot (and) cold: hand of Kūbu.
> If the temples are under pressure and his internal organs move: hand of Kūbu.
> If the temples are under pressure and his internal organs keep swelling up: hand of Kūbu.
> If the temples are under pressure and his ears do not hear (anything): hand of his personal god being laid on him, he will die.
> If his temple is in good shape, he will recover; if his temple collapses, he will die. (Labat 1951: 32–3, 1–5)

The symptoms are described in a methodical but mechanical way, with no indication of the individual characteristics of a patient, or an awareness of other symptoms that might occur. The crucial question being addressed

here is whether the patient will live or die, a concern that is also found in Diagnostic Handbook symptoms derived from the patient's face:

> If (a man's) face is covered with a yellow paste, his lips are covered with a film, his eyes secrete yellow (stuff), and his right eye squints, he will die.
> If his face is deformed, he will die.
> If his face is deformed and his tongue is yellow, (in fact) his body is yellow, he is ill in the stomach and will die (latest) on the third day. (Labat 1951: 74–5, 29–31)

Similar prognostic texts are known from aphorisms in the Hippocratic corpus (e.g. Lloyd 1983: 171). Not all passages demonstrate this pattern:

> If a man's complexion changes, his eyes roll around, his eyes begin to squint, he constantly scratches his lips and his chin, blood flows from his nose without being able to staunch it: the Gallû-demon has seized this man. (After Labat 1951: 190–91, 14; see *Iraq* 19: 40)

This passage (from the end of the composition) describes a group of different head symptoms and also provides a diagnosis; the attack of the Gallû-demon designates a certain type of illness. As with all other examples of the Diagnostic Handbook, we have no way of knowing in how many patients these same symptoms were noted, but such a passage is unlikely to be based on a single case history.

Medical Prescriptions

The largest genre of medical texts from Babylon were therapeutic texts, which begin with a symptom and then list drugs and procedures designed to relieve the symptoms (but not necessarily cure the disease). It is likely that a cure for disease was considered to be the province of gods (to be approached though magic and incantations, through an exorcist), while the physician's role was to treat symptoms. Among texts with a high "scientific quotient," therapeutic texts get a higher score than magical incantations, partly because of the mathematics rule of thumb we have been using (i.e. the more math, the more "science"). Therapeutic texts erratically (and not always) provide amounts or weights of each ingredient in a recipe, presumably reflecting relative proportions of ingredients, and occasionally give information about dosage, e.g. drugs to be administered three times a day, etc. Consider the following:

If ditto (= diseased anus), grind up 5 *sila* of flax seed, sieve, and you steep it in milk,
bind (it) for 14 days on the chest and shoulder and he will improve; the ingredients [are checked].

When you have tied on these poultices on him, he drinks 1/3 *sila* of date-juice, 10 *kisal*-weight of oil and afterwards he should not drink any [other] drug; he keeps drinking it for six to eight days and [he will improve].
(*BAM* 7 37 ii 14′–18′)

These recipes, although exceptional, indicate both specific measured amounts and dosage of medication. Nothing comparable exists within incantation texts or their accompanying rituals. Furthermore, even when no amounts are recorded in medical texts, it was likely that the recipe itself was only a mnemonic and that many of the details regarding how to administer drugs were instructed orally rather than being written down.[29]

There are some important distinguishing patterns of drug application for various ailments. For instance, eye-disease texts use more salves and ointments than drugs taken internally. Although one cannot assume that such general patterns reflect intuitive or rational thinking, they nevertheless show that recipes were designed specifically for specific ailments and that relatively few recipes were panaceas, used for any and all ailments.[30]

Some recipes may have been widely used because of some desired medicinal effect deemed to be useful for more than one condition. We are not referring here to any modern notions of side-effects or medical properties, but rather to what might have been perceived by ancient physicians as medically relevant. Many parts of the human body, for instance, were examined to see if they were hard or soft, or wet or dry, and drugs or diet could be administered in order to correct any abnormal condition, since this was considered to have serious consequences on general health. For example, drugs thought capable of drying a patient's loose stools (which were "wet") might also be thought effective in drying up a "wet" cough (which produced excessive sputum or phlegm).[31] Our ability to assess these conditions is severely hampered by our inability to identify ancient Babylonian plant and mineral names and hence drugs, in order to assess any chemical properties behind Babylonian prescriptions.

Types of disease classifications in medical texts differ from each other significantly. "Kidney-disease" and "rectal disease" were, transparently, seated in specific *organs*. The designation *suālu* or "cough" for a type of disease refers to a *symptom* of the illness, while Hand of the Ghost refers to a potential *cause* of the disease (in theory, at least). Given

that there were many facets to the Babylonian disease repertoire, it is unclear why very different conditions were often treated with the same prescriptions.

Regarding the overall structure and contents of typical medical treatises from Babylonia, the primary information comes from rubrics on medical texts themselves, which are intended to label the contents of the recipes, according to the conditions being treated (see Attinger 2008: 26f.). Typical rubrics are as follows: "if a man's teeth are 'ill'," "if a man's eyes are 'ill'," "if a man's 'heart' (e.g. bowels) is ill," "if a man's breathing is labored (lit. heavy)," "if a man suffers from paralysis (*šaššaṭu*)." Other rubrics offer a bit more relevant information, such as, "if a man suffers from cough, turning into colic,"[32] "if a man's neck sinews hurt, it is the Hand of a Ghost," or simply medical conditions generally ascribed to the Hand of a Ghost (Scurlock 2006: 5–20). One important series is more comprehensive than others, "if a man's brain (*muhhu*)[33] contains heat," which mostly concerns fever in the body.[34] Migraine is referred to as a disease affecting the temples, which corresponds to numerous incantations for headache within the magic corpus. Rubrics, however, do not always explain the nature of the disease, e.g. one set of recipes organized under the heading, "if a man suffers prematurely from groin pain" (Geller 2005: 102f.). Finally, we also find medical texts with rubrics that are clearly magical in nature, labeling recipes as belonging to a category of uš$_{11}$-búr-ru-da, "breaking the spell" or zi-ku$_5$-ru-da, "cutting the breath,"[35] which are well known in otherwise magical contexts.

These rubrics do not, however, exhaust the full range of diseases which Babylonian medical texts aimed to treat. Aside from ailments just mentioned, medical texts dealt with diseases specifically associated with a certain part of the anatomy, such as kidney disease, rectal disease, diseases of the lung and chest, gall bladder disease, and many kinds of skin ailments, diseases of the foot and tendon, and diseases affecting the mouth and nose which resemble some aspects of leprosy. Other diseases are more general, such as stroke and seizures, which would probably include forms of epilepsy. Baldness was considered to be a treatable disease (or at least one for which we have recipes). Various kinds of fevers and paralysis are medicated, as are digestive problems and general internal disorders, probably occurring almost anywhere in the abdomen. Childbirth was, in some sense, treated as a medical problem. The designations and classification of diseases is not very different from what we find in the Hippocratic corpus, although in almost no instance can we expect to give a modern diagnosis based upon symptoms described in our ancient medical literature. One good example of this phenomenon is kidney disease caused by hypertension, for which the various symptoms

and signs are not located in the kidneys (see George 2002), or venereal disease, which is known as the great imposter since it copies the symptoms of other ailments.

At times medical texts provide clues to causes of diseases, and these often differ from the kinds of causes which are found within incantations (such as demons and vengeful gods). A good example of a disease cause is the eating of hexed foodstuffs causing digestive problems; in medical texts, it is not the hex itself which is the problem but rather the ingesting of food which has been cursed or magically altered.

Sumerian and Akkadian Therapeutic Magic

We must turn to other "sciences" as well, including magic. The oldest surviving types of magical texts come from the mid-third millennium BC, but these early texts are too rudimentary to allow much scope for analysis (see Cunningham 1997: 5–43). The next important phase of magical texts is found in Nippur, towards the end of the third millennium BC, this time in Sumerian only, and the same workshop in Nippur appears to have produced the one complete Sumerian medical text which has survived from antiquity (van Dijk and Geller 2003; Civil 1960). These Sumerian incantations address medical problems, such as headache, along with many other types of catastrophic situations occasioned by the attack of demons, such as the interference with natural husbandry and even the malfunction of musical instruments (Krispijn 2008). The basic understanding of these early texts was that demons were capable of destroying all aspects of the world's natural order.[36]

By the time we arrive at the great Sumerian scribal libraries of the Old Babylonian period, contemporary with Hammurabi, the literary text genres have developed considerably, and Sumerian incantations have become long and complex compositions; the process of translating these texts into Akkadian is beginning. By the first millennium BC these same incantations recur in bilingual Sumerian-Akkadian form, preserved in numerous copies in all major libraries in Mesopotamia.

The incantations are formal and formulaic, usually consisting of a dialogue between Ea and Marduk in their roles as father and son, and also in their roles as God of Wisdom and Divine Exorcist. Marduk observes what is wrong with the patient or victim, reports back to Ea seeking advice about how to help, and after a brief discussion Ea tells Marduk what he needs to know. The ritual instructions, which follow as a separate section, usually (but not invariably) derive from Ea's advice, which confers legitimacy upon the exorcist's activities. There are, on the other

hand, other types of formal literary incantations from Mesopotamia, mostly in Akkadian, which mainly deal with protection against witches and witchcraft. There is a third genre of more "down-to-earth" types of magic, concerned with the seamy side of life, such as rivalry at court or love magic, and these incantations are often somewhat more vulgar, both in content and language. This scheme is very skeletal but gives a rough idea of genres.

The essential formal elements of these incantations thus consist of a ritual solution to the patient's difficulties being communicated via a dialogue between Marduk and his father Ea. This dialogue becomes so integral to Mesopotamian magic that it is even repeated later on within Akkadian incantations, even when there is no Sumerian original source.[37] Here is an atypical example of the dialogue, with slightly different *dramatis personae*:

> Girra approached Marduk and spoke to him of this
> and in the quiet of his couch at night, (Marduk) listened to this matter.
> (Marduk) entered the temple, to his father Ea, and called out,
> "My father, Girra has approached the East, and news of them has reached (here).
> Hasten to learn the ways of the Seven, and seek out their places."
> "Wise son of Eridu,"
> Ea answered his son Marduk.
> "My son, the Seven among them dwell in the Netherworld,
> and have come here from the Netherworld.
> The Seven were born in the Netherworld,
> and were reared in the Netherworld.
> They have approached here to tread on the edge of the Apsû.
> Go, my son Marduk:
> As for the *e'ru*-wood sceptre of the (protective) spirits (*rābiṣu*),
> in the middle of which Ea is invoked by name,
> and along with the august Eridu incantation formula of purification,
> apply fire to the tip and base (of the sceptre), so that the Seven of them do not draw near to the patient.
> Toss (the flame) like a broad net spread out in a broad place,
> so that it may constantly be present at his head at high noon, and both day and night.
> Let (the sceptre) be held in his hand to light up the street and thoroughfare at night.
> let (the sceptre) be present at the head of the distraught man in the middle of the night,
> (even) during normal sleep in bed." (Utukkū Lemnūtu 13–15: 61–81 [Geller 2007c: 244f.])

This dialogue has a calculated function within the context of the incantation. The officiating exorcist can claim that his incantation comes directly from the gods and that the patient is benefiting from the best possible magic available. Later Akkadian incantations adopt a similar strategy within other contexts, in which the exorcist declares that "the incantation is not mine," and that the spell comes directly from the gods. Nothing therefore depends upon the exorcist's own personal charisma. The dialogue between gods was intended to inspire the patient's confidence, since the patient's acceptance and internalizing of the words and ritual procedures becomes part of the healing process. The exorcist, however, was not trying to dupe the patient into accepting a fiction, since he too would have believed in a dialogue between gods in the same way that the patient believed it.

Sumerian and Akkadian bilingual incantations were eventually compiled into formal compositions or canonized texts by the end of the second millennium BC and formed a large part of ancient libraries. For the most part, these texts recognized the harmful attacks of many kinds of demons and recruited the gods against demons and adjured the demons to depart and not come back. Formal magic lays out the rules of engagement, that whimsical gods can send demons against humans for whatever reason, but usually because humans have upset the gods by committing some transgression or violating some taboo. We rarely hear the patient's own voice in describing his difficulties, although his plight is catalogued in detail by the exorcist, who occasionally speaks in the first person. The patient himself, described throughout as a "man son of his god" and as the "distraught man," is the passive object of all that is happening around him, but the incantations are written from the perspective of the exorcist, not the patient.

Other types of incantations take a slightly different view of man's affairs, although probably dating from a later period than bilingual compositions. Dingir.šà.dib.ba (*ilī ul idi*) incantations have the patient declaring that he does not know what he has done wrong (Lambert 1974: 270). These incantations express the patient's own anxieties in the first person and we hear his voice, expressing his fears, worries, or doubts. These types of incantations also include a lengthy confessional, based upon the assumption that the patient is ill or suffering because he violated some divine taboo, willingly or unwittingly (van der Toorn: 1985, 42f.)

Another series of incantations are collected under the title "Šurpû," which means "burning" referring to a specific ritual. Šurpu incantations provide the long confessional of sins, defined as violation of an ancient taboo, and these taboos are delineated within the incantation itself.

Šurpu incantations also have much in common with formal Sumerian-Akkadian bilingual magic, probably originating in the second millennium BC. Tablet IX (equivalent to a "chapter") of Šurpu consists of what are known as *Kultmittelbeschwörungen*, incantations conveying sanctity on all instruments and paraphernalia used in the relevant rituals. The idea is that any cultic tool used in an exorcism needed to be ritually purified by reciting the appropriate incantation (Cunningham 1997: 112f.).

Formal magic also must deal with the attack of ghosts rather than demons, when a restless spirit returns from the other world to attack living humans. The texts give many different reasons for a ghost to re-emerge, usually involving not being buried with the proper funerary rites because the person died at sea or in the steppe, or simply had no living descendants to make the required periodic funerary offerings. Of particular danger was the Ardat Lilî, the Maiden Lilith, who never married or had children and died before having normal sexual relations, and she thus returns to seek out sex with susceptible human partners. The Maiden Lilith is no demon, however; she is a ghost, which means that she was not created by the gods with the expressed purpose of causing harm, but she herself was a victim in her own life and she is looking for compensation among the living. On the other hand, she is potentially as harmful as any demon and incantations are needed against her visitation. Ardat Lilî is usually portrayed as a victim, defended by her patron goddess Ištar:

> The evil demon *took away* the maiden from the palace of the steppe.
> The one who was unnamed from the start pursued her relentlessly.
> The incorporeal one pursued her relentlessly.
> He struck her hand and placed (it) on his (own) hand,
> he struck her foot and placed (it) on his foot,
> he struck her head and placed (it) upon his head.
> She therefore enters the pure *gipar*.
> The woman (=Ištar) shook the heavens and made the earth quake.
> The proud pure Ištar cried out in heaven and earth,
> she burned, she was inflamed, she took an oath at the door of the upper room:
> "The evil Utukku and Alû demons must not enter the house,
> the evil Utukku demon who seized him (the victim) must stand aside,
> but may the good Utukku-spirit and genius be present at his side." (Utukkū Lemnūtu 5 183–95 [Geller 2007c: 213f.])

This notion of the returning ghost was a well-known folk motif in antiquity, and the ritual for getting rid of a maiden lilith also appears in

several different Akkadian contexts, for which the most effective ritual appeared to be the use of a marriage between male and female figurines, to attempt to alleviate the maiden ghost's sexual frustrations (Farber 2004: 117–32). Nevertheless, the actual descriptions of the attack of ghosts, like that of demons, is detached from any question regarding the patient's own thoughts or fears. Everything is in the third person.

In the third major type of incantation, Maqlû, we encounter a text of a completely different sort. For one thing, the subject matter concerns witches and witchcraft, not ordinary demons and ghosts. Also, texts appear in the first person, with the patient complaining that the witch attacks *me*, and hence the witch is addressed in the second person.

> Because a witch has bewitched me,
> A deceitful woman has accused me
> Has (thereby) caused my god and goddess to be estranged from me (and)
> I have become sickening in the sight of anyone who beholds me,
> I am therefore unable to rest day and night. (Maqlû I 4–8, translation Abusch 2002: 30)

> I call forth (lit. seek out) against you (O witch) cult-players and ecstatics;
> I (for my part) will break your bond.
> May warlocks bewitch you, I will break your bond.
> May witches bewitch you, I will break your bond.
> May cult-players bewitch you, I will break your bond.
> May ecstatics bewitch you, I will break your bond. (Maqlû VII 92–7, translation Abusch 2002: 10)

At first glance, it seems that we ought to have in Maqlû a more intimate view of the patient in which he expresses his own fears and anxieties, but a more extensive look at the text leaves us in doubt. The text itself is repetitive in places and formulaic, almost like liturgy, and we assume that this lengthy and nicely phrased text was intended to be recited by the patient or by a proxy, such as the incantation priest. So although Maqlû is important for showing an awareness in magical texts of the patient's psychological state, it provides little more than general descriptions of angst, depression, and paranoia.[38]

Incantations, for the most part, address the familiar problems of disease and death threatening the patient, but magic is designed to deal with the more supernatural causes of disease, such as the revenge of an angry god, witchcraft, or the patient's own breaking of ancient taboos and the subsequent forfeiting of any divine protection against demons and disease. By its very nature of dealing with the supernatural (gods, demons, witches), magic is classified lower down on the scale of scientific
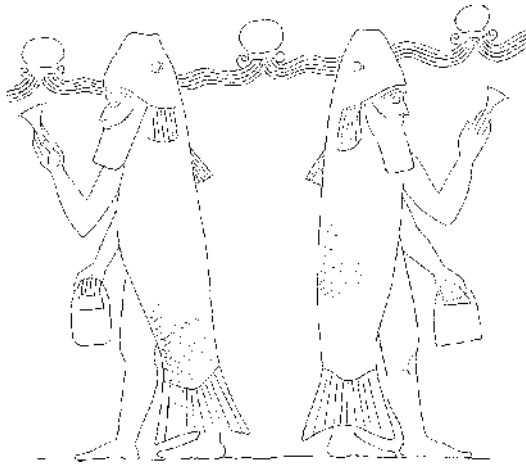
Figure 1.2 Exorcists performing a ritual, dressed as fish-men *apkallu* sages (Vorderasiatisches Museum, Berlin; drawing Tessa Rickards)

texts, bearing in mind our rule based on mathematics as a necessary component of scientific thinking. Magical texts comprised one of the disciplines forming a major part of the school curriculum in Babylon (Gesche 2001: 214f.), and the Babylon tablet libraries contained many varieties of magical texts. Although magical texts were mostly poetic and can be considered important examples of *belles lettres*, at the same time incantations and their associated rituals were designed for very practical purposes of influencing human health and fortunes, and hence represent applied "science." Although the concept of magic itself was to alter the effects of supernatural forces (demonic attacks, curses, even fate), the real effect of such texts was to alter the psychological state of a patient by reducing levels of anxiety and neurotic fear. The "science" of magic is based upon a profound understanding of human psychology grasped by the composers of these incantations and consisted of an impressive repertoire of incantations for very different purposes, aimed at alleviating feelings of guilt, helplessness, paranoia, anger, obsession, or other types of personality disorder. Nevertheless, there is little within magic that can be quantified or measured, and hence magic only merits a rather low score on our scientific quotient.

Examples of magical texts are numerous, and the following incantation tablet from Persian period Nippur in Babylonia (c. 500 BC) is a prayer addressed to the sun god Šamaš and to Gula, goddess of healing, on behalf of a patient whose illness is ascribed either to the attack of

demons, or to a worm. It is the alternative of supernatural and natural causes of disease which makes the incantation interesting from the point of view of ancient science:

> Incantation: Šamaš, lord and sublime judge of heaven and earth,
> Nintinugga (Gula), lady who brings the dead back to life,
> who are able to heal kings and servants;
> a man – tired, sleepless, and weary –
> in whose body there is disease, malaria, *lamaštu*-demon(-disease),
> jaundice, *chill*,[39] or parasites,
> which destroy the whole of a man's body;
> by the command of Ea, Šamaš, Marduk,
> and Nintinugga (Gula), may disease go out!
> As for malaria, *lamaštu*-demon(-disease), jaundice, *chill*,
> and parasites which are in his body,
> may they (all) go out and may the man recover.
> Incantation of Damu, Gula, and Dingirmah. Spell. (Nougayrol 1947: 41)

Psychosomatic Illness

The distinctions between *soma* (body) and *psyche* (soul) can be found in the Hippocratic corpus, and the notion of psychosomatic illness can be traced back to Plato, who writes, "When the soul is too strong for the body and of ardent temperament, she dislocates the whole frame and fills it with ailments from within" (*Timaeus*, translation Robinson 2006: 51). Similarly, older parts of the Hippocratic corpus described the diseased mind as exhibiting characteristic types of behavior, which include talking too much or not at all, exhibiting unmotivated or exaggerated moods and emotions, or speaking more aggressively or greeting people more warmly than warranted by the occasion (Gundert 2006: 34f.).

No corresponding conceptual framework can be found in Akkadian, which lacks any term or concept of "soul,"[40] but the distinction between physical and mental illness can be found in Babylonian medicine, although not expressed in the same philosophical form. An example of this phenomenon comes from Babylonian medical texts dealing with anti-witchcraft activities, of which we have a considerable number (Schwemer 2007: 165–79). Tablets dealing with witchcraft, however, differed considerably from anti-witchcraft tablets within the medical corpus. To illustrate the point, here are two examples of medical anti-witchcraft therapy:

If a man is seized by the "Hand of a Ghost"(-disease), or is seized by "epilepsy" (*bennu*), or is seized by stroke (*antašubbû*),
Saghulhaza(-disease) has seized him, Lugalurra(-disease) has seized him, "Hand of a God"(-disease) has seized him,
"Hand of a Goddess"(-disease) has seized him, "Hand of an Oath" (-disease) has seized him, "Hand of Mankind"(-disease) has seized him,
the Alû-demon has overwhelmed him, insanity ("change of mind") has seized him, he is sick with ague (*himittu*),
he faces rage, anger, and rejection of god and goddess,
his ears buzz, he keeps having depression ("broken heart"), he forgets what he says,
he talks to himself, gets heated, vacillates, can't make up his mind,
gives an order and changes his mind, he constantly sustains losses,
fear at night, and all day long he is in a daze,
he has quarrels at home and brawls in the street, one looks at him with malevolence, he is cursed by many people.
He swears in his mind to a goddess foolishly.
This is what that man [the witch] has over him by way of wrath of god and goddess!
In order to dissolve these (conditions) so that his anxieties not overcome him, and for
these sicknesses to be removed from his body, [perform the following rituals] … (Farber 1977: 56, 64; see Stol 1999: 65)

If a man's limbs tremble like (those of) a sick man,
… his feet and his *stomach-lining* are slack,
he speaks but nothing comes out,
he is robbed of his potency (lit. erection), his mood is always bad,
whether when urinating or
when he sleeps with a woman his semen is ejaculated (prematurely),
that man is not pure, god and goddess turn him away,
his command is not obeyed. (Farber 1977: 227, 237)

The texts above assume the format of medical rather than magical texts. Instead of the usual notations for magical spells, these passages both begin with the standard diagnostic phrase typical of medical texts, "if a man (suffers from) …". This formal distinction between magical and medical tablets from Mesopotamia is a fixed tradition which is not subject to alteration, and the diagnostic format of the passages above should technically be classified as medical. On the other hand, the rituals which accompany these medical-like diagnostic descriptions of mental illnesses are more magical than medical. The first ritual (see Farber 1977: 56, 64) involves bringing an offering of ash-baked cakes to a

shepherd, which is used to purchase a virgin kid. The next step is to sweep and wash the roof of the house and set up an altar to the goddess Gula, on which various offerings and libations are made (dates, flour, honey, butter, beer, and breads), with incense being burned. Some strands of the client's hair and garment hem are weighed in a balance in the presence of a chanting priest. The kid is then sacrificed and skinned, and the client recites an incantation. A similar ritual is performed for the second passage above (Farber 1977: 227, 237) in which the client is thoroughly purified over several days, an altar with foodstuffs is set up for Ištar and Dumuzi, and a sheep is sacrificed. On this occasion male and female figurines with arms being bound behind the back are constructed out of various materials (clay, gypsum, dough, fat), and appropriate incantations are recited.

A comparable case is described in the following medical text describing depression, for which the ritual prescribes a formal marriage ceremony between a male and female figurine, accompanied by offerings and the sacrifice of a sheep.

> If a man suffered a mishap but he did not know what had happened to him, he was constantly having regular reverses and losses, losses of barley and of money […], (or) losses of male and female servants, oxen, horses or flocks, dogs, and pigs, and even people were dying all at once: he kept having depression ("broken heart"). When he spoke, no one listened, and calling there was no answer. Taking people's complaints to heart, he lies frightened in his bed. He has paralysis. No holy water has come near him, and he is fed up with god and king. His limbs are flaccid and he gets increasingly afraid, not sleeping night and day and having terrifying dreams. He keeps having paralysis. He has less bread and beer (and) he forgets what he says. That man has earned the anger of god and goddess upon him, his own personal god and goddess are upset with him. If that man suffers from the Hand of the Oath, Hand of the God, Hand of Mankind or suffers from moaning, or the guilt of father, mother, sister or brother family, relations, and kin has affected him, in order to resolve it so that his worries (i.e. melancholy) do not overwhelm [him]: (Ritual follows). (*BAM* 234; see Ritter and Kinnier Wilson 1980: 24–27)[41]

Although the text does not specify why a ritual marriage is required, we can presume that the client's mental anguish is determined as being caused by the amorous intentions of a maiden lilith (*ardat lilî*), a

feared succubus, and that the purpose of the marriage was to provide a spouse to address her sexual needs. In other cases, a similar diagnosis of mental imbalance was attributed to sorcery (Stol 1999: 67). Although these texts are all examples of the grey area between medicine and magic, other medical texts dealing with mental problems resort to more traditional kinds of recipes for dealing with the symptoms. A good example of this can be found in a late Uruk medical text from the third century BC, which deals with anxiety and depression (von Weiher 1983: No. 22; von Weiher 1988: No. 85).[42] The patient imagines that he has a rival or enemy who causes him to experience hatred, perversions of justice, loss of breath, and aphasia when faced with authority (god or king), he suffers from anxiety day and night and in his dreams imagines himself to be the object of constant slander and gossip. The remedy for this poor mental state is various herbs and minerals being wrapped in a leather pouch to be hung from his neck. Although the prescription might appear more magical than medical to us, in ancient terms the use of drugs wrapped in a leather pouch was a standard medical procedure, seen to be more directly curative (like a potion) than like an amulet (see Farber 1973). A similar text (*BAM* 316) reads as follows:

> If a man is constantly frightened and worries day and night; losses are suffered regularly by him and his profit is cut off; people speak defamation about him, his interlocutor does not speak affirmatively, a finger of derision is stretched out (i.e. pointed) after him; in the palace where he appears he is not well received; his dreams are confused, in his dreams he keeps seeing dead people; heartbreak is laid upon him; the wrath of god and goddess is upon him, god and goddess are angry with him; witchcraft has been practiced against him; he has been cursed before god and goddess; his omens are confused; (city) god, king, noble, and prince are annoyed with him; as many as seven times his case (lit. judgment) is not cleared up (lit. is not straight[ened out]) by diviner or dream interpreter; he is beset by speaking but not being heard (and responded to favourably). (Translation Abusch 2002: 31–2)

There is no doubt about the genre of this text, since it occurs within a medical prescription. The ritual (not translated by Abusch) is revealing about how Babylonian physicians dealt with this kind of psychological trauma:

> Its ritual: you wrap in (a) leather (bag) *taramuš, imhur-lim, imhur-ešra, erkulla, elkulla, amēlānu*(-plants),

coral, tamarisk, (and) "mace"-plant;
recite over him seven times the incantation *alah salah bašinti*
(and) the incantation *arazu šutemab*[43] and place (the bag) [on] his neck.

Like in the previous case of amulet stones and incantations being
prescribed for psychological distress, this ritual calls for medicinal plants
and drugs to be hung around the patient's neck, along with appropriate
incantations being recited.[44] In both cases, medicinal plants and amuletic
stones hanging on the patient's body are often used with somatic ill-
nesses, which may show that these types of mental conditions resemble
illnesses in which physical symptoms are attributable to psychic causes.

The magical corpus was also designed to deal with a patient's anxie-
ties, to help him recognize the hidden and harmful forces of the sur-
rounding cosmos, to acknowledge the ultimate causes for misfortune
and ill-health, and to try to reconcile the patient with whatever is acting
against him. Mesopotamian man was full of fear of transgression, for
which there were abundant opportunities, such as eating the wrong
foods on the wrong day, or having intercourse with an unclean (men-
struating) woman. Essentially, while magic intended to explore the ulti-
mate causes of illness and misfortune, it employed a variety of strategies
to reverse the processes. In some cases, the patient was asked to make
his confession from a long list of sins (Šurpu Tablet II), while in other
cases the magic threatened retribution and revenge against demons and
purveyors of evil, such as malevolent witches (Schwemer 2007: 143).
Other types of magic include curses against rivals and enemies, which
are relatively less common, possibly because they originally represent a
type of folk magic which belonged to oral tradition or in later times was
more common in Aramaic. There are even cases of love incantations
within Mesopotamian magic, in which black magic is employed to force
a woman to abandon her family and run off with the subject of the
incantation, but this type of incantation can be seen within the context
of unrequited love as a type of sickness, for which the incantation serves
as a means of relief from psychic torment (Geller 2003). Other kinds of
incantations deal with fear of ghosts, bad dreams, sex with a succubus,
or against dog-bite and snakebite, all of which intend to offer the patient
some kind of relief against real or imagined harms. We have no incanta-
tions, on the other hand, specifically designated to treat depression or
obsessive-compulsive behavior, although Babylonian therapists had
enough grasp of human psychology to recognize these disorders, and it
is likely that magic was employed to deal with such problems in an
indirect way.
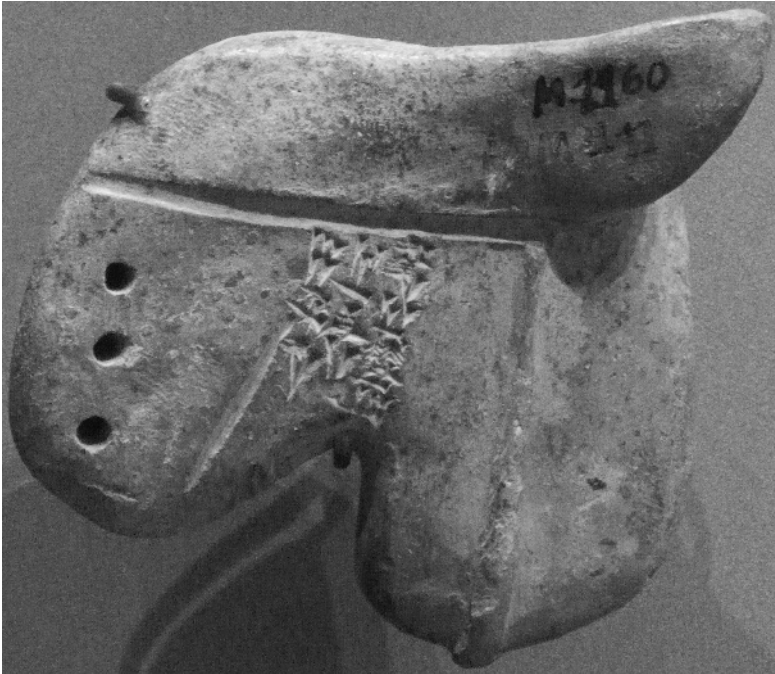
Figure 1.3   Clay model of a sheep liver used for divination, from Mari in Syria, second millennium BC (Musée du Louvre; photo Florentina Badalanova Geller)

Magic could be summarized as expressions of anxiety and worry about angry gods, malicious demons, harmful witches. There is another level on which to understand magic, as expressions of human psychology without reference to the actual existence (or not) of gods, demons, and witches. The relationship between humans and gods, as expressed in prayers and religious literature, is that of child to parent or of servant to master, and a child's fear of punishment for misbehavior reflects a similar pattern of fear between humans and gods. Divine anger and punishment was thought to apply even when human transgression was committed unintentionally; the essential relationship between man and god in Mesopotamia was that of fear. Incantations expressing the patient's alarm at being the object of divine wrath are understandable within these terms. Nevertheless, it is difficult to ascertain from this literature when any particular patient exceeded the boundaries of normal fear of gods and became excessively anxious, or in modern terms, neurotic.

We are also faced with a perverse sort of logic within magic, namely that if a person is ill or suffers misfortune, then this is *a priori* evidence

that the gods are angry with him. This argument is less a matter of anxiety and more a way of explaining the cause of illness in a way one could easily grasp: the gods are ultimately responsible for human fate and they are angry. Appease the gods and reduce the chances of further illness or misfortune.

Divination

Omens formed one of the most important parts of Babylon's school curriculum (Gesche 2001; Cryer 1994: 139–40). In some ways, divination can be classified as the least "scientific" among Babylon's disciplines, since the entire concept of divination is based upon the logical fallacy that two events in sequence are thought of as being causally related. Hence, the entrails of a sheep with a specific characteristic were thought to forecast some significant contemporary events, usually affairs of state. Nevertheless, the result of this logical fallacy had certain fortuitous consequences as far as scientific thinking is concerned: the ancient divination scholars collected large databases of ominous events (also from positions of celestial objects, flights of birds, patterns of oil on water or smoke, unnatural births, and many other genres of omens). The practice of collecting and sorting data, as well as analyzing data, must be seen as a process resembling certain aspects of scientific thinking. So although the aims of divination can be seen as heading off on the wrong tack, the methods and procedures of handling data, and the idea of drawing inferences from large amounts of data, should be seen as a type of forerunner to modern science.

In this way, the position of constellations or planets, or the sun or moon (e.g. eclipses) within the heavens was considered to be relevant to events happening on earth. It is difficult to know which discipline came first, astronomy or astrology. Was careful observation of heavenly bodies later applied to celestial divination, or did the "science" relating movements in the night sky to events on earth become the basis for astronomy? Whatever the rationale for watching the heavens, astrology by the Persian and later Hellenistic periods was flourishing and developed horoscopes which later influenced Greek thought, later to become the common pseudo-science of every newspaper in the modern world.

As for medical omens and the relationship between divination and medicine, the Diagnostic Handbook preserves its own unique style, which differs significantly from the way diseases and symptoms are usually described in therapeutic recipes (see Fincke 2006–7: 144f.;

Stol 1991–2: 64f.). While therapeutic recipes open with an "if" clause defining the symptoms, they are not casuistic in the same way that legal or omen texts operate. "If" the patient suffers from a certain disease or syndrome or ailment, the recipes provide instructions regarding what to do "in order to cure him," and as a result "he will get better" or "he will improve"; the conclusion is always positive. This differs fundamentally from the Diagnostic Handbook, which maintains the classical structure of omen texts, i.e. if such-and-such, then such-and-such (may result). In most cases the result will be that the patient will die, that his illness will be prolonged, or that he might survive and improve, and variations of these possibilities are given within a limited range of possibilities.

The search for parallels to the Diagnostic Handbook outside the genre of medical literature takes us to a group of first-millennium BC commentaries which were primarily academic in origin, known as *Multābiltu-*omens (Koch 2005). This group consists primarily of highly specialized explanatory texts on liver divination, and the texts provide general guidelines for interpreting omens and omen texts, based upon specific rules of exegesis. Hence, the concept of "long" implies "success," so that if a certain key physiological feature of an examined liver is "long," this portends that the king will have success in battle (see Jeyes 1980: 23f.). However, to proceed correctly one must know whether a "long" part of the liver anatomy is associated with the right or left half of the liver, since "long" on the left side may mean that it is one's enemy who has success.[45] This unusual divination text is highly theoretical and may reflect oral tradition (George 2008: 557) or discussions within the academy, as do other types of commentaries.

It must be emphasized that *Multābiltu*-omens belong squarely to divination and not medicine, despite the fact that an entire tablet (i.e. chapter) is devoted to omens taken on behalf of a patient. The seventh tablet begins with the phrase, "if you perform an examination of the liver (*têrtu*) for the well-being of the patient …" (Koch 2005: 154). What follows is a series of technical omens referring to an animal liver, with a typical protasis (or "if"-clause) as follows: "if you perform an extispicy (liver examination) and there are two 'paths' to the right of the gall bladder and two 'paths' to the left of the gall bladder …". Then comes the actual prediction, most commonly, "the patient will die" (Koch 2005: 155: 13′, 158, 560), but there are variations on this theme, such as, "the calmed patient who ate food and drank water will [have a relapse] of his illness [and die]," or the patient "will change his residence and get well" (Koch 2005: 155, 12–14). Occasionally the patient will contract a disease

but then recover or the illness will linger (Koch 2005: 156, 17–18). Such expressions are similar to those found in the Diagnostic Handbook.

One telling medical comment found in *Multābiltu* refers to the physician's withdrawing treatment from a patient in cases with a fatal prognosis. The interpretation of one such omen is that "the patient will get worse; depart quietly, do not perform any [treatment]" (Koch 2005: 156, 16).[46] It was not the diviner's task to offer or withhold medical treatment, so we have to presume either that the physician was an interested party to this particular omen, or that the information would be communicated to the physician, if appropriate. In any case, we have little information regarding the use of divination for patients, except for the meager references in the Neo-Assyrian letters and diviners' reports.

Other omen hermeneutics resemble diagnostic omens, such as diseases being labeled as the Hand of (a certain) God, and in *Multābiltu* Tablet VII we indeed find the "Hand of Marduk," "Hand of Ištar," as well as the "Curse of Ea," all designations of disease. One particularly revealing omen stipulates:

> If, ditto [= you perform the divination], and you perform (it) for the "Hand of a God," the patient will live until his appointed time, but after his appointed time he will die. (Koch 2005: 155, 13)

This omen is inserted out of sequence with the rest of the omens, which usually refer to an anatomical feature in the animal's liver, but uniquely not here. Obviously, the problem was to determine whether the disease was indeed caused by the "Hand of the God," or to determine precisely which god had brought the disease. In any case, this omen is predictive and not therapeutic, and the result will be that the patient will live or die according to his destiny decided by the gods.

The similarities between the omen apodoses of *Multābiltu* and the apodoses of the Diagnostic Handbook are unmistakable, and there seems to be only one inference to be drawn, that these texts derive from the same scribal source. On the surface, this conflicts with the supposition that omen divination was composed and copied by diviners[47] while diagnostic omens by exorcists. In fact, the authorship of these texts is more complicated. It is probably true that in the second millennium BC discrete genres of texts were composed by the professionals who actually used the texts, so that incantations were composed by exorcists and divination texts by diviners, etc. By the time of Assurbanipal's great library, however, the situation has already changed. No less than five *Multābiltu* texts found in Nineveh were copied by the renowned scholar

Nabû-zuqup-kēna in 711 BC (Koch 2005: 267). Although Nabû-zuqup-kēna refers to himself as *ṭupšarru*, "scribe," his wide knowledge and the impressive range of texts he copied show him to be a master of cuneiform literature. Certainly not a diviner, he took an interest in academic divination texts, such as those found in the *Multābiltu* corpus.

So although these large compendia of scientific texts found in Nineveh or Assur libraries go back to earlier prototypes from the second millennium BC, it seems likely that strict lines separating the professionals from one another was steadily breaking down in the first millennium (see Parpola 1983: 8). One of the *Multābiltu* texts found in the late Uruk library was copied by the prolific scribe and *mašmaššu*-exorcist Iqīšâ (Koch 2005: 209), who had a vast repertoire of tablets under his belt, including scholarly commentaries.

Since the Diagnostic Handbook was arguably the original (or older) composition upon which *Multābiltu* Tablet VII was modeled, this would tell us little about the milieu in which the Diagnostic Handbook itself was composed. It is true that the Diagnostic Handbook is attested already in the Old Babylonian period, from about 1700 BC. Nevertheless, the rapid growth of scholarship during the first millennium produced a much broader range of texts than had been known earlier, and it is likely that scientific literature grew up within the academy as schools became more widespread and specialized. It is also highly probable that the Diagnostic Handbook, like *Multābiltu*, was essentially a scholarly or theoretical composition, used to teach the theory of diagnosis, rather than a vade mecum which the doctor would carry with him to the patient's bedside, to look up the appropriate symptoms while examining the patient. It is quite possible, in fact, that the Diagnostic Handbook was never actually used by practicing physicians, but was a speculative treatise on diagnosis, much as we might find in the Hippocratic corpus or in Aristotle. The therapeutic recipes, on the other hand, probably existed in small single-tablet formats that may have actually represented prescriptions from the practice of medicine, and these were later copied into the great library and medical archives which we find in Nineveh, Assur, Babylon, Uruk, and other sites.