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The arrival in Iran of Greek ideas and sciences cannot be traced only through directly translated texts. It must also be sought in the allusions and references that we can glean from Pahlavi literature, and on occasion in longer passages where the closely related medical and philosophical theories of the ancient East indicate their origins in Greek or Indian civilization. As early as 1955, Robert Zaehner (p. 143) wrote: "That the Pahlavī books borrowed extensively from Greek philosophy seems now indisputable: the reverse has yet to be proved." While such borrowings are attested most of all in the Sasanian period, some go back at least as far as the Achaemenid period, when, as is shown by the frequent appearance of Greek doctors at the court, cultural relations were developed. We may cite as examples Ctesias, who spent seventeen years at the Achaemenid court and was the personal physician of Artaxerxes II, or Apollonides of Cos at the court of Xerxes and Artaxerxes I (Huyse, pp. 141-48).

This disposition to Greek (and Indian) medicine appears again in Sasanian times, in Gondēšāpur, a city in Khuzestan. Greek philosophers who had taken refuge in Iran after Justinian closed the School of Athens in 529 taught here. Besides, here was founded, probably under Ḵosrow I Anušervān, the first hospital (*bimārestān*), called the Academia Hippocratica (Schöffler, 1979 ; 2nd

ed., 1980, p. 94-95 ; Gignoux, 1987, pp. 59-60). Greek- and Syriac-speaking Christian deportees who had populated the city took charge of medical activities there. Evidence of this is the debate held under the aegis of Ḵosrow II Parviz in 610, in which the chief physician (*drustbed*) Gabriel of Šiggār (Senjār) took part (see entry "Gondēšāpur"). The management of the hospital of Gondēšāpur was in the hands of the Christian Boḵtišuʿ family. Medieval Muslim bibliographies attest a continuous Hippocratic tradition of medical practice and teaching at Gondēšāpur from the time of the city's foundation (see also HEALTH IN PERSIA i. PRE-ISLAMIC PERIOD).

Harold W. Bailey (pp. 86-93) identified several terms of Greek philosophy that were adopted by Iranian languages (often through Syriac) or translated into them word for word. The Greek *micros cosmos* is thus rendered in Middle Persian as *gēhān ī kōdak*, the microcosm, which is man as opposed to the cosmos or the macrocosm, as *gēhān ī wuzurg* in Middle Persian. The theory of the microcosm and macrocosm, which establishes a correspondence between the various elements of the human body and those of the cosmos, associated with astrology's seven planets and twelve signs of the zodiac, is of Greek and even Gnostic origin, and can be traced back to Plato's *Timaeus*. The *Bundahišn* (chap. 28) thus indicates that "the skin is as the sky, the flesh as the earth, the bones as the mountains, and the veins as rivers, the blood in the body is as the water in the sea, the stomach is as the ocean, and the hair as the plants ..." (Gignoux, 1994, p. 31). The *Dēnkard* (book 3, ed. Madan, p. 278; tr. de Menasce, 1973, chap. 263) attests the same theory, albeit limiting the number of elements in comparison to seven: "The body of the world is fire, water, earth, metals, plants, beasts, and man, as the body of man is marrow, blood, veins, nerve, bone, flesh, and hair." The seven parts of the body are clearly related to the seven planets, borrowed from Greek astrology. The same doctrines are present to a great extent in Manicheism, and one may wonder whether it might have accepted them before they passed into Mazdeism.

Non-Manichean Gnostic literature is replete with the same theories. The *Secret Book of John*, translated from Greek into Coptic, can be considered "the direct source of the Manichean, Syriac, and Iranian accounts," as stated by Michel Tardieu (p. 304), who considers that the Mazdean lists of seven terms derive from Manichean lists. The Hippocratic tradition (cf. Boethius, *De Hebdomadibus*, first cent. BC) employed both the teaching of the Greek astrologers and that of Plato's *Timaeus*, which is the original source for the theory of the microcosm. The Iranians also adopted the Greek, namely the

Hippocratic, concept of the composition of man, made up of the four cosmic elements (water, air, fire, and earth) and of the four liquids or humors (blood, phlegm, red bile, and black bile). Zādspram was well acquainted with the properties of each of the humors and their relation to those of the cosmic elements, as described by Hippocrates and Galen (see JĀLINUS). Water is cold and wet, air hot and dry, fire hot and wet, and the earth cold and dry. The humors, likewise, each had two distinct properties: blood is hot and wet, like fire; phlegm is cold and wet, like water; red bile is hot and dry, like air; and black bile is cold and dry, like the earth (Zādspram, 30:15).

To highlight the point, one may cite the following passage from Galen, which includes a noteworthy summary of this twofold concept, based on Hippocrates: "To this branch of science belongs [the book] *On the Elements According to Hippocrates*, in which it is demonstrated that hot, cold, wet, and dry constitute the common elements that issue from bodies subject to genesis and corruption. And if these are named according to their substance, they are earth, fire, air, and water, while human bodies are formed from the elements of blood, phlegm, and the two biles" (see Boudon-Millet and Pietrobelli, p. 531). The process of generation was also understood on the basis of Greek science, notably in the idea that the semen is located in the head (Onians, p. 111) and passes down the back. All this science probably reached the Iranians through Syriac Christians (see SYRIAC iii).

Paul the Persian is said to have dedicated a book on Aristotle's *Logic* to Ḵosrow I Anušervān (Bailey, p. 80). Ptolemy's *Almagest* is cited in *Dēnkard* (428.16) in the form *megistīk ī hrōmāy*, derived from the Greek *megistè* (probably via Syriac). A passage in *Dēnkard* IV clearly states that writings of the Greeks, as well as the Indians, were accepted, and therefore known and read, by the Mazdean theologians. The text, variously translated by Bailey, Shaked, and Shaki, can be read as follows: "The King of Kings Shābū**r,** son of Ardašīr, collected the secular writings … concerning medicine, astronomy, motion, time, space, substance, genesis, decay, transformation, logic, and other crafts and skills, which were dispersed among the Indians and the Greeks and other lands …" (Bailey, p. 81; Shaked, 1994, pp. 100-101; see also FALSAFA). The present author agrees with Mansour Shaki in taking the expression *az dēn bē* to mean "secular," and not "religious" (Shaked), a sense which does not fit the context. This list covers all the branches of science developed by Aristotle, which were so adapted in Mazdeism to the conceptual framework of a strict dualism that a rigorous comparison would be a somewhat risky endeavor

(Gignoux, 2001). Bailey has set out the comparable terms: "The two topics of *bawišn* 'becoming' and *vināsišn* 'destruction' ... refer ... to the treatise *Peri geneseōs kai phtorās* 'on becoming to be and passing away,' which was rendered into Syriac by Ḥunain (b. Esʿāq)." Middle Persian *jadag-vihīrīh* (transformation) corresponds exactly to Greek *metaskèmatisis* 'change of form'" (Bailey, pp. 82-83). Similarly, the Middle Persian "*gōhr ī dāmān* may reasonably be taken ... in the conception of creation as referring to the (Aristotelian) *protè hylè*, the underlying matter" (Bailey, pp. 89-90).

The association of medicine (*biziškīh*) and physics (*cihr-šnāsīh*) is also striking (cf. *Dēnkard*, ed. Madan, p. 645.14). The theory of the transformation of the cosmic elements by the means of their reciprocal differences, which is to be found in Aristotle's *On Generation and Corruption*, finds a striking echo in chapter 119 of *Dēnkard* III (Gignoux, 2006, p. 75), although the Mazdean author does not state the agent of such transformation, namely, the four elementary properties combined in pairs. As for the four humors and their seats, which are thoroughly described in Zādspram, the source is to be found in the treatise *On the Nature of Man* (Ar. *Fi ṭabiʿat al-ensān*) in the Hippocratic Corpus. Zādspram's explanation of sight (chap. 30.23) is that fiery light comes to reside in the eyes during the formation of the embryo. This corresponds to the explanation given by Plato (*Timaeus* 45) and by Empedocles, which was rejected by Aristotle (Bailey, p. 98). Touraj Daryaee (2002) has demonstrated the association between sight, the semen, and the brain, in which the semen forms an association that, as Richard Onians (1954) has shown, is of Greek origin. But only weak and marginal arguments support the attribution of this theory to an Indo-European tradition.

Shaki has dealt with Mazdean philosophical and theological ideas and has brought to light a Greek, or neo-Platonic, substratum (see entry "Falsafa"). But Mazdean philosophy is still too complex and too little explored to yield to study by the comparative method. As a first step, the overarching ideas would have to be defined in terms of their technical nature and their interrelations (Gignoux, 2001). Among these ideas, that of the "good measure" (Mid. Pers. *paymān*) is of particular significance. The *Dēnkard* declares that the Iranians have always praised moderation and faulted excess and shortcoming. The concept was not, of course, of their invention; it clearly came from Aristotle and was adopted by Hippocrates. In the *Nicomachean Ethics* (II.vi /1107a3-4), the writer defines virtue as a medium between two opposites: "It is a mean between two kinds of vice, one of excess and the other of deficiency." But the

Mazdean theologians, in adapting the concept to their system of strict dualism, somewhat distorted the significance of the medium as a just mean. They compared only two terms: "good is, in summary, the measure ...; evil is, in summary, excess and deficiency" (*Dēnkard* III, chap. 203, tr., pp. 214, 215). Aristotle also linked these two words when he wrote that "injustice consists in excess and deficiency in the sense that it is productive of these ..." (*Nichomachean Ethics*, V.5 / 1134a9). The *Dēnkard* appears to reproduce precisely that assertion: "Violence (*must*), which is itself excess and deficiency, is the principle of injustice" (tr., p. 228). These few comparisons should suffice to show the extent to which Ādurfarnbag ī Farroxzādān, the first author of *Dēnkard*, was acquainted with Aristotle's moral and philosophical writings, no doubt through Syriac versions (see entry "Syriac iii").

The theory of universal sympathy, which goes back at least as far as the Stoics (4th-3rd cent. BC), finds its counterpart in Iran not only in the theory of the microcosm and macrocosm, but also in some more obscure passages of the *Dēnkard*, where it is stated that physical medicine cannot keep the body in good health unless the soul is also taken care of, thus emphasizing the necessary harmony between body and soul (Gignoux, 2001, pp. 46-47).

In the field of astronomy, India seems to have been of greater influence than Greece. Antonio Panaino has shown in several of his works that astronomy and astrology spread from Iran to India thanks to borrowings from Greece and Mesopotamia, in a confluence of the Semitic, Greek, and Indo-Iranian world. It appears that the first two Sasanian kings commissioned translations of Greek and Sanskrit works on astronomy and astrology, notably the treatises of Dorotheus of Sidon and Vettius Valens and Ptolemy's *Syntaxis Mathematike* (see above), but these Middle Persian translations have been lost (see ASTROLOGY and ASTRONOMY i). Panaino has demonstrated the combined Greek and Indian origins of the astronomic tables (Mid. Pers. *zīj*), the horoscopes (Mid. Pers. *zāyc(ag)*), the calculations for the positions of the sun, moon, planets, and the determination of eclipses (Panaino, 1998; Gignoux, 2006, p. 77). In 556, Ḵosrow I Anušervān reportedly summoned an assembly of astronomers to draw up the tables. While deeply influenced by the Indian approach, the tables also had as a practical model the Greek tradition, notably Ptolemy's Manual Tables. Indian terminology and new astrological techniques are attested in the Arabic versions of Greek texts that had previously been translated into Middle Persian (Panaino, 1998, pp. 23 ff.).

History was never a science in pre-Islamic Iran; it was intermingled with

myth, and, furthermore, primary importance was given to oral transmission. Historical geography has received more attention in recent research (see Cereti). The world was envisaged as being divided into seven regions (*kišwar,* see CLIME), and the four cardinal points and a center, represented by Iran, which served as the point of reference. This latter theory was known across the ancient eastern Mediterranean. As for pharmacopoeia, it is an ancient branch of study, one in which it is very difficult to prove that any one country preceded any other. Medicinal plants were endemic in India as much as in Iran, in Greece as much as in Syria, and have been known by many different names. Research into the ingredients that were used to treat illnesses has barely begun, and in the case of Iran (Greece is better served thanks to the work of Suzanne Amigues) would require a considerable amount of work, to which the present author has as yet made little contribution.

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