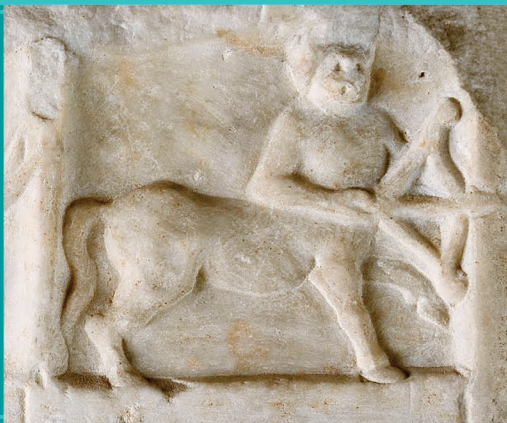


Cosmos, East and West

Astral Sciences in South and East Asia and
Their Interaction with the Greco-Roman World

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February 27, 2017
Institute for the Study of the Ancient World
New York University

 **NYU | ISAW**

**Cosmos, East and West:
Astral Sciences in South and East Asia and
Their Interaction with the Greco-Roman World**

February 27, 2017. 9:30- 17:00.

Lecture Hall, Institute for the Study of the Ancient World, New York University

9:00 Registration

9:30-9:40 Opening Remarks

Chair: **Lillian Tseng** (Associate Professor, ISAW, NYU)

9:40-10:30 **Bill Mak** (Associate Professor, Kyoto University)

"How Greek was Greco-Indian and Greco-Chinese Astral Science?"

Commentator: **Stephan Heilen** (Professor, University of Osnabrück)

10:30-10:50 Coffee Break

10:50-11:40 **W. Randolph Kloetzli** (Ph.D., University of Chicago)

"Ptolemy and the Indian Religious Cosmologies"

Commentator: **David Pankenier** (Professor Emeritus, Lehigh University)

11:40-12:30 **Michio Yano** (Professor Emeritus, Kyoto Sangyo University)

"The Size of the Universe in Indian Astronomy"

Commentator: **Alexander Jones** (Professor, ISAW, NYU)

12:30-13:50 Lunch

Chair: **Bill Mak** (Associate Professor, Kyoto University)

13:50-14:40 **Marko Geslani** (Assistant Professor, Emory University)

"Omens in Late-Vedic Rituals: Early Evidence"

Commentator: **Pia Brancaccio** (Associate Professor, Drexel University)

14:40-15:30 **David Pankenier** (Professor Emeritus, Lehigh University)

"Astrological History in the 'Treatise on the Celestial Offices' in Han China"

Commentator: **Nathan Sivin** (Professor Emeritus, University of Pennsylvania)

15:30-16:00 Coffee Break

16:00-16:50 **Kenneth Zysk** (Professor, University of Copenhagen)

"Greek and Indian Physiognomy"

Commentator: **Claire Bubb** (Assistant Professor, ISAW, NYU)

Conference Description:

The astral science was among the most developed bodies of knowledge in the ancient world. A complex and interrelated system of astronomical observation, astral rituals, divination and physiognomy was developed in Greece, India and China. While each civilization cultivated this knowledge along its own cultural trajectory and each system contained features unique to its own, there were moments when their paths crossed and ideas cross-fertilized and hybridized. This conference is concerned with the traditional lore of the cosmos and its evolution in South and East Asia, and how the astral knowledge of the “West” was received in the “East” in the pre-modern world.

Abstracts:

Bill Mak, "How Greek was Greco-Indian and Greco-Chinese astral science?"

A distinct genre of hybrid Greek astral science emerged when the South and East Asians came into contact with Greek science. The picture has been complicated by various paths of transmissions which lie between these cultures. Rather than pure translation, the products are often an eclectic amalgamation of elements from multiple sources. In this paper, I examine a number of distinctive features of such hybrid texts, from the *Yavanajātaka* of Sphujidhvaja to the *Yusi jing* possibly attributed to the Syriac-Persian Nestorians.

W. Randolph Kloetzli, "Ptolemy and the Indian Religious Cosmologies"

Historians of science generally focus on the 5th century astronomers to mark the influence of Greek spherical and mathematical science in India while dismissing the cosmologies of Hinduism, Buddhism and Jainism as lacking any relationship to ‘science’. While it is true these are primarily the mythological stages for dramas of transmigration and liberation, they reflect an understanding of the science of the day in their geometric structure and use of number employed to elaborate doctrine.

For this conference, I would like to focus on the disk-like Hindu cosmographs with the cosmic mountain, Mt. Meru, at the center found in 4th-6th century texts such as the *Viṣṇu Purāṇa*. The thesis is that the disk of the cosmograph derives from the projection of the sphere of the heavens onto the equatorial plane; a planispheric projection known to Hipparchus and Ptolemy (*Planisphaerium*) and the theoretical basis for an instrument known as the astrolabe. The seven regions (*varṣas*) of the central island, Jambudvīpa, are related to the Ptolemaic climates and the *Geography*. There is a shared sense of the limits of the inhabited world. Moreover, the Purāṇic Ganges, the Milky Way, which descends from Dhruva (the north celestial pole) to the orb of the moon, onto Mt. Meru and into the inhabited world, shares important structures with Ptolemy’s Nile and the name and structure of Mt. Meru may derive from the climate/island of Meroë. Macro-time intervals known as *kalpas* and *yugas* reflect an understanding of Greek acrophonic and Babylonian sexagesimal number as well as the approach of Apollonius of Perga to the construction of large, if limited, numbers. Themes of time, number and descent dominate Purāṇic cosmology.

Attention to other projections including ones possibly involved in Buddhist and Jain cosmographs may be addressed as well.

Michio Yano, "The size of the universe in Indian astronomy"

The first Indian astronomer who defined the weekday order by means of the distance of the planets is Āryabhaṭa (born 476 CE). He thought that the universe is of a spherical shape containing concentric orbs of the planets with the earth at the center (*Āryabhaṭīya* 3.15-6).

As is well known, the Hellenistic astronomy transmitted to India was that which belonged to the time after Hipparchus and before Ptolemy. Thus we wonder which kind of cosmography was disseminated and transformed in India.

According to Abh 1.6a the circumference of the lunar orbit (C_m) is $360 \times 60 \times 10 = 216,000$ *yojanas*. Since the Moon's revolutions in a *yuga* (R_m) are 57,753,336, the Moon travels $C_m \times R_m = 12,474,720,576,000$ *yojanas* in a *yuga*. This is also the circumference of the universe (C_u). For all the planets $C_i \times R_i = C_u$ is constant. Thus, in the case of the sun, for example, $C_\odot = \frac{C_u}{R_\odot} = 2,887,666$ *yojanas* ($R_\odot = 4,320,000$). This means that the distance of the sun from the earth is $\frac{C_\odot}{2\pi} \approx 459,585$ *yojanas*.

The radius of the earth is $1050/2 = 525$ *yojanas* (Abh 1.7). Therefore using the radius of the earth (r_e) as a unit, we can express the distance of the moon as $\frac{216,000}{2\pi} \approx 34377.387$ *yojanas* $\approx 65.48 r_e$ and that of the sun as $459,585$ *yojanas* $\approx 875.4 r_e$. The circumference of the sphere of the asterisms is 60 times that of the sun (Abh 3.12), i.e. $173,260,008$ *yojanas*, which means that the distance of the fixed stars from the earth is $\frac{173,260,008}{2\pi} \approx 27,575,122$ *yojanas* $= 52,524 r_e$.

Now, at last, we can compare the Indian numbers with those given, for example, by Ptolemy. According to his *Planetary Hypothesis*, the mean distance of the moon, the sun, and the fixed stars are, respectively, $48 r_e$, $1,210 r_e$, and $20,000 r_e$, which are not much different from the Indian values mentioned above.

According to Brahmagupta (born 598 CE), one minute of the lunar orbit is 15, instead of 10, *yojanas* and he uses *kalpa* (1000 times of *yuga*) when he gives the revolution number of the planets. Therefore the size of the universe was increased to $18,712,069,200,000,000$ *yojanas* ($= C_m \times R_m = 360 \times 60 \times 15 \times 57,753,300,000$) (Cf. BSS 1.16ab). If we convert this number into radius and express it in the modern way, this would be about 4,532 light years (provided that one *puruṣa* is 1.8m).

In this way Indian astronomers maintained the huge size of the universe on one hand, but on the other they had to shrink the size of Mt. Meru to an extreme degree. In the purāṇic cosmography the height of Meru is $84,000$ *yojanas*, but Āryabhaṭa regarded it only one *yojana* high.

Marko Geslani, "Omens in Late-Vedic Rituals: Early Evidence"

This paper reviews the issue of the appearance of omens in late Vedic ritual texts of the *Grhya-pariśiṣṭa*-level, including those previously studied by Pingree, Tsuji, and others. I take up this literature from the perspective of ritual technique and categorization. What specific ritual methods

were employed for the problem of omens in these early sources and how was this ritual activity conceived within the existing typologies of Vedic domestic ritual? The paper builds on my work on omen related rituals in the ancillary literature of the Atharvaveda, where one may trace a discernable shift in the ritual treatment of omens from atonement (*prāyaścitta*) to appeasement (*śānti*), along with corresponding shifts in ritual technique (homa to *abhiṣeka*). The present paper will attempt to broaden this analysis to include non-Atharvan Vedic omen texts, such as the *Adbhutabrāhmaṇa* of the Sāmaveda, the *Āśvalāyanīyagr̥hyaparīśiṣṭa* of the *R̥gveda*, and other *Gr̥hyasūtras* of the *Yajurveda*. By incorporating data from the history of astronomy/astrology (*Jyotiḥśāstra*), I will try to place the ritual developments in a clearer historical perspective.

David Pankenier, “Astrological History in the ‘Treatise on the Celestial Offices’ in Han China”

Sima Qian’s (c. 145 or 135 – 86 BCE) “Treatise on the Celestial Offices” 天官書 is the definitive account of astrology and astronomy in early imperial China. Building on his father, Sima Tan’s (c. 165 – 110 BCE), lifework, Sima Qian’s “Treatise” established a precedent followed closely by the compilers of the obligatory “Monographs on the Heavenly Patterns” 天文志 contained in all subsequent dynastic histories. The Simas’ pioneering “Treatise” is noteworthy in many respects – for systematically codifying and thereby rescuing from oblivion a vast amount of astronomical and astrological records, prognostications, regional traditions, and nomenclature, but also in attempting to formulate an astrological theory of history, arguably the first of its kind anywhere. As sketchy as the outline of their theory in the “Treatise” is, this facet of their work is the Simas most original contribution, and it will be the focus of Part One of my paper. Part Two will compare and contrast the role of planetary groupings in Chinese astrological history with somewhat similar theories that formed an important part of the imperial ideology of the Sāsānian Empire half a millennium later, which profoundly influenced astrology in the Latin West. Of particular interest will be the possible intersection of the two traditions at a watershed moment in mid-8th century.

Kenneth Zysk, “Greek and Indian Physiognomy”

This paper takes as its starting point my recent study of the Indian system of marks and develops an argument for an intellectual encounter between the Indian and Greek science of physiognomy in antiquity. The study is philologically driven and relies on the examination of both Greek and Sanskrit sources. The passages under scrutiny come from the *Physiognōmonika*, composed by a so-called pseudo-Aristotle (i.e., ps.-Aristotle after Swain) at about 300 BCE and the *Gārgīyajyotiṣa*, “The astral sciences according Garga,” which reflects the system of physiognomy known and practiced in the north-western and western parts of the Indian subcontinent at around the first century BCE.

Three specific points of contact found in both the Greek and the Sanskrit sources will be examined: 1. the use of a common stock of technical anatomical terms as protases in the formation of physiognomic omen; 2. the use of a common toe-to-head method for examination of the marks on the body; and 3. similarities (and differences) between the three basic sources of Greek physiognomy and the content of Indian physiognomy.

The conclusions drawn from the study point clearly to an intellectual interaction between the two systems of physiognomy, perhaps facilitated by the Indian contact with the Yavanas (i.e., Ionians) beginning from early fourth century before the Common Era.