

The Cupola of the Earth

The central point on the dividing line between east and west of the inhabitable world, X^v anira θ a (Pers. X^v anirah), drawn from the North Pole to the South Pole, was called, by the Persian astronomers, *gumbad ī zamīg/ gētīg* ‘Cupola of the Earth’ (rendered by Arabic قبة الأرض¹), and the Persian royal observatory was placed on that line. The Persian astronomical tables also gave a longitude of 90° E to the Castle of Kan̄ha (Pers. Kangdiz) listed as the easternmost point; and, at the same time, some astronomers reckoned longitude west from the eastern prime meridian. Abū-Ma’sar of Balx (Bactria) measured longitudes west from Kangdiz, and some early astronomical tables in Arabic imply a base meridian in the Persian Cupola. But the later tables in Arabic placed the base meridian in the west, the Fortunate Isles (Arab. الجزائر الخالدات, الجزائر العامرة), or Ujjayinī (Arab. ارين). Ujjayinī was considered as the Cupola (and it was even called قبة ارين ‘the Cupola of Arīn’) and the point 90° west of Ujjayinī was equated with Ptolemy’s prime meridian of the Fortunate Isles. Then the issue of the Persian Cupola of the Earth became obscure, and endeavors to clarify it vain. For example, Bērōnī, in spite of having some acquaintance with the Royal (Persian) astronomical tables, states that: “I do not know whether this (concept of the cupola of the earth) is an expression or opinion of the Persians, or others; since the Greek books do not mention it.”²

Where was situated the Cupola of the Persians?

Muqaddasī in his geography states that: « Près de Kāzerōn, du côté de la passe, coupole dont les Zoroastriens prétendent qu’elle représente le centre du monde. On y célèbre chaque année une fête. »³

¹ . Arab. قبة, جنبد. Pers. *gumbad* ‘cupola, dome; fire temple’ (Cf. VZ 29.3 *ātaš ī andar gumbad*), Armen. գմբէթ ‘cupola’. Cf. Gr. ὀμφαλὸς θαλάσσης, Lat. *umbilicus Terræ*.

² . «نه دائم كاین از سخن و رای پارسیان است یا آن دیگران، که کتابهای یونانیان از یاد او خالی اند.»
التفهیم، ج. همایی، ۱۳۵۳، ۱۹۳.

See also his *Canon*:

«و إذا اختلف المبدأ من جهة المغرب مع حصول الإجماع في طول العمران على نصف الدور وجب منه اختلاف المنتهى و لم يحصل من ذلك عندنا ما يجلب الثقة و ليس من مذهب بطليموس و لا قومه ذكر القبة و إنما هي موجودة من جهة الفرس.» القانون المسعودی، عبدالکريم جندی، بیروت، ۱۴۲۲، ۴۶۱.

³ . Al- Muqaddasī, *Aḥsan at-taqāsīm fī ma’rifat al-aqālīm* (trad. par A. Miquel), Damas, 1963, 117.

This place is 30° to the north of the equator and 51° 30' east from Greenwich. The celebration of the annual feast [of Nōgrōz] shows the specific relation of this place in Persis with the Persian calendar. However, it is not known if the meridian passing through that place was taken to be the prime meridian by the Persian astronomers⁴, or only the Aryans of Persis considered their proper land as the center of the world.⁵

X^vārazmī the scribe, in the *Mafātīḥ al-‘ulūm*⁶, the chapter on the astronomical terminology, gives the following definitions:

“**Kangdiz**: The farthest city in the eastern quarter, and in the farthest lands of China and (the island) Vāqvāq.”⁷

“**Cupola**: The midpoint of the earth, that is, the point between the supposed point in the east and the supposed point in the west; the line between these two points is 180°; and between the extreme point in the northern quarter and the extreme point in the southern quarter, its length is also 180°.”⁸

“**Tāra**: It is the name of an isle in the Ocean close to the Cupola. The city in our land that lies on (the meridian passing through Tāra) is Xujand, and in front of it (/ the cupola) is placed the city of Šābuhragān. It is the demarcation point (or, line) between the eastern and western lands...”⁹

Thus, according to X^vārazmī the scribe, in Persian astronomical tables, Tāra was assumed to be located at the midpoint of the

«بکازرون قبة من نحو العقبة تزعم الجوس انها وسط الدنيا ولها عيد في كل سنة.» احسن التقاسيم في معرفة الاقاليم، شمس الدين

محمد بن احمد بن ابو بكر البناء الشامي المقدسي، بريل، ١٨٧٧، ٤٦.

⁴ . This is the belief of جليل اخوان زنجاني:

رصد و تاريخگذاري در ايران، تهران، ١٣٨٤، ٩-٢٨.

⁵ . «... Les peuples anciens considéraient presque toujours leur propre pays comme étant le centre du monde, qu'ils employaient souvent, pour le désigner, la dénomination de coupole de la Terre (umbilicus Terræ). ... Chez les Grecs, la ville de Delphes étant placée par Euripide au centre des terres habitées, et cette idée de coupole du continent se trouve reproduite dans Cicéron, dans Tite-Live, etc.» M. L.-Am. Sédillot, *Mémoire sur les systèmes géographiques des Grecs et des Arabes, et en particulier sur Khobbet Arine قبة ارين (la coupole d'Arine), et Kankader كَنكَدَرِ servant chez les orientaux à déterminer la position du premier méridien dans l'énonciation des longitudes*, Paris, 1842, 4-5.

⁶ . مفاتيح العلوم، ابي عبدالله محمد بن احمد بن يوسف الكاتب الخوارزمي، (بريل، ١٨٩٥)، القاهرة، ١٣٤٩ / ١٩٣٠.

⁷ . «كنكدز هي أقصى مدينة في المشرق وهي في أقصى بلاد الصين والواقواق.» ١٢٨

⁸ . «القبة وسط الأرض أعنى ما بين نقطة المشرق المفروضة وبين نقطة المغرب المفروضة وذلك مائة وثمانون درجة وبين نقطة نهاية

ناحية الجنوب وبين نقطة نهاية ناحية الشمال وذلك أيضا مائة وثمانون درجة.» ١٢٨

⁹ . «تاره (بارو) اسم مدينة في جزيرة البحر الأعظم قريبة من القبة وبجذاتها من بلادنا هذه ححندة وبازاتها الشبورقان وهي

الفاصلة بين البلاد الشرقية والغربية فالمدن التي هي أعلا منها كفرغانة وكاشغار إلى الصين.» ١٢٨

hemisphere which extends from the Ocean in the West to the Ocean in the East and from pole to pole; that is, Tāra was a fictitious place on the equator, on the meridian of Šābuhragān (actual شبرغان in Afghanistan), 37° to the north of Tāra and 65.7° (65; 42°) east from Greenwich. At 90° east of the Cupola meridian on the equator the Persian astronomers placed the fortified city of Kaṇha (Pers. Kangdiz).

An example, given by the astronomer Abū-Naṣr of Qum, confirms the above account: “As an example, the longitude of Qum from the East is 104; 45°. This is the geographical longitude of the place (measured as the angle west) from the eastern meridian (the first eastern point of the inhabitable world); and its geographical distance from the first western point on the equatorial circle is 75° 15'. Qum is nearer to the West. The Cupola of the earth is that locality the longitude of which from the east and the west is equally 90°.”¹⁰

Thus, between Qum and the Cupola is

$$\Delta \lambda = 104; 45^\circ - 90^\circ = 14; 45^\circ$$

As the longitude of Qum is about 50; 57° east from Greenwich, then the longitude of the Cupola is 65; 42° E, that is the same as the longitude of Šābuhragān or Tāra. Notice that Abū-Naṣr has used here the eastern base meridian (Kangdiz) and the Cupola.

Hāšimī, identifies Tāra¹¹ with Lan̄kā, and states that the base meridian of the Siddhānta. He places Kangdiz 90° East of the Cupola of the earth on the meridian of Ujjayinī, and بولا bwl' /Pula?/ 90° West of it along the equator in the Green Sea.

واعظم الاصول واقدمها السندهند وهو معمول على تاره وهي قبة الأرض ووسط العالم بين طرفي العمران حيث منه الي الطرف الشرقي وهو ابتدا العمران وتسميه الفرس كنكدر ص درجه والطرف الاخر البحر الاخضر في جزيرة يقال لها بولا.

‘The mightiest of the elements and the earliest is the Siddhānta. It was composed at Tāra, which is the Cupola of the Earth and at the middle of the world between the two ends of the inhabited (portion)

¹⁰. «مثال آن چنان باشد کی طول قم از مشرق تا صد و چهار درجه و چهل و پنج دقیقه، و درازی وی از ابتدا، مشرق از عمران، و دوری وی از ابتدا، مغرب به قم از قوس دایره معدل النهار هفتاد و پنج درجه و پانزده دقیقه. و قم نزدیکتر است به مغرب. و قبة زمین آن جایگاه است کی طولش از مشرق و مغرب راست نود درجه بود.» ابونصر حسن بن علی قمی، (ترجمة) المدخل الی علم احکام النجوم، ج. اخوان زنجانی، تهران، ۱۳۷۵، ۳۶.

¹¹. Note that the copy of his book has Bāra.

which the Persians call Kangdiz, 90 degrees. The other end is in the Green Sea at an island called bwl'.¹²

Bērōnī also examines the base locality among the Persians and Indians. However reliable he may be for data transmission, his comparative remarks are often erroneous.

First, let us see what he says about the base meridian. In his treatise on mathematical geography, Bērōnī quotes this statement, that: "The Cupola is $1\frac{1}{3}^h$ east of Baghdād."¹³ In his encyclopedia of astronomical sciences, he states that between the Cupola and the Fortunate Isles is one quarter of a circle (that is, 90°), and Nēvšābuhr is 30 frasang to the west of the Cupola.¹⁴

As we see, according to Bērōnī's sources, between the Cupola and Baghdād is $1\frac{1}{3}^h$, and or 20° ; and as Baghdād (/ Babylon) is around 45° east from Greenwich, the base meridian is 65° , that is close to the meridian of Šābuhragān and Tāra.

Now, let us see how he interprets the above information: The قبة الأرض 'Cupola of the Earth' designates, such as a name, Laṅkā as the center of the inhabitable world, and the meridian of Ujjayinī (Uzēn) as the reference line for longitude estimation (قبة اوزين, cupola of Uzēn). "The Siddhānta's (longitudes) are basically reckoned from the Cupola which was regarded as the center of the inhabitable world. And (the Indian astronomers) all agreed upon this that the Cupola is located 20° , i.e. $1\frac{1}{3}^h$, to the east of Baghdād."¹⁵

However, between Ujjayinī, base locality of the Siddhānta, and Baghdād is 30° , i.e. 2 hours. This longitude difference was known to Indian astronomers, as Varāhamihira, in his *Pañcasiddhāntikā*, has said thus: "For the Yavana, (the day is to be reckoned) from the

¹² علي بن سليمان الهاشمي، كتاب في علل الزيجات . 12

¹³ 'Alī ibn Sulaymān al-Hāšimī, *The Book of the Reasons Behind Astronomical Tables*, F. I. Haddād & E.S. Kennedy, New York, 1981, 1, 91.

¹⁴ تحديد نهايات الأماكن لتصحيح مسافات المساكن، ترجمة ا. آرام، تهران، ۱۳۵۲، ۱۷۹: «گفته اند که

(قبة) به اندازه یک ساعت و ثلث ساعت در مشرق بغداد واقع است.»

¹⁵ «و من المنصورة إلى أوزين أكثر من مائة فرسخ نحو المشرق، و ليس يتصل أمره بأحد الرأيين المذكورين عن اليونانيين في

المبدأ، و ذلك أن نهاية ربع الدور من عند الجزائر الخالدات يقع عن غرب نيسابور بقرب من ثلاثين فرسخا و ليس في جنوبها إلا مدن

فارس و الأهواز.» القانون، ۴۶۱-۴۶۲.

¹⁶ تحديد نهايات ... ۲۵۶: «محاسبات سند هند در اصل برای قبة بوده است که آن را میانه آبادانی

می دانستند و اتفاق کلمه داشتند که قبة بیست زمان [۲۰°] یعنی یک ساعت و ثلث ساعت در مشرق بغداد

است.»

moment when ten *muhūrta* of the night (i.e., ten *muhūrta* after sunset) have passed, according to their *guru*.¹⁶

Since

$$360^\circ = 30 \text{ muhūrta} = 24^{\text{h}} (24 \text{ zamān})$$

Then

$$10 \text{ muhūrta} = 8^{\text{h}} = 120^\circ$$

Given the sunset time (6 p.m.) in Laṅkā (or, Ujjayinī), it will take 10 *muhūrta*, or 8 hours, so that Babylon, close to Baghdād, be at midnight. Thus, the distance between Ujjayinī and Babylon is 2.5 *muhūrta*, or 2 hours, or 30 degrees. Varārhamihira also confirms the midnight epoch of the royal/ Persian astronomical tables (of the *guru* of the Yavana).

As Yamakoṭi (or, Yavakoṭi) lies on the east of Laṅkā at a distance of 90° from it, Bērōnī makes it coincide with Kangdiz: “As *koṭi* means ‘castle’ and Yama is the angel of death, the word reminds me of Kangdiz, which, according to the Persians, had been built by Kay Kays (Kavi Usaḍan) or Jam (Yima) in the most remote east, behind the sea. Kay Xōsrō (Kavi Haosravah) traversed the sea to Kangdiz when following the traces of Frāsyāb the Tūr, and there he went at the time of his anchorite life and expatriation. For *diz* means in Persian ‘castle’, as *koṭi* in the Indian language. Abū-Ma‘šar of Balx has based his geographical canon on Kangdiz as the 0° of longitude or first meridian.”¹⁷

In these words there is confusion between the covered shelter (Av. *vara*) made by Yima (Pers. *var ī jimgird*) and the castle made by Syāvaršan, the son of kavi Usan (Pers. Kayus). In the *Mēnōg Xrad* it is said that: “Kangdiz is entrusted with the eastern quarter, near to Satavaēsa, on the frontier of Airyana Vaējah. The shelter made by Yima is constructed in Airyana Vaējah, below the earth.”¹⁸ Then it is Kangdiz that marks the eastern limit of Airyana Vaējah (Aryan homeland), and for the Persian astronomers it stood for the eastern limit of X^vaniraθa (inhabited continent).

¹⁶ . XV. 19.2 यवनानां निशि दशभिर्मुहूर्तैश्च तद्गुरुणा ॥

¹⁷ . «ولأن كوت اسم القلعة وژم هو ملك الموت فإنه يراح منها روايح كنگدز الذى يذكر الفرس ان كيكاس او جم بناه فى اقصى المشرق وراء البحر وأن كيوخسرو عبر إليه فى أثر فراسياب التركى واليه ذهب وقت التبرّد والخروج من الملك. وذلك لأن دز بالفارسيّة اسم القلعة وعلى هذا الموضع وضع ابومعشر البلخى زيجه.»

Alberuni's India, E. Sachau, London, 1887, 157.

¹⁸ . MX 62.13-15 *kangdiz ped ušastar rōn nazd ō sadvēs gumārd ēsted ped vimand ī ērānvēz. var ī jimgird ped ērānvēz azēr zamīg kird ēsted.*

On the other side, Kaṇha was made by Syāvaršan as a fortified city (*diz*) in the “Star station” (Pers. *star pāyag*), and was a space fortress, bound to the constellation Haptōiringa (the Great Bear) by a bond of wind¹⁹, until it landed, by the order of kavi Haosravah²⁰, in the far reaches of the Orient –it could be compared with Bə dyī grōm ‘the city in heaven’ of the Kati (the third branch of the Aryans): “There is a city in heaven fastened by a rope.”²¹

Vara was a subterranean bunker made by Yima before the arrival of the horrible Winter (the so-called الطوفان الجم ‘Flood of Yima’). This bunker made by Yima (Pers. Jimgird < **Yima-kṛta*) belongs to the Avesta tradition, while Yamakoṭi to the later tradition, the Purāṇic literature. We are not allowed to consider Jimgird as identical to Jamkoṭ (Yamakoṭi).²² Moreover, كوت /koṭ/ in جمكوت /Jam-koṭ/ comes from Skt. *koṭi/ī* meaning ‘end, edge’²³, and not ‘castle’²⁴ as does Persian *diz* (Av. **dizā*, OPers. *didā*) in *Kang-diz* ‘fort of Kaṇha’.

Bērōnī states that: “Yamakoṭi is, according to Ya‘qūb and Al-Fazārī, the country where is the city Tāra within a sea. I have not found the slightest trace of this name in Indian literature.”²⁵

He is right about the fact that there is no trace of the locality of Tāra in Indian books. However, as X^vārazmī the scribe has said, Tāra is situated in the middle of the inhabited world on the equator, and not in the farthest reaches of the East. Persian *tāra* means ‘crown of the head; forehead; cupola’ (Khot. *ttāri-* ‘top, forehead, crown’) and is cognate with Avesta *taēra* ‘peak’. According to the Avesta tradition, Taēra (Pers. *tērag*) was in the middle of the world, and the world was surrounded by Harā Bərəzaitī (Pers. *harburz*).²⁶ It is no wonder that the Persian astronomers did choose the term *tērag/ tārag* to denote the

¹⁹ . OPH 15.

²⁰ . RP 49.

²¹ . G. Morgenstierne, “Some Kati Myths and Hymns”, *Acta Orientalia*, xxi, 1953, 161-89, II.

²² . In Abul-Fidā’s geography Yamakoṭi is rendered by Persian جماكود (as in the Ms. of Paris), and not جماكرد:

«جمكوت هي على النهاية الشرقية مثل ما يحكى عن جزائر الخالدات في النهاية الغربية وليس شرقي جمكوت عمارة اصلاً واشها عند الفرس جماكود وهي على خط الاستواء عديمة العرض.» عماد الدين اسمعيل (أبى الفداء)، كتاب تقويم البلدان، باريس، ١٨٤٠، ٣٤٧.

²³ . Skt. *Yama-koṭi* could be rendered by Persian *Jam-karān*.

²⁴ . Indeed Skt. *koṭa* means ‘fortress, stronghold’.

²⁵ . «فاننا ژمكوت فهو في الموضع الذي يذكر يعقوب والفزاري أنّ في البحر فيه مدينة تسمى تاره، ولم أجد لها الاسم في كتب الهند أثراً بتّة.» تحقيق مالهند، ١٥٧.

²⁶ . Yt 12.25 ; Bd 55.

middle point on the equator, and to consider it as the Cupola of the Earth.

Indian

Persian

Lañkā

Tāra/ Tērag (Cupola of the Earth)

Yamakoṭi

Kangdiz

Romaka

Pula

Raham Asha