

# Japan before the Introduction of the Global Theory of the Earth

—In Search of a Japanese Image of the Earth—

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## 1. Rodriguez's Testimony I

When Christian missionaries first entered Japan between the late Sixteenth and early Seventeenth Centuries, they brought with them much more than the Word. One of these novelties was the Western conceived notion that the Earth was round. According to the various correspondence and diaries which these missionaries left behind, the Japanese response to this "global theory" was, as one may expect, mixed. For example, there were several Buddhist scholars who ultimately accepted the theory, and while in society at large there were those who shared the positive attitudes of these monks, there were those who opposed it, and, of course, there were those who really had no interest in such matters at all. But before we can begin to unravel the very interesting and important problem of the various repercussions which this new way of thinking caused, it is necessary to locate and identify the ideas about the Earth held by the Japanese before the Western concept was introduced. That is to say, we must first of all recognize that formerly existing views about the Universe are more or less closely connected to the determination of any new attitudes (whether for or against) concerning the Western concept. With this in mind, we would first like to draw attention to the comments on the Japanese image of the Earth left to us by João Rodriguez, who spent over 30 years of his life in Japan from 1577 to 1610, and who can be regarded as the top authority on Japan and its ways from among his fellow Jesuits.

These comments may be found in his *History of the Church in Japan*, an opus magnum which can be truly called his life's work as it is thought to have been written in Macao shortly before his death in March, 1643. Written painstakingly with Westerners unfamiliar with the East in mind, this work, often bemusing us Japanese readers with its rather dated cordiality, contains in Volume 2, Chapter 14 an explanation of the image of the Earth held by both the Chinese and Japanese of that time.

# 太陽中道之圖

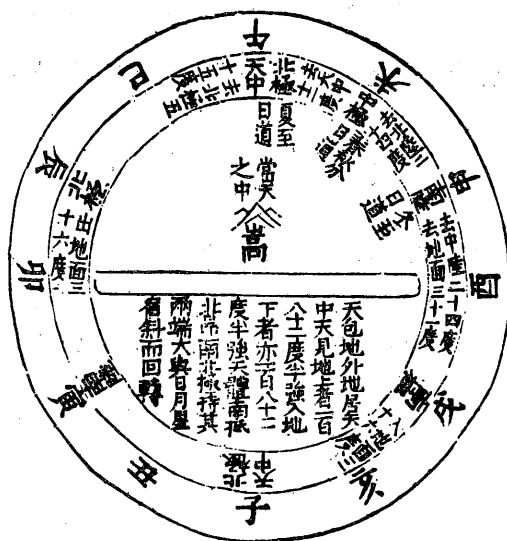


Fig. 1. A graphical explanation of the *Hun-t'ien* theory from the Ming period. The global axis forms a 36° angle with the face of the Earth, and the point directly below the summit of the Heavens corresponds to Chung-yüeh sung-shan 中嶽嵩山 (See 王圻, 太陽中道之圖 in Bk. 4 of 三才圖會).

"Concerning earth and water, the form of these two elements, as well as their size, the Chinese and the Japanese, who conform to the former's way of thinking on the subject, say the most foolish things which defie not only all the laws of Natural Philosophy, but also all common human experience. . . . The Earth, which is considered to be mutually related to the Heavens, they (the Japanese) call *chi* or *gi*; and the Chinese call it *ty*. . . . This *chi* is thought to be of square shape and located, together with the Water, right in the middle of the Heavens, thus forming their center. This corresponds to what we in the West refer to as water and earth together forming a spherical mass. They also imagine their Earth to be a composite of stone and soil having four directions with a sea located in each of these directions. They call these seas which enclose their Earth *xicay*; and in Chinese they are referred to as *suhay*." (João Rodriguez, *Nihon Kyōkai shi* 日本教會史, Japanese translation of *História da Igreja do Japão* pelo João Rodriguez Tçzu S. J., by Hamaguchi

Nojio 濱口乃二雄 and Itō Shuntarō 伊東俊太郎, *Daikōkaijidai sōsho* 大航海時代叢書, Vol. X, chap. 14.)

This description indicates an image of the Earth based on the *Hun-t'ien* 渾天 theory which originated in China. While the *Hun-t'ien* theory is an explanation of the Earth situated in the central point of the immense, surrounding Heavens which are continuously revolving, it says nothing about its shape, since it is fundamentally not a theory of the structure of the Universe, but a technique for calculating the orbits of heavenly bodies in correcting the Chinese calendar. As is already known, Chinese astronomy is generally much different from its Aristotelian counterpart, which searches for a unified principle of the Universe. On the other hand, the former, which aims at merely collecting data for calendar construction, by considering the Earth as a formless point in the Universe, sufficiently establishes its global surface astronomy. However, when thinking about the Earth apart from these calendar calculations, how did the Chinese astronomers imagine its shape?

Before the rise of the *Hun-t'ien* theory, the Earth, as opposed to the Heavens revolving on a point at the North Pole, was not only considered flat and level, but was thought to be in complete stasis. This idea is called the *Kai-t'ien* 蓋天 theory, or the "circular Heavens, square Earth" 天圓地方 theory. However, it must be noted here that this theory does not refer to the actually circular or square shapes of the elements of the Universe, but rather to the dynamic and static qualities of the Heavens and Earth respectively. The oldest source which we know of concerning the *Kai-t'ien* theory is the *Chou-pi suan-ching* 周髀算經, written in the Second Century. According to this work,

"The spinning of a carpenter's square forms a circular orbit. The placing of two carpenter's squares together forms a square. The square thus formed pertains to the Earth, and the circle to the Heavens. Therefore, the Heavens are circular and the Earth square."

While this description by no means makes clear the true relationships between Heaven-Earth and circular-square, a note to the text made by Chao Chün-ch'ing 趙君卿 sometime between the Second and Fourth Centuries explains:

"Things include both circles and squares; numbers include both even and odd. The Heavens, by moving, form a circle, and their number is odd. The Earth, being stationary, forms a square, and its number is even. This is how the Heavens and Earth are distributed into the two cosmic forces 陰陽. However, this has no relation to the actual shapes of the Heaven and the Earth."

If, then, the circle and square are not the shapes of the Heavens and the Earth, then what could be their forms? Chao Chün-ch'ing's note continues;

"The Heavens cannot be completely seen and the Earth cannot be observed as a whole. So how in the world are we supposed to determine whether or not they are circular and square?"

Even though it is useless to argue as to the specific shape of these two entities, the limits of which cannot be known, it still seems necessary to attribute the symbols circle and square to them. For example, we can see this necessity in the character forms which originated from the squares and circles of the *fang-ke kuei-ch'u ssu-shen* mirrors 方格規矩四神鏡 of ancient times. In later centuries, however, the true meaning of these symbols were forgotten, and somehow they came to be mistaken for the actual forms of the Heavens and Earth. Furthermore, with the appearance of the *Hun-t'ien* theory, the idea of a far and wide Heavens (the *Kai-t'ien* theory) was replaced by the notion that they were an immense globe; but because the *Hun-t'ien* theory avoided saying anything about the Earth's shape, the notion that it was flat and level remained unchallenged.

While there is no existing evidence to prove it, the *Hun-t'ien* theorists' idea that the Earth is floating on water probably derives from the part in the theory which posits that the circular Heavens are constantly half immersed in water. In any case, for the Chinese people, scholarship being a thing which should serve some "useful" purpose in solving "real" problems, the question of the actual shape of the Earth seemed to have no immediate connection to such "pressing" issues as state politics, or such mundane affairs as the lives of individuals. Therefore, while it is certain that Chinese astronomy had achieved an intellectual level equal to that of say the ancient Greeks, it really had no reason to pay attention to the rather impractical question of whether or not the Earth was in the shape of a sphere or not.

Returning to Rodriguez's *History*, what both the Japanese and the Chinese call "the four seas" 四海 were four bodies of water surrounding the Continent. However, these "four seas" have, we think, confused Rodriguez and lead him into error, for originally the present character for sea 海 had no relationship to water at all—it was a character for darkness 晦. Therefore these "four seas" actually indicated in a very vague way four undeveloped, "dark" regions which encircled the Middle Kingdom 中華. For example, in the *Wang-chih-pien* 王制編 of the writings of Hsün-Tzū 荀子, this great Confucian philosopher describes the "north sea" 北海 as a breeding ground for fine horses, the "south sea" 南海 as being rich in ivory, the "east sea" 東海 as abundant in sea products and cloth, and the "west sea" 西海 as a good source of leather. Also, it should be clear here that the character 海 does not in any way signify a body of water—rather, the word is used to

indicate the land of the exotic, backward peoples who lived on the borders of the highly civilized Middle Kingdom. Furthermore, as the frontiers of the Middle Kingdom are pushed out through development into these four directions, the "four seas" will gradually recede and finally vanish forever. Only by enveloping and annexing these "four seas" can the area of the Middle Kingdom increase.

As Rodriguez himself mentions, the occasions on which this term 四海 "is synonymous with *tencia* 天下, that is, the world (*munde*) and the underworld (*inferior*)" are numerous, indicating once more this word's disassociation with any body of water. Therefore, from just the word 四海 itself, one cannot directly assume that the Chinese believed in the presence of large bodies of water on the periphery of the Earth.

In a completely different sense from the origin and use of the word 四海, however, the image of the Earth ushered in by the *Hun-t'ien* theory definitely suggests a small entity floating on a seemingly endless sea; and it is in this sense that the Earth, irrespective of its size, should naturally be considered surrounded by an ocean of some kind. Perhaps Rodriguez took this way of thinking and tried to link it to the word 四海, thus resulting in his own rather unique explanation.

Again Rodriguez writes:

"Also it is thought that the water in these four seas, which are located at the four corners (of the Earth) is supported by the great Ether 大氣; and on this water's surface the land on which the human race resides, being located at a distance to the Northeast, does not occupy the center of the Heavens, but is approaching the Tropic of Cancer with another sea containing various islands left in its wake." (Rodriguez, *op.cit.*)

The fact of the Earth as well as the water enclosing it being supported by a great Ether is clearly a new terrestrial theory which began with the philosopher Chu-tzŭ 朱子. While, as we have already seen, the earlier *Hun-t'ien* theory envisaged a revolving circular Heavens continuously half-immersed in water, Chu-tzŭ conceived of the idea that the reason why the Earth, a composite of land and water, remains fixed in the center of the Universe is because the Ether which envelopes it is spinning at a high rate of speed. This theory of the Universe is known to us only through the very fragmentary writings of Chu-tzŭ's followers, so therefore, it is difficult to get a full picture of what he was really talking about. However, recently due to the superb work of Prof. Yamada Keiji 山田慶兒, we are now able to gain a greater familiarity with Chu-tzŭ's concepts. (See Yamada Keiji, *Shushi no Shizengaku* 朱子の自然學, 1978.)

In brief, Yamada's explanation of the Chu-tzŭ image of the Earth goes something like this. The Water and the Earth are enveloped by an Ether

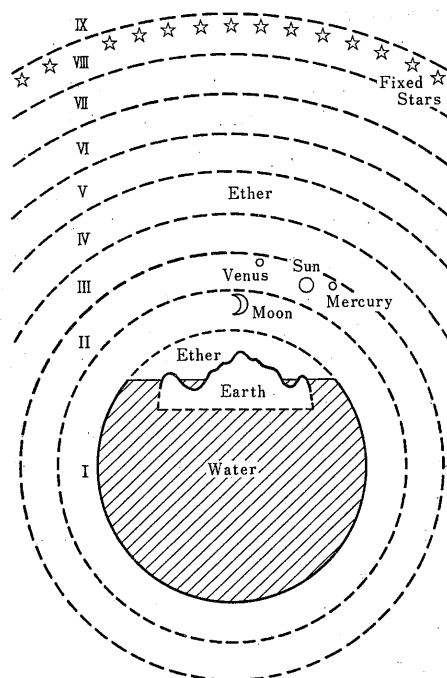


Fig. 2. Chu-tzū's image of the Universe in Yamada, *op. cit.*

which fills the whole Universe. These two entities, along with the Ether immediately lying over them, together form a global shape; and the Earth itself is thought to be relatively flat and level. With respect to the reason why the Water supporting the Earth does not fall into oblivion, Chu-tzū explains using the following analogy.

"The form of the Heavens and the Earth is similar to cupped hands holding water. If they are continuously rotated back and forth by the arms, then the water within will not spill; but if the rotation is stopped for even the slightest moment, the water will leak out." (*Chu-tzū yu-lei* 朱子語類 Bk. 1)

And using another analogy, he explains further.

"As when amusing oneself with the bottom of a *wan-chu* 弄碗珠底, the Water wants nothing but to spin unceasingly. For this reason, it will not fall even if it floats in thin air; but if it were to stop spinning, even for a very short while, it would fall." (*Chu-tzū yu-lei* Bk. 68)

In his research, Yamada found in such works as the *T'ung-tien* 通典, written

in around 801 A.D., the phrase 弄碗珠伎 and reasoned that it must refer to some sort of juggling trick using rice bowls 碗; or else, it was a kind of plate spinning game. However, we may also understand it as a gravity defying acrobatic feat of spinning a rice bowl or a ball on the end of a stick.

In any case, the likelihood seems slim that those living at the time of Japan's first exposure to the Western global theory of the Earth had at their fingertips anything like Yamada's research which involves constructing Chu-tzū's theory from an enormous number of collected fragments. But if such a small, easy to get a hold of volume existed in Japan at that time, there is no doubt that it would have been well studied.

Well, what are the chances of such a handy manual circulating in Japan around this time? And if it were really being read, who could have written it? There is only one possibility—the *T'ien-ti wan-wu tsao-hua lun* 天地萬物造化論, composed by Wang Po 王柏 during the Sung 宋 period. While an extensive discussion of the printing history of this work is beyond the immediate scope of this paper, we should mention here that the first known printing of the work in Japan (1642, over 30 years after Rodriguez's departure from Japan) was a typograph of a 1503 Chinese re-printed version. From this information we can easily assume that for sometime before 1642 the work must have enjoyed a fair amount of popularity to necessitate a printing in Japan. Furthermore, we know from the introduction written to the typograph by Chou Yung 周顥, that the work was first pressed in 1480, thus giving it ample time to find its way into Japan before Rodriguez's arrival. And finally, if we can show that Rodriguez's descriptions coincide with the theory of the Universe contained in the *T'ien-ti wan-wu tsao-hua-lun*, then we should be able to say with confidence that the Japanese understanding of Chu-tzū's theory was gained directly through Wang Po's work.

In order to prove this hypothesis, let us first take a look at how the conception of the Earth is explained in the *T'ien-ti wan-wu tsao-hua-lun*.

## 2. Wang Po's Image of the Earth

Wang Po was born in 1197 (three years before Chu-tzū's death) to a family of scholars who had for two generations studied the works of such greats as Chu-tzū himself and Lü Tsu-ch'ien 呂祖謙. He himself received his education from Huang Kan 黃榦, both a follower and son-in-law of Chu-tzū. (See the biography of Wang Po 王柏 in the *Sung-shih* 宋史, Bk. 428) It is not certain when he wrote *T'ien-ti wan-wu tsao-hua-lun*, but as mentioned before, from the fact of a version printed and annotated by Chou Yung 周顥 in 1480, it seems to have been widely read in the late Fifteenth Century, and was popular enough to warrant a second printing 23 years later in 1503.

As related by Chou Yung in the introduction to the work, it was a monograph "which inquires into the root of all things and makes clear the

mysteries of their creator," and which argued on such topics as the true nature and essence of astronomy, the weather, flora, fauna, and minerals. In addition to the above mentioned two printings, it was included as Volume 23 to the *Ko-chih ts'ung-shu* 格致叢書 edited by Hu Wên-huan 胡文煥 in 1603; and as it wields great influence in the field of natural philosophy in both China and Japan, we have dared to venture a presentation of the original text here.

Wang Po's theory of the Universe starts out in traditional fashion by describing the Heaven's and the Earth as originating from the midst of chaos. He quotes the famous saying from *Huai-nan-tzu* 淮南子:

"That which was light and limpid rose and became the Heavens; and that which was heavy and turbid congealed and formed the Earth."

He also repeats the *Hun-t'ien* theory that

"The shape of the Heavens is that of a canon ball; half covers over the Land and half is hidden in the Underworld."

Originally in the pre-Chu-tzŭ *Hun-t'ien* thinking, the conditions for the Earth to be permanently located in the middle of the circular Heavens is unclear, but Wang Po offers the following explanation.

"The Heavens because of their shape move unceasingly on the edge of the great void 太虛沖漠. The land sticks to the Ether 氣, and due to its occupation in the Ether's great circular flow, it will not fall."

In other words, the Earth is somehow attached to this Ether, and by the regular circulation of the Ether, like perhaps a cyclone, the Earth continues to occupy its center without falling. To this explanation Chou Yung 周顒 adds the following annotation.

"The Heavens are filled with Ether. They have shape but no substance. The Earth because of its substance attaches to the Ether. It is for this reason only that the Heavens and the Earth are connected."

Other than this quite unsatisfactory explanation, the text gives us no further idea concerning such a phenomenon. In sum, even though we may correctly say that Wang Po epigonically follows Chu-tzŭ's descriptions, he does diverge on at least one point concerning the Universe—that the Heavens do have a particular form, and their space is filled to overflowing with Ether. In other words,

"The Heavens and the Earth together total eighty-four thousand *li* 里,



and the Ether lies interceding between them. The positive cosmic force 陽 rises upward for forty-two thousand *li* 里; and the negative cosmic force 陰 plummets downward for forty-two thousand *li* 里.”

Here, the limits of the Universe are estimated at 84,000 *li* 里; and, while the specific shape of the Earth is not mentioned, it is noted that the sea surrounding the Earth does rise and fall according to the appearance and disappearance of the four seasons:

“The Earth lies in the middle of the Heavens with water encircling its perimeter. It's four seasonal journeys and its rising and falling do not exceed a distance of thirty thousand *li*. The Earth's Spring journey passes fifteen thousand *li* to the East, and at this time it falls a distance of about the same. The Autumn journey passes to the West a distance of fifteen thousand *li*, and rises the same. The Summer journey passes to the South, and for this reason the Earth lies over the Sun during this time. In the Winter, the Earth travels to the North and thus comes to lie to the South of the Sun. We humans ride on the Earth as a boat floats on water. And so when observing the movements of the galaxy, we do not perceive this rising and falling of the Earth.”

This idea of the Earth moving vertically and laterally in response to changes in the Seasons can be seen as early as the Han 漢 period in the *Shang-shu k'au-ling-yao* 尚書考靈曜, one of the Apocryphal Classics 緯書, a collection of oracles named in opposition to the Classics 經書. Here, also, the mutual relationship between the Heavens and the Earth is treated as relative with respect to movement. Essentially this work is a discussion of the concept put forth by the *Kai-t'ien* theory, a theory which considers both the Heavens and the Earth to be flat and which deals with the circular “seasonal journeys” 四遊 of the North Star thought to be located at the center of the northernmost point of the Heavens. This is of course the same phenomenon which is today explained by the theory of the rotation of the Earth. (See Yamada Keiji, *op.cit.*)

While agreeing on the fact of seasonal movements taking place in the Universe, Wang Po and the *Shang-shu k'au-ling-yao* are completely at odds on such particulars as the direction of movement and the seasonal position of the Earth. (Compare Fig. 3 and 4.) As to which of these explanations is the more rational, this writer is not in any position to judge, so let us be satisfied with the mere mention that the two are indeed different, and take up once again the Rodriguez text.

Rodriguez touches upon what may be the Sino-Japanese conception of the size of the Earth, and the location of its center (*op.cit.* Vol. 2, Ch. 14), saying that in the exact center of the Earth stands Mt. K'un-lun 崑崙, the

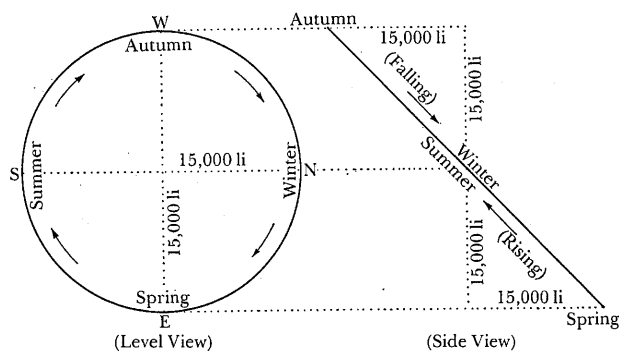


Fig. 3. Wang Po's explanation of the four seasonal journeys of the Earth.

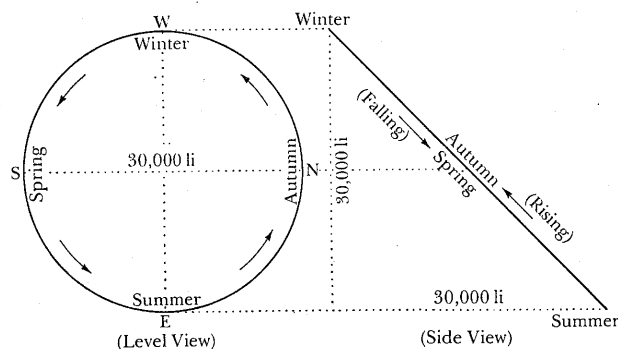


Fig. 4. Explanation of the four seasonal journeys in the *Shang-shu K'au-ling-yao*.

Land extending twenty thousand *li* to the East and thirty thousand *li* to the West of this mountain. The Sea is therefore wide to the East and narrow to the West. Rodriguez is not clear as to the combined area of both Land and Sea, but he seems certain here of the fact that the breadth of the Land alone from East to West is thought to total approximately fifty thousand *li*. In addition, he explains that Mt. K'un-lun is located at a northern latitude of  $33^{\circ}$  and a longitude of " $123^{\circ}$  thereby lying passed the Hsing-su Hai 星宿海," the source of the Yellow River, which is described as flowing alongside this mountain. This estimation was based on world maps drawn up by such fellow Jesuits as Matteo Ricci 利瑪竇 and Giulio Aleni 艾儒略 who, in turn, had constructed their maps not on the foundations of common Eastern knowledge concerning this mountain but on earlier maps which were all in error on this point. Perhaps, as well, Rodriguez had failed to distinguish the K'un-lun of tradition and the mountain of the same name which actually existed.

In any case, that the position of Mt. K'un-lun, as the "center of the

Earth," was from the standpoint of the Land alone biased towards the East cannot be said to have been a commonly held notion in Eastern society. The annotator of the Japanese translation of Rodriguez's *History*, Prof. Yabuuchi Kiyoshi 藪内清, is also quite vague on this point. However, this misunderstanding is certainly not of Rodriguez's authorship—rather it is based on such works as the *San-ts'ai t'u-hui* 三才圖會 and the *Tai-yuan ti-fung tu-hsu* 大圓地方圖叙, Bk. 28 of the *T'u-shu-pien* 圖書編, the great illustrated encyclopedia of the late Ming 明 period edited by Chang Huang 章潢, and first printed in 1613. It says as follows:

"In ancient times the center of the Land was taken to be Yang-ch'eng 陽城. However, Yang-ch'eng was not located in the center of the "four seas." Because it is directly below the summit of the Heavens, Yang-ch'eng is taken as (the center of) the Land. As to the center of the "four seas", this is K'un-lun, the highest point on the face of the Earth. On its Eastern side, all the rivers flow to the East. On its Western side, all rivers flow to the West, and so, too, with the rivers of the North and South. This mountain being over thirty-thousand *li* from the "Western Sea" and less than twenty thousand *li* from the "Eastern Sea," most of the land under the Heavens, therefore, lies to the West of the center of the Earth. In the East there is mostly ocean. For this reason, Yang-ch'eng does not form the center of the "four seas." Within the "four seas" there is a central point, and it is located north of India 天竺 and west of K'un-lun.

According to Chang Huang, from ancient times Yang-ch'eng 陽城 or what is now Têng-fang 登封 of Ho-nan 河南 Province (presently located in the vicinity of Mt. Sung-shan which was Chung-yüeh 中岳嵩山) had been called the center of the Land 地中 due to its position directly below the highest point in the circular Heavens. However from the viewpoint of the "four seas" as a whole (here used to mean *t'ien-hsia* 天下 or the world under the Heavens), the center of the Land was Mt. K'un-lun. Generally speaking, the expression 地中 is a very misleading term. For example, the very beginning of the famous *Shui-ching-chu* 水經注 (about 520 A.D.), tells us:

"The center of the Land lies fifty thousand *li* from Sung-kau 嵩高, which means the high mountain of Sung, at Mt. K'un-lun to the northeast."

That is, K'un-lun had also been described as the center of the Land from ancient times. Therefore, Chang Huang 章潢 probably wrote the above passage feeling it necessary to make a clear distinction between Yang-ch'eng and K'un-lun. However, even though there may have been scholars before Chang Huang who debated these points, we have no existing sources to show

that any of these scholars shared the same opinions as Chang Huang on the subject. This is probably because of the fact that it would have been extremely difficult for the Chinese people to recognize a theory which failed to put the Middle Kingdom 中國 in the center of the existing world.

It seems that in the back of Chuang Huang's mind the metaphysical Chinese notions about world geography had already been done away with, and in their place, a very different and foreign image of the World had begun to take form. It was the new Buddhist view of the World which he presented in Bk. 29 of *T'u-shu-pien* 圖書編.

By carefully examining this map, the *Ssü-hai hua-i tsung-t'u* 四海華夷總圖 or Map of the Civilized World and its Outlying Barbarous Regions (See Fig. 5), we can not only understand Chang Huang's explanation of the location of K'un-lun and the expanse of the Continent, but we can also see that it was obviously this map which prompted him to state, "Within the 'four seas' the central point is located north of India 天竺 and west of K'un-lun." Also, as written on its right edge, this is a map which depicts the Jambudvīpa 南瞻部洲, the Buddhist continent to contain both India 印度 and China. This continent is characterized by a tapering southern portion and includes both actual *e.g.* Hsüeh-shan 雪山, or the Himalayas and fictitious *e.g.* Hsiang-ling 香嶺, Wu-shi-ti 無熱池 place names. Concerning the map's origins and special characteristics, the reader is requested to refer to Muroga Nobuo 室賀信夫 and Unno Kazutaka 海野一隆, *Nippon ni okonawareta Bukkyō kei Sekaizu ni tsuite* 日本に行なわれた佛教系世界圖について, In: *Chirigakushi Kenkyū* 地理学史研究, Vol. 1, p. 67-141 1957 and reprinted 1979.

In sum, it is probably correct to assume that Rodriguez's descriptions of the size of the Continent were based on Chang Huang's *T'u-shu-pien*. In addition, Rodriguez's assertion that the length of the Land east of K'un-lun totals a full 20,000 *li* is merely a failure to fully comprehend Chang Huang's text on this point. Also, the discrepancy which he mentions between the expanses of the oceans in the East and the West is probably an inference from the part where Chang Huang states, "Most of the land under the Heavens lies to the west of the center of the Earth; and in the East there is mostly sea." In any case, the fact that *T'u-shu-pien* was first printed and distributed in 1613—that is, after Rodriguez's departure from Japan—casts doubt as to whether or not he had gained this information, or at least confirmed it, while he was in Japan. In other words, if these doubts can be substantiated, we must conclude that Rodriguez's descriptions have no direct relation to the actual Japanese view of the Universe before the introduction of the Western conception that the Earth was round.

Rodriguez left Japan in 1610, and early the next year entered Canton Province under the name of Lu Jo-han 陸若漢. Up until the time of his return to Macao in 1632, starting from Peking, he made several tours through China (see Doi Tadao 土井忠生, in Rodriguez's *History of the Church of*

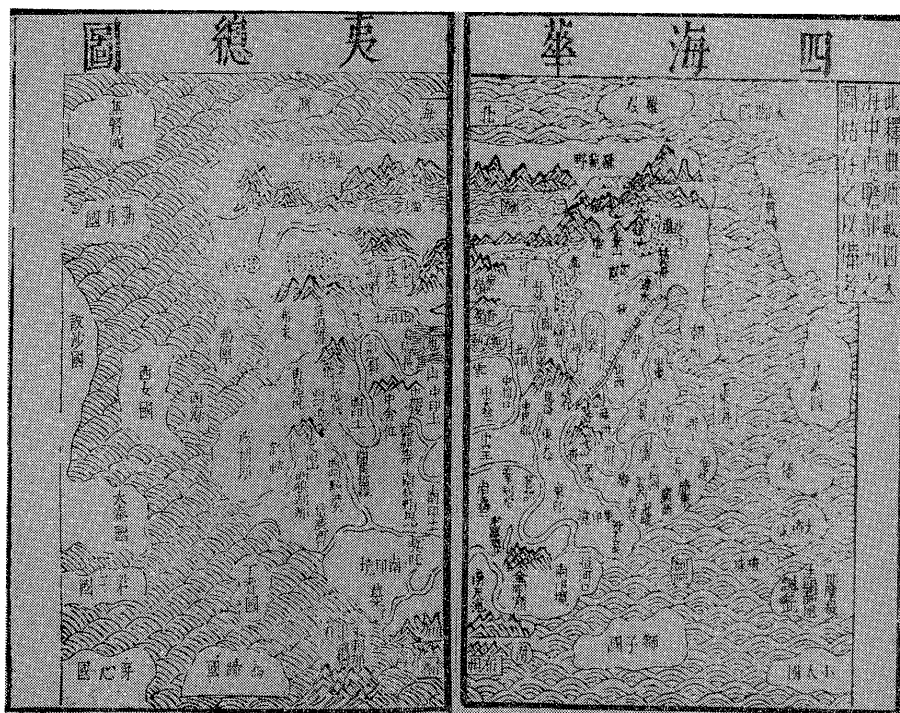


Fig. 5. Map of the Civilized World and its outlying Barbarous Regions 四海華夷總圖 in the *T'u-shu-pien* (1613). From such features as the Korean peninsula 朝鮮半島, Fu-lin 弗懷 symmetrical to it, and various islands having no relation to Buddhism, there seems to be here an emergence from the traditional maps depicting Jambudvīpa. It is also clear that it was drawn in reaction to the world maps of Matteo Ricci.

Japan), during which time there should have been ample opportunity for him to have seen and read the newly published *T'u-shu-pien*. In 1630 he raised in Têng-chou 登州 of Shantung Province a Portuguese battalion in support of the Ming Dynasty against the Ch'ing 清; and during that time there is the incident of his meeting with Li Jung-hou 李榮後, the official interpreter to the Korean liaison 陳奏使 to the Ming Court, Jōng Tou-wōn 鄭斗源 who had come to Têng-chou to avoid passing through enemy territories. On this occasion, Rodriguez presented Li with copies of a world map and *Chih-li yuan-ch'i* 治曆緣起. Furthermore, in response to Li's letter of appreciation, he sent a letter written boldly in Chinese. (See Yamaguchi Masayuki 山口正之, *Chōsen Seikyōshi* 朝鮮西教史, 1967). If indeed Rodriguez possessed the Chinese language skills exhibited in this reply, he should have had very little difficulty understanding the jist of *T'u-shu-pien*.

In any case, Chang Huang was certainly not the first Chinese scholar to take up the question of the size of the Land. There were, for example, as far back as the Second Century B.C. the *Ti-hsing-hsün* 地形訓 in the *Huai-*

*nan-tzu* 淮南子, which estimated the combined north-south plus east-west distances of the Land at 230,500 *li* 里 75 *pu* 步; and there were also those in the *Chung-shan-ching* 中山經 of the *Shan-hai-ching* 山海經, in the *Ti-shu-pien* 地數篇 of the *Kuan-tzū* 管子, and also Yu-shih-lan's 有始覽 *Lü-shih ch'un-ch'iu* 呂氏春秋 all of whom calculated the Land, or the "four seas" at 28,000 *li* (east-west) and 26,000 *li* (north-south). Eventhough none of the above comes close to Chang Huang's estimate of about 50,000 *li* for the east-west distance, this is no reason for merely attributing this value to Chang Huang's imagination, for Wang Po (*op.cit.*) in relating actual travelling distances between known points comes relatively close to Chang Huang's estimate.

"In going from Lo-yang 洛陽 east to Fu-sang 扶桑, one must travel twenty thousand *li*. From Lo-yang the journey to Japan 日本, a land of temperate climate, takes fifteen thousand *li*. (The Japanese edition, which lacks the character 二, states just one thousand *li*.) Going west to An-hsi 安息 (Persia) twenty-five thousand *li*, then south eight thousand *li* brings one to Ta-ch'in 大秦 (Alexandria), a land of torrid climate. South to Chên-la 真臘 (Cambodia) takes 20,000 *li*, similarly south to Fu-nan 扶南 (Phnom on the lower Mekong River) takes a fewer 13,000 *li*. This land is also of torrid environs. In travelling north to Liu-kuei 流鬼 (Sakhalin) one must journey fifteen thousand *li*; and north to Po-ma 駝馬, (the northern country of Chieh-ku 結骨, Kirghiz, on the Yenisei River) on this side of it takes fourteen thousand *li*. In this region, the snow falls constantly. Our postal system ends at this place." (Wang Po, *op.cit.*)

This passage, which by the way does not bring up the subject of Mt. K'un-lun, takes Lo-yang as the base point for measuring distances. Adding up the totals, we find the distance between Fu-sang and Persia, in other words the furthestmost east-west points of the known world, to be approximately 45,000 *li*. The comparable north-south distance between Sakhalin and Cambodia comes to 35,000 *li*. However, because Fu-sang and Japan are obviously countries situated east of the Sea of China, it is difficult to get a precise idea of what the width of the Land itself might be. On the other hand, in an annotation to Wang Po's text, Chou Yung makes the following comment:

"The easternmost point is Hei-ch'ih 黑齒 (a country in the "eastern sea"). The westernmost is Fu-lin 拂菻 (Rome). The northernmost is Liu-kuei (Sakhalin) and the southernmost is Yin-shu 飲水 (which can not be located). From the "eastern sea" to the "western sea," it takes twenty-eight thousand *li*. From the "Southern sea" to the "Northern sea", it takes twenty-six thousand *li*."

Here it is clear that Chou Yung is using an estimate in the *Chung-shan-ching* of the *Shan-hui-ching* to explain distances.

Next, we would like to pose the question of why the two distances estimated by the *Chung-shan-ching* should differ by 2,000 *li*. There being no direct answer coming from the Chinese people, who were not at all interested in the subject, we indeed are in need of clues; but there is one relatively dependable source, the aforementioned *Chou-pi suan-ching*, Bk. I, 周髀算經, which produced these values by a method using the projection of the Sun onto the face of the Earth—a procedure based on the *Kai-t'ien* 蓋天 theory. According to this procedure, at summer solstice the Sun travels south over a point on the Land 16,000 *li* from the Chou 周 Capital. This figure is equal to the distance of a straight line from Lo-yang to the Tropic of Cancer. Taking this measurement as a standard, the east-west length of the Land estimated at 28,000 *li* is nearly equivalent to the distance from the Shang-tung Peninsula to the desert regions of Kan-su Province. The north-south distance, 26,000 *li* is nearly equivalent to the distance from northern Vietnam to the Great Wall. Moreover, these distances correspond to roughly the territory of the Han Dynasty. We can therefore assume that this represents the geographical limits of the World known to the Chinese people, who were centered along the main branch of the Yellow River. In later times, while the names and peoples of the extreme points of the Land changed with current geographical knowledge, in many cases the figures representing distances remained unchanged thereby resulting in a great amount of confusion.

The above investigation can bring us to only one conclusion: that the figures presented by the likes of Wang Po and Chou Yung are of a completely different tradition from those of Chang Huang. However, this is not to say that Chang Huang's estimates have no basis. Rather, we must lament that we cannot find that basis in the vast number of things past now possibly lost to us forever.

### 3. Rodriguez's Testimony II

In Volume 2 Chapter 9 of his *History*, Rodriguez introduces his readers to Chinese and Japanese astronomy.

"Some postulate an Earth with six faces and a Heavens round and in motion. Other imagine a world unified into a lofty and deeply rooted pyramid consisting of mostly Heavens." (Rodriguez, *op.cit.*)

It is clear here that "a lofty and deeply rooted pyramid consisting of mostly Heavens" together with a point later in the text which states, "In the original three worlds, called *sangay* 三界, of Xaca . . .," indicates the Buddhist view of the World which takes Mt. Sumeru 須彌山 at the center

of the Universe. On the other hand, concerning "an Earth with six faces," since Rodriguez does not mention this anywhere else in his *History*, it is difficult to take him at face value without further investigation.

"An Earth with six faces" is probably a conceptualization which imagines the Earth as a cube. However, as already mentioned, even the *Hun-t'ien* 渾天 theory which understands the Heavens to be of spherical shape, the Earth, eventhough considered flat, is certainly not thought to be cubic in form. Furthermore, given the fact that this cubic theory of the Earth cannot be found anywhere in the Chinese astronomical literature, is it not possible that this image of the Earth could have been uniquely Japanese?



Fig. 6. The diagram of Mt. Sumeru etched on the lotus petals forming the base of the Great Buddha at Todai-ji. Depicting an oblique overview of a circular Earth, it indicates a 25 level Heavens in the upper portion. The actual etching located in the middle of one lotus petal measures approximately 93 cm. from the lowest point on its circular perimeter to the uppermost part of the Heavens, and 40 cm. from right to left.



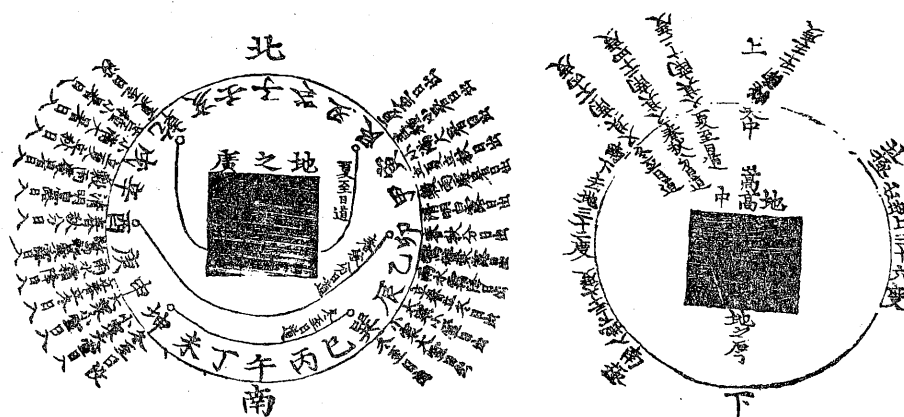


Fig. 7. Ch'uan Chin's image of the Earth in *Ju-hsüeh T'u-shuo* (1547).

The key to answering this question may lie in the Korean scholar Ch'uan Chin's 權 權 *Ju-hsüeh t'u-shuo*, Bk. II 入學圖說後集 first published in 1425. Ch'uan Chin (1352–1409) was a famous Chu-tzŭ academician active from the late Kaoli era into the early years of the Li 李 Dynasty; and as the title *Ju-hsüeh t'u-shuo* implies, he authored that work as a primer for Chu-tzŭ initiates, not as a treatise on astronomy. However, the work contains a diagram of the structure of the Heavens and the Earth as yet unseen in any Chu-tzŭ teaching related source known to us today. As presented in Figure 7, the map appears in two different views: from overhead (天地橫看之圖), and from a side cut (天地豎看之圖). Since in both cases the Earth is depicted as a square, it naturally becomes a six-faced figure just as Rodriguez explained. However, in reviewing once more than Chu-tzŭ image of the Earth, we find that the Land, the Water which supports it, and the Ether immediately over it together form a global shape. Has Ch'uan Chin misunderstood Chu-tzŭ on this point? Or has he attempted a revision to suit his own thinking? In either case, let us take a closer look at Ch'uan Chin's new discovery.

“The Heavens envelope the perimeter of the Earth and the Earth lies in the middle of the Heavens. Within the Heavens and the Earth there are six levels. For this reason, the art of telling the future established a divination sign of six strokes . . . . Half of the Heavens appears over the Earth, and half are under the Earth. Therefore, that which appears over the Earth has two levels, and that which is under the Earth has two levels. Also that which lies within the Earth itself occupies two levels. It is like chung-fu 中孚 (the divination sign) (䷼) which consists of in each of its upper and lower portions two *yang-yao* 陽爻 (positive elements) and in its central portion two *yin-yao* 陰爻 (negative elements).

For this reason, in constructing a vertical diagram of the Heavens and the Earth, one indicates the Heavens above and below with four levels, and the Earth between with two levels.

Here Ch'uan Chin emphasises that because there is the same proportion of Heavens below the Earth as above it, it is necessary to recognize the relationship between the Heavens and the Earth by the proportion 4 : 2. Concerning the fact that there are Heavens in the underworld as well, Ch'uan Chin writes,

"Someone has asked, If there are Heavens under the Earth, then the teaching which says, 'That which was light and limpid rose and became the Heavens; and that which was heavy and turbid congealed and formed the Earth,' must be falsified."

To this Ch'uan Chin replies:

"If there were no Ether below the heavy and turbid mass, then what in the world could be holding it up? Not only that but what keeps the Sun, Moon and Stars from falling? If one were to say that the Ether exists below not three levels but three levels of the heavy and turbid mass, then he would be saying no less that the Heavens and the Earth are not limited to six levels. In addition, everything above and below, and in all directions comes to rest in the movement of the positive cosmic force 陽氣; and for this reason only could that which is heavy and turbid congeal and form a mass. Chu-tzŭ says wisely, 'Form has limits, but the Ether knows none.'"

It seems therefore safe to say that the theory of a *cubic* Earth began with Ch'uan Chin, there being no precedent among the Chinese.

Ch'uan Chin's *Ju-hsüeh t'u-shuo* was twice printed in the Sixteenth Century, and also found its way into Hayashi Razan's 林羅山 reading list before 1604, that is, during Rodriguez's stay in Japan. (See Hayashi Shunsai 林春齋, *Razan-sensei Nenpu* 羅山先生年譜.) This certainly indicates that Ch'uan Chin's work was well known and read by Japanese intellectuals of this time. Furthermore, the first printing in Japan (1634) from a plate made on the Continent in 1547 indicates a healthy demand for the work during and shortly before that time. However, since this printing occurred after Rodriguez's departure from Japan, the possibility remains that he may have seen or at least heard of the work during the time of his activities in Japan, but there is a strong probability that he first became acquainted with the *cubic* theory of the Earth while still in Japan. On the other hand, since, unlike the close-minded China of Ch'uan Chin's time, the China of

Rodriguez's time (the late Ming) was an era in which such new ways of thinking were beginning to awaken, it is difficult to say with complete confidence that the latter's writings were limited exclusively to trends of thought in Japan.

One example of this difficulty is the *Wu-chi t'ien-chu chêng-chiao chên-chuan shih-lu* 無極天主正教眞傳實錄 (Manila, 1593.) written in Chinese by the Dominican priest Juan Cobo 噶嘑啞 in order to explain the Western global theory of the Earth. In his discussions, Cobo criticizes, with illustrations, this *cubic* theory as irrational. While this particular concept of a *cubic* theory may be merely a result of Cobo's own extrapolations of the various square theories of the Earth mentioned in Part I of this paper, we certainly cannot rule out the possibility that this theory was in reality known to late Ming society. What we are sure of, however, is that the *cubic* theory of the Earth as an offshoot of the *Hun-t'ien* theory that the Earth is a square of some sort can be very easily incorporated into any discussion on the origins of the Universe in Chinese thought. We must apologize here for having interrupted the discussion of Buddhism in order to return once more to classical Chinese concepts of the World; but it was necessary in order to faithfully pursue the true significance of Rodriguez's writings. Now let us continue with Rodriguez's explanations of the image of the Universe found in Buddhism.

"The first of the 'three worlds' is called *yocay* 欲界 and means the world of material desires. (The second is) *xikicay* 色界, the world of physical objects, or the world of color, for color is synonymous with object. Finally, there is the non-material world having no color (*mushikikai* 無色界). In the middle of the three worlds Xaca placed a mountain having the shape of an extremely high pyramid, which is called *Xumixen* 須彌山 (Mt. Sumeru), or in Chinese it is called *Xumixan*. Alongside the foot of this mountain there exists four lands—one located to the South, another to the North, still another to the East, and finally one to the West."

Since our discussion here concerns mainly the various images of the Earth as a real object, it is not necessary for us to enter into the extremely metaphysical Buddhist concept of the "three worlds 三界." Instead, we will concentrate on Mt. Sumeru and the four land masses surrounding it. Concerning this mountain, Rodriguez writes:

"From sea level to its summit this mountain measures 46,080 leagues, and from sea level to its very bottom it measures a depth of the same distance, thereby totalling 92,160 leagues as a whole. There are thirty-three Heavens divided into three stages above this mountain, and the

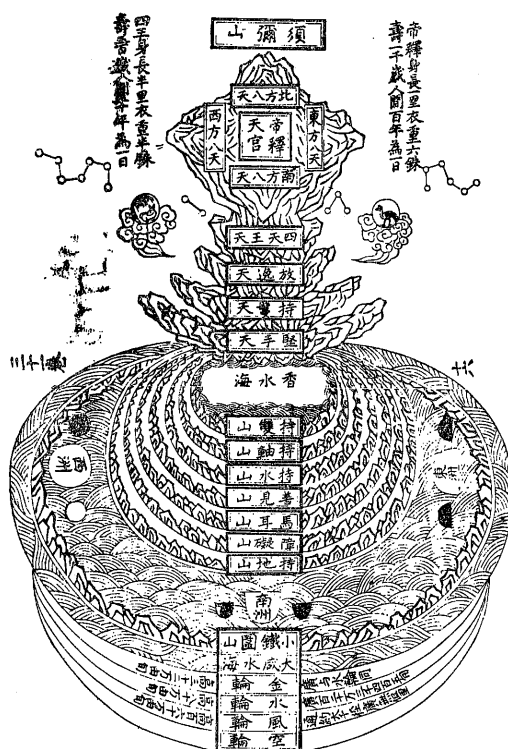


Fig. 8. An oblique overview of the "Worlds of Mt. Sumeru" depicted in the Southern-Sung period work, *Fo-tsu t'ung-chi* 佛祖統紀 by Chih P'an 志磐 (1271).

Sun, the Moon and the Stars revolve around it. The shape of this mountain is like an hour glass, narrow in the middle and wide at the top and bottom."

There are several Buddhist classics, including the *Dirghāgamaśūtra* 長阿含經, *Lokaprajñāptyabhidharmaśāstra* (?) 立世阿毘曇論, and *Abhidharmakośaśāstra* 阿毘達磨俱舍論, which explain the structure of the Universe with Mt. Sumeru as its center. According to the *Abhidharmakośaśāstra*, Mt. Sumeru rises above sea level to a height of and plunges to a depth of 80,000 *yojana* 踰繕那 respectively. In addition, it takes up a land area of 80,000 *yojana* on each of its four sides.

The *yojana* is a unit of length used in ancient India, but even today there are several conflicting estimates as to its actual size. Essentially the *yojana* expresses the distance over which a bull can travel in one day. According to the monk Hsüan-chuang 玄奘 who travelled to India in the Seventh Century, "In the old days it was said to be forty *li* (about 22 km.)." (See *Ta-t'ang hsi-yü-chi* 大唐西域記, Bk. 2.) This seems to be a reasonable

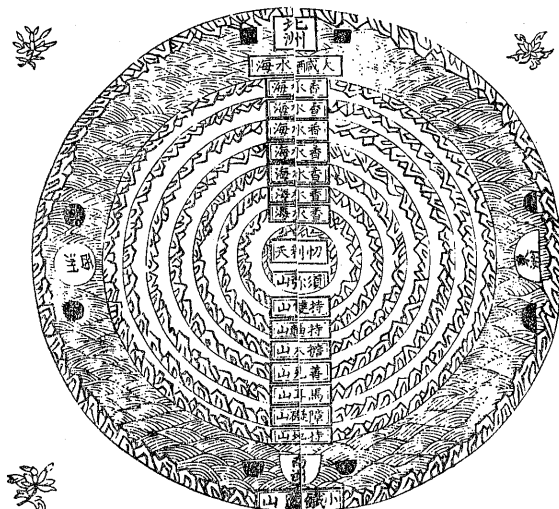


Fig. 9. A view from directly above Mt. Sumeru (*ibid.*)

figures; but given the fact that these figures denote a fictitious mountain, the question of the unit used to measure it is not really all that important. In another sense, though, such quantification of the Buddhist universe, complete enough to enable us even today to construct diagrams of it, reflects the true nature of the Indian people, a people who conceived of such mathematical wonders as the Arabic numeral system and the zero.

Rodriguez's description of Mt. Sumeru's shape as that of an hour glass is not seen anywhere in the above mentioned Buddhist works. However, from a diagram (see Fig. 8) of this mountain, copies of which can be found in both China and Japan, we can see that it certainly does exhibit an hour glass shape, which leads us to believe that Rodriguez may have chanced to see this very diagram during his Asian travels. Of course, Rodriguez's writing on Buddhist thought do not end here, and we must say that his observations are generally correct, a great tribute to his powers of understanding. Unfortunately, however, he failed to leave us any detailed information concerning the Buddhist view of the Earth itself. For that purpose we must consult another source, the Buddhist classics themselves.

#### 4. The Buddhist Image of the Earth

According to the *Abhidharmakośaśāstra*, in the area surrounding Mt. Sumeru there are seven mountain ranges with water basins flowing between them. The height and breadth of the range closest to this mountain is said to be 40,000 *yojana*, and the height and breadth of each succeeding range to be exactly halved as they proceed out from Mt. Sumeru till the Seventh range measures only 625 *yojana*. The breadth of the water basins follow

this pattern as well, beginning with 80,000 *yojana* for the basin closest to Mt. Sumeru and successively halving to 40,000, 20,000, etc. going away from the mountain. The water in these basins is called the Water of the Eight Virtues 八功德水, and therefore does not represent actual lake or sea water.

The outer limit of the seventh mountain range becomes a large sea of salt water. The distance from this last ring of mountains to Cakravāḍa-paravata 鐵輪圍山, a mountain surrounding this sea is 322,000 *yojana*. In this vast sea there are four land masses: a half-moon shaped continent to the East of Mt. Sumeru, a round continent to the West, a "wagon-shaped" 車形 continent to the South, and a square-shaped continent to the North. To each continent two small lands of the same shape as the main land are attached. The names and sizes of each land mass are also mentioned, but here we would like to concentrate on the continent which actually exists—the land mass which includes India.

The name of this continent is Jambudvīpa 瞻部洲; and being that its north, east and west coasts measure 2000 *yojana* and its southern tip only 3.5 *yojana*, it gives the impression of an inverted trapezoid with a very short base, almost approaching an inverted triangle. Perhaps the "wagon-shaped" characterization derives from the author's association of the Indian continent with the rear view of an Indian cattle drawn carriage which has a seemingly top heavy hood. The name of the continent is related to the giant imaginary tree, *jambu*, which grows on the shores of Lake Munetsunō 無熱惱池 e.g. Anavatapta, a holy place in the Himalaya's. In Chinese characters *dvīpa* is written as 洲 (continent), or the whole word itself is written as its phonetic equivalent 閼浮提 (*enbudai* or *yen-fu-t'i*). The remaining continents seem to have originally been related to India's outlying areas, but later they became merely continents of the imagination. It was also thought that the facial shapes of the inhabitants of each continent resembled the shape of each continent itself. Of the three imaginary land masses the one with which we are most familiar is Shōshin-shū 勝身洲 or Pūrvavideha because of the monkey Songokū 孫悟空 who was born on Kaka Mountain 花果山, an island of its coast.

In sum, what we know call the face of the Earth consists of, from the Buddhist point of view, *Shishū-kusen-hakkai* 四洲九山八海, which include the aforementioned four continents; the nine mountains consisting of Mt. Sumeru itself, the Seven Golden Mountains 七金山 encircling it, and Cakravāḍa-paravata; and the Eight Seas consisting of the seven water basins containing the Water of the Eight Virtues, and the great ocean separating the seventh mountain range from Cakravāḍa-paravata. In addition, since all of these geographic formations are situated on the same plane, the Buddhist image of the Earth is clearly a "flat" conceptualization.

Next, the Buddhist Earth is supported by what is called *Konrin* 金輪, measuring 320,000 *yojana* in thickness and 1,203,450 *yojana* in diameter. This

hard "Ring of Gold" corresponds to what we today the Earth's crust. *Konrin-zai* 金輪際, or the edge of the Ring of Gold forms the very bottom of the Earth; and blow this with a thickness of 800,000 *yojana* and a diameter equal to the Ring of Gold is the Ring of Water 水輪. Again below this is the Ring of Wind 風輪 which measures 1,600,000 *yojana* in thickness and extends horizontally without end. On the other side of the picture, there are one milliard "Worlds" of Mt. Sumeru 須彌山世界, which each consists of Mt. Sumeru and twenty-five storeys of *t'ien* 天 on top of it, and they are called *Sanzendaisen-sekai* 三千大千世界 (1000<sup>3</sup> worlds) as a whole.

As one can plainly see here the Buddhist use of the word *Shih-chieh* 世界 is closer to what we write today as *Yü-chou* 宇宙, or outer space. Originally the Chinese word 世界 was a translation of the Sanskrit word *Loka dhātu* whose meaning, being similar to the Kosmos of the ancient Greeks and the Universum of the Romans, encompasses all things of the Heavens and the Earth (天地萬有). Also, the Chinese people found a comparable meaning in the word 宇宙, for as the *Ch'i-su-hsün* 齊俗訓, Bk. 11 of the



Fig. 10. Jambudvīpa, the existing continent containing India and China. (Jèn Ch'ao 仁潮, *Fa-chieh an-li-kuo* 法界安立國, 1607).

*Huai-nan-tzu* compiled in the second century B.C., explains: "All time from the past to the present is called Chou 宙; and all space above, below and in all directions is called Yü 宇." It is therefore truly ironical that the later Buddhist usage of 世界, as delineating only the space above the Earth, should be in such disproportion to the original Sanskrit definition.

Be that as it may, this Buddhist view of the Universe, which began in India, was originally a later development of a concept established by Brahmanism. Brahmanism conceptualized Mt. Meru as standing in the center of Jambudvīpa, a round continent which included India on its southern tip. This continent was in turn surrounded by six, ring-shaped land masses and separated from them by a sea. Compared to this Brahmanistic notion of Jambudvīpa, which places Mt. Meru on the same continent as India but much farther north, and which includes quite a few imaginary names, the Buddhist conception, which divides this Jambudvīpa into four parts and creates four separate continents, can be said to be an advancement. However, it is clear that both ways of thinking already suggest to us geographically a land with the Himalayas rising high in the North and a narrowing Indian peninsula to the South. But these rich powers of imagination are only natural to a people who created the great art of Magic.

### 5. The Adoption of the Sumeru Concept in Japan

From the above discussion, it is not difficult to imagine that the Buddhist conception of the Universe was introduced to Japan along with the introduction of Buddhist thought itself. Below let us search for the actual forms in which this conception was adopted by the Japanese.

Generally, the native Japanese concept of the Universe merely recognizes a shamanistic, vertical structure of *Takamagahara* 高天原 corresponding to the Heavens, *Ashihara-no-nakatsukuni* 葦原中國 corresponding to the face of the Earth, and *Ne-no-kuni* 根の國 and *Yomi-no-kuni* 黄泉國 corresponding to the underworld. It is difficult to obtain a clear understanding of the image of the Earth contained in this simple thinking, but we can correctly assume that the Earth was considered to be extending broadly on a level plane. With the introduction of such an overwhelming and quantitatively exact concept as the Buddhist view of the Universe, people in Japan were no doubt drawn to it without much resistance; and together with the promotion of Buddhism by the ancient state, the Sumeru theory soon spread to every corner of Japan.

What we know today as the oldest reference to the Sumeru concept is the item in the *Nihon-shoki* 日本書紀 dated the twentieth year of the reign of the Empress Suiko 推古天皇, or 612 A.D.. The item mentions a map of Shirahata 白癩, possibly meaning white catfish (japanese name of a disease), who came from the region of Kudara 百濟 on the Korea peninsula to con-



struct a model of Mt. Sumeru and an arched bridge 吳橋 in the southern Imperial Garden. Next, we see in the same chronicle an item dated the third year of the reign of the Empress Saimei 齊明天皇, or 657, in which six men and women from the country of Tokwara 觀貨邏國 Dvāravātī on the lower Menam River, who had drifted ashore in Kyūshū 九州, were called to the Asuka capital and feasted after the construction of an image of Mt. Sumeru to the west of Asuka-dera 飛鳥寺. Two years later in the third month of 659 a similar model of Mt. Sumeru was built on a riverbank to the east of Amakashinooka 甘檮丘 in preparation for a banquet in honor of a group of Emishi people 蝦夷 from the regions of Michinoku 陸奥 and Koshi 越. Again in the fifth month of 660, in honor of 47 Iteki 夷狄, or Mishihasse 肅慎 an image of Mt. Sumeru was built on the shore of Lake Isonokami 石上池 and was described as "resembling a temple pagoda 廟塔." (For all the above items see *Nihon-shoki* 日本書紀 Bk. 26).

All of these selections without exception have already been quoted in essays relating to the origins of Japanese Gardens, but the actual forms of these early gardens have not been as yet made clear. However, in 1903, three parts to a stone figure were found in a section of Asuka village called Ishigami 石神. Measuring about 176 cm. tall, this figure was identified, correctly we think, by Prof. Shigeta Teiichi 重田定一 as having the proper shape and location of a "Mt. Sumeru stone." (See Fig. 11.) Shigeta noticed that when the three parts were stacked in place, there was a vacant spot formed between the middle and lower portions, indicating the possible existence of a fourth portion. He then argued that his four piece figure closely resembled in both function and form an incense burner 博山炉 popular in China from Han times. (See Asuka no Shumisen 飛鳥の須彌山, In: *Shigaku Zasshi* 史學雜誌, Vol. 15, no. 1, P. 47~54, 1904.) Together with this stone figure was found a combined male-female stone figurine in which a hole had been bored from the base up through to the top for use as a standing fountain. Since we can also identify a similar hole for shooting water in the Sumeru stones's mortar-shaped base, we can conclude that both stone figures were parts of the same fountain design.

Despite Shigeta's pioneering efforts, there are still today many questions which have been left unanswered concerning this figure. For example, why was it necessary for the Sumeru stone and the human figurine to be part of one design? Or, if indeed the Sumeru stone, which Shigeta estimates at a mere 2-3 meters in height, was constructed during the era of the Empress Saimei, how do we explain the passage in the *Nihon-shoki* which says that "its height is about the same as a temple pagoda"? And finally, if the image of Mt. Sumeru was indeed set up at banquets to welcome foreign visitors, why, as the *Nihon-shoki* tells us, was it necessary to construct it only every one or two years? Concerning the actual size of a temple pagoda, if we take, for example, the earth pagoda 土塔 of Ōno-dera 大野寺 (founded by

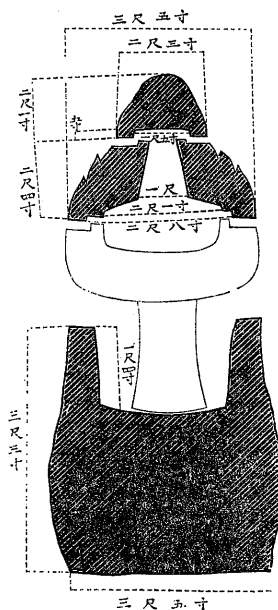


Fig. 11. A cross section of the Sumeru stone found at Ishi-gami, Asuka village, and drawn by Shigeta Teiichi. The stem glass shaped form rising from the base is Shigeta's missing fourth part. (一尺=10 寸=1 ft.)

Gyōki 行基) in the city of Sakai 堺, this structure built in the Eighth Century is protected from exposure by a nine meter high, sixty meter wide (at its base) square spiral. Therefore, it is difficult to take the *Nihon-shoki* at face value on this point. In any case, feeling that the only way to dispose of such doubt being a complete re-thinking after an extensive on-the-spot investigation, last summer this author entered the environs of Asuka.

As we have recently seen and heard in the Japanese mass media, there are in the Asuka region a number of strange stone remains whose purposes for being there are as yet unknown to us. Invariably carved out of granite, these forms, when depicting humans or animals, show a variety of comical poses and facial expressions. Not only this but the three stone monkeys 猿石 at the grave of Kibi-no-himegimi 吉備姫王墓 and the two-faced stone figure on the grounds of Tachibana-dera 橘寺, being carvings of multiple figures in one stone, seem to be of the same genre as the stone figurines at Ishi-gami 石神. Excluding the Ishi-gami figurines which measure 1.7 meters in height, but including such sculptures as the monkey stone of Takatori Castle 高取城 and stones in the form of human heads that have today become hand washing basins (手水鉢, *chōzu-bachi*) in some Japanese homes, the above are all much shorter (about one meter) and stockier, as well as limited to some directional fronts facing view. These facets seem to suggest that

each figure does not take up a unique structural space; rather, they all give one the impression of having been parts of much larger constructions, and placed in a relatively lower area of those works. On this point, the five, lettered stones found both within the grounds of Kogon-ji 廣嚴寺, also know as Toyura-dera 豊浦寺, and in the water tunnels around this temple not only show similiar characteristics, but also the lettering itself is very close to that of the Sumeru stone found at Ishi-gami.

This calls to mind the item contained in both the *Ch'ang-an-chih* 長安志, Bk. 5, of Sung Ming-ch'iu 宋敏求, which was first introduced by Kosugi Kazuo 小杉一雄, *Asuka jidai ni okeru zōzan no genryū ni tsuite* 飛鳥時代に於ける造山の源流について (In: *Hōun* 寶雲, Vol. 13, 1935), and in the *Shi-liu-kuo ch'un-ch'iu* 十六國春秋, Bk. 57, which was first introduced by Yabuta Kaichirō 藪田嘉一郎, *Suiko Tennō Nijūnenki Zō Shumisenkikō* 推古天皇廿年紀造須彌山記考 (In: *Shiseki to Bijutsu* 史蹟と美術, Nos. 163 and 164, 1944). These selections relate to the facts surrounding the building of the Buddhist temples in Yung-kuei li 永貴里 of Ch'ang-an 長安 by the late Ch'in 後秦 Emperor Yao Hsing 姚興. Here we have chosen to present only the text of the *Ch'ang-an-chih* because of its conciseness.

"In the first month of the Spring of the seventh year of Hung-shi (弘始, 405 A.D.) . . . pagodas were constructed a Yung-kuei li, and a *Po-jo-t'ai* 波若臺, probably for 般若臺, which might have been a hall for chanting, was built in the Chung-kung 中宮, and Mt. Sumeru was erected. On its four faces are carved tall summits, steep cliffs, exotic birds and animals, forests and plants, ghosts and monsters of all kinds, hermits and Buddhas. Being a thing never before seen by man, this Sumeru is regarded by everyone as nothing less than mysterious."

While here the text does not elaborate on the construction materials of Sumeru, it does make quite clear the exotic nature of the structure. Perhaps there are even elements included from traditional Chinese occultism.

However, what is important here is that, from the fact of this mysterious model of Mt. Sumeru having been constructed on the Continent over 200 years before the first known Japanese construction in 612, we can sufficiently conclude that the route by which the sculpture-type entered Japan was from China by way of the Korean peninsula. In addition, the reason why the above mentioned visitors from Kudara 百濟 were given such names as Shikimaro 芝耆摩呂 and "Michikonotakumi 路子工" is probably related to the fact that the former were artisans skilled in the construction of *shiki* 磯城, ceremonial stone altars, and the latter were specialists in building wooden or bamboo tubing irrigation systems for standing fountains. In other words, the technology brought to Japan by these artisans from Kudara 百濟 was probably the same technology used to sculpture and assemble the various

parts the Sumeru statue and install it standing fountains. Given this fact, then, we can therefore say that any installation of water gushing devices by stringing end-to-end lengths of wooden or bamboo tubing indicates an attempt to construct Sumeru. In this way of thinking the above selections from the *Nihon-shoki* form a logical sequence.

Moreover, this large scale construction does not stop at being a mere reproduction of a mountain, but is an object—with its comical human and animal figurines and its fountains providing movement to an otherwise static piece—which lent a lovely natural motif to the gaiety of the garden parties of ancient Japan.

From the fact that the occasions on which Sumeru was constructed to honor foreign guests are limited only to the reign of Empress Saimei, it comes clearly from particular flair for extravagant affairs mentioned in the *Nihon-shoki*. She also ordered her hydrolic engineers, called “*mizutakumi*” 水工, to dig a transport canal between the west side of Kagu Mountain 香山 and Mt. Isonokami 石上山, for the purpose of bringing of a large quantity of stone. The author of the *Nihon-shoki* says that certain persons of those days criticised the canal as the “Ditch of a crazy Heart” 狂心渠. Among other various stone remains to be seen in the Asuka region, of interest to the historian of industry and technology are the well-known *sakabune-ishi* 酒船石, a device which separated minerals of different weights by water flow, and the *iwabune* 岩船 found in Masuda 益田, which, judging from the extremely hard surface around its square hole, may have been used to apply great amounts of pressure to inserted materials.

We are afraid that we may have gone too deeply into the exposition of what the *Nihon-shoki* tells us of Sumeru stone sculptures, but in view of a recent Asuka region guidebook which was published by the *Shiryōkan* or Research Materials Library at Asuka 飛鳥資料館, these aforementioned points have not been explained, at least to our satisfaction. If we are not mistaken, it is clear the Sumeru stone clusters found in the gardens of temples of later periods are of a different tradition from those of the earlier Suiko and Saimei periods, for the reason that the latter amounted to no more than one or several natural stones positioned somewhere within court gardens. Moreover, whether or not what today is called a Mt. Sumeru stone cluster 須彌山石組 was really understood by landscape architects as Mt. Sumeru itself is very doubtful, for a clear distinction from Mt. Hōrai 蓬萊山 was apparently not made. As a matter of fact, rock clusters which indicate the actual positioning and shape of the mountain Sumeru are practically non-existent. One of these rarities is the Sumeru group of Kyoto's Saihō-ji 西芳寺, also known as Koke-dera 苔寺, which has been constructed to resemble the Universe containing the “four continents—nine mountains—eight seas” of the legendary Mt. Sumeru. (See Fig. 12.) Even though the residents of the temple themselves are at a loss as to the date of construction, there is good reason

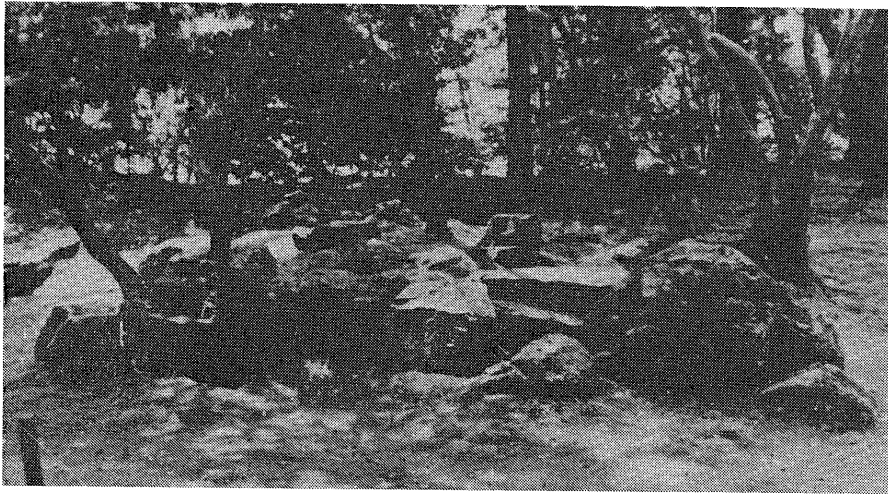


Fig. 12. The Sumeru stone cluster in the garden of Kyoto's Saiho-ji. Almost natural, uncut stones have been positioned to represent Mt. Sumeru itself, the Seven Golden Mountains and the Four Continents. (Photo courtesy of Uchida Hideo)

to believe that this Sumeru cluster is a work of the late Edo 江戸 period, a time characterized by a strong call for the support of Buddhist astronomy.

In contrast to the various ambiguities found in the *Nihon-shoki* concerning Mt. Sumeru, the etching on one of the 2 m.  $\times$  3.5 m. lotus petals at the base of the Great Buddha at Tōdai-ji 東大寺 presents before our eyes and in large detailed manner the worlds of Sumeru. In the Jambudvīpa depicted in this etching (see Fig. 6, lower center), four great rivers (Indus, Ganges, Am Dalia and Sītā (Tarim?)) can be clearly seen flowing from and around Lake Munetsunō through the mouths of four animals—a cattle, a horse, an elephant, and a lion. From the fact that the figure is incomplete in parts twice repaired after damage due to the ravages of war, it is clear that this Sumeru was etched soon after the casting of the Buddha itself in 749 A.D.. Indeed, it was this figure by which the people of Eighth Century Japan must have come to learn the Buddhist image of the Universe. Not only this but, from a worldwide perspective, for such a figure of the worlds of Sumeru to have even existed at this time was a very rare occurrence.

In addition, probably the oldest written explanation of the Sumeru theory in Japan is the *Sangaigi* 三界義 written by the Tendai 天台 sect monk Genshin 源信, known during his lifetime (942–1017) as Eshin-sōzu 慧心僧都, and who is famous for his work *Ōjōyōshū* 往生要集. Filled with selections from every kind of Chinese classic, the work fails to give the thoughts of Genshin himself on the subject; however, for familiarizing oneself with the general knowledge of the time concerning “all things of the Heavens and the Earth,” the work is without a doubt a very handy volume. For example, with respect to the subject of the eclipses of the Sun and Moon, the

phenomena thunder and lighting, and the origins of earthquakes, *Sangaigi* gives the following explanations. Quoting from the *Dirghāgamaśūtra* 長阿含經 on the solar and lunar eclipses, Genshin relates that the kings of the moon and the sun lose their brilliance due to the panic experienced when Asura doubles his size and prepares to attack the Sun and the Moon. According to the same source, Genshin explains, thunder is a phenomenon caused by the basic elements of the Earth and the Water, the Earth and the Fire, the Earth and the Wind, and the Water and the Wind all coming into contact with each other at once. From the *\*Parinirvāṇaśūtra* 般泥洹經, he describes the four causes of earthquakes: 1) when the movement of the Ring of Wind passes through the Ring of Water and shakes the Earth; 2) when Arhat 阿羅漢 testing his strength strokes the Earth with his fingers; 3) when the great mystical force 大威神力 in the ground tries to move the Earth; 4) when the time for the entrance of Buddha in Nirvana drew near.

It goes without saying that by the introduction of this work, as well as by means of the classics, not only monks but lay intellectuals of the day were more deeply and extensively permeated with the Sumeru theory. The author of the *Towazugatari* (問はず語り), which could be called a *Vita Sexualis* of the court women of the late Kamakura 鎌倉 period (c.1320), in reminiscing of her late father says, "greatness of his affection to me is higher than eighty thousand *Meiro* 迷廬, meaning Sumeru . . . and deeper than the waters of the Four Great Seas 四大海." This passage implies no doubt a vivid image in the back of her mind of the nine mountains—eight seas of Mt. Sumeru. Also in the *Jinnōshōtō-ki* 神皇正統記 Kitabatake Chikafusa 北畠親房 utilizes the notion of Mt. Sumeru in situating Japan in the world.

Because of its role in educating the masses, Buddhism without a doubt wielded great influence on the view of the Universe and the image of the Earth held by the Japanese people. However, at the same time, due to the fact that, among the intellectuals, Confucian learning was certainly not slighted, Chinese concepts of the structure of the Universe, such as the *Hun-t'ien* 渾天 and *Kai-t'ien* 蓋天 theories, were also of influence. The *Chou-pei suan-ching* 周髀算經, which taught the *Kai-t'ien* theory, was for example a required textbook of the Office of Higher Learning 大學寮 under the Ritsuryō 律令 bureaucracy (see *Ryō-no-gige* 令義解, 833 A.D.). And in Kamo Arikata's 賀茂在方 *Rekirin-mondō-shū* 曆林問答集 of 1414, the *Kai-t'ien* theory is argued based on selections from Chu-tzū. In this work, the eclipses of the Sun and the Moon are explained as follows:

"When the affairs of government become pressing, the Sun goes by quickly; and when they become humdrum, the Sun passes slowly. If fastness and slowness lose their rhythm, then a solar eclipse will occur. An eclipse occurs when the Sun takes the same path as the Moon, and the Moon, chasing the Sun, catches up to it and disappears.

To the side of the Moon there is a mystical cloud called the "dark void" 闇虚. If it chances to strike the Moon, a lunar eclipse will occur. If it strikes a star, the star will die out."

In such a conceptualization, and in Buddhist thinking as well, it is virtually impossible to recognize the Earth as being spherical in shape. Therefore, it is safe to say that the peoples of the East really seemed to have no particular interest as to the possible shape of the Earth.

In concluding we should like to mention an encyclopedic directory of the later Kamakura period, the *Shūgaishō* 拾芥抄, which estimates the height of the Heavens to be 78,940 *li*, and the thickness of the Earth to be 59,049 *li*. (See Bks. 1 and 2 of the 拾芥抄.) In mentioning the "thickness" of the Earth, this work is clearly based not on the Chinese *Kai-t'ien* or *Hun-t'ien* theories, but on Buddhist scripture. However, since all the known values for the Earth's "thickness" found in Buddhist literature are calculated in units of thousands, we are at a loss as to the source of the figures given in the *Shūgaishō*. We await further enlightenment on this point.

