TITLE: *The Xian-or-Southern Sung Maps: the Yü Chi T'u*
DATE: *1137 A.D.*
AUTHOR: *unknown*
DESCRIPTION: The *Yü Chi T'u (Yuji tu)* [Map of the Tracks of Yü (the Great)] is one of the two oldest extant comprehensive maps of China and is engraved on the opposite side of the stone tablet that displays the *Hua I T'u (#218).* Although these two maps were made about 1,000 years after the date in the third century B.C., at which the physical record, both literary and cartographic, documents the earliest mapmaking activity in China to have survived, they each illustrate the clear links that continued to exist with the very earliest traditions and themes of both Chinese geography and cartography. The two maps, the *Hua I T'u* [Map of China and the Barbarian (i.e., Foreign) Countries] and the *Yü-Chi T'u (Yuji tu)* were engraved on the same stone tablet, measuring about three feet square, and within six months of one another by an unknown artist in 1137 A.D. during the Song Dynasty (960-1280 A.D). It was carved into the face of an upright monument on the grounds of a school in Xi'an so that visitors could make detailed rubbings using paper and ink. These rubbings could be taken away for later reference. The stone plaque thus functioned as something like an immovable printing block, remaining in Xi'an while copies of its map found their way further afield. The maps are now housed among a very large collection of engraved stones in the *Pei Lin* [the Forest of Steles or Tablets] in the Shensi Provincial Museum at Xian.

A brief history of the Chinese cartographic tradition will serve to reference the sources upon which these two maps have drawn, and demonstrate the remarkable antiquity and show the continuity that prevailed in Chinese cartography.

From ancient times maps have served a variety of purposes in China. Many were designed as practical educational tools for scholar-officials, to guide, instruct and edify in times of both peace and war. They were also employed as a concrete means of asserting the emperor's territorial claims, whether local, empire-wide, or world-wide. Maps became symbolic tokens of exchange in China's domestic and foreign relations, and were even used to depict a perceived link between the realms of heaven and earth. Significantly, they also provided a means by which viewers could take "spiritual" journeys to distant lands - the cartographic equivalent of "travelling [through a landscape painting] while remaining at rest [*woyou*]".

Traditional Chinese maps tend not to be drawn to scale, include a great deal of text and are sometimes pictorial. This generalization is accurate in so far as one acknowledges that a number of kinds of mapping practices, reflecting various epistemologies, did coexist. Distinct technologies and map styles were suited to different audiences and purposes.

According to the cartographic historian Leo Bagrow, Chinese tradition places the earliest reference to a cartographic display at about 2,000 B.C., when nine copper or bronze vases on tripods are said to have been made, bearing representations of nine provinces of the then current Hsia Dynasty and showing mountains, rivers and local products. These vases are thought to have lasted until the end of the Chou Dynasty (ca. 300 B.C.) and were destroyed. Most of the other authorities associated with this subject, however, hesitate to go beyond references to maps of the Chou Dynasty (1122-256 B.C.), specifically those of the third century.

Referring again to Mr. Bagrow, by 1125 B.C. the Chinese had produced a map of their entire kingdom, which must have been the result of many years' work. It seems to have been compiled by Wen-Wang and was certainly based upon geographical material

in the official description of China, the *Yü-Kung* [Tribute of Yü]. This document was highly significant as a primary source for any cartographic effort during this and subsequent periods, which also can only be dated with certainty at least as early as the Chou Dynasty. A copy is presently found as a chapter of the *Shu Ching* [Historic Classic], one possibly prepared by an early disciple of Confucius and ascribed to the fifth century B.C., making it nearly contemporaneous with the earliest Greek map making endeavors of Anaximander *(#106 in Book I)*. The text of the *Yü Kung* recounts the labors of the culture-hero, the Great Yü, as he mastered the primeval flood and laid down the mountains and rivers of the ancient Chinese landscape. Shorn of its mythical context, it may be seen simply as a primitive economic geography of the nine natural regions into which China could be divided. Yü himself became the patron of hydraulic engineers, and of all those concerned with irrigation and water conservation. The *Yü Kung* became and has remained a source of challenge and inspiration to all later generations of Chinese geographers and cartographers.

It can be assumed that maps, charts and plans accompanied even very early examples of these geographical works. Besides the example sited above, another specific reference in Chinese literature alludes to a map painted on silk in the 3rd century B.C., the *weft* and *woof* of the material may, in fact, have suggested a map grid. We also learn of various rulers, generals and scholars during the Han Dynasty (207 B.C.-220 A.D.) having a high regard for maps and using them for administrative and military purposes. The many maps that are recorded from this dynasty were executed on a variety of different materials - wood, silk, stone and paper, the latter of which was an invention by Ts'ai Lun in 105 A.D. In fact the oldest extant maps from China, dated ca. 168 B.C. were a group painted on silk and unearthed in 1973 at Mawangtui, near Changsha in Hunan province in a Han Dynasty tomb.

Apparently the rectangular grid (a coordinate system consisting of lines intersecting at equal intervals to form squares which were intended to facilitate the measurement of distance, in *li*), which was basic to much of the scientific cartography in China, was formally introduced in the first century A.D. by the astronomer Chang Hêng (78-139 A.D., a contemporary of Claudius Ptolemy, #*119 Book I*). The grid subdivided a plane or flat surface; this figure was assumed for purposes of mapmaking but it must not be supposed that all scholars in China believed that this was the shape of the earth. Indeed, we know that the Chinese used the gnomon and were aware of the continual variation in the length of its shadow in the long north-south extent of their own country, knowledge that presumably suggested to them a curving surface, if not a globe.

During the Chin Dynasty, P'ei Hsiu (a.k.a. Pei Xian (Xiu), 224-271 A.D.), who was Minister of Works in an empire only just reunited after the divisions of the Three Kingdoms period, found that the maps available to assist him in his work were incomplete and inaccurate. Considering that his office was concerned with the land and the earth; and finding that the names of mountains, rivers and places, as given in the Yü Kung, had suffered numerous changes since ancient times, so that those who discussed their identifications had often proposed rather forced ideas, with the result that obscurity had gradually prevailed. Therefore P'ei Hsiu undertook a rigorous reconstruction in the light of knowledge then available, he rejected what was dubious, and classified whenever he could, the ancient names which had disappeared; finally composing, among other items, a geographical map of the *Tribute of Yü* in 18 sheets, with the title *Yü Kung Ti Yü T'u*. He presented it to the emperor, Wu Ti, who kept it in the secret archives. It is reported to be a map of China on a scale of 500 *li* to an inch. While

the map has not survived, his text is now preserved in the Chin Dynasty history. In his preface, P'ei, now known as the 'father of scientific cartography in China', clearly outlined the principles of official mapmaking which included: the rectangular grid for scale and locational reference; orientation; triangulation; and altitude measurement (a complete translation of this preface is attached at the end of the monograph).

P'ei's methods are comparable to the contributions made in this regard by Ptolemy in the west; but whereas Ptolemy's methods passed to the Arabs and were not known again in Europe until the Renaissance, China's tradition of scientific cartography, and in particular that of the use of the rectangular grid, is unbroken from P'ei Hsiu's time to the present.

THE YÜ-CHI T'U

If the *Hua I T'u* is the older of the Xian pair, and the more closely linked with the work of earlier cartographers, the *Yü-chi T'u* [Map of the Tracks of Yü (the Great)] may be regarded nonetheless as the more archaic, or at least belonging to a younger tradition. It is an attempt, as was P'ei Hsiu's map, to reconstruct the geography of the *Yü Kung*. Some authorities such as Wang Yung have suggested that this map may be a copied version of P'ei Hsiu's original map by a similar title. The *Yü-chi T'u* uses a grid similar to P'ei's, but it omits all features of administrative or military significance, and even omits the Great Wall (which of course did not exist at the time of the Great Yü). Although more accurate in its treatment of the coastline than the *Hua I T'u* (note the difference in the shape of the Shantung peninsula), and probably, therefore, includes an element of geographic knowledge gained between the time of Chia Tan and the 12th century, the *Yü-chi T'u* clearly served a very different purpose. Engraved from a later original, it was intended as a teaching aid, to instruct students of the classics in the earliest geography of China, as described in the much revered *Yü Kung.* The scale of this map is 100 *li* (about 36 miles) to each square, resulting in the entire map measuring about three feet square.

A comparison of this stone engraved map from the 12th century with that of a modern map of approximately the same scale (below) demonstrates the remarkable accuracy of this unknown medieval Chinese cartographer. Nothing resembling this "modern" look appeared anywhere in western Europe (or Asia) for another 500-600 years, until the period of modern systematic surveys. The *Yü-chi T'u* was evidently drawn with excellent information as to longitudes, much the same as that found on the *portolan* [nautical] charts made in the West a century or two later. While markedly different in appearance, and cultural outlooks, the fundamental purpose and scope may not be so at odds between the *portolans* and these medieval Chinese maps. The *portolan* charts, primarily navigational charts found in Western Europe from the early 14th century on, delineated very accurate coastlines of the Mediterranean but usually displayed little or no interior detail. Conversely, the *Yü-chi T'u* focuses its detail on the interior of China - its river system primarily. This apparent difference in emphasis is actually produced for basically the same reason. Like the Mediterranean Sea, China's rivers were her major commercial and transportation arteries or highways. China was also traditionally very much inward looking, therefore the coastlines of this map are somewhat generalized by comparison.

A closer comparison again of the 12th century Chinese map and the accompanying modern example will show some of the same rivers flowing in different directions. This does not necessarily indicate inaccuracies in the older map. The rivers

of China, particularly the Hwang Ho, or Yellow River, have the habit of changing their courses with occasionally disastrous consequences. The Yellow River is, in fact, called "*China's Sorrow*", changing its course three times in the last 150 years. The *Yü-chi T'u* shows this river following a course to the North of its present one, but that older course, in one of the northern valleys, is perfectly reasonable.

Adding to the modern appearance of both of the Xian maps is the lack of the fabulous creatures, religious themes or adornment of superfluous material so common to many of the European maps of the same period. Also their orientation to the North (true of all Song Dynasty maps that have survived) contributes to the allusion. Professors Needham and Ling, writing in their excellent multi-volume *Science and Civilisation in China*, assert, with ample justification, that this latter map is "the most remarkable cartographic work of its age in any culture".

P'ei Hsiu's Preface

> The origin of maps and geographical treatises goes far back into former ages. Under the three dynasties (Hsia, Shang and Chou) there were special officials for this (Kuo Shih). Then, when the Han people sacked Hsien-yang, Hsiao Ho collected all the maps and documents of the Chhin. Now it is no longer possible to find the old maps in the secret archives, and even those which Hsiao Ho found are missing; we only have maps, both general and local, from the (Later) Han time. None of these employs a graduated scale and none of them is arranged on a rectangular grid. Moreover, none of them gives anything like a complete representation of the celebrated mountains and the great rivers; their arrangement is very rough and imperfect, and one cannot rely on them. Indeed some of them contain absurdities, irrelevancies, and exaggerations, which are not in accord with reality, and which should be banished by good sense.
>
> The assumption of power by the great Chin dynasty has unified space in all the six directions. To purify its territory, it began with Yung and Shu [Hupei and Szechuan], and penetrated deeply into their regions, though full of obstacles. The emperor Wen then ordered the appropriate officials to draw up maps of Wu and Shu. After Shu had been conquered and the maps were examined, with regard to the distances from one another of mountains, rivers and places, the positions of plains and declivities, and the lines of the roads, whether straight or curved, which the six armies had followed; it was found that there was not the slightest error. Now, referring back to antiquity, I have examined according to the *Yü Kung* the mountains and lakes, the courses of the rivers, the plateaus and plains, the slopes and marshes, the limits of the nine ancient provinces and the sixteen modern ones, taking account of commanderies and fiefs, prefectures and cities, and not forgetting the names of places where the ancient kingdoms concluded treaties or held meetings; and lastly, inserting the roads, paths, and navigable waters, I have made this map in eighteen sheets.
>
> In making a map there are six principles observable:
>
> (I) The graduated divisions, which are the means of determining the scale to which the map is to be drawn.
> (2) The rectangular grid (of parallel lines in two dimensions), which is the way of depicting the correct relations between the various parts of the map.

(3) Pacing out the sides of right-angled triangles (tao li), which is the way of fixing the lengths of derived distances (i.e., the third side of the triangle which cannot be walked over).
(4) (Measuring) the high and the low.
(5) (Measuring) right angles and acute angles.
(6) (Measuring) curves and straight lines.

These three principles are used according to the nature of the terrain, and are the means by which one reduces what are really plains and hills (literally cliffs) to distances on a plane surface.

If one draws a map without having graduated divisions, there is no means of distinguishing between what is near and what is far. If one has graduated divisions, but no rectangular grid or network of lines, then while one may attain accuracy in one corner of the map, one will certainly lose it elsewhere (i.e., in the middle, far from guiding marks). If one has a rectangular grid, but has not worked upon the *tao li* principle, then when it is a case of places in difficult country, among mountains, lakes or seas (which cannot be traversed directly by the surveyor), one cannot ascertain how they are related to one another. If one has adopted the *tao li* principle, but has not taken account of the high and the low the right angles and acute angles, and the curves and straight lines, then the figures for distances indicated on the paths and roads will be far from the truth, and one will lose the accuracy of the rectangular grid.

But if we examine a map which has been prepared by the combination of all these principles, we find that a true scale representation of the distances is fixed by the graduated divisions. So also the reality of the relative positions is attained by the use of paced sides of right-angled triangles; and the true scale of degrees and figures is reproduced by the determinations of high and low, angular dimensions, and curved or straight lines. Thus even if there are great obstacles in the shape of high mountains or vast lakes, huge distances or strange places, necessitating climbs and descents, retracing of steps or detours—everything can be taken into account and determined. When the principle of the rectangular grid is properly applied, then the straight and the curved, the near and the far, can conceal nothing of their form from us.

In an historically contextualized overview of the earliest extant version of the *Yü-chi T'u*, engraved on stone under the Liu Yu regime but believed to be a copy of a Northern Song map, a paper by Alexander Akin analyzes factors that complicate its geo-referencing. The paper introduces a new algorithm for nonlinear geo-referencing, applying it to 45 points and finding that the placement of sites on the north-south axis must have been based on latitudinal observation. Despite the *Yü-chi T'u's* startlingly modern appearance, the paper finds that there are areas in which it reflects a loyalty to classical texts.

In this paper Dr, Akin describes the *Yü-chi T'u [Yujitu]* as having as its base layer a river network charted on a regular grid of squares representing 100 *li*, or about 33 miles, to a side. This network is liberally plotted with mountain names. It is not entirely a physiographic map, however, as a constellation of cities extends over its surface. A small square at the upper left lists the map's contents as: "Names of mountains and rivers from the *Yugong*, names of provinces and prefectures from past and present, and mountain and river names and toponyms from past and present." Thus it takes the names of natural features recorded in the ancient text of the *Yugong*, which was believed

to cover the entire physical sphere of classical civilization, then plots these places alongside towns and cities from the beginning of the dynastic period up to the present. The *Yugong* is a chapter in the *Shangshu* 尚書 [Book of Documents], one of the classical texts which was traditionally believed to have been personally edited by Confucius. While it claims to be a record of the sage-king Yu's suppression of a flood that ravaged the world in the 21st century B.C., the *Yugong* also served for many centuries as a textual outline of ancient topography. Many of the earliest surviving geographical texts and printed maps were produced by scholars trying to make this book's heavily condensed enumeration of territories and place names easier for readers of their day to understand. It does this without mentioning political or administrative boundaries from the time it was engraved. The *Yü-chi T'u* depiction of the historical sphere of civilization, carved in an age when the world it depicts was driven by political fragmentation and instability, might have been intended at another level as a wistful call for the reunification of this space under a single virtuous and stable dynasty.

When the *Yü-chi T'u* was carved in Xi'an, the city was under the short-lived rule of Liu Yu 劉豫, who ruled as a local puppet of the Jin dynasty from 1130 to 1137. Liu's tiny kingdom would only have covered a small portion of this map. There are no boundaries of contemporary states marked on its surface. This is not a "national" map in the sense we would understand the term today, as demarcating the territory of one or more nation-states. It functions as a diachronic depiction of cultural space, reflecting the endurance of Confucian culture and its transcendence of any particular dynasty's borders. The map's historical qualities, even what we might today define as mythological aspects, are inseparable from its technical qualities, even though it is its technical appearance that first strikes the modern viewer. The *Yü-chi T'u* has long been cited as a technical marvel; it looks surprisingly modern, even though contemporary records leave no doubt that it is a product of the 12th century (indeed, probably copied from a now-lost 11th century original). Such impressions of technical precision can be superficial, though; how can we test its accuracy? One way is to "rubber sheet" it over a modern map to see how and where it is distorted. In this case, 37 points on the *Yü-chi T'u* were linked by Dr. Akin to coordinates on *Google Earth* using *ArcGIS* software.

The courses of rivers change, the most obvious examples being the Yellow River and the Huai, so establishing links based on river features is obviously not optimal. The points linked to modern coordinates are primarily city sites, mountains, and coastal sites lying far from the river deltas. There are some blatant errors on the map; for example, Ya prefecture on the island of Hainan is placed at the opposite end of the island from its true site. This is a clerical error, since other contemporary sources have it in the right place. For Dr. Akin's purpose it doesn't make sense to input this type of mistake into *ArcGIS*, but it should be noted in any discussion of the map's accuracy.

Dr. Akin found that the cartographer treated the *Yugong* as something of a sacred text. Information already thought to be incorrect at the time the map was carved remains in place, perhaps because of misgivings about challenging a Confucian classic. For example, the historian Cao Wanru has shown that rather than having the Yellow River originate in the Kunlun Mountains, a common belief at the time, it is shown as beginning at a place called *Jishi*, the origin given in the *Yugong*. Dr. Akin states that if we were geo-referencing based on river courses, we would face a dilemma because the map shows courses already thought to be incorrect at the time it was made. Any discussion of "accuracy" would have to incorporate the intellectual context behind decisions like this.

The northeastern part of the map is extraordinarily distorted, pushed down to ensure that the Liao River remains on the map, as is the southern edge and the island of Hainan. In selecting points to link, these distortions at the edge of the map, which may also have been influenced by the desire to fit it into a square, have not been allowed to weigh down the data accumulated from links in more central locations. Because of the way *Google Earth* works, this does not hide the distortion at the edges from you; it is possible simply to adjust the opacity of the map and allow the terrain underlying the map to show through. It is thus possible to see at a glance that a vast central region can be overlaid on the modern globe with little distortion, while the regions closer to the edge grow increasingly warped.

The compilers of the *Yü-chi T'u* found ways to tiptoe around cases where the *Yugong* is particularly obscure. One striking example is the *Heishui*, or Black River. It is only vaguely described in the *Yugong*, which mentions that it passes Sanwei Mountain and flows south into the sea. The *Yü-chi T'u* shows Sanwei Mountain in the far northwest, in what is now Gansu, then the river conveniently goes off the map, swinging back into the southwest before entering the sea in the south. We have no way of knowing whether the *Heishui* recorded in the *Yugong* was originally based on vague knowledge of some real river, or even on mythology - at the time the *Yugong* was originally composed not much was known about the far southwest - but by the 12th century it was well understood that a river basin came through this area, which had been visited at that point by numerous monks and diplomats. The compilers of this map, in a bit of geo-referencing of their own, decided to equate the southern portion of the vaguely described *Heishui* from the *Yugong* with one of these rivers. How exactly it could get from central Asia down to the south was a problem that could be glossed over by taking its course off the edge of the map.

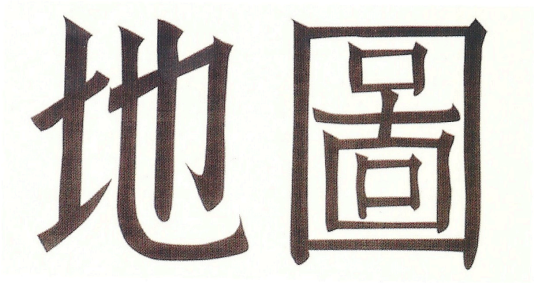
By fusing the world of the ancient *Yugong* text to a form of representation that approached the technical state of the art for its time, the *Yü-chi T'u* served a particular goal that we overlook if we examine only the ways in which it agrees with modern cartography. The *Yü-chi T'u's* futuristic appearance for a 12th century map camouflages the fact that for some areas it actually clings to a textual tradition rather than incorporating the newest data available. The *Yü-chi T'u* was originally intended not only as a tool for teaching geography in a strict sense, but as a reference for situating the toponyms that students would encounter as they read the Classics and later dynastic histories. It was not meant simply to be an accurate map; it mapped out the legacy of a culture on the face of the land.

LOCATION: Pei Lin - Shensi Provincial Museum at Xian
Harvard University holds a rubbing made from the original stone
(*http://vc.lib.harvard.edu/vc/deliver/~rubbings/olvwork271685)*

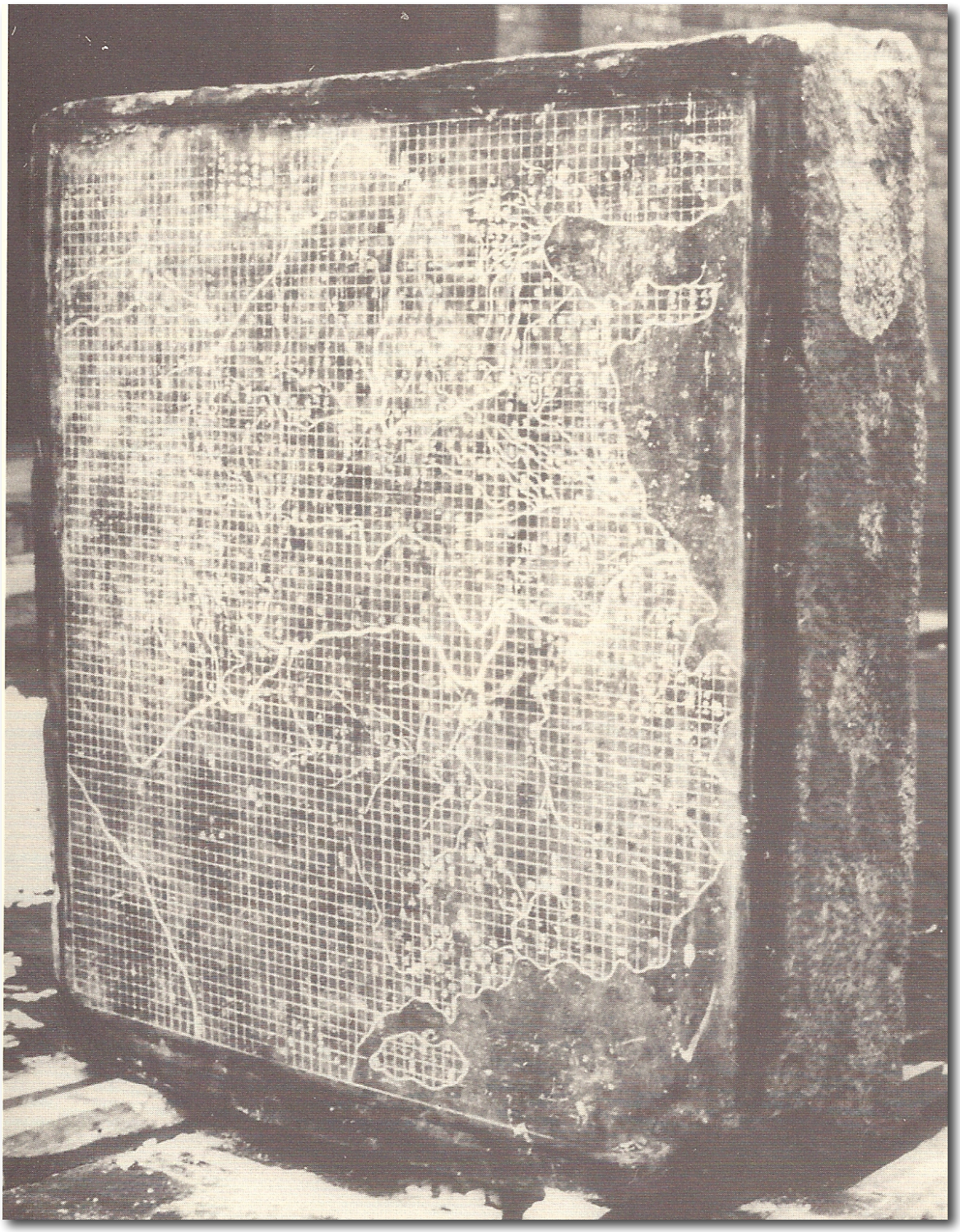
REFERENCES:

*Akin, Alexander & David Mumford, "Yu laid out the lands:" georeferencing the Chinese Yujitu [Map of the Tracks of Yu] of 1136, *Cartography and Geographic Information Science*, 39:3 (2012), 154-169.
*Bagrow, L., *The History of Cartography*, pp. 197-200.
*Cao, W. et al., *Atlas of Ancient Maps in China* 中國古代地圖集: Zhan Guo-Yuan. Beijing: Wenwu chubanshe, 1990, plates 54-59.
Chang, Kuei-sheng, "Africa and the Indian Ocean . . .", *Imago Mundi,* p. 28, Fig 5.

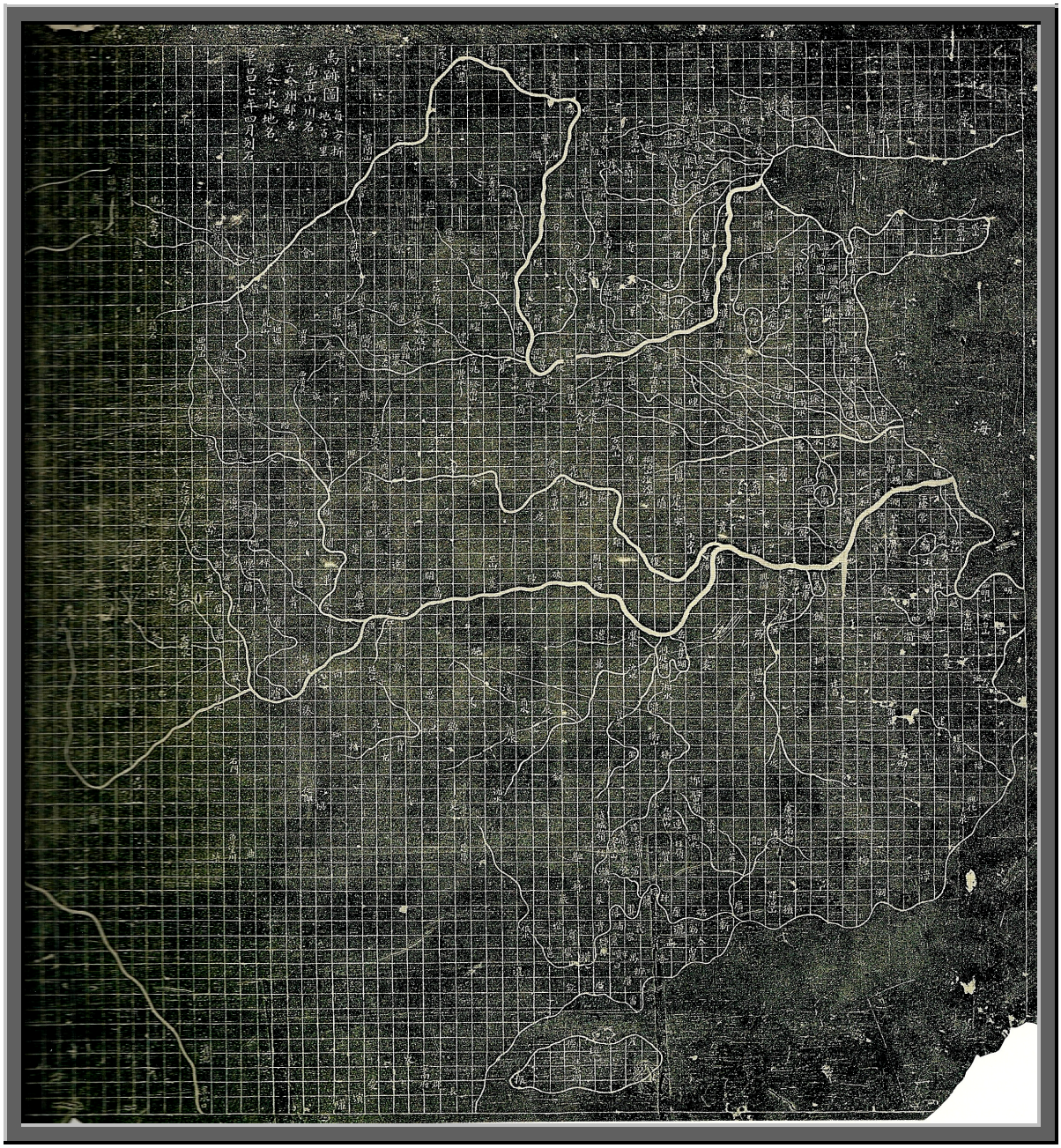
*Hapgood, C., *Maps of the Ancient Sea Kings*, pp. 118 - 123, Table 10.
*Harvey, P.D.A., *Medieval Maps,* p. 17, Plate 12.
*Hermann, A., *Die Westlander in d. chinesischen Kartographie, . . .,* volume 3, pp. 91-406.
*Hostetler, L., *Qing Colonial Enterprise, Ethnography and Cartography in Early Modern China*, pp. 6-8.
*Nakamura, H., "Old Chinese Maps Preserved by Koreans", *Imago Mundi,* vol. IV, pp. 3-22.
*Needham, J., *Science and Civilisation in China,* volume 3, pp. 543-549, Figures 225, 226.
*Nelson, H., "Maps from Old Cathay", *Geographical Magazine,* pp. 702 - 704.
*Park, H., *Mapping the Chinese and Islamic Worlds,* pp. 34-36.
*Smith, Richard J., *Chinese Maps, Images of 'all under Heaven'*, p. 28.
*Soothill, W.E., "Two Oldest Maps of China Extant", *R.G.S. Journal,* vol. LXIX.
*Virga, V., *Cartographia, Mapping Civilizations*, pp. 49-52, Plates 39 and 40.
*Weert, H. de, "Maps and Memory: Readings of Cartography in Twelfth- and Thirteenth-Century Song China", *Imago Mundi*, 61:2, p. 145; Figures 2 and 3.
*illustrated



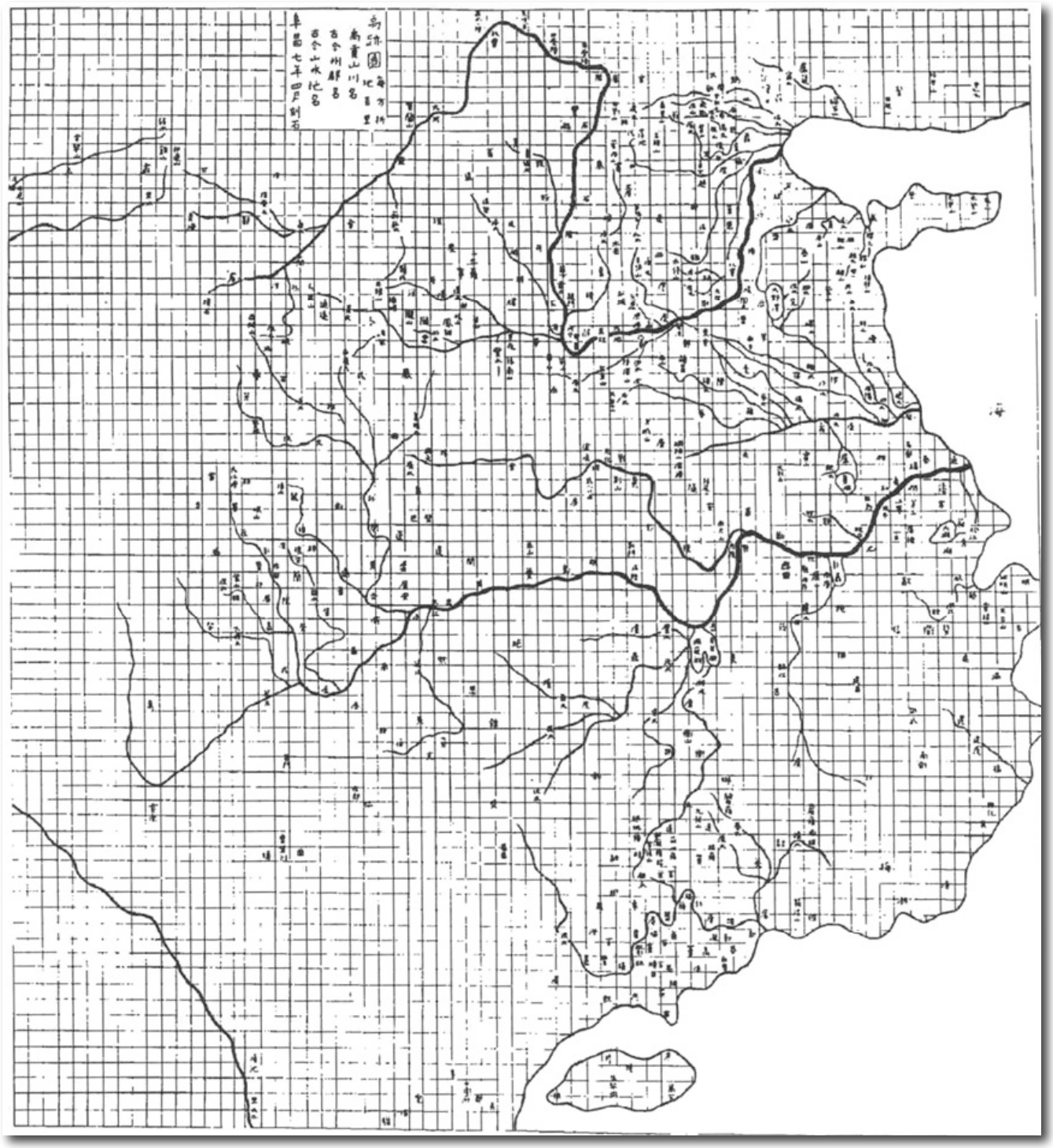
Chinese characters di tu *[Map of the Land].*
The Chinese ideogram for "map" contains a schematic map



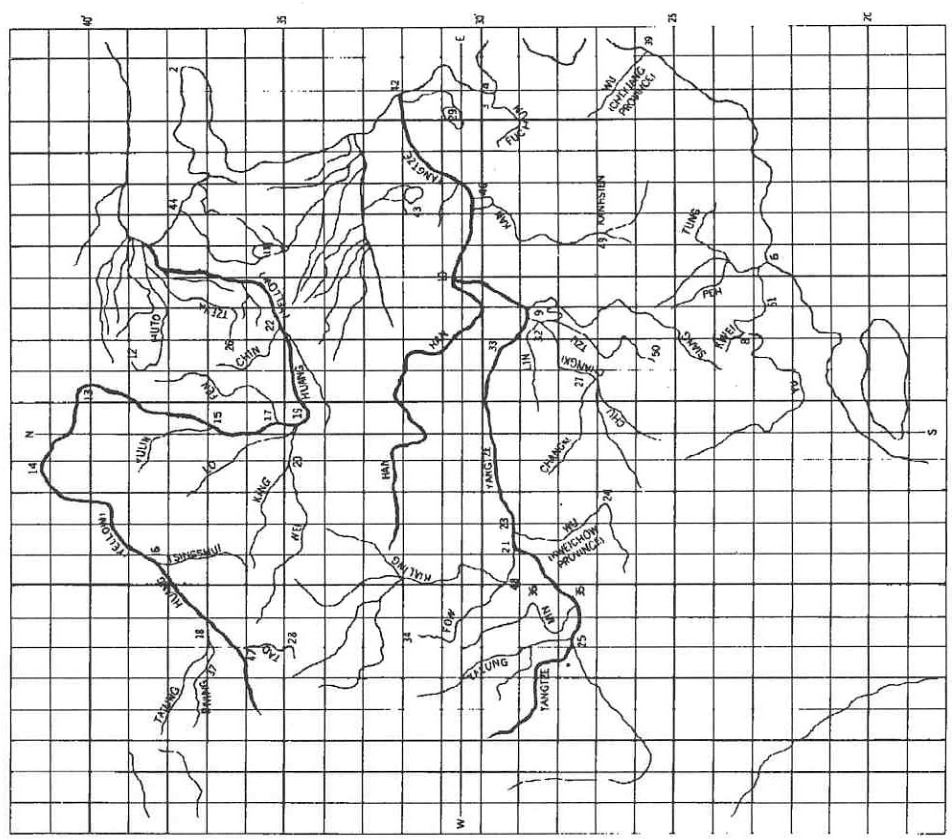
Yü Chi T'u [Map Tracing the Tracks of Yu], *1136.80 x 79 cm (2'9" x 2'8.25")*
The map is carved into a monumental stone (stele). North is at the top. The grid was here used as a measure of the distance between administrative nodes. Rivers and mountains are named, prefectures from the past to the late 11th century are also marked.
The stele is in the Shaanxi Provincial Museum, Xi'an, China.



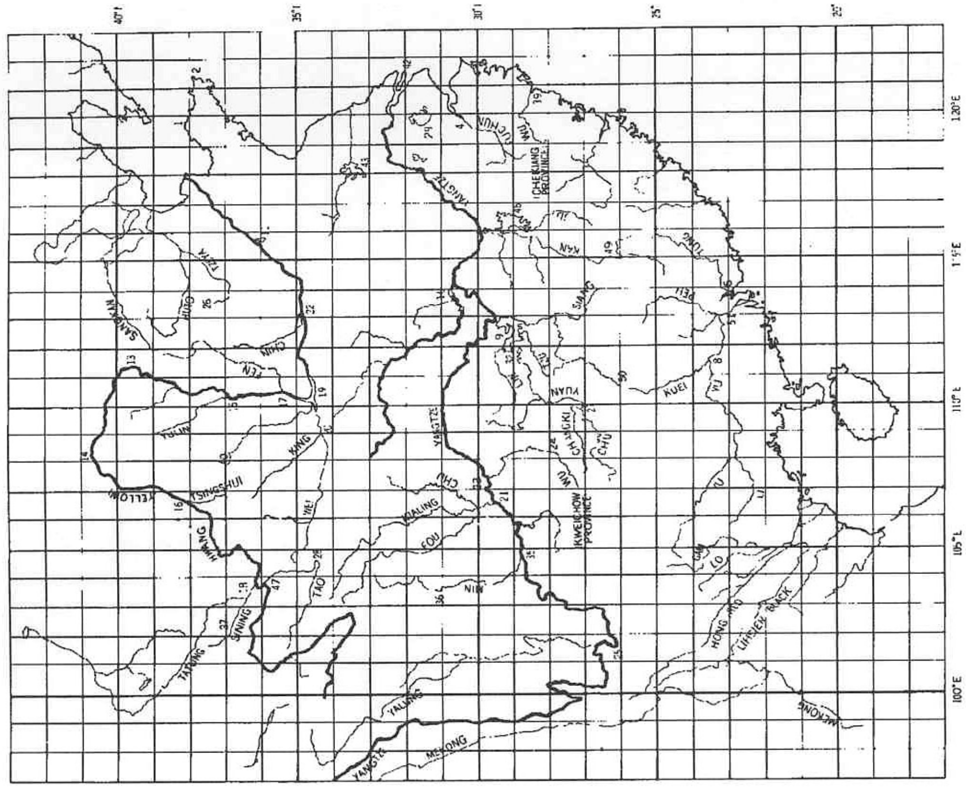
A "rubbing" of Yü Chi T'u
[Map of the Tracks of Yü the Great], 1137 A.D.
a rubbing from map carved in stone, actual size is about 3 feet square
Each square on the grid represents 100 li, or about 50 kilometers



The Yü Chi T'u, [Map of the Tracks of Yü the Great], carved in stone in 1137, about 3 feet square
Each square on the grid represents 100 li, or about 50 kilometers
(from Hapgood)



A redrawing of the Yü-chi T'u with an oblong grid constructed empirically from the geography, the numbers refer to the accompanying table. (from Hapgood)



A modern map of China, on a comparable scale to the Yü-chi T'u and corresponding numbers

Locality	True Position	1137 Map	Errors
(a) THE NORTHWEST QUADRANT			
18. Junction of the Tatung and Sining Rivers	36.4 N 103.0 E	37.0 N 103.3 E	0.6 N 0.3 E
15. Bend of the R. Hwang near Ningsia	38.5 N 107.2 E	37.0 N 107.5 E	1.5 S 0.3 E
16. Junction of R. Hwang and R. Tsingshui	38.0 N 106.0 E	38.0 N 105.5 E	0.0 0.5 W
17. Junction of R. Hwang and R. Fen	35.5 N 110.5 E	35.3 N 110.5 E	0.2 S 0.0
19. Eastward turn of R. Hwang at Tali	34.5 N 110.0 E	34.5 N 110.5 E	0.0 0.5 E
20. Junction of R. King and R. Wei (Siking Province)	34.4 N 109.0 E	35.0 N 109.0 E	0.6 N 0.0
28. Bend in the R. Tao	34.5 N 104.0 E	35.0 N 103.0 E	0.5 N 1.0 W
47. Junction of the R. Hwang and the R. Tao	36.0 N 103.0 E	36.0 N 103.0 E	0.0 0.0
(b) THE NORTHEAST QUADRANT			
1. Penglai	37.7 N 120.6 E	37.7 N 119.5 E	0.0 1.1 W
2. Chenshan Tow (tip of Shantung Peninsula)	37.4 N 122.5 E	37.7 N 122.0 E	0.3 N 0.5 W
11. Lake (Tunga) on former course of the R. Hwang	36.0 N 116.0 E	35– 36 N 116.0 E	0.0 0.0
13. Southward turn of the Hwang at Tokoto (Suiyuan P.)	40.0 N 111.2 E	40.0 N 111.6 E	0.0 0.4 E
22. Junction of R. Hwang and R. Chin	35.0 N 113.3 E	35.2 N 113.3 E	0.2 N 0.0
26. Source of the R. Tzeya	37.0 N 113.2 E	36.6 N 113.3 E	0.4 S 0.1 E
29. Island in Lake Tai Hu	30.7 N 120.5 E	31.0 N 120.3 E	0.3 N 0.2 W
42. Mouth of the R. Yangtze	31.5 N 122.0 E	32.0 N 121.0 E	0.5 N 1.0 W
43. Lake Hungtze Hu	33.2 N 118.5 E	32.0 N 118.0 E	1.2 S 0.5 W
44. Taku, former mouth of the R. Hwang (1852–1938)	37.7 N 118.8 E	37.8 N 117.5 E	0.1 N 1.3 W
(c) SOUTHWEST QUADRANT			
8. Junction of R. Kwei and R. Yu at Kwei Ping	23.5 N 110.0 E	23.3 N 113.0 E	0.2 S 3.0 E
21. Chungking, at junction of R. Yangtze and R. (Fow)	29.3 N 106.0 E	29.3 N 106.5 E	0.0 0.5 E
23. Junction of the R. Yangtze and the R. Wu (Kweichow Province)	30.0 N 107.5 E	29.5 N 106.5 E	0.5 S 1.0 W
24. Westward bend of the R. Wu	28.0 N 106.2 E	26.7 N 107.5 E	1.3 S 1.3 E
27. Junction of the R. Changti and the R. Chu	27.9 N 110.1 E	27.1 N 111.9 E	0.8 S 1.8 E
35. Junction of the R. Yangtze and R. Min near Ipin	29.7 N 104.5 E	27.5 N 104.5 E	2.2 S 0.0
36. Chengtu on the R. Min	30.5 N 104.0 E	28.5 N 104.5 E	2.0 S 0.5 E
25. Junction of the R. Yangtze and the R. Yalung	26.5 N 101.7 E	27.7 N 103.2 E	1.2 N 1.5 E
50. Source of R. Tzu	26.5 N 110.5 E	25.3 N 112.2 E	1.2 S 1.7 E

Locality	True Position	1137 Map	Errors
(d) SOUTHEAST QUADRANT			
9. Lake Tung Ting Hu	29.0 N 112–113 E	28– 29 N 113.5–114.5 E	0.0 1.5 E
10. Junction of R. Yangtze and R. Han at Hankow	30.5 N 114.0 E	30.7 N 115.0 E	0.2 N 1.0 E
4. Mouth of R. Fushun	30.4 N 121.0 E	29.7 N 121.0 E	0.7 S 0.0
6. Mouth of the R. Kwei	22.0 N 113.0 E	22.6 N 115.5 E	0.6 N 2.5 E
39. Mouth of the R. Wu (Chekiang Province)	23.0 N 121.0 E	25.7 N 122.5 E	2.7 N 1.5 E
46. Lake Pohang Hu	29.0 N 116.5 E	30.0 N 117.5 E	1.0 N 1.0 E
49. Kanhsien, Kiang Prov.	25.8 N 115.0 E	26.7 N 116.5 E	0.9 N 1.5 E

the Yü Chi T'u and a comparison with a modern map of China (Hapgood)