ANATOMETRICS IN ANCIENT CHINA

by

Yamada Keiji

The first record of human dissection in China, and the only one found in the Standard Histories, is a famous anecdote in the biography of Wang Mang in the History of the Former Han Dynasty (Han Shu 漢書).

Zhai Yi 翟義 rebelled against the ambitious regent Wang Mang 王莽 in A.D. 8, when Wang had put an infant on the throne and was barely concealing his intent to occupy it himself and end the Han dynasty. Though Wang suppressed the uprising and became emperor in the same year, Zhai’s strategist Wangsun Qing 王孫慶 managed to escape. Wangsun was caught in the third year of the Tianfeng 天鳳 era (A.D. 16) of Wang’s Xin dynasty:

Wangsun Qing, the confederate of Zhai Yi, was captured. Wang Mang sent his personal Palace Physician and artisans from the Directorate for Imperial Manufacturers to work with skilled butchers to dissect Wangsun. They measured and weighed his yin organs (wu tsang 五臟), and used a bamboo strip to trace the

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2. I use the word “treatise” to remind the reader that the Huang di nei jing brings together what were originally many different books. In some instances a treatise or an excerpt from an original treatise corresponds to pian 薰 in the extant work, and in others to parts of pian.

Wu tsang and liu fu 王貞 are not easily distinguished in translation, since both tsang and fu, during the period in which the medical classics were written and compiled, meant “storehouse.” Fu as “headquarters or official residence” is a post-Han meaning; see N. Sivin, Traditional Medicine in Contemporary China [Ann Arbor, 1987], p. 121. Some modern scholars distinguish tsang and fu in anatomical contexts as solid and hollow organs or in physiological contexts as storing and processing organs respectively. Those are not classical views of the difference, but doubtful inferences from a single Inner Canon passage (Su wen 11.1) that clearly do not hold for other treatises in the same book (Sivin, p. 132). The list of tsang and fu in that passage is not the one that later became canonical. The only distinction common to the Inner Canon is that the wu tsang are yin in relation to the liu fu. It is also necessary to keep in mind that “wu tsang” is often, as in this instance, a term for all the visceral systems. See Manfred Porkert, The Theoretical Foundations of Chinese Medicine. Systems of Correspondence (Cambridge, MA: 1974), pp. 110-111.

The reader should keep in mind that in most medical writing, which is not anatomical in approach, the wu tsang and liu fu are thought of not as organs but as systems of functions. It more faithfully reflects the purport of the classics to say that anatomical viscera may be associated with them (which for most early medical authors is not the case with one system, the san chiao 三焦) than that the functional systems are associated with viscera. See Sivin, pp. 117-133.
courses of his circulation vessels (mo 開) to learn where they began and ended. [The Emperor] said that [this knowledge] could be used to cure illness.³

It was believed for a long time that the account of this dissection had been lost. However, my attention was irresistibly drawn to the treatises gathered in the Divine Pivot (Ling shu 靈樞), one of the surviving partial recensions of the early medical anthology, the Inner Canon of the Yellow Lord (Huang di nei jing 黃帝內經). A clear reference to the efficacy of dissection appears in one of these treatises, and numerical measurements that could have been obtained only through dissection are recorded in others.⁴

One of the treatises in this work, "Cardinal Waters" (Jing Shui 結水), takes the form of questions and answers between the Yellow Lord (Huang Di) and his minister Qi Bo 嘉伯. The treatise enumerates correspondences between the great watercourses of China and the cardinal circulation vessels in the body, as an aspect of the relation between macrocosm and microcosm. The Yellow Lord asks how, through reasoning on such correspondences, the physician can determine how deep to needle, or how many units of moxa to apply—that is, how correspondences guide praxis.

Qi Bo, in replying, mentions dissection:

A splendid question! Heaven is highest of all, too high to gauge, and earth broadest of all, too broad to measure: that is your point. Human beings live between sky and earth, within the six orientations.⁵ The height of the sky and the breadth of the earth are beyond human power to encompass through measurement. But if we had a gentleman eight chi (159 cm or five feet three inches) tall, in the flesh right here, we could measure and palpate the exterior [of his body] to learn about [his condition]. And after the body has died, we could open it up and examine it.⁶

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3. Han shu, 99B: 4145-6. For additional information on Wangsun's part in the rebellion, see 84: 3426.


5. The four cardinal points of the compass plus up and down.

6. Since the Chinese system of linear measure was generally decimal, I have converted all dimensions in the remainder of this essay to a single quantity, the cm or 0.1 chi. The dimensions in the Inner Canon are based on Zhou measures, in which the cm was an average of 1.991 cm or, for all practical purposes, 2 cm. The cm of the Qin and Han (2.3 cm) would make the aristocrat 184 cm or six feet tall, and the commoner (see p. 42 below) 173 cm or five feet seven inches tall. See the discussion in N. Sivin, Traditional Medicine in Contemporary China (Ann Arbor, 1987), p. 96, n. 3. The value for the Zhou cm given in Wu Chenglu 吳承洛, Zhongguo duixiangsheng shi 中國度量衡史 (Shanghai, 1937), p. 54, has yet to be superseded, but its figure of 2.765 cm for the Western Han does not tally with the many footrules excavated in recent decades. They suggest an equi-
What exactly can be learned from observing and measuring the outside and inside of the body?

The firmness of the yin organs, the size of the yang organs, their capacity for grain, the length of the vessels, the purity of the xue, the quantity of qi, whether in each of the cardinal circulation tracts there is more or less xue than qi, or whether they all have more or less xue and qi (than normal). For all of these there are general numerical regularities (da shu 大數). In therapy with needles and moxa to regulate the qi of the cardinal circulation tracts, must there not certainly be correspondences?

It seems clear that the confident assertions made here are based on measurements, and are the results of dissections actually carried out.

One can find four other treatises in the Huang Di Nei Jing that correspond directly to the passages given above, including "Dimensions of the Bones" (Gu du 骨度, LS14), "Dimensions of the Pulsating Vessels" (Mo du 脉度, LS17), "Intestines and Stomach" (Chang wei 腸胃, LS31),

valent of 2.3 cm throughout the Han. See, for instance, Guojia Jiliang Zongju 国家計量总局, Zhongguo gudai duliangbeng tuji 中國古代量衡圖集 (Beijing, 1981), text, pp. 41-42.

Measures of weight and capacity below also conform to the Zhou system. The study of the late Zhou sheng by Qiu Guangming 丘光明 in "Shi lun Zhongguo rongliang zhidu" 試論戰國容量制度, Wenwu 文物, 1981, 10: 63-72, shows that the average value for a given state could be as little as 168 ml or as much as 218 ml. Since nothing is known about the local origin of this Inner Canon text, 200 ml is a defensible guess at an equivalent. Zhongguo gudai duliangbeng tu ji, text, pp. 46-47, shows a similar range implying a rough equivalent of 250 g for the jin or one-sixteenth of that, 15.6 g, for the liang. All equivalents given below are rounded to avoid a misleading impression of precision.

The use of Zhou measures does not weigh against a Han date for the Inner Canon. It is a consciously archaic work, like many Han writings, and draws on pre-Han texts.

7. LS12.2. The author’s point is that correspondences may be both qualitative (using yin-yang, Five Phases, etc.) and quantitative (mathematical or numerological). The obvious utility of metrological constants validates the less obviously useful qualitative correspondences between the circulation system and the great watercourses.

Xue in everyday language, and to a limited extent in early medical writing, referred to blood, but in the latter generally referred to the yin aspect of qi, which in a given context might or might not be tangible. In this passage xue and qi are the relatively yin and yang aspects of circulating vital substance. See Sivin, pp. 150-160, 437, 440. "Grain" as usual in Chinese writing about diet refers to solid food in general.

Treatises parallel to those in LS are found in the Grand Basis (Tai su 太素) recension of the Inner Canon, cited below by pusan 羣山 and pisan number from the Tōhō igaku zempō sōshō ed. as TS. TS has been less drastically edited over the centuries than Su wen and LS. For this passage see TS5.4.
and “A Normal Man Abstains from Cereals” (Ping ren jue gu 平人絶谷，LS32).  

The treatises dealing with anatometrics are concerned primarily with measuring the hard and soft parts of the body, and drawing physiological conclusions from those measurements. An excerpt from “Dimensions of the Bones” will give the flavor:

The Yellow Lord asked Bo Gao: “‘Dimensions of the Pulsating Vessels’ discusses the lengths of the pulsating vessels. How were they arrived at?”

Bo Gao replied “First one measures the girths, widths, and lengths of the bones and joints; from these the measures of the pulsating vessels are determined.” The Yellow Lord said “I would like to hear about the dimensions of commoners (zhongren 人). What are the girths and lengths of the bones and joints in someone seven and a half chi (149 cm or four feet eleven inches) tall?”

Bo Gao said “The great bone of the head [i.e., the skull] is 26 can in circumference; the chest is 45 can in circumference; the waist is 42 can in circumference. The part [of the head] covered by the hair, from the top of the head to the nape of the neck, is 12 can. From the hair down to the chin is 10 can. In the gentleman this is divided into three parts. From the Adam’s apple down to the middle of the depression at the lower side of the neck is 4 can; from the depression down to the bone at the bottom of the sternum is 9 can. If more than that, the lungs will be [abnormally] large; if not that much, they will be small. From the bone at the bottom of the sternum to a point beside the navel is 8 can. If more than that, the stomach will be [abnormally] large; if not that much, it will be small. . . .

8. Counterparts of all four treatises studied below are found together in TS13.2-4; the texts that correspond to LS31 and LS32 are combined under the title “Dimensions of the Gut” (Chang du 長度). These versions differ significantly, but for the present purpose I will not compare them in detail. In citations from LS I note only textual problems directly relevant to the translations. For important discrepancies in numbers see table 3, p. 51. These treatises take the form of questions posed by the Yellow Lord and answered in one case by Qi Bo and in three cases by another minister, Bo Gao (伯高). I believe that these writings record the dissection and measurement of human body contents carried out under Wang Mang. I base this inference on the fact that Wang’s biography quoted above corresponds exactly in certain respects to the passages found in the Huang di nei jing. To focus on this content I propose the term “anatometrics,” which concisely expresses the salient characteristic of ancient Chinese anatomical writing.

9. In Mo du, the relevant part of which is translated below, da 大 refers to circumference; width, when given, is one third of the girth.

10. I correct “zhong 仲” to “can 速度” as in TS13.2.28 and other sources listed in LSG, p. 327. The commentators explain this passage as saying that the distances from the hairline to the eyebrows, from the eyebrows to the bottom of the nose, and from the latter to the point of the jaw, are equal. Note that this aside does not apply to “commoners,” whose facial proportions are not necessarily ideal.

11. Quepen 齊頰, the acupuncture locus at the supraclavicular fossa.

12. Heyu 高頜, xiphoid process.

13. Tianshu 天枢, an acupuncture locus 2 can lateral to the navel.
These are the dimensions of commoners, from which the lengths of the cardinal pulsating vessels are established. With this in mind, observe the cardinal vessels on the surface of the body. If they appear to float and are firm, or to be clearly defined and large, they contain mostly xue. If they are fine and sunken, they contain mostly qi.\textsuperscript{14}

The part omitted completes the enumeration of the bones. Their thickness, width, and length are given—not all three dimensions for each bone—including measured values for the lengths of the front, back, and side of the body. More attention is given to the distances between them than to their dimensions. Untypical dimensions or distances, as in the examples translated, are taken as signs of abnormally large or small internal organs. In the last three sentences, “observe” (shib 視) may refer to palpation of the pulse.

Four points may be noted concerning these measurements.\textsuperscript{15}

1. All measurements apply to a “commoner” 75 cun (149 cm) tall. According to the Tang dynasty annotator Yang Shang-Shan 杨上善, this was an average height. Since it was not calculated statistically, however, it is not a mean but a standard value. The difference between the height of a patrician cited above and that of an “ordinary man” is thus 5 cun, equivalent to ten cm or four inches.

The height of eight Zhou chi (159 cm) for a male aristocrat agrees roughly with excavated cadavers of early Han nobles. The remarkably intact body of the Lady of Dai, who was interred at Mawangdui in 168 B.C. and excavated in 1972-1973, was 154 cm tall; the relatively well-preserved male cadaver of Sui Shaoyan 進小鸞, who died in 167 B.C. and was disinterred at Fenghuangshan in 1975, was about 166 cm tall. If we used the Han rather than the Zhou equivalent, the height given in the text for the aristocrat would correspond to 184 cm or six feet. That is not out of the question, but it is a great deal less likely.\textsuperscript{15}

2. All measurements are external, and few are actual dimensions of bones. Distances between parts of the body with clear characteristics that could be seen with the eye or felt with the hand were chosen as reference

\textsuperscript{14} LS14.1-2, 6; cf. TS13.2: 26-40. The Inner Canon uses a diverse terminology for the branches of the circulation system to reflect various functions. When it discusses their role in distributing vitality and nutriment through the body it calls them jing 經, which does not imply any physical form or characteristics. When it is emphasizing their pulsation and their ability to hold substances it calls them mo 脉. When it thinks of them as physical conduits it calls them sui 腦. The main branches may be called jingmo, jinglao 經絡, or da jingsu 大經絡. I follow Sivin in translating mo as “[pulsating] vessel,” jing as “tract,” and sui as “conduit”; pp. 122, 136-137.

\textsuperscript{15} See note 6 on p. 40 and Changsha Mawangdui yibao Han mu gu shi yanjiu 長沙馬王堆一号漢墓考古研究 (Beijing, 1980), p. 27; “Hubei Jiangling Fenghuangshan yilubahao Han mu fajuejian bao” 湖北江陵鳳凰山一號漢墓發掘報告 Wen-wu 文物, 1975, 9: 1-19,28, esp. p. 3.
points for measurement. Most of these reference points were parts of bones, but they also included such skin-related characteristics as the hairline and the navel.

3. The character of the measurements of the front, side, and back, and the way the points of reference were chosen, bear out Bo Gao’s statement that the purpose of the measurements was to determine, not empirically but by inference, the basic “dimensions of the pulsating vessels” 脉度. If it is assumed that each part of the body is related to the whole in a more or less set and universal ratio, these proportions can be used to deduce the size of the vessels and thus the intervals between acupuncture loci in people of differing bodily proportions. 16

4. Finally, although these measurements do not require dissection, the text hints at the possibility that dissection did indeed take place. This hint can be found in the observation, of which an example is included in this excerpt, that there are positive correlations between external body dimensions and the length and size of the lungs, stomach, and a section of the intestine. The discussion of variation implies that more than one body was dissected.

“Dimensions of the Bones” is explicitly meant to explain how the internal dimensions in another treatise, “Dimensions of the Pulsating Vessels,” were found. The latter begins:

The Yellow Lord said “I would like to hear about the dimensions of the pulsating vessels.” Qi Bo replied “The six hand yang [conduits], from the hand to the head, are 50 cun long; six fives is 300 cun (597 cm). The six hand yin [conduits], from the hand to the mid-thorax, are 35 cun long; three sixes is 180 cun and five sixes is 30 cun, a total of 210 cun (418 cm). The six foot yang [conduits], from the feet up to the head, are 80 cun long; six eights is 480 cun (956 cm). The six foot yin [conduits], from the foot to the mid-thorax, are 65 cun long; six sixes is 360 cun and five sixes is 30 cun, a total of 390 cun (776 cm). The heel tracts (qiao mo 藻脈), from the foot to the eye, are 75 cun; two sevens is 140 cun and two fives is 10 cun, a total of 150 cun (299 cm). The superintendent vessel (du mo 伏脈) and the conception vessel (ren mo 任脈) are each 45 cun long; two fours is 80 cun and two fives is 10 cun, a total of 90 cun (179 cm). The grand total is 1620 cun (3225 cm, 32 m, or 106 feet). These are the great cardinal conduits for qi. . . .

However the dimensions in this passage were derived, the authors of “Dimensions of the Bones” believed that they were inferred from external measurements. In that sense they do not contradict Qi Bo’s assertion that

16. On this modular conception see Lu Gwei-djen & Joseph Needham, Celestial Lances. A History and Rationale of Acupuncture and Moxa (Cambridge, 1980), pp. 122-127. That section is mainly concerned with finding acupuncture loci on bodies of different proportions. This major problem in practice undoubtedly is responsible for the emphasis on distances between body features in the anatometric writings. Note that the diagram on p. 123 of Lu & Needham incorporates dimensions given in the passage above.
we can “we can measure [the body] on the outside, and palpate it,” and thus infer the interior states with which classical physicians were preoccupied. That the lengths of the qi circulation vessels were estimated by tracing their paths under the skin is as likely as any other hypothesis. Indeed it would be difficult to argue convincingly that any particular anatomical structure could have been dissected out and measured for this purpose. But we can find in the treatises “Intestines and Stomach” (LS31) and “A Normal Man Abstains from Cereals” (LS32) dimensions that could only have been determined because, as Qi Bo put it, “after the body has died, we can open it up and examine it.”

Here is “Intestines and Stomach” in its entirety:

The Yellow Lord asked Bo Gao “I would like to hear about the girths and lengths of the intestines and stomach and their capacity for grain as these affect the distribution of grain to the six yang visceral systems of function.”

Bo Gao said “Let me tell you all about it. Following [the course of] grain from entry to exit, the dimensions of depth, distance, and length are: from lips to teeth, a length of 0.9 can; the mouth is 2.5 can wide; from the teeth back to the epiglottis is a depth of 3.5 can; and a capacity of 0.5 sheng (100 ml). The tongue weighs 10 liang (156 g); it is 7 can long, and 2.5 can wide. The gate [i.e., upper part] of the pharynx (yen men 任門) weighs 10 liang; it is 1.5 can wide, and its distance to the stomach is 16 can. The stomach twists and retracts; when stretched out it is 26 can long. Its girth is 15 can, it is 5 can across, and it has a capacity of 35 sheng. The small intestine is attached at its rear to the backbone; it twists leftward, forming a coil. Where it discharges [its contents] into the winding intestine (huachang 虚腸), it is attached externally above the navel; it turns, coiling, through sixteen turns. Its girth is 2.5 can, and it is 0.83 can wide and 320 can long. The winding intestine is located at the navel; it twists leftward, forming a coil. It turns downward, coiling through sixteen turns. Its girth is 4 can, and it is 1.3 can wide and 210 can long. The broad intestine is attached to the backbone where it receives [the contents of] the winding intestine. It twists leftward, piling up in vertical folds. Its girth is 8 can, and it is 2.3 can wide and 28 can long. The intestines and stomach [i.e., the alimentary tract], from where [food] enters to where [the excretum] exits, is 604.4 can long. It twists and coils through thirty-two turns.”

This passage gives dimensions for the alimentary tract from lips to anus, including widths, lengths, diameters, circumferences, capacities (related to but not necessarily equal to volumes), and weights. The three sections are

17. The punctuation here makes the meaning uncertain.

18. In the Han shaoban 大半 and daban 少半 usually mean one third and two thirds, but are sometimes used for one quarter and three quarters, and sometimes are approximate measures. Since in the anatometric writings widths are regularly given as one third of girths, I take these two terms in the first sense, and round to 0.3 and 0.7 to avoid misleading precision.

19. See LSG, p. 504, n. 13, for textual evidence that this may originally have been considered a rightward coil.

20. The text of this sentence does not make sense. I tentatively emend 適通 to die i 追通 on the basis of arguments in LSG, p. 504-505, notes 14, 17.
not easily compared with the divisions known to modern anatomy (lengths are average; the figure in parentheses is in each case the percentage of the whole length taken up by the part):

<table>
<thead>
<tr>
<th>NEICHING</th>
<th>LENGTH, CM</th>
<th>MODERN</th>
<th>LENGTH, CM</th>
</tr>
</thead>
<tbody>
<tr>
<td>small intestine</td>
<td>637 cm (57%)</td>
<td>duodenum</td>
<td>23 cm (4%)</td>
</tr>
<tr>
<td>winding intestine</td>
<td>418 cm (37%)</td>
<td>jejunum</td>
<td>370 cm (68%)</td>
</tr>
<tr>
<td>broad intestine</td>
<td>64 cm (6%)</td>
<td>colon</td>
<td>150 cm (28%)</td>
</tr>
<tr>
<td></td>
<td>TOTAL 1119 cm</td>
<td>rectum</td>
<td>12.7 cm (1%)</td>
</tr>
</tbody>
</table>

Table 1.
Comparison of Ancient and Modern Intestinal Tracts

But the discrepancies are not surprising. In contrast to hard parts such as the skeleton, soft parts such as the viscera are difficult to measure. Since they easily change shape, the anatometrician must decide exactly what is to be measured under what conditions. A modern scholar who wishes to understand a given set of choices must reconstruct the ultimate purpose of measurement. The purpose of the physicians who conducted the measurements in this case was to clarify the physiological basis for life processes. We know this from the treatise “A Normal Man Abstains from Cereals” (LS32).

The Yellow Lord said “I would like to hear why people die when they have not eaten for seven days.”

Bo Gao said “Let me tell you the reason. The girth of the stomach is 15 cun; it is 5 cun across and 26 cun long. Horizontal and retracted, its capacity is 35 sheng (7 l) of liquid and grain. Normally when it retains 20 sheng of grain and 15 sheng of liquid it is full. . . . The girth of the small intestine is 2.5 cun; it is 0.83 cun across and 320 cun long. Its capacity is 24 sheng of grain and 6.37 sheng of liquid. The girth of the winding intestine is 4 cun; it is 1.3 cun across and 210 cun long. Its capacity is 10 sheng of grain and 7.5 sheng of liquid. The girth of the broad intestine is 8 cun; it is 2.7 cun wide and 28 cun long. Its capacity is 9.3125 sheng of grain. The overall length of the intestines and stomach is 584 cun, and their capacity for grain and liquid is 92.17 sheng (18.4 l). These are the numerical regularities for their grain and liquid capacity.

But this is not how it is in a normal man. When his stomach is full his intestines are depleted; when his intestines are full his stomach is depleted. They

21. As part of the colon, this is not included in the total.

22. Expressed as “9 sheng, 3 ge $\frac{1}{2}$, and 1/8 ge.”
alternate in filling and emptying. In this way qi is able to ascend and descend; the visceral systems of function are stable; the [flow of] xue [in the circulation] vessels is concordant and unimpeded; and the essence and spirit (jingshen 精神) remain in place. Now what is called spiritual vitality (shen) is the essential qi of [ingested] liquid and grain.

This being so, 20 sheng of grain and 15 sheng of liquid are regularly retained within the intestines and stomach. Now a normal man defecates twice a day, 2.5 sheng (500 ml) at a time or 5 sheng in the course of a day. Five sheng per day for seven days is five sevens or 35 sheng. [At the end of that time] the retained liquid and grain are gone. Therefore, that people die when they have not eaten for seven days is because their liquid and grain, essential qi, and dispersed bodily fluids (jinye 津液) are completely gone.’’

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<table>
<thead>
<tr>
<th>INTERLOCUTOR</th>
<th>RESPONDENT</th>
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<tbody>
<tr>
<td>Lei Gong</td>
<td>The Yellow Lord</td>
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<tr>
<td>The Yellow Lord</td>
<td>Shao Shi</td>
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<tr>
<td>The Yellow Lord</td>
<td>Bo Gao</td>
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<tr>
<td>The Yellow Lord</td>
<td>Shao Yu</td>
</tr>
<tr>
<td>The Yellow Lord</td>
<td>Qi Bo</td>
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</table>

Table 2.
Participants in Inner Canon Dialogues

According to these physicians, life can be maintained only when the body is constantly supplied with food and drink. The requisite amount of nutrition was determined by measuring the capacity of the digestive organs and speculating on their functional relationships. The alternate filling and emptying of stomach and intestines somehow move xue nutriment and qi vitality through the circulation system. Fasting for seven days will evacuate all of the water and grain held in a full stomach and deplete the vital substances elsewhere in the body, causing death.

The references to body measurements and dissection found here correspond strikingly to the section quoted on pp. 40-41 from ‘‘Cardinal Waters.’’ My analysis published elsewhere leads to the conclusion that ‘‘Cardinal Waters’’ is later than the other treatises translated above.23

The treatises found in the Huang di nei jing are mostly in the same question-and-answer form as those already discussed. There are five combinations of inquirer and respondent, summarized in Table 2.

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23. See the two essays cited in note 4, p. 40, above.
I submit that these five combinations correspond to the five sub-groups within the Yellow Lord school. I have therefore named these groups after the figure who answers questions, and thus provides most of the information, in each group: the Yellow Lord group, the Shao Shi group, the Bo Gao group, the Shao Yu group, and the Qi Bo group. From the content of their writings, it would appear that the Yellow Lord and Shao Shi groups appeared first, and were followed by the other three. If we provisionally grant this hypothesis, then an important conclusion follows from the proposition that the anatomic treatises record dissections carried out by order of Wang Mang.

First, we know that the anatomic treatises in pian 14, 31, and 32 were written by the Bo Gao group. If the anatomic treatises are the record of the dissections, and if they were written not long after the dissections took place, then at least the three Bo Gao treatises are the first that we can positively identify in Huang di nei jing as products of the Wang Mang period. The Bo Gao group left behind a mere ten treatises, which suggests a small group that died out after only a relatively short period of activity. I therefore postulate that the Bo Gao group was active, and that all of its treatises were written, during the Xin dynasty.

Further, Qi Bo is the speaker in the passage from pian 17 translated above. Although this passage gave the treatise its name, it is only one of five sections in it. It has nothing particular in common with the other four, which are related to each other. Thus, although the passage in 17.1 is part of a chapter compiled by the Qi Bo group, it appears to be a fragment inserted from an earlier source by the authors or editors of pian 17. It is thus possible that the Yellow Lord's interlocutor was not originally Qi Bo, and that the name of the interlocutor was changed to make this section compatible with the rest. Although it is impossible to go into concrete detail here, we can argue further that the Bo Gao group predates, and had a great influence on, the Shao Yu and Qi Bo groups. If this is so, then we can infer that the transition from the early Huang Di and Shao Shi groups to the later Bo Gao, Shao Yu, and Qi Bo groups occurred from the end of the Former Han period through the Xin dynasty, roughly the first three decades of the common era.

This inference yields a corollary. It is widely known that the earliest reference to Huang di nei jing appears in the bibliographic treatise of the Standard History of the Former Han, which lists books extant at the end of

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24. For a more detailed discussion see Yamada, “Hakkôha no keiryô kaibôgaku to jintai keisoku no shisô” (中世時代の計量解剖学・人体解剖の思想), in Chôgoku kodai kaigakushi rom, zokuhèn 中國古代科學史論, 總論, ed. Yamada Keiji & Tanaka Tan 田中辰 (Kyoto, 1991), 427-492.

25. Pian 14, 31, 32, 55, 56,59, 64, 71.1, 71.2, and 76.4. There are no Bo Gao treatises in the Basic Questions.
the first century B.C. Significantly, the reference ascribes 18 yuan to the work.

Liao Yuqun 侯育群 has recently pointed out that the terms yuan and pian are exactly equivalent and are used without distinction in the Han History’s bibliography.26 He argues that the Huang di nei jing as listed was actually a thin book containing only 18 pian. There is indeed no evidence that in the Han it contained eighty-one pian grouped in nine yuan. He suggests that the Han version is closely related to the Lei Gong/Yellow Lord treatises.27 My own inferences support Liao’s position. I therefore propose that the Huang di nei jing extant at the end of the Western Han was a compendium of the writings of the Yellow Lord and Shao shi groups. Thus the writings of the later Bo Gao, Shao Yu, and Qi Bo groups were not included. The work mentioned in the Han bibliography would thus be much smaller than the extant Huang di nei jing.

When we compare the reference to dissection found in the biography of Wang Mang with the anatomic treatises in the Divine Pivot, one discrepancy is immediately noticeable. Whereas the former work mentions weights for the five yin organs, the latter records weights for the six yang organs. Even if we assume that the term wu tsang stands for the five yin organs and six yang organs, as is often the case, it is still odd that the Inner Canon does not record the weights of the five yin organs. However, a separate record of those weights is found in the Canon of Problems (Nan jing, probably second century A.D.), problem 42. The Canon was the first of three great attempts to resolve the contradictions in the previous Yellow Lord treatises and form a more or less integral system from them.28 It is obvious that parts of this material are derived from pian 31 and 32 of the Divine Pivot.

42. What are the lengths of the intestines and stomach and their capacities for liquid and grain?

This is it: The girth of the stomach is 15 cun; it is 5 cun across and 26 cun long. Horizontal and retracted, its capacity is 35 sheng of liquid and grain. Normally it retains 20 sheng of grain and 15 sheng of liquid. The girth of the small intestine is 2.5 cun; it is 0.83 cun across and 320 cun long. Its capacity is 24 sheng of grain and 6.37 sheng of liquid. The girth of the winding intestine is 4 cun; it is 1.5 cun across and 210 cun long. Its capacity is 10 sheng of grain and 7.5 sheng of


27. Pian 10, 48, 49, and 73.4 in the Divine Pivot, and pian 75-81 in the present-day Basic Questions. In some of the Su wen sections the Yellow Lord is the initial questioner, but he regularly provides the answer when Lei Gong proves unable to do so.

28. The Nan jing also falls in the Yellow Lord tradition, as its earliest known title, Huang di bāshí yì nan jing 黃帝八十一難經 (Canon of eighty-one problems [in the Inner Canon] of the Yellow Lord), indicates.
liquid. The girth of the broad intestine is 8 cun; it is 2.5 cun wide and 28 cun long. Its capacity is 9.3125 sheng of grain.

The overall length of the intestines and stomach is thus 584 cun, and their capacity for grain and liquid is a little over 87.6125 sheng (17.5 l). These are the numerical regularities for their lengths and their grain and liquid capacity.

The liver weighs 36 liang (563 g). It has three leaves [i.e., lobes] on the left and four on the right, for a total of seven. It is in charge of storing the yang soul (bun 觀). The heart weighs 12 liang (188 g). In it there are seven holes and three hairs. It holds 0.3 sheng of essential juices. It is in charge of storing spiritual vitality (shen). The spleen weighs 35 liang (547 g). It is flattened in shape, 3 cun wide and 5 cun long. It contains 8 liang of dispersed fat (san yao 散膏). It is in charge of enveloping the xue, warming the five yin organs, and storing intention (i 意). The lungs weigh 51 liang (797 g), with six leaves and two ears, for a total of eight leaves. They are in charge of storing yin soul (po 饒). There are two kidneys, weighing 17 liang (266 g). They are in charge of storing will (chih 沉). The gall bladder is located among the short leaves of the liver. It weighs 3.125 liang (49 g). It holds 0.3 sheng (60 ml) of essential juices. The stomach weighs 34 liang (531 g). It twists and retracts; when stretched out, it is 26 cun long, 15 cun in girth, 5 cun across, and has a capacity of 20 sheng of grain and 15 sheng of liquid. The small intestine weighs 46 liang (719 g). It is 320 cun long, 2.5 cun wide (guang), and 0.83 cun across. It twists leftward through sixteen turns. Its capacity is 24 sheng of grain and 6.37 sheng of liquid. The large intestine weighs 44 liang (688 g). It is 210 cun long, 4 cun wide, and 1 cun across. It is located at the navel. It turns right through sixteen turns. Its capacity is 10 sheng of grain and 7.5 sheng of liquid. The urinary bladder weighs 9.083 liang (142 g). Its width from top to bottom is 9 cun. It holds 9.9 sheng (2 l) of urine.

The mouth is 2.5 cun wide. From lips to teeth is a distance of 0.9 cun; from the teeth back to the epiglottis is a depth of 3.5 cun and a capacity of 0.5 sheng. The tongue weighs 10 liang (156 g); it is 7 cun long, and 2.5 cun wide. The gate of the pharynx weighs 12 liang (188 g); it is 2.5 cun wide, and its distance to the stomach is 16 cun. The windpipe weighs 12 liang. Its width is 2 cun; it is 12 cun long and is divided into nine sections. The "rectal gate" (kangmen 廠門) weighs 12 liang. Its girth is 8 cun; it is 2.7 cun across and 28 cun long. Its capacity for grain is 9.3125 sheng.

29. Expressed as 2 jin 4 liang. A jin is 16 liang.

30. Since an average kidney today weighs 113-170 g, the figure given is probably for the pair.

31. "Intention" and "will" are difficult to understand in this context. The corresponding passages in Bei ji qian jin yao fang 備急千金要方 (650/659; Taipei, 1965, reprint of Edo Igaku ed.), 15A: 267a and 19: 339a, instead read "constructive qi" (ying 憲) and "essential qi" (jing 精), which are more obviously connected with the splenetic and renal functions.

32. Expressed as 3 liang 3 zhu. A zhu is 1/24 liang.

33. These two occurrences of "wide" are obvious errors for "in girth," given correctly in the description of the small and large intestines earlier in this pian.

There are many textual discrepancies between this passage and its sources in the Inner Canon. Note in particular that the two sections of the large intestine, called the winding and broad intestines in LS32 and in the first section of this text, are called the “large intestine” and the “rectal gate” at the end. Their lengths and capacities are the same in both nomenclatures. Their discussions here are separated by an arrangement that ignores the logical sequence from ingestion to secretion of LS31.

There are also a few significant differences between the dimensions given in the Nanjing passage translated above (NJ42) and those in the Divine Pivot (LS) and the Grand Basis (TS). They are summarized in this table:

<table>
<thead>
<tr>
<th>ORGAN</th>
<th>UNIT</th>
<th>LS31</th>
<th>LS32</th>
<th>NJ42</th>
<th>TS5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stomach, capacity</td>
<td>sheng</td>
<td>35.</td>
<td>35.</td>
<td>30.</td>
<td></td>
</tr>
<tr>
<td>(Grain + liquid)</td>
<td></td>
<td></td>
<td>(20. + 15.)</td>
<td>(20. + 15.)</td>
<td>(24. + 11.)</td>
</tr>
<tr>
<td>Small intestine, capacity</td>
<td>sheng</td>
<td>30.37</td>
<td>30.37</td>
<td>10.37</td>
<td></td>
</tr>
<tr>
<td>Intestines &amp; stomach, length</td>
<td>cun</td>
<td>604.4</td>
<td>584.</td>
<td>584.</td>
<td>604.4</td>
</tr>
<tr>
<td>Intestines &amp; stomach, capacity</td>
<td>sheng</td>
<td>92.17</td>
<td>87.6125</td>
<td>66.6125</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.
Discrepancies between Dimensions Given in Various Texts

In the first part of the second half of Nanjing 42, we find a record concerning the five yin organs that has no counterpart in the anatometric treatises. The weight, shape, and size of the liver, heart, spleen, lungs, and kidneys are given. There is no reason to believe that this record is based on a different source than the materials in the Divine Pivot that we have considered. Although we do not know exactly when the Canon of Problems was written, it was certainly a work of the Later Han dynasty. Thus one to two centuries elapsed between the compilation of the eighteen-pian Inner Canon and the writing of the Canon of Problems. It is reasonable to postulate that the records concerning the five yin organs, somehow excluded or lost from the former, are preserved in the latter.

35. The total and breakdown in TS are inconsistent.
36. The term normally includes the pancreas. See Sakurai Kensuke, “Kōtei naikai somon 6 Hyō chu ni shirusareta gozōzu ni tsuite” (黄帝內經素問王注に記された五臟値について), Kampō no rinshō 漢方の臨床, 1991, 38.4: 26-34.
Conclusion

I am convinced by the available evidence that anatometric human dissection was recorded only once in ancient China. That single instance of dissection, I believe, was none other than the one carried out on Wangsun Qing and recounted in the biography of Wang Mang. Because there was no revival of interest in anatometrics, the numerical values that appear in the Inner Canon and the Canon of Problems were never fundamentally revised. No interest in physiological or surgical anatomy of the sort we find in India or the Greek and Islamic worlds developed until the nineteenth century, and even then remained remarkably limited. The crude figures from the Inner Canon and Canon of Problems were simply copied over and over by later generations, generally ignoring the considerable discrepancies between the classical accounts.

The anatometric concept assumes that the structures and functions of the human body exist in regular proportions and obey quantitative laws. It also assumes that the contents of the human body are measurable, and that such measurements may be used to clarify human physiology and pathology. But where did the anatometric concept itself originate? The answer lies in the central concept of the new Qin-Han orthodoxy of a unified state that draws its legitimacy from the correspondence between Nature as macrocosm and the human body as microcosm. Since the activity of the planets and other heavenly bodies could be understood quantitatively, the body necessarily could be understood the same way. Such ideas of correspondences dominated Han thought, including that of the Bo Gao group, and greatly influenced the Qi Bo group as well. This line of reasoning gave birth to the peculiar type of anatomy I have called anatometrics.