[From "The China Medical Missionary Journal," December, 1893.]

A MODERN CHINESE ANATOMIST.

BY JOHN DUDGEON, M.D., Imperial Maritime Customs, Peking.

Wang Ch'ing-jen (王清任), a native of U-t'ien-hsien (玉田县), about 200 li (70 miles) to the east of Peking, published a book called I-lin-kai-tso (醫林改錯) in the 29th year of the reign Tao Kwang (道光) (1850). The work is in one small octavo volume, divided into two chapters, the first being anatomical, in which are pointed out, according to the writer's ideas, the mistakes and misapprehensions of the ancients, with his own views of the structure and functions of the body, and the second is taken up with a system of practical medicine founded upon his observations and consisting, for the most part, of the remedies which he or others found useful in various diseases. With the latter chapter we have now nothing to do, but the first is so interesting from a physiological point of view as presenting us with the ancient medical knowledge possessed by the Chinese with the writer's criticisms and his investigations into human anatomy exemplifying such a rare spirit of enquiry—a spirit altogether foreign to the Chinese mind. If such a man as Dr. Wang, of a truly enquiring and scientific turn of mind, had happened to come across a Western physician, medical missionary or any of our works (but unfortunately at that time none had been translated into Chinese), Dr. Hobson's anatomy was first published at Canton in 1851) he must have proved an apt pupil. He would have had his gropings after the truth directed, his false inferences corrected, and he would have produced a work which would have dethroned the Nei-ching (內經), the Ling-shu (靈樞) and Su-wen (素問), and all the successive medical writers who have followed so slavishly these ancient books long antecedent to our Christian era. As it is he exposes their errors and inconsistencies by quoting one against another, a style of writing of which he seems to be a perfect master, as far as his own partially enlightened knowledge can lead him. The spirit in which he follows out his investigations is to be highly commended; he is often right and justly severe upon his country's medical writers, but in many cases too the ancients are nearer the truth than he is. His fundamental error lies in mistaking the arteries for air vessels, an error certainly pardonable when we consider that up to the time of our own immortal Harvey some 300 years ago we ourselves did not know that the arteries contained blood and our name for these blood vessels still retains our earlier misconception, viz., arteria air vessels. But for this serious error he might have hit upon the true circulation of the blood. He never seems to have seen a divided artery and the spurting of the blood, and an ordinary execution might have convinced him of his
error regarding the air vessels. He never seems to have noticed the different characters of the red and venous blood. On account of this blemish his new system of the body and its functions is as difficult to understand as that of Hwang Ti (黄帝) and Chi Po (岐伯) 2000 years before our era. His work, although known in this part of China by the literati, has not produced any effect upon their medical stereotyped ideas nor led so far as I know to further enquiry and investigation, but the work is useful as indicating his careful and numerous examinations, his unremitting research and general honesty and modesty and therefore is a pattern for future Chinese workers in this and other departments. With so many opportunities around the Chinese in the slaughtering of oxen, sheep, pigs, etc., on the streets, with the viscera, especially the heart and lungs everywhere exposed at the butchers’ shops, with the country dotted over with graves, many of which are exposed by the ravages of the weather, dogs, pigs or wolves, or the exigencies of cultivation, the customs of the Mongols of leaving the bodies of their dead unburied to be devoured by wild beasts and birds, one might have imagined there was here a splendid field for anatomical research. With such opportunities in our country in all probability the passing of an Anatomy Bill over 60 years ago would never have been rendered necessary, because the dearth of bodies for dissection would in all probability never have been felt. We should not then have been punishable at one and the same time for not knowing our profession and for trying to learn it in the only effectual manner. Law, religion, filial piety and prejudice have put dissections out of this question in China. The principle in China is that the body received from one’s parents should be kept complete and unmutilated. To allow it to be maimed or disfigured or they themselves to do so, except for the nourishment of these same parents as in the case of soup made from their flesh, is to slight and undervalue the gift of their parents and would be reckoned among the sins of filial impiety and deservedly punished, if not in this life, most certainly in the next.

After several prefaces by friends by way of introducing and commending his book, a practice everywhere common in China, and a picture of the author, the work begins by exposing the main errors of the ancients and so preparing the way for, and showing the importance of, his discoveries. To cure disease, he sets out by remarking, we must know the viscera. According to the ideas of curing disease, held by the ancients, discoursing on the viscera and origin of disease, the real fons et origo mali is completely lost sight of and notwithstanding one’s ability, one cannot explain disease by reference to the viscera. Among those who have written on the viscera and have given delineations of them there is not a single point in which one agrees with the other. One author shows that the ancients among themselves differ widely and therefore that both cannot be true and his object is to point out their errors and
indicate what is true and therefore reliable. Then follow examples of the want of agreement among themselves. The ancients said, e.g., that the spleen is related to earth, that earth governs the immovable and therefore the spleen does not move and if it move there is no rest; how then at the same time do they say that when it hears a sound it moves. They also say when it moves it grinds the stomach and dissolves the food, but if it do not move then the food is not digested. So you have here the mistake of the spleen moving and not moving. The lungs again are said to be empty and to resemble a wasp's nest, that they have no openings below, that in inspiration they are full and in expiration empty while at the same time it is said the lungs have 24 openings, placed in rows and divided into sections and that they communicate with the air of the viscera. This relates to the error of the 24 openings. Regarding the kidneys there are said to be two, and the moving air in the middle of them is said to be the ming-men (命門), door of life, if so why do others say the left is the kidney and the right is the Door of Life. The two kidneys have one body and what reason is there for giving them two different names. If the moving air is the gate of life what is its nature? This is the mistake in regard to the kidneys. The liver is said to have two roads or blood vessels proceeding from the two sides of the ribs; one ascending to the head and eyes, the other going downwards, surrounding the yin-chi (陰器), genital organs or organs related to the dark or female principle in nature and therefore descending to the big toe. If there are then two vessels, a right and a left, why is it said by others the liver is on the left side of the body and that the left ribs are related to the liver. There can therefore be only one vessel. Why in discoursing do they speak of right and left. How is this? (The Chinese are perfectly at sea in regard to the number, position and function of the various viscera.) The heart is the sovereign. The five functions of the brain are all said to be stored in the heart. But how about the spleen which, according to others, is the seat of the will, the kidney of ingenuity, the liver of policy, the gall bladder of determining, so that in this way all the viscera take part in the mental processes and yet some of the ancients say that the heart only is concerned about these things. Each part has an intellective apparatus and no one has condescended to tell us what is, or where it is stored. This is a sample of the unintelligible way in which they discourse upon the heart. The stomach is said to govern the digestion of water and the cereals. Others say that the movement of the spleen is the cause of digestion; the upper mouth of the stomach is the pên-men (胃門), cardiac orifice; food enter the stomach; the delicate air from the pên-men ascends and is relegated to the spleen and thence is dispersed to all the pulses. According to my idea these views have no reason on their side. The lower door of the stomach is the yen-men (幽門) (pylorus); this is the upper mouth of the small intestines-
The ancients discoursing on the small intestines considered its office that of receiving and storing and the digested matters issued therefrom, and the food entered the small intestines and became faeces; below in the lan-men (閘門) (ileo-cecal valve,) that is, the lower door of the small intestines and the fine and coarse faeces are here divided; the faeces went to the large intestines and passed out at the anus; the water to the bladder and became urine. According to this view the urine percolates out from the faeces, fen (粪), which would make the urine of a very foetid odour; indeed people have used children's urine as a vehicle for the administration of medicines or people themselves have used their own urine to cure eye diseases; the taste is said to be saltish not foetid; again if food and water unite together to form faeces, the latter should be very thin and we should have diarrhoea. Fowls and ducks have no separate urinary apparatus, food and water pass together. This condition of food and water going together in them is therefore all right; in horses and cows where there is the existence of the small convenience, penis (小便) this principle does not hold; in man it is still more so. As regards what the ancients say of the small intestines digesting food and water and passing out by the lan-men (閘門) (ileo-cecal valve), everybody is convulsed at the very idea. Such views do not need refutation. They have been a subject of ridicule all down the ages.

The pericardium is said to be a delicate tendon like silk fibres connecting the heart and lungs. Others say the yellow fat outside the heart is the pericardium. Others say the pericardium is the yellow fat below the heart, above the horizontal membrane (diaphragm) (隔膜) and below the vertical membrane (mediastinum). Others say it is in the centre of the sternum or thereabouts, having a name but without form. Although it is said to have a name and to be without substance, how is it said that the shao-chueh-yin (少厥陰脈) pulse is the ching (road or vessel) of the pericardium? So many have discoursed on the pericardium, what after all we would ask is it? How can it be so many different things?

Discoursing of the three divisions is a still greater subject for laughter. The Ling-shu (靈樞) (one of the oldest of the Chinese medicine books) says that the shou-shao-yin (手 少陰) of the three chiau (or divisions of the body) (三焦) is above and the tsu-tai-yang (足太陽) three divisions are below. According to this view then there are two, three divisions. The Nanching (難經) in its 31st section which is wholly taken up with this subject, says that the upper chiao is above the stomach; it takes in but does not put out things; the middle chiao is placed at the central part of the stomach and its function is to dissolve the food and fluids; the lower chiao is below the umbilicus and separates the urine and faeces. It is also said that the three chiau is the road taken by the food and water, thus giving the three chiao a shape or body. The
Nanching also says that the space between the two kidneys is that where the air originates and is the root of the three divisions. In this sense, therefore, the three chiao have no form. So we are, according to the Nanching, that it has no form and that it has form and that there are two, three chiaos. Wang-shu-ho (王叔和) (a celebrated physician) speaks of the three divisions as having a name without a body thus following the Nanching. Chen-wu-chae (陳無擇) of the Sung dynasty (10th century) understood the omentum to be the three divisions (脂膜). Yuen Chun-fu (袁淳甫) says that the three divisions are the reddish coloured lining of the body (the mucus membrane). U T'ien-min (虞 天 民) points to the hollow in the chest as the three divisions. Chin I-lung (金 一 龍) says that in front are three chiao and behind are also three chiao. The ancients, therefore, are quite at sea about these three chiao of the body. The various ideas regarding these san-chiao cannot be calculated on the fingers by nipping the thumb. Whether it has a body or not you see, according to them is uncertain. Why do they say that the ching of the ring finger is the ching of the shou-shao-yang three chiau. There is here the very utmost confusion. Later writers have disputed and given the lie to these statements. The mistake goes back to its origin; when the source is wrong all else proceeding from it is wrong. I have always had a strong inclination for correcting errors but never having seen the viscera I got quite angry with myself. How could I bring out a work and myself never had seen the viscera. To produce such a book under such circumstances would have been foolish and like a man dreaming. If the doctors do not understand the viscera, they are like the blind groping their way along the street, so that no matter with what intelligence and diligence the medical art may be practised, what avails it? For ten years I have been daily engaged in correcting these errors and there has not been one single day that the subject has not occupied my thoughts. In the second year of the reign of Kia Ching (1798) I was thirty years old. Early in the 4th moon I was at Lan-chow (蘭洲), at a place called Tao-ti-chen (稻 地 鎮), east of Peking when an epidemic of measles and severe dysentery was raging fiercely among children. Of nine or ten who took ill at least eight or nine died. The poor people wrapped up the bodies in mats and buried them quite superficially, according to the custom of the place in order that the dogs might tear them and eat them, with the idea that subsequent births might be spared to them. I went out daily and examined these dead bodies in the public burying place and saw daily over 100, and daily I rode past on horseback. At first from the bad odours of the place I held my nose but afterwards on account of the mistakes made by the ancients because they had not seen the viscera, I did not any longer think of the feted odours but every morning went to the burial place and closely examined the viscera of the children, many of which I found exposed. The
dogs left chiefly the intestines and stomach but very few hearts and livers, so I examined first this and then that. In ten I found about three complete and for ten consecutive days I examined them. I thus saw about thirty perfect bodies and in this way I came to know and compared the various parts with the ancient drawings and found they did not agree. The number and position of the viscera did not at all coincide. There was one thing I failed to understand fully and that was the very thin partition called the diaphragm. I failed to see whether it was above or below the heart, whether even or inclined. It was thin and torn. In the 4th year of Kia King 1800, and the 6th moon I happened to be in Feng-tien-fu (奉 天 府) and had an opportunity of investigating this point. A woman 26 years of age was mad and had killed her husband and her father-in-law. She was tried and condemned and afterwards taken outside of the West Gate to be cut into 10,000 pieces. (The west of the provincial cities is invariably selected for executions because it is in the direction of the Western Heaven or Paradise of the Buddhists). I followed hoping to have my anatomical curiosity satisfied. I thought it was a splendid opportunity for examining the viscera. But upon reflection I bethought myself that the culprit being a woman, it would be highly delicate and therefore inconvenient, when suddenly as I passed the executioner tore out the heart, liver and lungs before my very eyes and which I therefore saw plainly and this tallied in every respect with what I had formerly seen. At Peking in the reign of Kia King, in the year of the cycle Keng-shên (庚 申) there was a man found guilty of killing his mother. He lived outside of the Hata Gate 哈 塔 門) south of the bridge. I was allowed to visit the place and follow the prisoner. On arriving at the scene, although I saw the viscera, the diaphragm was unfortunately torn. In the 8th year of Tao Kwang 1828, the 5th moon and the 14th day there was a man to suffer ling-chih (凌 迢) (the punishment of being cut into ten thousand pieces) and when I got to the place I could not get to the front to see the viscera. In the 9th year of the same reign 1829, the 12th moon and 13th day, in the evening, in the Anting Gate St. 安 定 門) in the Pan-chang-rh lane (板 厲 胡 同) at the house of Mr. Hêng (恒 宅) I was invited to attend one in the family who was ill. In the course of conversation we got on to the subject of the diaphragm. I said I had been examining this point for forty years and had not yet succeeded in investigating it thoroughly. Among those present during the conversation was one Hêng Ching-kung 恒 敬 公 who had been an officer in Hami 哈 蜜 and was in charge of soldiers leading them to Kashgar and had seen many executed and knew all about the midriff most minutely. I rejoiced when I heard this and questioned him carefully about it and seeing how interested I was he told me all most readily. I have been examining the viscera for 24 years now and this is the first opportunity I have had of hearing accurately about them, and
consequently I have been able to draw my diagrams. My idea is to publish them for the benefit of succeeding generations so that all may know this matter of the viscera. I fear that people succeeding me will not themselves examine the viscera; they will say that I have controverted the statements of the ancients and they will not be able to decide (which is right). They will condemn me for not agreeing with the ancients. But if I do not on this account publish my work, medical learners will go on for centuries perpetuating these errors of the ancients. I have thought of Hwang Ti (黃帝) who feared that the people would suffer from disease. We have the writers of the Su-wên (索問) and Ling-shu, but if they knew for certain, they could teach the people, but if what they knew was groundless, they should have further investigated the matters. Why if they themselves were ignorant, did they presume to teach others, and in this way injuring all who come after them? Afterwards the men of Ch'în and Zuëh (秦越) made the book Nanching (3rd century B.C.) to explain the obscurity of the Lu-wên and Ling-shu. In the Ming dynasty in the early part of the 16th century Chang Shih-hsien (張世賢) published his work illustrated by diagrams and commentaries; he weighed the heart, liver and lungs, determining the weight of each and the length of the intestines, the capacity of the stomach, the number of tow and sheng (pints and gills) it can contain; his language looks very like the truth but really he had not seen the viscera; his statements are without proof, and were made with the intention of deceiving; he has in consequence obtained an empty reputation, and posterity reaps the disadvantage. If a man steal another's wealth, he is designated a thief; if he steal another's reputation is he not also a thief? For more than a thousand years it is not certain that there has been even one who knew these statements of the ancients to be errors. I have had these figures cut according to my ideas, not with the view of deciding that the ancients were wrong, neither that posterity may know me, and I don't care whether posterity blackguards me or not in consequence. My only desire is that the medical faculty should see the illustrations and then their minds will be clear in regard to the matter and their eyes when they see them will understand at a glance and they will know how to treat disease intelligently and will not resemble the ancients, following the cart rest. (In front a cart behind the rest), and their patients will not suffer injury from the ignorance of the faculty. This is what I earnestly look for. I hope for people who will understand that it was no easy matter for me to put out this book and will think of the condition of my heart in these circumstances. So much for the preface of the author.

To understand the viscera and their structure it is first necessary to know inspiration, expiration and the alimentary canal. The ancients called the part behind the tongue the hörç (喉) larynx because it waits upon the inspiration and expiration of the air. The hörç comes from the hör (喉) of waiting,
This is the upper mouth of the lung vessel (trachea). Behind the larynx is the yen (咽) or gullet so called from the yen (咽) of swallowing. By the gullet the food enters the stomach and so forms the upper mouth of the stomach vessels (wei-kwan 胃管). The yen (gullet) receives the food; the how (larynx) the air. For the last 4000 years this has been most surely believed. The book Ling-shu asserts this and no one has dared to correct or challenge the statement. All understand that what is swallowed enters the stomach but there is a serious misunderstanding about the larynx and inspiration and expiration, arising out of a want of knowledge and examination that the large faces of the two lobes of the lungs are turned to the back or spine; that above there are four apices or peaks which are directed to the chest and that below there is a small piece which also looks to the chest; that the lung vessel below divides into two branches (the right and left trachea) which enter the two lobes of the lungs; that each branch divides again into nine middle bifurcations and each of these again into nine little branches and these again into still more minute branches; that at the end of these minute divisions there are no openings; that in appearance they resemble the chi-lin (麒麟), a certain vegetable; that the outer skin (pleura) of the lungs has also no openings. Inside, the lungs contain light white froth. Below the lungs are no openings whatever, so the 24 holes of the ancients have no existence. The ancients said that in inspiration the lungs were filled and that in expiration they were empty. At present I need not minutely controvert this mistake. In inspiration the abdomen is enlarged and not the lungs; in expiration the abdomen becomes small and not the lungs. Inspiration, expiration, the expectoration of phlegm mucus, saliva and such like have nothing to do with the lungs.

Behind the lung vessel (trachea), in front of the stomach vessel (the oesophagus), on the right and left hollow spaces are the two roots of the air vessel, in appearance like tendons, the upper mouth is situated below the (hwei-yen 會咽) (epiglottis). On the left is the air door (chi-mên 氣門), on the right the right air door, and these are the vessels from which proceed the phlegm, mucus, saliva, etc.

The ancients considered cough, asthma, hooping cough as lung diseases, because they came from the chest. In treating these diseases which were owing to external causes, they used diaphoretics and so cured the malady; in treating the warm phlegm, they administered cool remedies and cured the disease; with inside inflammation, they used purgatives; in weakness of the air, they prescribed tonics; if the blood got obstructed, they used remedies to disperse it and seeing all these methods successful, they were naturally elated and left books on the subject stating that these were diseases of the lungs. In this way this belief became established; but the ancients were ignorant of
the fact that two air doors, a right and left, descend on each sure half way down on the front of the lung vessel where they unite to form one trunk, like two branches uniting to form one stem, like a tendon, it proceeds downwards and enters the heart and again about the size of a writing pencil, emerging from the heart it turns to the left and proceeds to the back of the heart. On the left side of the lung vessel it passes the lungs and enters in front of the spine and proceeds downwards to the coccyx (the caudal extremity.) This is the wei-tsung vessel (胃緑管) (the all defending vessel), popularly called the yao (腰) (lumbar) vessel. Within the abdomen there are two vessels, like tendons, the upper goes to the c'hi-fu (氣府) (air residence); c'hi-fu=to the great omentum or caul or cock's comb oil because it resembles the han-ying (鶏冠花) flower, so called from the cock's comb. The upper vessel here described may be the gastro-epiploic artery, coming from the cæliac axis or probably the superior mesenteric artery. The c'hi-fu covers and protects the small intestines. The small intestines lie horizontally in the c'hi-fu. Outside the small intestines and inside the c'hi-fu the original or constitutional air of man is stored and preserved. The original air is fire and this fire is the original air. This fire is the vital root of man's life. The food enters the stomach and small intestines and is dissolved by this original air. When this original air is sufficient digestion is easily performed and vice versa difficult. The above relates to the upper abdominal vessel. The lower or descending vessel on the other hand is connected probably with the male spermatic road and the female uterus. I took great pains to accurately observe this latter vessel. I was unable to satisfy myself that I understood it at all well, so I still remain in doubt but I hope some medical scholars who come after me, if they find a good opportunity will with diligence investigate this point and so fill up here my deficiency. This lower vessel is either the inferior mesenteric artery or spermatic arteries which rise from the aorta below the renal arteries.

From the wei-tsung vessel at the back of the heart are two vessels, like a tendon in size, which go to the two shoulders (the subclavian arteries); opposite the lumbar region there are also two vessels which enter the two kidneys (the renal arteries). Below the lumbar region are two vessels which go to the hanch (the iliac arteries.) Above the lumbar region immediately opposite the middle of the spine there are eleven short vessels* which connect with the back bone. This is the road the air and lymph juices take. If the air be sufficient the fire increases and the juices become thick; the thick is called phlegm (tan 痰). If the air is weak the heat is diminished and it cannot boil the juices which therefore remain thin and watery and are called thin or

* These are without doubt the intercostal arteries, branches of the descending aorta. They are usually ten in number on each side. In the diagram they leave the vessel between the subclavian to the renal arteries. If the superior intercostal were not a branch of the subclavian, our author's number would be correct.
imperfect phlegm (yin 飲). Inside the vessel it is borne up by the air, passes upwards, crosses the heart in front of the lung vessel and in the middle of the air vessel and obtains egress by the right and left air door. The phlegm, juices, saliva, etc., are therefore matters belonging to the root air vessels, i.e., the carotids of our author. The ancients were therefore undoubtedly wrong in asserting that these things belonged to and issue from the lungs because they did not know that in front of the lung vessel there are air vessels which unite. They knew that the phlegm, etc., came from the chest, and so supposed they proceeded from the lungs, never having seen any true diagrams of the viscera nor having personally examined them. Whether we regard the function of the hand grasping things, the feet walking, the head turning, the body rotating, going forwards or backwards, all depend upon this air. When we inspire the air we fill the c'hi-fu (air residence), when the c'hi-fu is full the abdomen enlarges. In expiration on the other hand the c'hi-fu becomes empty, and the abdomen consequently becomes small, therefore the wei-tsung vessel (abdominal aorta) is an air vessel and contains no blood. If there were blood in the c'hi-fu it would find exit with the air in expiration and there would of necessity be haemoptysis and discoloured phlegm; and if the blood proceeded downwards we should have bloody stools and haematuria. The wei-tsung vessel connects in front with a tendon-like vessel. This is the jung-tsung (榮 總管) vessel, the veins of our author, a blood vessel containing blood and in length like the wei-tsung vessel. The blood in this vessel nourishes the hsieh-fu (血府) (blood receptacle.) The blood in this vessel flows into the hsieh-fu, which is below the chest and forms one piece of the k'o-moh or diaphragm, in thickness like paper but very strong. Its front length is on a line with the concavity of the mouth of the heart (the hollow below the breast bone) and goes from the two sides of the ribs to the upper part of the lumbar region straight but inclined, in front high, behind low; the base is like a pond in the earth, inside it stores blood which is dissolved from the delicate juices. This is the blood residence. The juices will be discussed when we come to speak of the juice door of the stomach. I before spoke of the epiglottis as the white piece behind the tongue which covers the right and left air doors and the door of the larynx.

The organ that receives what is swallowed in birds is called su (嗉), in quadrupeds tu (肚), in man wei (胃). The ancients pictured the stomach with the upper mouth above and called it pên mên (貰門) and the lower mouth as the yen mên (幽門). They spoke therefore of two mouths or doors, an upper and a lower but they did not know that the stomach has three doors. They drew it vertically, whereas it is not only horizontal but it is placed in a flat position with one side up; the pen-mên is directed to the back, the base towards the abdomen, the lower mouth yen-mên is also at the upper part on
the right side and is directed to the spine. About an inch to the left of the yen-mên there is another door called the chin-mên (津門) juice above the chin door is the chin-kwan (津管). This is the road by which the delicate juice and watery juice comes out of stomach, but it is difficult to investigate this matter of the juice vessel because above it there is the tsung-ti (總才) pancreas* which covers it. The tsung-ti is popularly called i-tse (胰子). The body of the tsung-ti is on the right of the pen-mên and left of the yen-mên, and completely covers the chin-mên. Below the tsung-ti and connected with the chi-fu in front are the small intestines; behind it the chi-fu connects with the large intestines; above the stomach it connects with the liver and the liver connects with the spine. These are all situated below the diaphragm and the tsung-ti connects with the body of the stomach, liver, small and large intestines. Food enters the stomach; the chyme flows first out of the chin-mên and enters the chin-kwan and outside an inch or more this vessel divides into three divisions, the delicate chyle enters the narrow residence (sui-fu 骨府) and forms marrow; the thicker sort goes by the upper branch and along with the blood enters the hsiih-fu and is converted into blood, the watery juice goes by the lower division and from the centre of the liver passes over to the spleen. In the centre of the spleen there is a vessel which resembles a ling-lung (玲瓏) and is called lung-kwan (瓊管), a vessel resembling a gem with interspaces, the whole in the form of a dragon. The watery portion in this vessel divides into two sides and enters the outgoing water road, which road resembles a fish net, ù-wang (魚網), and is popularly called wang-yen (油網). The water percolates through the water road and enters the bladder and becomes urine. This part is indeed difficult to investigate. In the second year of Kia Ching 1798, when I investigated the viscera there were found bells full of water and some without water, and as I could not examine this point fully, so I cannot speak of it with certainty. Sometime afterwards I happened to be attending some patients with diseases of a very chronic character, who died; some of them drank much water, some little and some none at all, so that afterwards there was water still in the abdomen and although according to my earlier investigations of the outgoing water road I seemed to have reason on my side, yet I cannot definitely say it is so. Afterwards I compared it with animals and on killing them after they had drunk water, the bells of the wang-yen contained water, and if for three or four days they were not fed they had no water bells and so I came to the conclusion that water issued out of the water way. I have said above that food and water enter the stomach;

* The Chinese medical works do not acknowledge the existence of the pancreas as a viscus and on account of its absence our European physicians in their translations have taken the term (總才).

(By the way is not 甜肉 Sweet Flesh used by the modern medical translator, even as 脈油 was the ancient medical term? the literal rendering here (thick oil) is somewhat obscure, yet we take it that these characters represented the pancreas itself irrespective of conveying any very distinctive meaning).—(Ed.)
the coarse parts of the food remain in the stomach, the chyle and watery juice flows out of the chin-men; the opening would allow the juice to pass and also watery rice, and it is in this way that the chin-men, although it is as large as a tendon, the body of the stomach at this place is very thick and compresses the opening all round so that water can pass but not food. Inside the stomach about a line elsewhere said to be an inch to the left of the chin-men there is a tubercle, of the size of a date called cho-shih (遮食). Its function is to obstruct the food until the juices have run out and afterwards the dry food is dissolved and enters the small intestines and becomes fæces. But how do the small intestines dissolve the food and form fæces? It is because outside the small bowels there is the c'hi-fu which surrounds and embraces them and outside the bowels and inside the c'hi-fu there is stored up the primordial air which is a food dissolver, after which it enters the large intestines and goes out by the seat anus (肛門).

(To be continued)
A MODERN CHINESE ANATOMIST.

BY JOHN DUDGEON, M.D., Imperial Maritime Customs, Peking.

(Continued.)

Discourse on the Brain Marrow.

Man's power of contrivance and memory lie not in the heart but in the brain. I have no wish to assert this doctrine and even if I do I know that nobody will believe me. If I do not, however, speak there are many diseases whose origin cannot be known, so I cannot but speak out. Not only do the medical books assert that memory and mind come from the heart but the learned, in treating of reason, virtue and conscience, all say that intelligence and memory are located in the heart, because at the beginning people did not know what the heart governed; they knew that it lay in the chest; they did not know that at the two sides of the larynx and gullet there are two air vessels, which at the front of the lungs unite to form one vessel which enters the heart; then goes out of the left side of the heart, passes the lungs and enters the spine. This is the wei-tsung vessel. In front it connects with the ch'i-fu and spermatic road; behind with the spine; above with the two shoulders; in the middle with the two kidneys, and below with the two lower extremities. This is the vessel that preserves the original or vital air and juices. This air goes out and in the heart; how then can the heart produce mind and store up memory? Why do I say that these mental qualities are in the brain, because food and water produce air and blood which grows the flesh; the pure delicate juice is converted into marrow which advances by the spine and so up to the brain and therefore is called nao-sui (brain marrow). That which contains the brain marrow is called the sui-hai (the marrow sea); the top bone is called the trien-ling-hai (the cranium); the two ears communicate with the brain; the sounds we hear go to the brain. When the brain air is weak the brain is small; the brain and
ear air fail to connect, so there is resulting deafness arising from weakness; if anything obstructs the road between the ear and brain then there is complete deafness. The two eyes grow out from the brain; the two optic cords, like threads, are produced from the brain, so that things seen go to the brain. The pupil (tung-jen 瞳 人) is of a white colour, because the brain juice fills it below and is called the brain juice entering the eye.* The nose also communicates with the brain and so odours go to the brain. If the brain suffers by either wind or heat from the nose the mucus and faetid secretion flow out, and this is called brain fistula (nao-lou 腦漏). When we look at a little child at birth whose brain is not completely formed, the anterior fontanelle (hsing-mên 顳門) is weak; the eyes do not move actively; the ear does not hear; the nose does not smell; the tongue does not speak. After a year the brain begins to develop; the fontanelle fills up; the ear hears a little; the eyes move a little intelligently; the nose smells a little and knows the difference between what is fragrant and disagreeable; the tongue can speak one or two words. Advancing up to three or four years of age the brain becomes full; the fontanelle becomes completely closed; the ears can hear; the eyes can move and see; the nose can distinguish smells; the tongue can speak, and that children have no memory is because their brains are not completely formed. Old people’s memory fails because the brain becomes hollow, in other words the brain matter becomes less. Li Shih-chên (李時珍) says that the brain is the residence of the original spirit; Chin Chêng-hsi (金正希) says that man’s memory lies in his brain; Wang Jin-an (汪鏡菴) says that when one wishes to remember or recall a past action he shuts his eyes, throws up his head and thinks; all which proves, in my opinion, that memory is located in the brain. If the brain is deprived for any period say two hours of air, there is not only no mind but there is death during that period; if one is half an hour without air one is dead for the same period; so there is epilepsy, which is caused by the original air not reaching the brain for that period; in convulsions the patient is alive, but the brain is dead; he is alive because the abdomen contains air and therefore the four extremities move. The brain is dead when it is deprived of air and therefore the ear is deaf, the eyes turn up like a dead person; there is a scream emitted before the convulsive attack, because there is no air in the brain and the chest air is confined and does not go out and in harmoniously, and being compressed there is the loud scream. During the convolution there is a low groaning in the chest, because the saliva (chîn-ye 津液) is in the air vessels; the mind of the brain cannot control the swal-

*This is doubtless the aqueous humour of the anterior chamber of the eye called white, much in the same way as they say pai-k'âu-shui (白開水), meaning white or clear boiling water. The Chinese idea is similar to our own and that of the Hebrews—the pupil or little man of the eye. How comes the curious expression ‘apple of the eye’ which seems devoid of any meaning? What more appropriate than the pupil of the eye.
lowing or vomiting of the saliva and so it remains stored up in the air vessels and this causes this peculiar sound called lu-lu (漉漉). After the convulsion there is headache and drowsiness, which although the air now circulates in the brain, is insufficient; in the child that is long ill the original air is weak and thus they are subject to convulsions. Grown up people are sometimes suddenly deprived of their senses (as in apoplexy for example); this is because the brain has no air, so the affected person does not recognise anything and is like a dead person. According to these investigations, does it not prove that the intelligence of man is situated in the brain?

Discourse on the Air, Blood and Pulse.

In regard to the nature of the pulse, what I inform posterity is the truth; if there are those who speak or write not according to what they know, or believe and assert themselves to be genii and do not conscientiously discourse of things, they must suffer punishments at the hands of Heaven. The c'hi-fu stores air; the hsieh-fu stores blood; the air from the c'hi-fu which comes from the wei-tsung vessel passes through the whole body whence the name; the jung-tsung (榮總管) vessel from the hsieh-fu travels all through the body and hence its name. The wei-tsung vessel is thick and coarse; it lies in front of the spine, connects with it and is distributed to the head, face and four extremities. That which lies close to the tendons and bones throughout the body is the air vessel. The jung-tsung vessel is thin. Lautse says in the Tao-teh-king, man's blood is the jung, the air is the wei. The Nei-ching says when the wei does not move the five viscera are not pervious and delicate and lies in front of and communicates with the wei-tsung vessel and is distributed to the head, face and four extremities and lies close to the skin and muscles and out of which arise the blood vessels of the whole body. The air in the c'hi-fu goes out and in. The exit and ingress are the expiration and inspiration; the eyes see, the ears hear, the head rotates, the body moves, the hand grasps, the feet walk, are one and all owing to the ling-chi (靈機) pressing the air to circulate; it percolates out of the vessel and grows the flesh; the air vessels lie near the tendons and bones and therefore concealed in the inside and so difficult to see; the blood vessels lie near the skin and flesh and appear externally and are therefore easily discernible. The air moves in the air vessels and thus the vessels move; the blood vessels store the blood and do not move. When the vessels of the head, face and limbs are pressed, they pulsate; this is owing to the air not to the blood. In the hollow called the tai-yang (太陽 the temple), behind the superciliary ridge, there is only skin and bone, little flesh, and hence the air pulsating is distinctly felt in the head and face air vessel. In the foot between the large and second toe there is a pulse on account of there being little flesh there and
the skin connects with the bone and communicates with the two air vessels of the foot. In the two hands above the transverse wrinkles on the high bone (on the radius at the wrist), the flesh is small and the skin lies on the bone and so it pulsates and connects with the two air vessels of the arm. The air vessels are large and small, straight and crooked; every person is not the same; below the elbow, near the carpus, the flesh is thick, the superficial air vessels are short; if the flesh be thin the vessels appear long. For example if we come under the influence of the external air and it enters the vessels, these vessels become large, and on pressure they feel high or elevated; if cold gets admittance the chin-ye coagulates and then the air becomes obstructed and the pulse necessarily slow; if fire (inflammation) enters the c'hi-kwan the pulse moves quickly; if a person is robust the thievish or deflected air from the outside excessive, the air in the vessels great, the pulse becomes very strong. On the other hand if man is weak, the perfect or original air insufficient and the air in the vessels inadequate, then the pulse becomes small and without strength; if a person is sick for a long time, and there is no hope of recovery, the original air little, the air travels to the head and upper extremities but does not descend to the lower parts so that there is no pulse in the face of the foot; if the pulse in the air vessels of two wrists is small like a thread or a very little movement or no movement or intermittent it indicates that the air is nearly exhausted. The air vessels in man therefore from birth to death are all different; they are large, small, straight or crooked. Their length or shortness varies according to the thickness or thinness of the flesh at the wrist. If you press it you will find whether it is large or small by its being weak or strong. When it pulsates quickly and slowly it is owing to fire and cold respectively.

What I have said above relates to the pulse, although I have not once mentioned the word (i.e. in the Chinese text), only spoken of movement, because the ancients did not know that there were right and left air doors, air and blood residences, wei and juny-tsung vessels, a chin-mên and chin-kwan, the tsung-ti covering the food and the lung (肺管) or exit water vessel. All these parts are in the abdomen and have their functions, of which the ancients were altogether ignorant. The ancients discoursed on the viscera and pericardium but did not know what they were, neither did they determine the ching-lo (經絡) and the san-chiao (三焦) three divisions and they could not tell whether the ching-lo were air or blood vessels. In discoursing on the pulse they said it was the ‘blood residence’ and communicated with the whole body, so that according to them the pulse vessels are blood vessels and contain air and blood circulating round and round. According to the ancients blood-flowing-discourse, if the blood of one part can flow to another part, the other part must have a hole or
receptacle for receiving it, but if there be a hollow empty place anywhere then the blood is insufficient, and if there be no empty place whither does the blood flow? The ancients did not know that the pulse was the air vessels, although they discoursed on a great variety of pulses and their positions in which every man was different. They said there were 27 characters or sorts and I dare not say they were wrong in their doctrine of the pulse, not because they have not a leg to stand upon (in Chinese no footing for their views) but because posterity in their treatment of disease would have no doctrine of the pulse to go upon. By feeling the pulse and knowing whether a person is going to live or die is easy, but to decide on the disease is difficult. In curing disease according to important methods the difference between blood and air must be distinguished, whether it is derived from without or set up from within and wish to know at the very beginning, if the disease can injure the individual, what things cannot injure the viscera cannot injure the tendons, and bones cannot injure the skin and flesh; these things that injure must be either blood or air; we cannot escape from these two causes. The air is either weak or strong (hsü 虚 or shih 實); the latter is the deflected or outside air, the former is its own original weakness. If the air is weak it must be of the order of the hemiplegic diseases, of which there are forty different sorts; of infantile convulsions there are twenty sorts which all belong to the weak diseases. According as diseases arise from weakness of air, our blood is either kwei 血 虧 (little or impoverished) or ū (菨), i.e. coagulated and must be owing to some cause; the former is owing to haemoptysis, or spitting coloured phlegm coloured with blood, or hematuria, or bloody stools, or injury somewhere and blood escapes, or menorrhagia (pêng-low 崩漏), or post partum hemorrhage and much blood is lost and so greatly injured. These are blood kwei diseases. Of diseases depending on the blood ū we have further on mentioned fifty sorts, but if the blood in the ‘blood residence’ is coagulated and not movable and therefore difficult to distinguish the blood in the ‘blood residence’ and coagulated blood as for example in diseases that are feverish for half the afternoon and still worse during the first part of the night; the morning lighter and in the forenoon no fever, this is owing to be coagulated blood in the ‘blood residence.’ When the coagulated blood becomes lighter the diseases do not divide into four portions and the feverishness comes at one time before and after sunset and still lighter only at one time, both inside and outside are hot. After mid-day the body is cold and there is a short period of heat. This condition is owing to insufficiency of the air and ginseng and hwang-chi 黃芪 (astragulus hwang-chi) must be used, if at sunrise the body is not hot and then hot for a little, ginseng and fu-tse 附子 (tuberous roots of Aconitum Fischeri) are the remedies and they must not all be mixed up together.
Discourse on the absence of Blood in the Heart.

I have a friend called Hsieuh Wén-hwang (薛文煌), whose designation is Lang Chai (朗齋), a native of T'ung-chow, who has also studied medicine. Before proceeding to Shantung in the 2nd moon of the 10th year of Tao-kwang, 1830, he came to pay me a parting visit and we talked upon the root and origin of the blood of man. The ancients said the heart produces blood and the spleen moves and directs the blood and others state the opposite, but who knows which is correct? According to my idea neither is correct. I say that the blood is the delicate juice which enters the 'blood residence' where it is converted into blood. The heart is simply the out and ingoing air road and there is no blood inside it. Lang Chai opposed my view. He said the hearts of animals contained blood, why is it that man's contains none? I replied by asking him what animals' hearts contained blood? And he replied that in ancient prescriptions there is mentioned the sui-sin-tan (逐心丹), pills taken to cure madness. These pills are made of a species of Wickstremia (kan-sui 甘遂) ground to powder and mixed with pig's heart's blood and thereof the pills are made, and is this not proof that the pig's heart contains blood? I replied that this was an error of the ancients; it was pig's blood but not out of the heart. When the heart is cut with a knife the blood in the heart comes from the cut walls of the chest, and if the heart be not cut there is no blood within it. I have seen numerous cases of this. I have seen an enormous number of sheep killed; they cut the neck and not the heart (as in the pig.) The sheep's heart contained no blood. He said if you do not cut the heart how is it the sheep dies so quickly? I replied, the blood in the chest walls is great and flows out rapidly at the moment of cutting and afterwards all the (systemic) blood of the body flows to the walls of the chest and afterwards it flows slowly. When the blood has all flowed out the air is dispersed, and the animal dies. For example two persons fight, one injures the other, and loses much blood; the air is dispersed and the blood flows away in quantity. The injured person goes into convulsions, which the ancients called pō-shang-feng (破傷風), lacerated wound air = traumatic tetanus, and they used the san-fēng (散風) to cure it, and the person died all the more rapidly. The ancients therefore in trying to cure one killed two; they killed the injured person and the injurer was killed in consequence. If they had understood the doctrine of the dispersing of the air and blood they would not have had recourse to the san-fēng remedy but to hwang-chí and tang-shen, the root of an umbellifer (党参) as tonics to the air, and if they had cured the injured individual they would have saved two lives. When Lang Chai heard this he nodded his head and departed.
Preface to his Prescriptions.

I have not discoursed on the San-chiau, the three divisions, because I do not believe in such. On the outside the body is divided into the head, face and four extremities and the blood vessels of the whole body are inside. The diaphragm divides the trunk into an upper and lower portion; above is the heart, lung, larynx, pharynx and 'right and left air doors'; all the remainder are situated below the midriff. . . . . This book is not a complete one for the cure of disease. For diseases one had better consult Wang-k'en-tang’s (王 肯 堂) work entitled Ch'ing-ch'i-chun-sh'eng (證 治 準 織), and if you wish to consult prescriptions the reader should look into Chow-t'ing (周 定) and Wang-chu-sun’s (王 朱 紹) P'u-chi-fang (普 濟 方).

If you want to investigate the nature and properties of drugs take Li-shih-chên’s Pen-t'iao (Great Herbal). These three books are the origin and root of the medical faculty. One must read them and remember them. Outside these works now specified there is the I-tsung-chin-chien (醫 宗 金 鑑) of our dynasty; the rationale given of disease and its prescriptions are good, and Wu-yen-k'o's (呂 又 可) book on Epidemic Fevers, and as for the remaining celebrated doctors, although they have not seen man's viscera, their methods of producing diaphoresis and their tonic and cathartic prescriptions produce good results.

Although I have written this book I cannot say that I have produced a work. My sole object has been to correct some errors of the ancients, and I have noted a number of prescriptions in the latter half of my book in order that a little of the order of medicine may be understood. My book is not in any sense complete. If persons do not read and study books and think by reading mine to have sufficient knowledge, that is not my fault but their own.

Explanation of the Diagrams.

The first twelve illustrations are those given by the ancients. Our author gives thirteen of his own.

According to the ancients the lungs have six lobes and two small ears or lobules, in all eight; that the large intestines have the lan-mên (ileo caecal valve) above and the kang-mên (anus) below; that the stomach has the pên-men (cardiac orifice) above and the yen-men (pylorus) below; that the small intestines have the pylorus above and the lan-mên below; that the mouth of the bladder is the meatus urinarius (niao-k'ung 洞 孔); that the gall bladder is situated in the short lobe of the liver and that the liver has three lobes on the left and four on the right, in all seven; that there are the three chiao, or divisions—upper, middle and lower; that the pericardium surrounds the heart and that out of the heart issue three pairs, san-man (vessels?) one each going to the kidneys, the liver and the spleen.
I saw them thus as the result of examining a great many viscera:—The
two vessels called the ‘right and left air doors’ unite to form one vessel which
enters the heart and from the left side turns horizontally, and behind connects
with the weih-tsun vessel (the all embracing or protecting vessel). The heart
is placed below the air vessel, not below the lung vessel. The heart and the
lobes of the lungs above are on the same level. The lung vessel divides into
two branches which enter the two lobes of the lungs and go to the very
bottom of them, and these vessels have joints (cartilaginous rings). The lungs
contain very light white mucus or froth like bean curd. The large faces of the
two large lobes are directed backwards; the small face is directed to the chest;
above are four peaks (apices), also directed to the chest; below there is a small
piece, also directed to the chest. The outer skin of the lungs has no openings;
there are, therefore, not twenty-four holes for the passage of the air as the
ancestors say.

Above the k'o-moh diaphragm are only the lungs, heart and the two air
doors right and left and nothing else. Above the diaphragm the chest is full
of blood and hence called hsieh-fu, the ‘blood reservoir.’ All other things are
below the diaphragm. The diaphragm is the partition between things above
and below.

The liver has four lobes. The gall bladder is situated below the second
lobe on the right side (Lobus Quadratus.)

The tsung-ti lies above the stomach, the liver is above the tsung-ti. The
large face is directed upwards; behind it is connected into the spine. The
body of the liver is solid and strong and cannot be compared with the intestines,
stomach and bladder and therefore cannot contain blood (the ancients say
the liver stores blood).

The upper mouth of the stomach is called the pên-men and lies right in
the middle of the upper part of this organ; the zen-mên lies also at the upper
part of the stomach but on the right side. An inch to the left of the yen-mên
is the chin-mên; inside the stomach to the left of the chin-mên is a
tubercle called the cho-shih; on the outside of the stomach on the left of
the chin-mên is the tsung-ti and the liver is attached to it above. The stomach
lies in the abdomen, lying quite flat in the lung direction; the upper mouth is
directed to the back, the lower mouth to the right; its base is directed to the
abdomen and is connected with the outgoing water road.

In the middle of the spleen is a vessel called the lung vessel (a perforated
gem in the form of a dragon), full of perforations which permits of water
passing freely out, hence called lung-kwan. The vessels of the spleen and
stomach enter together the spleen, in the middle is the lung vessel. I have in
addition drawn the lung vessel, because it is the outgoing water road, in
order that the student may clearly understand it. The lung vessel divides on
both sides into outgoing water roads; the water percolates from the heart (spleen?) and enters the bladder and becomes urine. In the middle of the outgoing water vessels there are returning (curious expression!) blood vessels, the remainder are all water vessels.

The c'hi-fu popularly called chi-kwan-yen (cock's comb oil) covers by its lower border the small intestines. Inside the c'hi-fu and outside the small intestines is stored the original or primordial air of man (tan-tien 丹田). This original air is the solvent of the food (by entering the spleen and causing it to move on the stomach); man's vital force is here conserved.

The upper mouth of the large intestines is the lower mouth of the small intestines, and is called lan-mên (ileo-caecal valve) and the lower door of the large bowels is called kang-mên (anus.)

The bladder has a lower but no upper mouth and the lower door is connected with the ching (腎) (penis). The lower opening of the seminal road ching-tao (精道) enters the ching (腎). The seminal road in the female is called the uterus. The seminal road connects above with the wei-tsung vessel and the spine.

In the hollow of the two kidneys are two air vessels connected with the two sides of the wei-tsung-kwan. The body of the kidney is solid and strong and inside are no openings and therefore cannot store semen as the ancients said.

The white piece at the back of the tongue is called hwei-yen and covers right and left air doors' and the how-mên (larynx).

The wei-tsung vessel connects with the vessel coming out of the left side of the heart. This is the wei-tsung vessel, that is, air vessel and popularly called yao (lumbar) vessel (descending aorta). The slender vessel is the jung-tsung vessel which is a blood vessel. This jung-tsung vessel at the curvature (of the aorta) enters the hsieh-fu. The upper of the two middle branches connects with the c'hi-fu, the lower with the seminal road. At the upper part there are two vessels going to the right and left arms. Other two vessels right and left, enter the kidneys; the two lower ones the lower extremities, The eleven short vessels enter the spine.

The ancients said that the ching-lo were blood vessels, that in the outside of each viscus there were two roots; except the bladder which had four branches. I saw in the course of my examinations over 100 viscera and I found no such vessels emerging from them and so I have drawn the diagrams exhibiting this.

Remarks.—The fundamental error as already noted, into which our author falls, is his mistaking the arteries for air vessels. What he therefore calls his 'right and left air doors' are nothing else than the right and left common carotids which arise from the arch of the aorta, the right springing from the arteria innominata and the left direct from the transverse portion of the arch
of the aorta. According to Wang’s view these two vessels unite with the trachea between them to form one vessel which enters the heart; this is the aorta which issues out of the left ventricles or as he says the left side of the heart and inclines horizontally backwards and unites with the wei-tsung vessel which is the descending aorta. This is the term for the arteries in general and has precisely the same meaning as originally attached to artery, viz., air vessel. He does not explain how the vessel entering the heart and rising from it must be the same. He could not have confounded the pulmonary artery and aorta. His description clearly points to the aorta as entering and leaving the heart.

By the lung vessel is meant the trachea. In many Chinese drawings the trachea is made to enter the heart, instead of the lungs. Mr. Wang is perfectly correct in his view of the lung vessel and the name he gives it indicates this. It divides into two branches which enter and proceed to the bottom by the lungs. He is particular on this last point for an obvious reason.

If we include the large vessels springing out of the heart, he is not far wrong in saying that the heart and upper border of the lungs are on the same level. He speaks of six lobes between the two lungs. The lungs we know have only five lobes, the right three and left two. He is right when he says that the pulmonary pleura have no holes. One of the most serious mistakes committed by the ancients was in the matter of these holes which permitted the air to circulate all over the body. He is right in saying that the liver has four lobes. He speaks of five but it is more to bring the number into harmony with the five fissures, five vessels and five ligaments, for the lobulus caudatus is hardly worthy of the name and at best is but the tail of the lobus.

In this we have perhaps an instance of our own addiction to the power of numbers.

The tsung-ti is the pancreas and may properly be said to lie above the stomach. On opening the abdomen if the liver be raised and the lesser omentum removed a part of the pancreas is seen along the lesser or upper curvature of the stomach.

The pylorus in the rough drawing is placed at the bottom of the descending portion of the duodenum, thus including the upper portion of the small intestines in the stomach. The cho-shih would thus become the pylorus or rather the circular or crescentic folds formed by the reduplication of the mucus membranes. The chin-mèn becomes then from its location in the drawing either the hepatic or cystic duct formed by the union of the two common bile ducts which is made to enter the stomach on the right upper aspect and this again with the duct of the pancreas before entering the small bowel. The pancreas is not represented here with any duct and the chin (saliva) vessel appears to come from (or in his sense) to proceed to the gall bladder or liver. The
lung vessel certainly refers to the hilus or vertical fissure dividing the internal surface of the spleen, indicated by a fissure running through the whole length of the organ. The drawing, however, of this vessel illustrates roughly the areolar framework of the organ with dense meshes of tissues. The explanation perhaps of the expression that from this lung vessel exit-water-courses proceed four in number one each side, may be considered the four branches into which the splenic artery divides, which enter the hilus of the organ and ramify through its substance. Each branch of the artery runs in the transverse axis of the organ from within outwards and gives off smaller branches. These branches in the absence of any knowledge of the arterial circulation may be considered as the exit-water-courses. The same remarks would of course hold good as applied to the veins. In the drawing which is, of course, of the roughest description, the water courses have closed ends towards the central vessel and open ends towards the circumference which seems absurd. The soft white semi-fluid albuminous substance contained in the capsules might suggest the organ as engaged in separating the water. It is altogether impossible to understand how the water percolates out of the heart and enters the bladder and becomes urine, unless we suppose by the heart that blood is meant or that the lung vessel, the splenic artery, connects with the descending aorta which springs out of the heart. This latter is the most natural explanation, the former pre-supposes a knowledge of physiology which the Chinese to this day do not possess. The intermediary organs—the kidneys, are of course left out of the calculation. In the diagram of the bladder no ureters are indicated.

The chi-fu is a thing of our author's own creation; it may refer to the great omentum or the mesentery, more properly the latter from the description of its appearance and from the fact that it is attached to the posterior wall of the abdomen, the place which the Chinese assume to be the origin of the primordial air.

The two air vessels of the kidneys are the renal arteries, which arise from the sides of the aorta—the author's wei-tsung vessel. The drawing represents them in a curved manner instead of proceeding as the renal arteries do at nearly a right angle from the aorta.

The right and left air doors are, as already stated, the common carotid arteries supposed by our author to be air vessels; the epiglottis is said to cover the two doors and also the how door, which is of course the known and always recognised opening to the lung vessel or trachea. There is great confusion in China regarding the how, whether it should be applied to the larynx or to the pharynx.

The wei-tsung vessel (carotid arteries) unites with the vessel coming out of the left side of the heart, that is, the aorta. It is carried to the left in an
arched form and there are two vessels, one on the right and one on the left that connect with the arms; these are the subclavian arteries. The slender or thin and delicate vessel adjoining the aorta, drawn on the left side of the diagram, is the jung-tsung vessel, which is a blood vessel. Particular notice is taken of this fact that this vessel contains blood. The term is applied to the veins and here refers to the inferior vena cava. This vessel enters the blood receptacle called hsieh-fu, which according to our ideas should be the right auricle. From the right side of this vessel proceed two vessels, the upper one connects with the c’hi-fu, most probably the superior mesenteric, the lower with the seminal road, most likely the spermatic arteries. The eleven short vessels which connect with the spine are the intercostals. The spinal arteries do not rise directly from the descending aorta. The descending wei-tsung vessel is an air vessel and popularly called the lumbar vessel; this is the descending aorta. On the left of the illustration below are two vessels which connect with the two kidneys; these are the renal arteries, the two lower ones connect with the lower extremities; these are the right and left common iliac arteries. The description of the diaphragm is tolerably correct. He makes it the hsieh-fu, or blood residence, holding blood on its upper surface because of its shape and probably because the blood vessels pass through it. Ignorant of the true use of the arteries, it was necessary to create some such blood reservoir. Properly speaking this blood receptacle should be the right auricle of the heart.

Our author differs from the ancients in giving the stomach three instead of two doors. His description of the position of the stomach is substantially correct. He puts the pylorus down in the duodenum and so brings in his third door or opening. Our so-called pylorus, according to his diagram, is the chin-mên. He states correctly that the yen-mên is situated at the upper and right side of the stomach which hardly tallies with its position in his diagram. He has completely inverted the uses of his chin-mên and chin-kwan by which he thinks the juices of the stomach proceed from instead of their carrying juices to the alimentary canal. The division of the chin-kwan outside the chin-mên into three divisions makes it apparent that by the chin-mên he means the common opening of the pancreatic and bile ducts and the three ducts of which he speaks are doubtless those of the pancreas, common bile and cystic ducts. This part was rendered difficult of investigation by reason of the pancreas covering the chin-mên, a part of which requires to be removed to expose the opening of its duct. Were it not that this description is so minute, one would suppose that he had transposed the characters chin and yen. From the juice coming out of the stomach, one part goes to form marrow, one part to be converted into blood and the watery juice goes to the lower division and from the centre of the liver passes over to the spleen. The wang-yen is doubtless
the great omentum with its cribriform appearance, giving it the character of a fish net, through which the water is supposed to percolate. Were it not that he speaks of it as a vessel, the passing from the liver to the spleen probably refers to the lesser or gastrohepatic omentum.

From its connections the pancreas may with truth be called the tsung-ti' the body that unites and suspends all. The duodenum being the widest and most fixed parts of the small intestines, it may seem to be but a prolongation of the still more dilated part called by us the stomach, although the thickened ring of the pylorus, making this the narrowest part of the whole alimentary canal, ought to have suggested some more rational limit to the stomach. A desire to be different from the ancients may have impelled him to this. The three divisions into which the chin-kwan divide may be pancreatic, hepatic and cystic ducts; this is on the supposition that the chin-mên is the mark of the pancreatic duct. This explanation it is difficult to reconcile with the description and drawing. What is meant by the lower division entering the liver and from the centre of the liver passing over to the spleen is difficult to say, unless the chin-kwan be the hepatic and cystic ducts.