Report on the surgical considerations in regard to the propriety of an operation for the separation of Eng and Chang Bunker, commonly known as the Siamese twins : deduced from an autopsy made by the commission appointed by the College of Physicians of Philadelphia, February, 1874 / by William H. Pancoast.

REPORT

ON THE

SURGICAL CONSIDERATIONS

IN REGARD TO THE

PROPRIETY OF AN OPERATION FOR THE SEPARATION OF ENG AND CHANG BUNKER, COMMONLY KNOWN AS THE SIAMESE TWINS.

DEDUCED FROM AN AUTOPSY MADE BY THE COMMISSION APPOINTED BY THE COLLEGE OF PHYSICIANS OF PHILADELPHIA, FEBRUARY, 1874.

By

WILLIAM H. PANCOAST, M.D.,

PROFESSOR OF GENERAL, DESCRIPTIVE, AND SURGICAL ANATOMY IN THE JEFFERSON MEDICAL COLLEGE, ONE OF THE SURGEONS TO THE PHILADELPHIA HOSPITAL, CONSULTING SURGEON TO THE CHARITY HOSPITAL, ETC.

[Read May 5, 1875.]

The news of the death of the Siamese Twins, Eng and Chang Bunker, which occurred at the residence of the former at Mount Airy, North Carolina, January 17, 1874, was widely published, and caused much interest and discussion among medical men and the public generally. The twins, about 63 years old at the time of their death, as stated by their families, had, during the greater portion of their lives, supported themselves by exhibiting their curious bond of union, so as ultimately to have accumulated what was to them a handsome competence. To advance their

own interests they frequently consulted medical men in different parts of America and Europe, as to the safety of a surgical operation to divide the band and release them from their peculiar connection; these consultations were mainly used to excite the curiosity of the public, as it is believed by those who knew them well, that they never, except once, seriously contemplated such an operation. Upon this one occasion, after a violent disagreement, they consulted their physician, Dr. Hollingsworth, Sr., of Mount Airy, but, when he stated to them his belief of the uncertainty and danger of the operation, reminding them of the opinions that they had received from many distinguished medical men, they relinquished the idea entirely. This event occurred not very many months prior to their death. In consequence of the interest excited, not only in this country, but abroad, in reference to the propriety of any operation, much curiosity was expressed in the medical centres of our country, on receipt of the telegram announcing the death of the twins, as to what might be the nature of this connecting band, and a hope that a post-mortem examination would be made to investigate its structure, so as to decide whether or not they could have been safely separated, and thus gratify a desire very widely entertained. It was held to be a duty to science and humanity, that the family of the deceased should permit an autopsy. The twins had availed themselves most freely of the services of our profession in both hemispheres, and it was considered by many but as a proper and necessary return, that at their death this *quæstio vexata* (the possibility of a successful section of the band) should be settled by an examination of its

anatomical structure. Conversing upon this subject with several of my medical friends, I became impressed with its importance, and felt that it was the duty of the medical profession of this country to make an effort to elucidate the point at issue.

Day after day passed and no information was received as to whether or not an examination had been made. At the end of a week it was understood that the bodies had been placed in a cool cellar, well protected from external injury, but not preserved by any antiseptic. In conversation with some of my present colleagues of the faculty of the Jefferson Medical College, it was thought advisable to make inquiry at Mount Airy, the home of the twins, distant about 400 miles. With the consent of Prof. S. D. Gross, a senior member of the faculty, I telegraphed to the Mayor of Greensborough (that city being the nearest point of telegraphic connection to Mount Airy), by the aid and through the courtesy of Mr. Wm. S. Stokley, Mayor of this city, and General Henry H. Bingham. I inquired if a post-mortem examination had been made, and, if not, if one would be permitted; offering the use of the anatomical rooms of the Jefferson Medical College for that purpose, and my own services in making an autopsy. Should the family not permit the bodies to be removed, I volunteered to go to Mount Airy to make the examination.

I received a visit in the course of two days from Dr. Hollingsworth, the elder of the two brothers who were the physicians of the twins, and it was decided that I should go at once to Mount Airy to make the examination. At the suggestion of Prof. Joseph Leidy, Dr. W. S. W. Ruschenberger, and Prof. John Neill, I

received as a colleague Prof. Harrison Allen; I also invited Dr. T. H. Andrews to accompany us. It was arranged that Dr. Allen and myself, if successful in obtaining an autopsy, should make our report to the College of Physicians, if the College should deem it worthy of acceptance. We succeeded in inducing the family to trust us with the bodies, under a written agreement which engaged Dr. Allen and myself to return them to such agent or agents as the family should select. This gave us permission to make such a post-mortem examination as would not disfigure the cadavers, and to examine the strange band that united them, on what was called its posterior part, but in no way to deface it in front, nor to divide it asunder.

We commenced the examination at the house of Eng, February 1, 1874. We first injected the bodies with a solution of chloride of zinc, which I took with me, of the ordinary strength that I have been in the habit of using for the preservation of subjects for dissection. We opened the right primitive iliac artery of Eng, and the left one of Chang, injecting the antiseptic fluid upwards and downwards, as the bodies lay before us in their natural or customary recumbent position. Dr. Allen and myself are much indebted to Dr. Andrews for his valuable assistance at Mount Airy, and particularly for his accurate memoranda of the ante-mortem history, as given to us by the Drs. Hollingsworth and the family of the twins. In addition our thanks are due to the Drs. Hollingsworth, and to the legal adviser of the widows Bunker, for the valuable assistance which they rendered us. Without their active co-operation we should have failed in our effort. The autopsy was concluded at the Mütter Museum of

the College of Physicians, where we conveyed the bodies. The College accepted the care of the cadavers; honored the three gentlemen above mentioned who had gone to Mount Airy with a vote of thanks, and appointed Dr. Allen and myself a commission to conduct the examination.

The commission endeavored to make the autopsy carefully and accurately. Its members were associated in the dissection, and together critically examined all its details previous to placing them on record. At a special meeting of the College held February 18, 1874, at which were present many prominent surgeons and physicians, the commission made a verbal report describing the general and surgical anatomy of the structures uniting the bodies, which description is included in this paper.

The complete anatomical description of this human anomaly is interesting and valuable to anatomists, but the general interest of the medical profession is centered in the question whether a being of this duplex development, so closely united as to justify the scientific name of Omphalopagus xiphodidymus, could be separated with safety to life. This name, which I suggested for the anomaly, and which was adopted by the commission at the above-mentioned meeting of the College, is formed in accordance with the nomenclature of double monsters employed by Dr. Fisher, of Sing Sing, New York. In his article on duplex development, he gives of compound monsters, Class I. Double monsters. Order III. Terata . anacatadidyma; *Def.* Duplicity with more or less separation of both the cephalic and the caudal extremities of the cerebro-spinal axis existing contemporaneously. Of this order

Genus I. is the Omphalopagus; Species I. Omphalopagus xiphodidymus. As on our dissection we found this specimen of duplex development to be closely united by the diaphragms as well as by the xiphoid cartilages, it might be more accurate to class it as *Omphalopagus diaphragmo-xiphodidymus.* There was also union of the livers and of the peritoneum; but the above name seems sufficiently explicit without requiring further complication.

As far as I can learn, it was the general opinion of our profession, both in Europe and America, that any of the proposed methods of section of the band would have involved great risk to life; that upon moral and even physical considerations, it would have been well if the twins could have been separated; but that, upon such information as could be obtained of the anatomy of the band, it was thought to contain structures of such vital importance that the twins' lives would unquestionably have been endangered from shock and subsequent inflammation. No one observer, I believe, attempted to describe all the structures of this connecting band; but the junction of the sternums could be felt at the top, and the peritoneum lining its cavity was recognized by the projection into it, or hernia, as it was called, of a part of the intestines, probably the colon. This was first noticed in this country, as I am told, when one of the twins was suffering from a cough. It could not be positively determined by an examination what other viscera were in the band, or what were its vascular connections. It was impossible by digital examination, even after death, to recognize the presence of the connecting liver band, or the junction of the diaphragms. This could only be inferred from analogous

cases. Sir James Y. Simpson, upon the last visit of the twins to Edinburgh, examined them with much care. He attempted to illuminate the band by means of a powerful light placed behind it, but it proved too opaque. He tested the vascular connection of the twins by giving a dose of iodide of potassium to Eng, and then after sufficient time examining the urine of each by the starch test for iodine. This gave the characteristic color with the urine of Eng, but no distinct trace with that of Chang; a result which corresponded with the experiment made by Bolton in 1830, who made use of asparagus, giving it first to one and then to the other.[1] The result of this autopsy must, however, in the case of any similar monster, in connection with the autopsies of analogous cases, not only bring to the surgeon's consideration as parts likely to be severed, the peritoneum and cartilages, and some arteries and nerves of lesser importance, but must also suggest the possibility of danger from the presence of the liver, if there be but one doing duty for both bodies, or from some connection between separate livers, and also from the existence of connected or united diaphragms.

As far as I have been able to find opinions expressed in regard to the propriety of an operation, it was not the fear of the vascularity of the band that impressed surgeons with the danger of the procedure, but the known risk of shock and inflammation attendant upon opening or cutting into the peritoneal cavity; and, in addition, the uncertainty as to the constituents of the band, and the fear lest some additional and unforeseen complication might occur in the operation, which would increase the risk already recognized.

[1] British Medical Journal, vol. i. 1869, pp. 139, 232.

The post-mortem examination has revealed that the vascularity of the band would have been no obstacle, and that even the circulation in the tract of union of the livers was slight. The band of hepatic tissue uniting the livers, elongated and narrow, of about the relative size, shown in the diagram (**B**), would not have proved an obstacle to the section, and the ensiform cartilages could have been easily separated at their articulation. But cutting through the united diaphragms would have made an additional and grave complication, and the shock to the sympathetic nervous system would have been serious. In addition to peritonitis, diaphragmitis might have occurred, with inflammation extending to the pericardium and pleura, and a new disturbance to the heart might thus have been added to the original shock.

The twins were naturally fearful as to the result of an operation, and had become so accustomed to their curious relation as to act and live under certain regulations of their own as one individual. We were told in North Carolina that they had agreed that each should in turn control the action of the other. Thus Eng would for one week be complete master; they would live for that time at Eng's house, and Chang would submit his will and desires completely to those of Eng, and *vice versâ*. Though it seems most immoral and shocking that the two should occupy the same marital couch with the wife of one, yet so thorough was this understanding of alternate mastery, that, as I was told by one of the widows, there had never been any improper relations between the wives and the brothers. This understanding was so positive, that Chang's death, and Eng's following it, were immediately due to

their leaving Chang's house in inclement weather, at the end of the week, to go to Eng's, for his week in return. When Chang was master for the week he would do whatever pleased him, and Eng could only remonstrate or make suggestions. Thus Chang would become intoxicated in spite of his brother, and much to his inconvenience; would break things in his own house, and, upon one occasion, threw a feather bed into the fire, and made himself otherwise disagreeable, in spite of the remonstrances of his brother.

I mention these circumstances to show how they had learned to accommodate themselves to their situation; and probably they regarded themselves as equally, if not more favorably situated in respect to the necessities of life than if they had enjoyed a separate existence. They brought to the accomplishment of any undertaking, if needed, a double strength and a double will. This was recognized in their double life, and after their death the sentiment of the family was such that they were not divided. I have in my possession a print, in which they are shown as engaged in various employments—rowing in a boat, shooting, chopping wood, etc.—and I was told that at Mt. Airy they were in much request among their neighbors in house raisings, as they could lift a corner better than any one or two men. This feeling of unity would have been in my judgment a consideration of some importance in the question of the operation of separation, when they were in their prime and at their best. Of course the revelations made in the autopsy of the atheromatous condition of the arteries, would exclude the idea of any late operation under that condition. In addition to the ordinary physical shock of an operation affecting

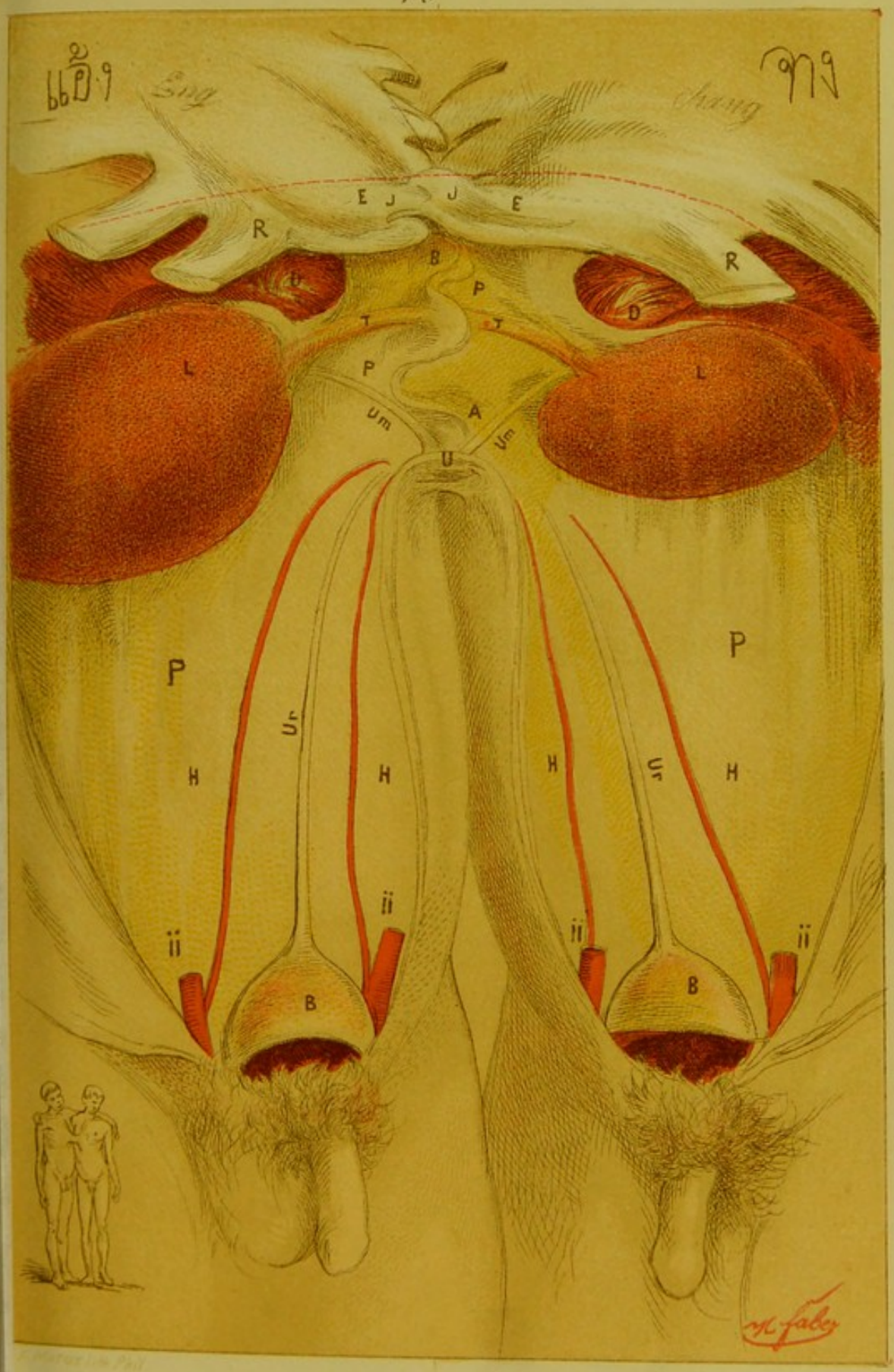
such important anatomical structures, the serious mental and moral impression it would have made, even if they had been anxious and willing, would unquestionably have been great. It would have entered seriously into the question by preventing the surgeon from urging an operation if they had been unwilling to submit to it, and should have formed part of its consideration even if they had been willing, and if they had wished to assume all the responsibility.

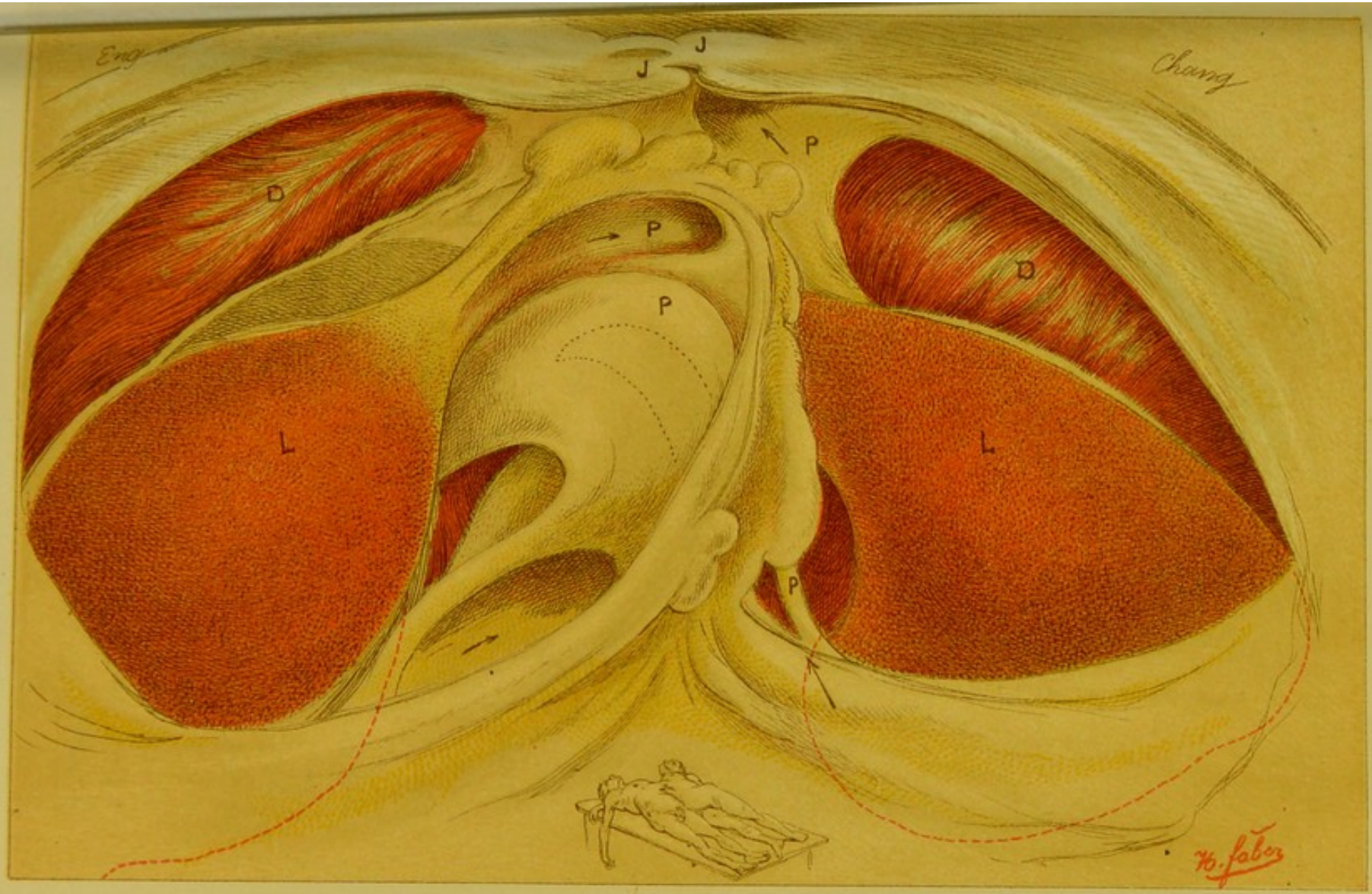
The malformation of the twins' bodies, as the curvature of their spines, and the greater relative strength of their external arms and shoulders (external in the acquired lateral position), so that the right arm and shoulder of Eng and the left of Chang were stronger and larger than those of the opposite sides; and the greater strength and development of their outside legs, which I noticed when I saw them on their last visit to Philadelphia, showed the thorough accommodation of their bodies. This was consequent upon the instinctive, intelligent, and repeated efforts of this duality from early childhood to become a practical unity, so that physically and morally they were practically two in one.

The accompanying lithograph (**A**), while only a diagram, and not anatomically correct, is yet practically so. The accurate and thorough anatomical details are given in the report of my colleague of the commission. By this diagram I aim to show the arrangement of the structures within the band, as well as its surgical anatomy.

At U, on the under surface of the band, is the umbilicus, a large scar; to this went the hypogastric arteries, H, H, and the urachi, Ur, Ur, and from it we traced

A.




J
J
P
P
P
D
D
L
L
P

the two umbilical veins, Um, Um, in their connection with the livers, L, L. B, B are the respective bladders, and on each side of them are I, I, I, I, the internal iliac arteries. The peritoneums, colored yellow for distinction, P, P, were found in the median line A B of the band as four pouches or processes, separating the peritoneal cavity of one body from that of the other. T represents the tract of hepatic structure, which joined the two livers and lay behind the peritoneum, just under the diaphragm D, colored red. E, E are the ensiform cartilages, joined in the middle line, making an arthrodial joint at J, J. The line representing the lower costal margin of the thorax is shown at R, R.

The second diagram (**B**) shows accurately the arrangement of the peritoneums, P, P, livers, L, L, and diaphragms, D, D. The connecting liver band, being behind the peritoneum, is but faintly shown. The relation of the diaphragms, D, D, to the ensiform cartilages is clear; the arthrodial articulation of these cartilages is shown, and there is also exhibited the cavity of the articulation at J, J, into which was passed the handle of a scalpel from behind, and which was apparently lined by a synovial membrane covering those parts which were not in contact.

The arrows represent the direction of the pouches of peritoneum. The upper two, marked by the arrows, and called, from their position in regard to the liver, the hepatic pouches—one from Chang's side, the other from Eng's—are on nearly the same plane running to the middle of the band. The lower two, running in the same manner, are called in the anatomical description the umbilical pouches of Eng and Chang

respectively. These were so joined, as illustrated in Diagram **A**, that one peritoneal cavity was completely separated by a septum from the other.

In my judgment it is not improbable that the peritoneal cavities were continuous and one in early fœtal life, and that the liver connection was much shorter, and so also the band. In the history of the twins it is related that, in their childhood, they could twist themselves around the band so as to reverse their positions, bringing their heads and feet together, and that they often did so. In these gymnastics it seems to me probable that the continuous peritoneum in the band became twisted, and thus gradually closed so as to form the irregular septum demonstrated in our dissection and shown in Diagram **B**. The very irregularity of the method of forming this septum, or oblique dissepiment of peritoneum, as Sir James Y. Simpson[1] called it, seems to me to support this view, as does also the fact that so many analogous cases are reported, which when examined just after birth showed a continuous peritoneal cavity from one twin to the other. Even if this was not the case, yet the explanation may account for the irregularity of the peritoneal connections.

From a consideration of the anatomical structure of the band, as described and illustrated, I think that the surgeons who refused to operate upon the Siamese twins, in their adult state, were right in their decision. I do not believe it would be judicious to operate by section of the band upon any other such exactly similar adult monstrosity, should it present itself. The experiment of applying a strong ligature around the

[1] Brit. Med. Journ., vol. i. 1869, pp. 139, 232.

band, when the idea was under discussion of cutting through it by the progressive ulceration caused in this way, proved that it could not be done safely, as the pressure of the ligature caused so much sickness and nervous impression that it had to be removed. This, I think, is in proof of the greater dangers which would have been produced by any violent separation. Apart from such experiments, involving the idea of an operation, the twins could easily endure those of a much rougher character. For instance, when returning from Europe, they allowed themselves to be pulled about the deck of the vessel by a rope passed around the band.

We are probably not sufficiently informed as to the condition of the twins in childhood to decide whether an operation would then have been justifiable. But if it ever was to have been performed, then was the proper time, before they had acquired their full mental and physical development. As they are reported, in such history as we have of their infancy, to have been very delicate for the first six months of their life, the operation during that time would have been hazardous. Even after that period, or under the most favorable circumstances, the operation would have been attended with great shock, and uncertainty as to its ultimate success. The removal of a superabundant part is often done when it is relatively but small in comparison with the whole body; even parasitical formations, when they may be large relatively, but only partially developed, and not with perfect nervous connections, may be removed, as in the case of George Washington Lane, operated upon by Prof. J. Pancoast. In that case a partially formed second body,

with hands, feet, and visceral developments, was fastened to the left cheek of the well-formed body, and was growing *pari passu* with it; removal was effected with the *écraseur;* but in giving the child ether I had to stop its use for a few minutes, and the operating surgeon administered stimulus to save the child from dying on the table. The patient is now nearly seventeen years old, and hearty and strong.

There are only two cases on record, that I know of, where the operation has been tried, with any success, upon twins joined at the umbilicus and sternum. That of Dr. Böhm[1] cannot be called a complete success, as one of the children died in three days and a half, and the other was very much prostrated.

The other, and a very famous case, was successfully operated upon by Dr. Fatio, and is also known as the "König case" and the "Zwinger case." I have seen the account, with a plate, in a volume of the Ephemerides Germanicæ, in the library of the College of Physicians.[2] The operation was an ingenious and cautious one, and deserving of being remembered in connection with this problem of surgery. The case seems very analogous to that of the Siamese twins.

"The connecting band[3] is stated to have been formed by a coalition of the xiphoid cartilages, and umbilical vessels, surrounded by areolar tissue, and covered with skin, with a very thick umbilical cord attached to its lower surface. It

[1] Recorded in the Revue de Thérapeutique Médico-Chirurgicale of Aug. 1st, and in Virchow's Archives, 1866, vol. xxxvi., page 152, and by Dr. Robert P. Harris in the American Journal of Medical Sciences, No. cxxxvi., Oct 1874.

[2] Dr. Emanuel König, Ephemerides Germanicæ, 1690; Dec. ii., An. viii., Obs. 145.

[3] Dr. Theodore Zwinger (Zwingerus), Ibid., 1691. Dec. ii., An. ix., Obs. 134. Translated by Dr. Robert P. Harris, Am. Journ. Med. Sci., Oct. 1874.

measured an inch and a half in length, one inch in thickness, and five inches in circumference, which would give a vertical diameter of about two inches. The double funis had been cut and tied by the midwife, at a length of about eight inches, which was found of advantage in the method of operation adopted by the consultation. This was to separate the cord up to its division in the band, tie the vessels to prevent hemorrhage, ligate the band below the cartilaginous link; and when the ligature cut its way out, sever the cartilages by incision."

"It would appear . . . . . that when the children cried, the band above the umbilical junction '*appeared thick and swollen.*' . . . . . After the cords were separated and tied, Dr. Fatio perforated the band with needles, and ligated all below the ensiform bridge, using a second ligature of six wires, thrice carried around, to be tied tighter and tighter, until all the included parts were divided. The ligature having fallen off in nine days, the ensiform connection was severed by a bistoury on November 23d, 1689, in the presence of several physicians, surgeons, and distinguished citizens of the town of 'Basil.' The parts healed in ten days, and six months afterwards the twins and mother were reported as in good health."[1]

These are the only two successful cases of operation among the great number of cases of omphalapagous twins reported in two hundred years. Foerster, so commonly quoted, gives us a table of 114 cases, in only one of which was an operation of separation performed.

Through the courtesy of Dr. A. B. Cook, Prof. of Surgery in the Kentucky School of Medicine, Louisville, Ky., I have

[1] Harris, Amer. Journ. of Med. Sciences, Oct. 1874, p. 372.

received his interesting report of an examination of a similar monstrosity. He reports that the anatomical examination revealed the following peculiarities:—

1. The junction of the xiphoid cartilages.
2. Two lineæ albæ.
3. One common diaphragm.
4. One common peritoneum lining a common cavity, and two sets of viscera, with one exception (the liver).
5. One common umbilical vein.
6. One liver, with a double circulation.
7. The curve of the inferior cava of the right fœtus, to the left side of the vertebral column.
8. The radical change in the relations of the venæ cavæ, hepatic veins, and venous ducts, to the posterior border of the liver.
9. The duplication of all the organs, with the exception of the liver.

In this case, owing to there being only one liver common to the twins, and that placed in the band, and a common diaphragm, no section of the band could have been successful.

About ten days ago I was shown at the Philadelphia Hospital by Dr. E. E. Montgomery, one of the Resident Physicians, an omphalopagus, which he had delivered in the obstetrical ward of the hospital, aided by his fellow-residents, Dr. Edwards and Dr. Deaver.

Dr. Montgomery kindly permitted me to see his dissection, and afterwards wrote me a description of the anatomical facts, of which the following is a summary:—

1. The twins, both males, weighed together 10 lbs. 4 oz.; neither showed any sign of life.
2. They were connected at the umbilici by a band three inches in length.
3. At the centre the band was seven inches in circumference

but constricted where it joined the bodies; it contained a portion of the intestines.

4. The anus in each twin was imperforate.

5. The genitalia were well developed.

6. So also were the lower extremities, except for a talipes equino-varus of the right leg, in the first child.

7. The placenta was large, but presented no separation.

8. The cord, which consisted of two arteries and two veins, came off from the centre of the placenta.

9. The membranes of the first child covered the whole fœtal surface of the placenta, while those of the second arose from the placental end and surface of the cord, and consequently were enveloped by those of the first; the membranes of the second child were apparently a reflexion of those of the first, thus placing the child without, instead of within, the membranes.

10. The umbilical cord became bifurcated three inches from the children, and entering the band had a portion directed to each child.

11. The circulation in the liver was the same.

12. The vein entering the umbilicus took its usual course to the liver.

13. The abdominal aorta in each twin gave off but one hypogastric artery, which passing out at the umbilicus became the umbilical artery.

14. The peritoneal surface was continuous from one twin to the other.

15. The greater portion of the small intestine in each, was in the abdominal cavity, but at about the junction of the ileum with the jejunum of each child, the intestines passed through into the common sac, where they joined to form a triangular union or receptaculum, an inch and a half in length, by an inch in breadth at the base, which was continued by small intestines to the cæcum.

16. The peritoneum of each was so arranged that it supported the large intestine, much in the same manner as the uterus is ordinarily supported. At the cæcal end there was

on either side of the double mesocolon, an appendix vermiformis cæci, one for each child.

17. The common large intestine terminated at the lower portion of the band in a large pouch, which opened by a small slit-like aperture into a sulcus.

18. This sulcus beneath the peritoneal surface extended from the body of one child into that of the other.

19. The urethræ were closed within a quarter of an inch of the meati, and there was no indication of the development of a bladder in either body.

20. Introducing a probe into each ureter, it was found to emerge from the sulcus at either side of the anus.

In this case the sternums and diaphragms were not united, but owing to the presence of the continued or united intestines in the band, these twins could not have been separated with safety.

From a consideration of the operation of Dr. Fatio, I would be induced to believe that an operation in the case of the Siamese twins, when infants, might possibly, and only possibly, have been attended with success; that is with the saving of the life of one, if not of both, of the children, if they had had sufficient strength, or if the surgeon had even waited some months or a year or two to give them an opportunity of becoming as strong as possible, and before their minds could have comprehended the risks of the operation. Should such a case occur again, I would recommend the operation, and be willing to perform it, even if, as in Dr. Böhm's case, one of the children died, for then at least the survivor would be able to enjoy a natural life. Even if both perished, the risk might be justified; the moral sense of the community, at least in a Christian country, would then not be shocked by the unnatural complication which otherwise would

arise, and did arise in the case of the Siamese twins, proving the cause of so much criticism—a criticism severe and unjust, when we consider the peculiar conditions under which the twins enjoyed their lives, the respectable families which they raised, and the good opinion in which both the Messrs. and Mistresses Bunker were held in their neighborhood.

In regard to the question of separating the dead brother from the living, I think it should have been done, and that it would have been the part of wisdom in Eng, when he found his brother so ill, to have engaged his surgeon to remain continually at his house. It would have given him a chance for his life, and as the section would have been made through the dead parts of the band on Chang's side, the peritoneal cavity of Eng need not have been opened. Of course the result would have been uncertain, but I have the wish that it had been essayed. In the case of the male Armenian twins A. D. 945,[1] united by their abdomens, when one died, the dead one was separated by surgeons from the living, the latter surviving for three days and then also perishing. During the reign of James IV. of Scotland, a double male monster was born in that country, near Glasgow. The twins were brought up and educated by the king, and therefore the character of the monstrosity was well known. They were described by George Buchanan, John Lindsay of Pitscottie, and Drummond of Hawthornden. John Lindsay says that the male twins were two bodies from the navel up, complete in all their members; from the waist down but one person, and joined at the back. They lived

[1] L'Histoire eu Bas-Empire par Le Beau, 1776, t. xvi. p. 28. Harris, loc. cit.

to the age of 28 years, one dying several days before the other. As the dead became putrescent, the living wasted away by degrees.[1]

In concluding the surgical consideration of the uniting band of the Siamese twins, I believe that every practical surgeon will coincide in the opinion:—

I. That as a necessary deduction from the anatomical demonstration of its constituent parts, no operation of section of the band, for the purpose of separating the twins in adult life, could have been performed and their lives preserved.

II. That it would have been judicious surgery, upon the death of Chang, to have at once applied a strong ligature around the band, as far as possible from the body of Eng, and then to have cut through the band between the ligature and the body of Chang.

III. That whether or not the operation would have been successful in the childhood of the twins, is problematical; but that it would have been the part of wisdom and humanity to have made the effort, using all the precautions employed by Dr. Fatio in his case in 1689, with such additional ones as might have been suggested.

Note.—It has been generally believed that the names Eng and Chang were given to the twins to distinguish them by their position; that Eng signified in the Siamese language *right* and Chang *left*. In this sense the names could not have been appropriate at the period of the twins' birth, for the natural position of their bodies was front to front, the band of union running from the chest and abdomen of one to the same parts of the other. Born in this position, and retaining

[1] Sir J. Y. Simpson, British Medical Journal, vol. i., 1869, p. 231.

it for some years, the twins could, as stated in their history, reverse their position at will, and were in the habit of so doing; and it is not likely, therefore, that one should have been called right and the other left. Moreover, as a matter of fact, the words Eng and Chang have not this meaning. I have examined in the Astor library, of New York, a copy of the celebrated dictionary of the Siamese language, *Dictionarium linguæ Thaï sive Siamiensis*, by Monseigneur J. B. Pallegoix, Bishop of Mallo, etc. Therein are numerous translations of the words Eng and Chang, but in no place do they signify right and left. In the Siamese language, words spelt exactly in the same way may have an entirely different signification according to the accompanying accent. Thus, by a different pronunciation, a word is made to do service for various meanings. Of all the different significations of the words Eng and Chang, those which give for Eng the meaning of "strictly, to tie strongly," and to Chang that of "unsavory, tasteless," seem alone applicable.

This justifies the statement which has been made, that the twins were not originally called Eng and Chang to distinguish them as right and left, but that the names were given them to express their natural characteristics. Eng was ever the stronger and healthier of the two, and of a pleasant disposition; Chang was irritable, and less amiable. With this understanding of their peculiarities, the names seem much more appropriate, and were probably given for this reason.