A LECTURE ON THE SIAMESE AND OTHER VIABLE UNITED TWINS.*

BY SIR JAMES V. SIMPSON, BART., M.D., D.C.L.,
Professor of Medicine and Midwifery in the University of Edinburgh.

UNITED twins or double monsters appear under a great variety of forms, and under very diverse degrees of duplicity. Sometimes the two individuals are complete, or nearly complete, in all respects, and are found united by the fronts of the chest and abdomen, or by the backs, or by their heads and scalps, or by the pelvis, or by the arms and sides. More frequently the two united persons are more or less incomplete, in consequence of their conjunction being more intimate and deep at the line of union. The degree of incompleteness which thus occurs varies infinitely. Thus, some monsters are altogether double above, and altogether single below; or, in other words, they possess two heads and four arms, but only two lower extremities. Others, again, are single above and double below; or, they have one head and four lower extremities. Every conceivable gradation is found in the intermediate part and organs in these varying degrees of double union. But the junctions, however diverse between the united twin individuals, are found to conform to the general teratological law that, in the two, the same parts only unite to the same parts; and not only muscle only to muscle, bone only to bone; but the same muscle in the one twin unites at the line of conjunction to the same muscle in the other twin; the same bone to the same bone; the same nerve to the same nerve; the same organ and part, as the liver, intestine, pericardium, nose, ears, etc., to the same organ and part in the opposite individual whenever the conjunction extends to these and other organs and parts. This teratological law of the union of like to like—*eadem ibidem*—is, as I have said, a general law in the structure of united twins; but it is not an universal law. For in some descriptions of double monstrosity, when one of the two attached beings has the form of a dwarfed parasite, the attached parasite does not necessarily conform in its mode and site of attachment to the principle of the union of the same parts to the same parts.

The Siamese twins form the most remarkable instance of united twins in this respect—that, with two bodies individually complete, they have lived to a more advanced age than any other instance in the records of science. Let me, therefore, state some of the more interesting historical, anatomical, and physiological facts regarding them.

The Siamese Twins: their History, etc.

The Siamese twins, Chang and Eng, or, as they now sign themselves, Chang and Eng Bunker, were born in the kingdom of Siam, in the year 1811. They are now, therefore, 58 years of age. Their father, originally Chinese, had emigrated to Siam, where he married a native, by whom he had four children before the birth of the twins. It does not appear, however, that any of the other children—for they had a large family—presented any peculiarity in development. The twins themselves declare that their mother experienced no special difficulty in giving birth to them. They affirm that, while the one came as a head the other came as a foot-presentation, a statement which, as made merely from what they have been told, does not at first sight seem very probable. The twins themselves, are however, very decided as to the truth of this tradition, and mention an interesting fact in corroboration of it; viz., that up to the age of twelve they were able to twist themselves on the band or ligament connecting their bodies together, so, that the head of Eng should be at the feet of Chang, and *vice versa*; and they occasionally used to amuse themselves by doing so.

When infants, the two children were placed face to face, a position the extreme awkwardness of which would have completely prevented them from either walking easily, or sitting down at the same time. Hence, from a very early period of their childhood, they were continually and instinctively engaged in attempts to arrive at a more comfortable relative position. These efforts finally succeeded, so far as to enable them to adopt their present imperfect lateral relation to each other (as shown in Fig. 1). In dressing, etc., they still stand face to face.

The Siamese Twins, when lately visiting Edinburgh, were good enough to allow themselves to be shewn to the students of the Midwifery Class in the University; and the following lecture.

The twins lived with their mother—for their father died when they were still young—in the kingdom of Siam until the year 1829, when an enterprising American ship-captain brought them over to New York for the purpose of exhibiting them. At the end of the same year, they came over to Europe and excited great interest in the scientific circles of the day, both in our country and on the continent. Having realised some

Fig. 1.

money by thus exhibiting themselves, they went back to America and purchased property in North Carolina, and lived quietly and happily there, engaged in agricultural pursuits, until the late American civil war swept away their stock of slaves, etc., and again reduced them to comparative poverty. Since the close of the war, they have been obliged to exhibit themselves again in America, and they have arrived in Great Britain for a similar purpose. It is their object also to obtain the opinions of a few of the most eminent surgeons of Europe, as to the vexed question of their possible separation by the division of the band uniting them.

Description of the Twins.

Dressed, as they are, in the ordinary American fashion, with the hair cut short, and talking English, as they do, with the American accent, they retain little or nothing of the appearance of Eastern subjects; except their black hair and their features, which, however, can scarcely be called very typical specimens of Chinese or Siamese faces, though they have the external angles of their eyes slightly depressed. But their heads are markedly dolicocephalic or elongated in form, and well developed. In features the brothers greatly resemble each other. They are short, but wiry-looking men; Eng, the taller of the two, being only five feet and two and a half inches; Chang an inch shorter; and this difference in height, combined with their lateral position, gives them an awkward appearance, as Eng appears always to be leaning upon Chang. This appearance, however, is deceptive, as they have themselves assured me that, though their chests touch above the band when they stand upright, yet they do not lean on one another. They are not placed exactly laterally, but somewhat obliquely to each other, the angle of obliquity being about thirty degrees. While sitting or standing, the left arm of the one and the right of the other are usually placed behind their backs, the most convenient position for them; but when eating, each of the twins generally makes use of both his arms in front without the one interfering in any degree with the other. As a matter of course, those arms which are in front are those most used; and in consequence they ought to be more muscular theoretically than the other two. This was maintained thirty years ago during their first visit to Europe; but actual admeasurement shews, now at least, little, or indeed no difference of this kind between the arms. But the two

outer legs of the twins are more developed and muscular than their two inner legs, and measure about an inch more in circumference. They use the outer legs more than the inner in standing. When they stand or walk, they always keep the same relation to each other; Chang always taking the right side, and Eng the left. They have held this relative position from childhood, or ever since the band was so stretched as to allow them to take a partially lateral position. In consequence, the outer surfaces of their chests have come to bulge out more than their inner surfaces, which latter are somewhat flattened from mutual contact and pressure.

A curious circumstance, which was noticed at a very early period by the twins, is, that the two inner eyes—the left one of Eng, and the right of Chang—possess a much clearer and more distinct vision than the two outer. In fact, when the two inner eyes are closed, they say they are quite unable to distinguish any object clearly. I have ascertained, by experiment, that the right ear of Eng is more acute than his left; and the twins themselves know very well that Chang is much deaf than his brother. He does not hear a watch in contact with his right ear.

Professor Allen Thomson of Glasgow has shown it to be a general law in relation to double monsters, that the heart, liver, etc., are inverted in position, or on the reverse side, in one of the two individuals forming united twins. This does not seem to hold good in relation to either Chang or Eng. Dr. Aitken has carefully examined them for me in relation to this question. The livers in both, if we may judge from percussion, are situated normally on the right side of the abdomen; and their hearts on the left side of the thorax. The apex-beat of the heart in Eng is a little below and to the outside of the left nipple. In Chang, the apex-beat is not very determinable; but the heart-sounds are loudest on a level with his left nipple, and a little to the right of it.

Neither are the respirations or circulations of the two brothers synchronous. On one of the occasions in which Dr. Aitken examined their hearts, the twins were both suffering from slight influenza; but Chang's pulse was twenty-four beats in the minute quicker than Eng's.*

In their chemical functions, if I may so call them, as well as in their organic, they are two separate and distinct individuals. In proof of this, let me state that Dr. Arthur Gamgee was so kind as to analyse for me specimens of the urinary secretions passed at the same time by the two brothers.† The urine in each differed as much in the relative amount of its solids, in its quantity of urea, uric acid, etc., as ever we see the same secretion differ in two different and unconnected individuals—one fact among many others proving that there is perfect duality in their unity.

Chang and Eng are married to two sisters, the daughters of an American clergyman. Each brother is the father of a large family. The family of Eng consisted of seven sons and five daughters; the family of Chang of three sons and seven daughters. Their first children were born within three or four days of each other; the others at irregular intervals. Chang's youngest child was born three months ago.

In regard to progression, they walk readily and easily; can run and swim; and their movements are, from education, so harmonious as to seem at first as if they were directed by a single mind. In farming operations at home, they often work together, and with different kinds of tools. They are keen sportsmen and good shots. They are fond of chess, playing it always, it is said, with a stranger, and not with each other. They are intelligent and well-informed gentlemen, and good men of business.

These Siamese brothers are perfectly dual in mind, though mythical and incorrect tales of an alleged perfect unity in thought, sympathies, etc., have been long circulated by some and accredited by others. Educated constantly together for now upwards of half a century, in thought and word, in action and movement, it is not, perhaps, wonderful that their tastes and habits, their ideas and the expressions of them, should conform so entirely as they do. Alike in moral character and disposition, and ever lovingly fond of each other, it is averred that throughout life they have never had a quarrel or any marked diversity of opinion; and hence apparently they think, act, and move like one individual. Always accustomed, when spoken to, to listen together to the same conversation, one or other almost always gives any required answer or observation; but, when tested, the two brothers can so far be separated and changed from their usual custom as to carry on a conversation with two dif-

ferent individuals. Having spoken English for thirty years, they are perfect English speakers, and scholars also; and, when reading history or poetry, etc., of which they are both fond, one usually reads aloud, and the other listens. But they sometimes read separately, each to himself. They usually go to sleep and waken at or near the same time, but not always so; and their night dreams, like their day thoughts, are quite independent of each other. Their feelings of hunger and thirst, and the calls of nature upon them, are generally responded to simultaneously, but not always so, or necessarily so. Their minds are, indeed, more dual than their bodies; for the latter are united together, while the former are not.

Band of Union: its Formation.

The organic roundish band of union which connects the two brothers stretches in each from the xiphoid or ensiform cartilage or lower end of the sternum down to the umbilicus. In truth, the umbilicus is single, and its cicatrix can be felt upon the middle of the lower surface of the band. The measurements of the band are as follows. When it is put fully on the stretch, and the brothers stand face to face, as far as possible apart, its length is about 4½ inches. In the centre, its circumference is 7½ inches; while, close to each twin, it is nearer 8½ or 9 inches; and about 3½ in depth as it springs from the body of each. Consisting thus of a band about the thickness of the forearm, it varies much in consistence in its upper and lower surfaces, in consequence of the diversity of its contained structures. Covered over, of course, by a continuity of skin, it is felt to be, on its upper surface, composed of a kind of arched hard tissue, jointed, and partially flexible. In fact, it is formed of the ensiform cartilages of each twin, turned at right angles forwards, so as to meet at their apices, and form a sheath or covering within the superior surface of the band. This hard sheath superiorly is increased laterally by apparently some of the adjoining rib-cartilages, being also extended or dragged forwards. Below, the inferior surface of the band is, on the contrary, soft, thin, and elastic in its walls, like the integuments covering a large hernia. Indeed, when either brother coughs, the intestine can be felt projected forwards into the interior of the band.

The apices of the horizontally placed xiphoid cartilages feel close, but jointed, where they touch each other; but, when fully stretched out, the tip of the finger can be placed between them. The band still shows a considerable amount of flexibility, though nothing comparatively now to that which it is said to have possessed in the younger days of the twins. I have seen Chang, the shorter of the two, bend low enough to touch his foot, while Eng maintained the erect posture.

The Degree of Nervous Connection between the two brothers, as shown in the sensibility of the band, is not great. When the middle of the band is touched, both feel it; and each brother feels every irritation applied to his own half of the band. But each seems also aware of any pricking or touching the skin of the band for about half an inch or more on the other side of the medial line; this crossed sensibility diminishing from the centre outwards.

The Degree of Vascular Intercommunication between the Twins is a more interesting question. The pathological history of the brothers seemed to me at first sight to suggest that this vascular communication was greater than physiological inquiry has proved it to be. They have enjoyed, on the whole, excellent health; but have suffered under various diseases. When these were essentially blood-diseases, both brothers, as in other instances of united twins, suffered simultaneously. Thus they both at the same time laboured under small-pox, and again under measles. At one time they were attacked with ague; and the paroxysms of the cold, hot, and sweating stages went on simultaneously in each. I have seen both of them suffering under influenza, but one more severely than the other. Other diseases, not necessarily emanating from the blood and vascular system, have occurred in one, and not in the other—as toothache. Chang jocosely complains that, when suffering from severe toothache, he had failed in getting any due sympathy from Eng, who never had the disease; but more, even when he required to have his tooth pulled out by the dentist, Eng had no fellow-suffering with him. They have had diarrhoea sometimes separately, sometimes simultaneously.

There is no vessel to be found beating in the walls of the band connecting the two brothers, and hence no large artery passing from the one to the other. Is there aught like a very free minor or capillary vascular intercommunication in the walls of this uniting band? To answer this question, and test the freedom of the sanguineous intercourse between the two brothers, I have tried the following experiment. One of them—Eng—was so good as to swallow, at my request, a draught containing about ten grains of iodide of potassium. The first urine passed by each brother an hour or two subsequently was carefully tested for me by that able chemist, Dr. Arthur Gamgee. Eng's urine showed very deep discoloration under the starch-test. Chang's

* [Recently examined in London in good health by Sir Henry Thompson and Mr. Ernest Hart, the pulse of Eng marked 84, that of Chang 84.]

† The following is Dr. Gamgee's report of the analysis of the urines of the two brothers. "The urine of Eng is of normal colour, and has a density of 1015.7. Total solids per cent., 2.85; urea, 1.54. The urine of Chang is of a higher colour than that of Eng. On standing, a crystalline deposit of uric acid is visible. Density, 1025.2. Total solids per cent., 4.59; urea, 2.35. The urine of Eng is thus rather below the average density, whilst that of Chang is slightly above it. The percentage of urea in Eng's case was below the average, whilst that of Chang's urine was about the average. Chang's urine deposited uric acid, whilst Eng's did not."

showed no distinct trace of discoloration under it. When we consider the great delicacy of this test, and the small quantity of iodine that gives the necessary reaction, it is evident that the vascular connexion between the two brothers must be comparatively very small.

Question of the Surgical Separation of the Siamese Twins.

Chang and Eng have themselves no desire to be surgically divided from each other. But some of their relatives have become anxious that they should be separated, if it were possible to do so; for latterly their two families have been living apart, and they have sojourned for a few days alternately in the two separated homesteads. The operation is certainly possible, and would be attended probably with little, or indeed no difficulty; but it would be so perilous in its character that the twins could not, in my opinion, be justified in submitting to it, nor any surgeon justified in performing it.

The cutaneous, cartilaginous, vascular, and other tissues composing the walls and mass of the band, offer in themselves no special obstruction to its surgical division. The interior of the band, however, contains, I believe, a canal or diverticulum of peritoneum, which passes from the abdominal cavity of the one brother to the abdominal cavity of the other. In modern surgery, we are by no means so afraid of dividing and opening into the peritoneum, as medical men were ten or twenty years ago. In witness of this, we appeal, for example, to the marvellous success attending the now frequent operation of ovariotomy. Still the danger of cutting through a diverticulum of peritoneum is too great to be ever done without very grave and urgent reasons; and none such exist in this case. With them it is not a question of life or death; but a question merely of seemliness and convenience, and perhaps of pleasure and gratification to their relatives. Besides, if it were attempted in the Siamese twins it would be difficult perhaps to close up the exposed peritoneal cavity in each after the division. For, in the lower and inferior portion of the band, or in their umbilical region, the coats are very thin and distended, and this condition runs onwards to the middle of the band.

I have spoken of the band containing a peritoneal canal, common to the abdomen of each brother. That a large segment of peritoneum enters into the composition of the band on either side, is easily ascertained by touching it below or laterally, and feeling the full impulse of bowel sent into the band when the individual on that side coughs. That the peritoneal cavity, in the form of a canal, extends entirely through the band from one brother to another is more doubtful, and rests on this kind of evidence; viz., when you place your finger on the lower surface of the band, and upon the cicatrix of the umbilicus there, if the brother on the right coughs he sends an impelled portion of bowel not only up to, but beyond the point touched; and, in the same way, if the brother on the left coughs, the impelled bowel passes somewhat apparently to the right, beyond the site of the central umbilical cicatrix.

You are well aware that various attempts have been made of late years, by electric and other strong lights, to make portions of the body more or less translucent. By placing a powerful light behind the connecting band in Eng and Chang, I tried to make its thinner portions transparent, with a view of possibly tracing its contents better than by touch; but I failed entirely in getting any advantage from this mode of examination. If the band contains throughout it an extension of peritoneum, as I believe it does, then it is possible that—as in similar cases of the same type of double monstrosity united by a similar band in the same situation, and described by Otto, St. Hilaire, and others—a portion of bowel or even of hepatic structure may intercommunicate; but I do not think that this is the case in the conformation of the Siamese brothers. When twins are united front to front, like Chang and Eng, the degree of union in the band has varied infinitely in extent and also specially in depth; being far more complete and intimate in some cases than in the Siamese brothers, and less perfect in others again than in them, as was probably the fact in united female twins, whose case is recorded by Emmanuel Koenig in the *Ephemerides* for 1690, and where he tells us he effected successfully their surgical separation. The uniting band in Koenig's case was in the same situation as in Chang and Eng, and extended, as in them, from the ensiform cartilage down to the thick and single umbilical cord ("coalitus a cartilagine ensiformi usque ad coram umbilicos in unum funem summopere crassum contortos"). There were four umbilical arteries and two umbilical veins in this double cord. The imperfect sketch which Koenig gives of those united twins (and which is copied in Fig. 2), represents the band as more narrow than we must hold it to have been from his own words, and from his account of its involving the ensiform cartilages in each twin ("contigit hic coalitus in ipsis cartilaginibus ensiformibus"). He speaks of the measurement of the band in these new-born infants as one inch in breadth, half an inch in depth, and five inches in thickness. Shortly after birth Koenig applied a ligature to the middle of the connecting

band, tightened it daily, and, at last, successfully divided the remnant of the band with the knife. In the two cut surfaces represented as left after this division, no appearance of peritoneum is seen. The only

Fig. 2.

other point noted by Koenig in regard to this case of—as he terms it—*Gemelli sibi invicem adnati, feliciter separati*—is that the operation on the two sisters was not followed by convulsions in either.

[To be continued.]

OBSTETRIC MEMORANDA.

[UNDER this head, we shall, from time to time, as materials come to hand from correspondents, publish records of cases remarkable in themselves, or illustrating points of interest in obstetric practice, therapeutic or manipulative. We shall probably in this way preserve from oblivion the notes of very many useful and instructive occurrences in private practice; for the great obstetric experience is that—for the most part hitherto unwritten—of the great body of general practitioners throughout Great Britain. We will only ask those who may forward cases for record, to relate them with the utmost brevity, and equally to condense any appended remarks.]

CASE OF TWINS, OF WHICH ONE WAS IMBEDDED IN THE PLACENTA.

By JOHN BROWN, L.R.C.P., Oldbury.

I WAS called lately to attend a lady in her sixth confinement. I found, on examination, the os uteri dilated to about the size of a five shilling piece, and the membranes entire, and presentation natural. In the course of a short time, the membranes ruptured spontaneously, and the nurse sent for me. I found the head in the natural position, but the os not fully dilated. I left for a short time; and upon my return, I found another bag of membranes, which were entire. The os being now fully dilated, I ruptured them. The pains followed regularly, and the child was expelled in due course. I expected a case of twins, from the fact of two lots of membranes. I at once examined the patient, but there were no signs of a second child. In the course of half an hour, the placenta followed. From its peculiar appearance, I was induced to examine it minutely, and I found imbedded in the substance of it a perfect fetus of about three months' gestation.

HAND AND FUNIS PRESENTATION: VERSION.

On the morning of January 27th, 1869, I was requested by a midwife to visit a poor woman in labour. Upon examination, I found the hand and a loop of the funis presenting externally; both were cold. The patient had been in labour twenty-four hours; the membranes ruptured six hours before I was summoned; the uterus was firmly contracted round the child; the pains frequent and tolerably strong, but, of course, without any avail. With much difficulty I succeeded in passing my left hand into the uterus, and found the child lying in the abdominal-posterior position, the feet being at the fundus uteri. I brought the feet down, and with considerable trouble effected delivery. The child was still-born, a female, and it was the mother's first labour. She subsequently did well. I believe hand-and-funis presentation in primiparae to be sufficiently rare to merit notice.—C. S. D.