Mursinna, Osiander, Weissbrod : a study of forceps / by Alban Doran.

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A Study of Forceps

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A STUDY OF FORCEPS.

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I. Mursinna's Forceps.

Among the obstetrical instruments in the series which once formed the Museum of the Obstetrical Society of London and is now deposited in the Museum of the College of Surgeons as a loan collection from the Royal Society of Medicine, is a very powerful forceps of the Levret type. Each limb is forged out of one piece of steel. The left bears a pin in the depressed portion of the lock, and a screw is fixed below the lock forming an axle on which revolves a radial block-lock $2\frac{1}{2}$ inches (6·35 cm.) in length. Immediately above the lock is a deep groove made to receive the free end of the block-lock. The right blade is slightly wider in its shank at this point, in order to check the bolt, and a hole in its lock portion receives the pin in the left limb. When the block-lock is fixed in the groove the lock is complete, whilst when it is rotated downwards the blades can be detached. The handles are flattened laterally, not rounded, and perfectly smooth, and their ends are rectangular. The blades bear a strong pelvic curve. The lowermost limits of the fenestræ show evidence of a brazing, probably for traction purposes, a feature detected by Mr. Barry Hopkins of Messrs. Arnold and Son, who has examined this instrument.[1] It is interesting in relation to Saxtorph's and Osiander's practices presently to be noted. The maker's name " Gribel " is cut into the left blade.

The weight of this forceps is 2 lb. (908 gram.); its length 18 ins. (45·7 cm.), the length of the blades 9 in. (22·8 cm.), their breadth $1\frac{3}{4}$ in. (4·4 cm.). The greatest breadth across the blades is $2\frac{5}{8}$ in. (6·6 cm.), and the distance between their tips when closed $\frac{5}{8}$ in. (1·7 cm.). The length of the fenestræ is $6\frac{3}{4}$ in. (17·1 cm.) and their breadth $\frac{3}{4}$ in. or nearly 2 cm.

1. It is on the authority of Mr. Hopkins that I have made use of what he has explained to me as the correct terms for the mechanical contrivances in the instruments described in this article, such as "block-lock" for the bolt, "thumb-piece" and "pin."

Mursinna's Original Description of His Forceps.

This forceps is described and figured by Mursinna himself in the first volume of his *Neues Journal für die Chirurgie, Arzneykunde und Geburtshülfe* (1803), p. 135, and Plate I. I must here express my deep obligation to Dr. Kuntze, Oberstabsarzt at the Kaiser-Wilhelms-Akademie für den Militärarzte Bildungswesen, Berlin, for the loan of the copy of Mursinna's *Neues Journal* from the library of that institution. No copy of this particular volume is preserved in the libraries of the College of Surgeons and the Royal Society of Medicine. I recently sent a sketch of the College forceps to my friend Professor August Martin, who kindly took the pains to identify the instrument as Mursinna's from the original forceps in the Museum of the Kaiser-Wilhelms-Akademie, and Professor Martin referred me to Dr. Kuntze for the inventor's original account of his forceps. A similar instrument, Professor Martin informs me, is preserved in another Museum in Berlin.

Mursinna's original description of his forceps is placed at the end of his Annual Report of Births in the *Charité*, Berlin, 1801-2. There were 260 labours and the forceps was applied in five only. Mursinna declares (*loc. cit.*, p. 128) that he never made use of the forceps save when the patient's condition was so grave that no other measure would ensure speedy delivery. Thus, as we shall see, though Mursinna took his lock from Osiander, he differed totally from that great obstetrician in his sparing use of the forceps. In 2 out of the 5 forceps' cases the patients were multiparæ with the abdomen highly pendulous; in 2 labour was delayed in the second stage, owing to the size of the fœtal head; and in the fifth labour was prolonged on account of uterine inertia. All the 5 children and 4 of the mothers were saved, in the fifth case the mother died in the fifth week, apparently from puerperal fever. Mursinna concludes his report with a short note describing the instrument which is the subject of this memoir. He speaks of it as "my improved forceps,[1] which he had used in all the five instrumental cases in the *Charité* series and also employed in private. He was of opinion that, as it had proved satisfactory in his hands, a note about it might be of interest to obstetricians. His forceps, he reminds us, is largely modelled after Levret's instrument, but he made it longer and improved the blades and handle. It measures two inches longer than Levret's and is, therefore, he finds, easier to apply to the head at the brim, and to draw down the head when accurately fixed. The

1. Bei dieser Gelegenheit habe ich zugleich meine verbesserte Zange, die ich in der *Charité*, und ueberhaupt im Gebrauch habe, mit abzeichnen lassen" (*loc cit*, p. 135). It is not quite clear whether he meant "my improvement on forceps designed by others" or "my improvement on my own earlier design." This question will be discussed further on.

blades are fenestrated, but their inner surfaces are well rounded off, without prominent borders, and are made perfectly smooth so as to press evenly on the fœtal head. The handles are longer than Levret's and almost straight, so that they may be firmly and comfortably grasped without fear of dangerous compression of the fœtal head. Lastly Mursinna states clearly that the lock is adopted from Osiander's forceps, for he had found that that obstetrician's joint and block-lock were easier of adjustment and firmer, and on that account more fit for their purpose, than all the other locks of other forceps that he knew of.[1] Yet Mursinna, unlike Osiander, retained the fenestræ and used the forceps—his own instrument—very rarely.

Mursinna represents his forceps as of the natural size, which I find on measurement to be 17 inches (43·18 cm.), being one inch shorter than the College specimen. The blades, in one figure, are closed and the swing block-lock, fixed by a screw on the handle of the left or male blade, is represented with its incurved free end lying in a notch on the left blade above the lock. This is the same mechanism as in the College specimen. The male and female, or right blade, are also figured separately. The pin in the left blade is identical with that in the College specimen. On the other hand Mursinna figures the block-lock with a small thumb-piece to fix it in the groove in the blade. Most probably this contrivance was found to be superfluous and therefore was omitted in the College specimen. There is also a notch in each handle below the lock to allow of the passage of the block-lock over the handles, as is shown in the tracing which I have taken from Mursinna's plate, where it is represented as fixed into the notch in the left handle. These notches in the handles, also represented in Kilian's *Armamentarium Lucinæ Novum* (Pl. xxiv.) are omitted in the College sample, so it is clear that they ultimately proved superfluous. The inventor or his pupils probably found that the blades could be disarticulated and packed without them. The handles have rectangular ends as in the College forceps, but both ends could be unscrewed. The handles are rounded and seem rather more slender than in the College instrument. Kilian (*loc. cit.*) represents a second forceps marked "Mursinna," with very solid handles, flattened laterally, as in the College forceps, but the lock is a button-screw of the older French type, the instrument being a modified, lightened "Levret." Mursinna, in his account of his forceps here quoted, admits that it was largely modelled after Levret's instrument. The sample in the College is transitional. Its lock is of the Osiander type as in Mursinna's "improved" forceps,

1. "Das Schloss habe ich von der Osianderschen Zange entlehnt. Ich finde diese Zusammenfügung und den Ueberwurf bequemer und fester, folglich zum Gebrauch nützlicher, als alle die Schlösser derjenigen Zangen, die ich kenne. Ich hoffe, Herr Osiander wird mir meine Freiheit verzeihen."

its handles are solid and flattened laterally, as in Kilian's second forceps marked "Mursinna." I can find no notice of the second instrument in Mursinna's works, where as has been shown he states in full how he followed Levret but adopted Osiander's lock in his "improved" forceps. Hence we may infer that this block-lock forceps was an improvement on an earlier instrument of his own, little if at all modified from Levret's. On the other hand it is just possible he found that the Osiander-lock was inconvenient and reverted to Levret's type of forceps.

II. Mursinna: His Life and His Work.

Carl Ludwig Mursinna was a very remarkable man, although Ingerslev makes no mention of him in his *Geburtszange*, whilst all that is recorded about him in Siebold's *Geschichte der Geburtshülfe* is the unfortunate fact that he performed symphyseotomy once but with a fatal result. The child was dead and was extracted with the forceps, and the mother died on the same day. The operation was performed in November 1815, and the operator did not neglect to publish the case.

Mursinna in the course of his long life went through varied experiences in other fields, especially battle fields, although he gained deserved distinction as an obstetrician. He was an entirely self-made and self-taught man, an "Autodidact' 'as the Germans say. He was blessed with a highly robust constitution so that in his old age he served in the field as an army surgeon throughout the terrible Jena campaign in 1806, and was once more in the field in 1811, though he had served as a surgeon in the seven years' war. As late as 1815 he actively superintended the care of the wounded sent to Berlin in the Waterloo campaign, and as above related he likewise performed a symphyseotomy.

Mursinna began life[1] as a barber-surgeon in his native town of Stolp, Pomerania. After receiving instruction as an apprentice to a municipal medical officer in the port of Colberg, he set out for the field in 1760. Already Frederick the Great's reverses had been retrieved and Mursinna returned to civil practice with the victorious army of his country in 1763, evidently girt with professional laurels of his own. By 1775 he was medical officer to the *Charité*, Berlin, where he practised obstetrics as well as medicine and civil surgery. The war of the Bavarian Succession called him once more to the field in 1778. In 1780 a grave epidemic of dysentery occurred in Westphalia; Mursinna had become by this date a man of some importance,

1. Gurlt and Hirsch, *Biographisches Lexicon der hervorragenden Aerzte aller Zeiten und Völker*, give the date of his birth as December 17, 1744, but make him out as 89 years old at his death in May 1823.

as the authorities sent him down to that province and he published a report according to their request.

Returning to Berlin, he took not only to hospital and private practice but also to active literary work, continued through the days of the French Revolution, and the ruin, deliverance and triumph of his own country. By 1782 some medical and surgical observations appeared,[1] but he must have had already by that date much experience in obstetrics, for in 1784 his *Abhandlungen von der Krankheiten der Schwangeren, der Gebärenden, Wöchnerinnen und Saüglinge* was published and went through a second edition. It was a work of considerable merit and is to be found in some medical libraries in London. In 1787 Mursinna was made Professor of Surgery and General Surgeon. While he was doing obstetrical work and amputations, he likewise undertook ophthalmic surgery, performing in forty years 908 cataract operations with, it is recorded, only 41 complete failures. In 1795 he once more went to the field of battle, the Prussian army being engaged in a campaign in Poland.

From Poland, Mursinna returned to Berlin. He took to the pen again, and was now recognized as a great operator and obstetrician. Hitherto, at least in the works above mentioned, he wrote nothing about the use of the forceps. But in 1801 he started his *Journal*, and in 1803 published in its pages the account of his own forceps which is reproduced in this article. The *Journal*, some volumes only of which are preserved in the library of the College of Surgeons, ran from 1801 to 1815, but was suspended during the war in 1806-7. Mursinna held the appointment of surgeon to the Pepinière-Schule für Militärarzte, now the Kaiser-Wilhelm-Akademie für den Militärarzte Bildungswesen, where a sample of his forceps is still preserved. Mursinna also contributed to several other serials, especially to Stark's *Archiv*. He was very busy in the field during the Jena campaign. His jubilee of fifty years' service was kept in 1811, and his pupils greeted him with enthusiasm on that occasion, for he was a good teacher and an eloquent speaker, his annual addresses at the Pepinière in 1804, 1809 and 1811 exciting great interest. Mursinna, by 1813, was too old to go to the field, but was active in Berlin. He did not resign his office of Surgeon-Director to the *Charité* until 1818 and he lectured until 1820. Mursinna died three years later, at the age of 89. His colleagues apparently, and his pupils more decidedly, admitted that he always taught commonsense, and condemned quack doctrines and over-confidence in any particular teacher.

1. *Medicinisch-chirurgische Beobachtungen.* A copy is preserved in the library of the College of Surgeons and a copy of the *Neue Beobachtungen* (1796) is to be found in the library of the Royal Society of Medicine, with "Royal College of Surgeons" stamped on its title-page.

We will now turn to a much better remembered obstetrician, Osiander, because as we have seen, Mursinna avowedly adopted his lock, yet though experienced in midwifery and the inventor of a forceps, he rather dissuaded than encouraged his followers in its use, whilst Osiander did all he could to generalize instrumental delivery as beneficial to the child as well as the mother.

III. Osiander.

This distinguished obstetrician appears to have been the first advocate of the forceps as an instrument which should be used and not unsparingly by every practitioner. His principal teacher, George Stein, was an out and out supporter of the forceps, insisting on the superior merits of Levret's instrument, and rejecting all modifications, "deformed bastards" as he called them. As Stein's instruction was delivered about 1781, there were, as Mulder testifies, a considerable number of *missgestaltete Bastarde* already in use. Stein held that compression played the chief share in the action of the forceps, and affixed to the handles of Levret's forceps a scale or "labimeter" to ascertain the size of the fœtal head and the degree of compression exercised by the operator. But neither Mulder nor Kilian figure Stein's labimeter. About forty years ago Kristeller of Berlin devised a forceps with a scale, to measure the degree of compression, on its handle, and a sample is preserved in the Obstetrical Society's collection at the College of Surgeons.

The pupil became a great advocate of the forceps, but it would be interesting to know what Stein, who lived till 1803, thought of Osiander's remarkable modifications. Friedrich Benjamin Osiander was born in Zell unter Aichelberg, in Würtemberg, in 1759. He took his degree at Tübingen University in 1779, and immediately entered into private practice at Kircheim unter Teck. He became known as a very industrious young practitioner and gained a large midwifery practice; before he had reached the age of thirty he grew convinced that it was the duty of the doctor to shorten delivery as much as possible when the natural powers failed and for that aim turning or the forceps was the best agent. From that conviction he never wavered, though he gave up his practice and studied under professors of obstetrics. The first was Siegwart of Tübingen (1778), then Osiander studied in Strassburg a year later. But in 1781 he worked under Stein in Cassel. Stein placed high trust in his pupil, leaving him in charge of his private home and much of his private obstetric practice. Osiander declared that Stein only confirmed his own views and experience by teaching him in a scientific and systematic manner the advantages of the forceps, skilfully applied. Then Osiander returned to Kircheim, where he managed to resume his large private obstetric practice and demonstrated and defended

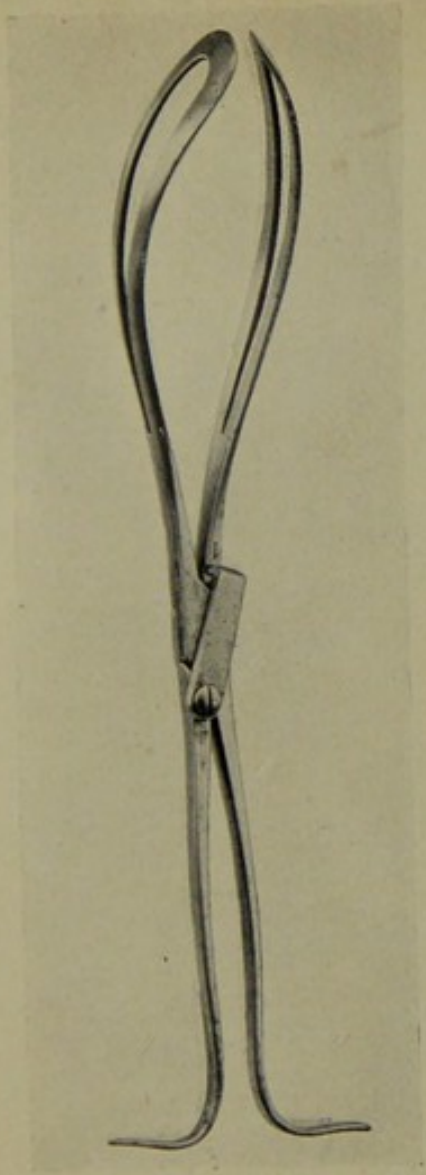

Fig. 1.

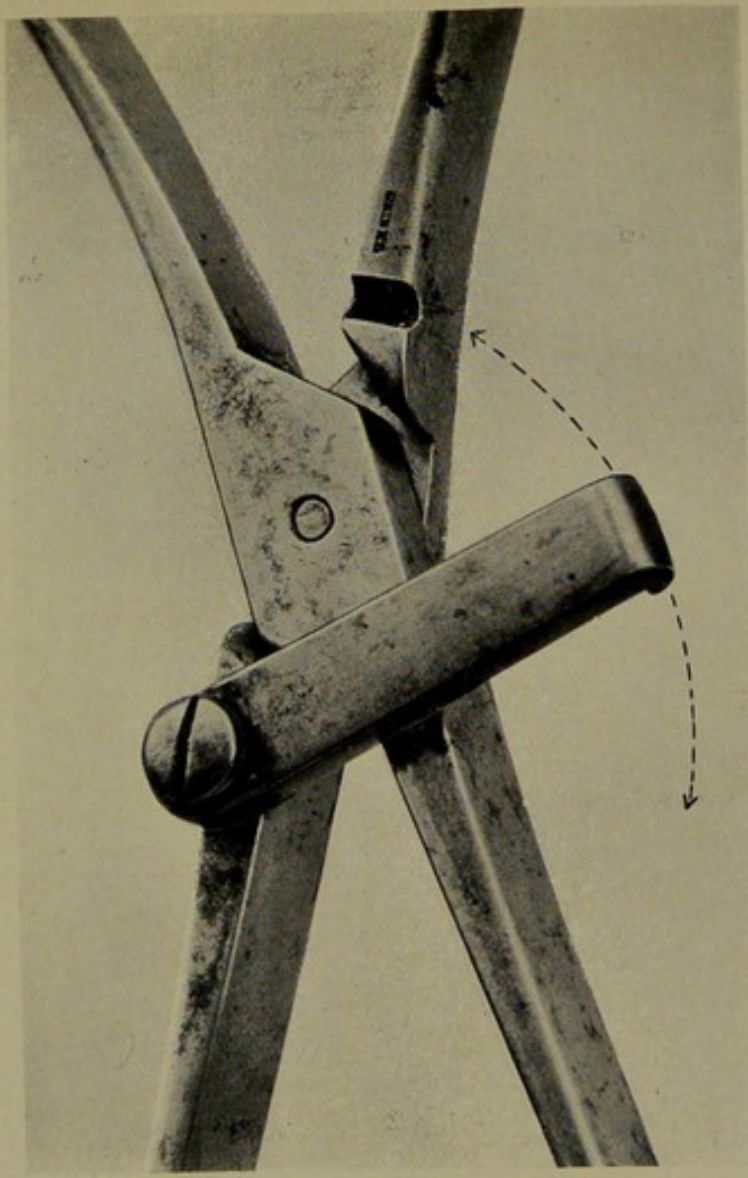

Fig. 2.

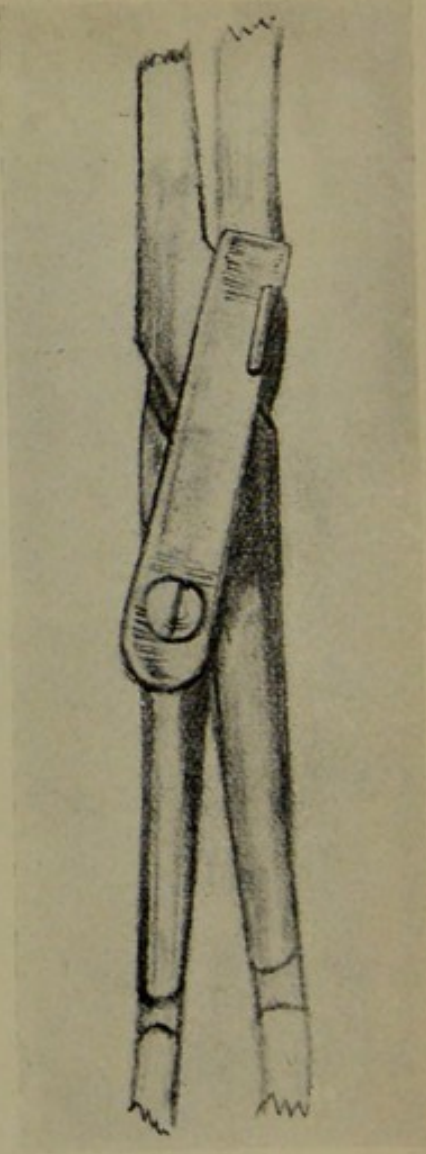

Fig. 3.

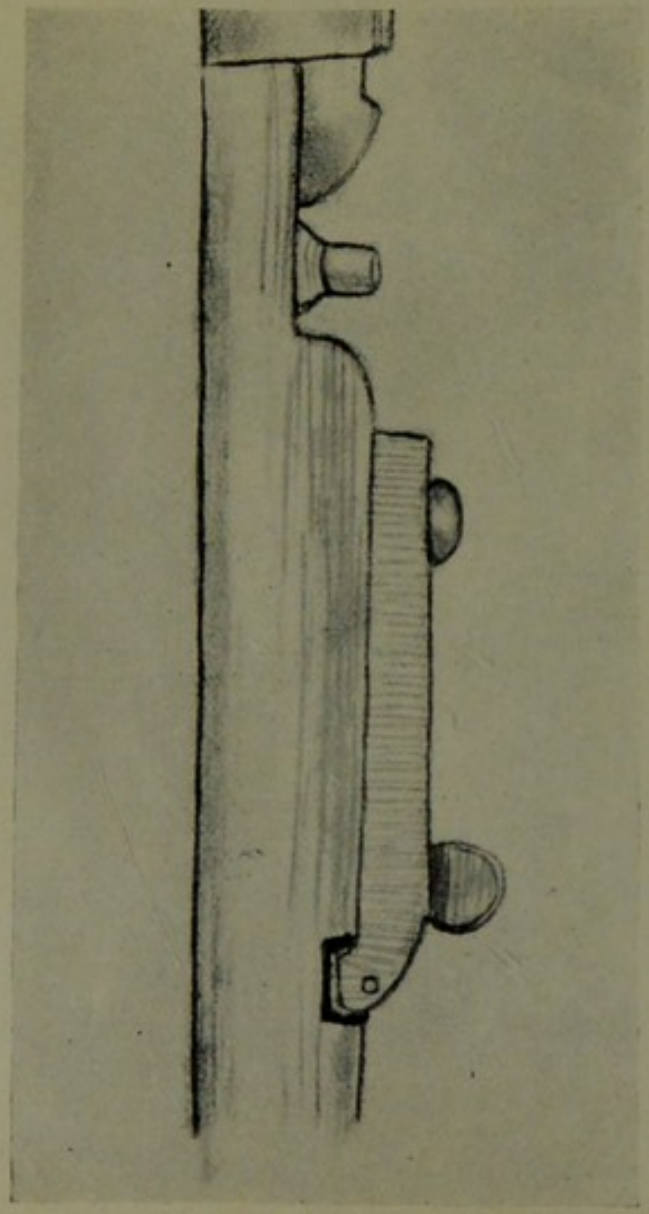

Fig. 4.

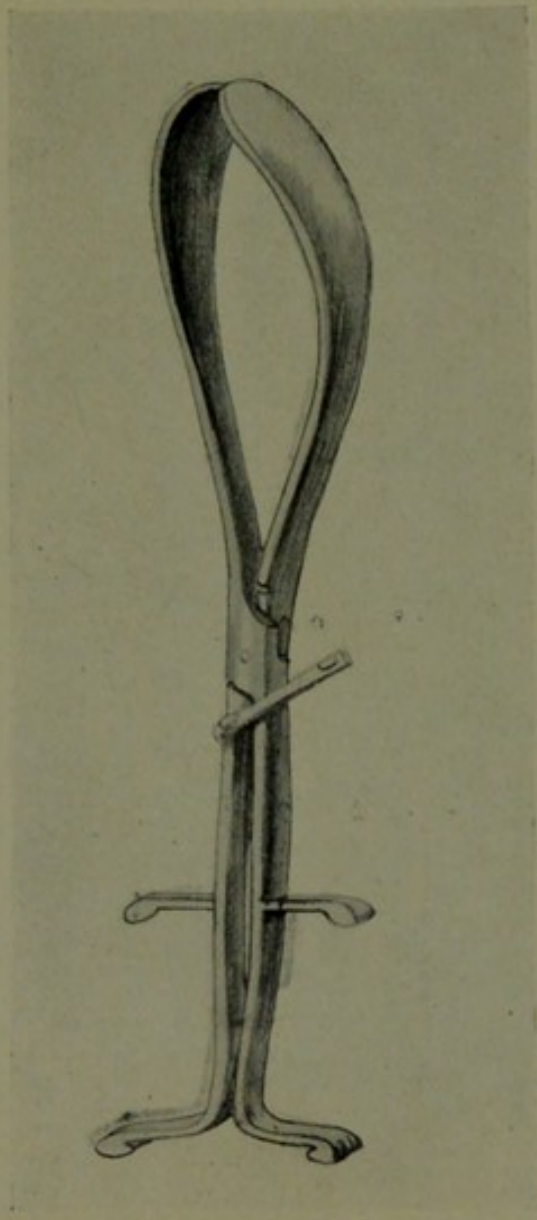

Fig. 5.

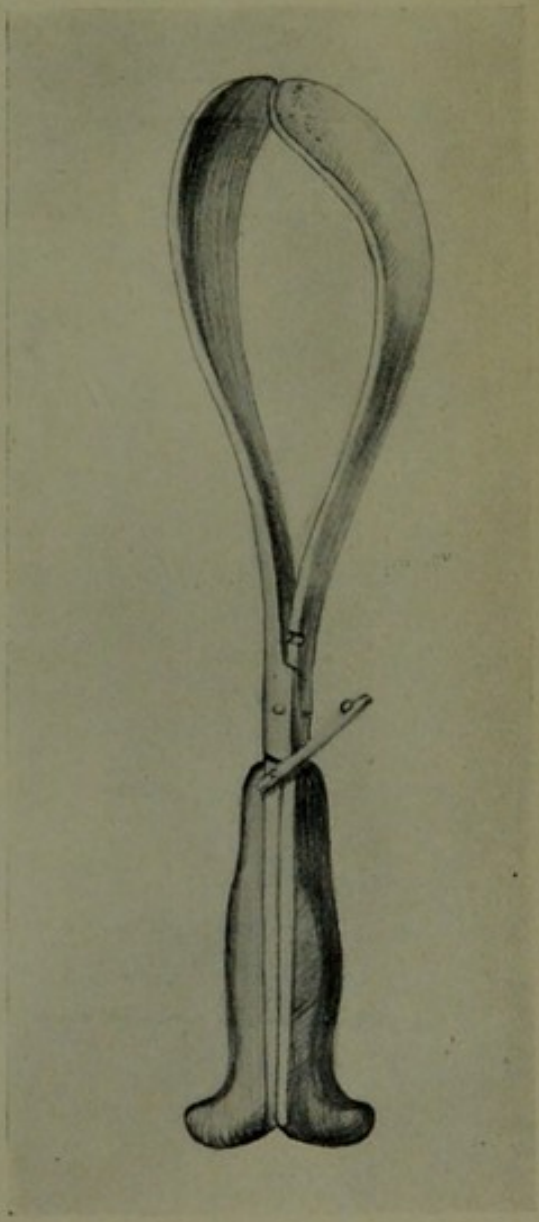

Fig. 6.

the use of the forceps before sceptical and hostile fellow citizens. He also studied the history of obstetrics from the earliest times. By 1792 he not only had used the forceps freely, in 39 out of 168 cases in fact, but he had performed his first perforation, which was to be his last. He abhorred that operation and taught that the forceps should be used up to the limit where Cæsarean section was absolutely demanded—a conjugate of $2\frac{3}{4}$ inches or 7 centimetres.[1] Known by 1792 as a most experienced obstetrician, he accepted the professorship of obstetrics at Göttingen. As director of the maternity institute attached to the University he worked with the most exemplary diligence for nearly thirty years. His teaching was strenuously opposed by Lukas Johann Boër (1751—1835) of Vienna. The latter no doubt was right in objecting to much of Osiander's teaching, but it must be remembered that Boër in 1790 applied the forceps in delivering an Austrian Archduchess and lost his august patient within a few hours, although he saved the child, a princess. This, and domestic troubles, preyed on Boër's mind. The literary war was continued after Osiander's death in 1822 by his son, John Frederick Osiander, D'Outrepont, Boër's pupil, defending his teacher. Ingerslev ably throws light not only on the teaching but also on the practice of Osiander. Forty pulls of the forceps marked the limit where if extraction failed perforation was allowable, but Osiander himself boasted that he had pulled 175 times in some cases and 100 times in a good number, yet without the slightest harm to mother or fœtus. Holding fast to his determination, he never did a craniotomy in the Göttingen maternity. Between 1792 and 1822, 2,540 labours were treated in that institution. Out of these 1016 were forceps cases and 111 were delivered by turning. Forty per cent. of forceps cases naturally called for the criticism of Boër and even less hostile obstetricians. In his first year, 1792, Osiander used the forceps in 8 out of 16 cases and performed version twice. In 1801 we find a "record" of 59 forceps cases out of 93 deliveries, with 8 versions and 1 Cæsarean section! 13 over half the total looks like "meddlesome midwifery." At that same date, as has been shown, Mursinna applied his forceps in 5 out of 260 labours, or under 2 per cent. In his later years, as Gurlt and Hirsch point out, Osiander used the forceps much less frequently, and it is significant that his son, also professor of obstetrics, employed it even less, though he strongly defended his sire against the assaults of Boër and his pupils.

Osiander was the author of several text-books, a *Handbuch der Entbindungskunst*, a *Lehrbuch der Hebammenskunst*, and a *Lehrbuch der Entbindungskunst*. The third was a good, though rather partial history of obstetrics, the model for many which succeeded it.

1. He also objected to the induction of premature labour and to symphyseotomy.

Another work was a singular little illustrated book *Epigrammata in Diversas res Musei sui Anatomico et Pinacothecæ cum figuris aere incisis et expressis*, a copy of which is preserved in the Library of the College of Surgeons. Osiander's warfare with Boër in medical journals is accomplished—and long forgotten.

Siebold, who was personally acquainted with him, declared that Osiander won laurels that could never fade and that no foe could tear from his brow.[1] He paid the greatest attention to the forceps, using at first a lengthened Levret (the shortest of Levret's three forceps measured 15½ inches and the longest 18 inches!), and then inventing one, very long and strong, which could be used by him even when the head lay very high. Gurlt and Hirsch, in a good summary of Osiander's life, conclude that in accordance with his teachings and practice, Osiander's merit lay exclusively in the direction of strict operative technique, correct application of the forceps and dexterity in the performance of version. He invented a large number of instruments, pelvimeters, dilators, metrotomes, hysterotomes and vectes, all of which soon fell into disuse, like his method of performing Cæsarean section and like—most interesting of all—his obstetric forceps.

Osiander's forceps was indeed a remarkable weapon, bigger in fact than not a few patterns of the cephalotribe. Whilst his master Stein denounced all modifications of Levret's instrument, Osiander designed a forceps different from all previously constructed. The blades were not fenestrated, for he considered that solid blades allowed of the best possible hold of the fœtal head, opposing to it a wide uniform surface. Each handle bore two finger rests, one was the ordinary projecting terminal portion, forming almost a right angle, familiar in foreign forceps, the second was a flange not immediately below the lock as in Aitken's, Busch's and, much later, Simpson's forceps, but halfway between the pin end and the lock. The earliest pattern of Osiander's forceps was provided with a rack and lock at the free end, such as Gayton added to his straight forceps in 1863, but this was omitted as unnecessary, we may presume, in the later pattern which we reproduce from Kilian (*loc. cit.*, p. cxxiii.). Ingerslev reminds us that Osiander likened the forceps to two artificial hands, and therefore, contrary to his predecessors and successors, he called the blade corresponding to the left hand the left blade and *vice versa*. Ingerslev, who dwells at full length on Tarnier's great invention, considers that Osiander was the first obstetrician who recognized that something was wanting for insuring the right direction during traction, the problem which the great French obstetrician ultimately solved in 1877. More recently, Dr. J. Munro Kerr refers

1. *Versuch einer Geschichte der Geburtshülfe*, 1845, vol. ii, pp. 598, 602.

to Osiander's practice in respect to traction.[1] He notes how Saxtorph, the Dane, suggested the passing of bands through the fenestræ of the blades with the object of obtaining traction in the axis of the pelvis, and Stein, his pupil, seems to have made use of that contrivance. The practice of pulling on the handles with the right hand and pulling on the shanks with the left, generally termed "Pajot's manœuvre," was described by Osiander, Stein's pupil, though it was really first suggested by Saxtorph.

Lastly, but most to the point in the present article, Osiander set up a lock of his own. He rejected the button screw and the pivot and mortise of the French, and objected to the English lock. The blades were simply opposed, a pin in the left lock fitted into a hole in the right, and a block-lock secured them. This lock is that adopted by Mursinna and figured and explained above. Mursinna, as has been shown, approved highly of it. In Kilian's drawings of Osiander's forceps the block-lock bears a small thumb-piece to fix it in the groove in the blade as in the forceps figured by Mursinna, that contrivance being absent in the Mursinna's forceps in the Museum of the College of Surgeons.

In respect to the actual year in which Osiander's forceps was invented or made public, that obstetrician, according to the "Appendix" added by J. W. Schlegel to his German translation of Mulder's *Historia Forcipum et Vectium*, which was published in 1798, had not up to that date spoken or written of any special forceps of his own design. He had already practised a method of coating the forceps, and presumably other obstetric instruments, with india-rubber. Comparing the date of Schlegel's statement with Mursinna's reference to Osiander's instrument in 1803, it would appear that Osiander's special forceps must have been devised, or at least made known by the inventor in the course of the five intervening years.

Boër, the great opponent of Osiander, objected to the application of the forceps when the head was not arrested at the inlet. That instrument was indicated only when the head lay high. He designed a light and short forceps, fenestrated and with a very slight pelvic curve. The tips of the blades did not touch when the handles were closed. Otherwise, as Ingerslev remarks, Boër's forceps recalled Smellie's.

We may now return to Mursinna. His forceps was a big, heavy instrument, and it bore a peculiar lock, resembling Osiander's in these respects. But Mursinna retained, like Boër, the fenestræ in the blades and in practice refrained still more than the great Viennese obstetrician from the application of even his own instrument.

1. *Operative Midwifery*, second edition, p. 334.

IV. Weissbrod's Forceps.

Only one other forceps, besides Mursinna's, bore Osiander's lock, as far as Kilian can enlighten us. It was designed by Weissbrod and is figured in the *Armamentarium Novum*, Pl. xxvii. Kilian, unlike Mulder, gives no references, but as far as can be made out from Siebold's *Geschichte der Geburtshülfe*, Weissbrod, Director of the Lying-in Hospital in Munich about 80 years ago wrote an *Aufsatz über die zweckmässigste Construction der Gerburtszangen*, published in Textor's *Neue Chirurgie*, vol. 2, in 1825, and presumably the drawing reproduced by Kilian was published with the inventor's paper. The blades are of Osiander's type, non-fenestrated, the block-lock forms a replica of Osiander's second pattern, but the handles are coated externally with wood, and everted at the free end, a kind of compromise between the bulging palm rest, so familiar a feature in English forceps and the curved or rectangular hooks of French instruments, as well as of Osiander's and Mursinna's. There is no flange or finger-rest and hardly any shoulder to the handle.

In conclusion, time and the experience of later obstetricians has not favoured Osiander's and Mursinna's lock, for it rapidly fell into disuse. Still it seemed to be an ingenious piece of mechanism which deserved rescue from oblivion.

I must express my thanks to Professor Keith and the President and Council of the Royal College of Surgeons for allowing photographs of the forceps to be taken for illustrating this article.

APPENDIX.

The Origin of the Osiander Lock.

Dr. Edward Martin, in a pamphlet entitled *Die Gebäranstalt und die geburtshülflichen Kliniken der Universität Jena*, figures (p. 74 and Pl. ii, fig. 1) some old forceps preserved in the museum attached to the Jena Lying-in Hospital, formerly in the possession of E. Martin's predecessor, J. G. Stark. One instrument is described by Martin as without doubt one of the oldest type of forceps, but its inventor has been forgotten. It is represented as a typical heavy solid steel French forceps, with unfenestrated blades bearing a wide cephalic curve, and the handles are turned up at their extremities. The lock at first sight appears almost identical with Osiander's. There is a pin which fits into a hole in the opposite limb. But the pin has a broad, flattened head and the lock is not closed by the bolt-lock revolving on a screw. There is a separate piece of metal, a sliding bar which bears a hole prolonged into a slot. The head of the pin was passed through the hole and the bar slid upwards, so as to make fast the lock. Osiander knew Stark, and contributed to his Journal. The contrivance here described may have suggested the

Osiander lock, which in that case would be a simplification, as the bolt-lock attached to the forceps by a screw did not require to be fixed on and taken off whenever the forceps was employed. Mulder does not figure any forceps with the sliding bar, or with Osiander's bolt-lock in his *Historia Forcipum.*

Illustrations.

Fig. 1. Mursinna's forceps. Photographed from a sample in the loan collection of obstetrical instruments in the Museum of the College of Surgeons. The lock is nearly closed by the bolt- or block-lock.

Fig. 2. Lock of the same instrument. The block-lock is rotated downwards, exposing the notch in the left blade designed to receive its incurved end, and the pin in the left blade fitting into the hole in the right or female blade.

Fig. 3. Lock as figured in Mursinna's plate illustrating his original account of his forceps, *Neues Journal für die Chirurgie Arzneykunde und Geburtshülfe,* 1803, p. 135, and Pl. i. The block-lock bears a small thumb-piece to fix it in the groove in the left blade and both handles are grooved, to allow of the rotation downwards of the block-lock.

Fig. 4. Portion of left limb as figured in Mursinna's plate, showing the pin in the lock which is identical with the pin in the College sample, and the block rotated downwards with its incurved free end lying in a groove in the handle, fixed by the thumb-piece.

Fig. 5. Osiander's forceps, second pattern. Drawn by A. Reid, after Kilian, *Armamentarium Lucinæ Novum,* Pl. xxiii. Showing block-lock and groove in left blade, the mechanism adopted by Mursinna.

Fig. 6. Weissbrod's forceps. Drawn by A. Reid after Kilian, *loc. cit,* Pl. xxvii. Showing block-lock and groove in left blade.