Three Demonstrations ON MALFORMATIONS OF THE HIND END OF THE BODY.

GIVEN AT THE ROYAL COLLEGE OF SURGEONS, ENGLAND.

BY

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II.—HYPOSPADIAS AND ALLIED CONDITIONS.

THE specimens for to-day's demonstration illustrate a subject in which Hunter's knowledge was a hundred years and more ahead of his time. On the table are his celebrated preparations of the sexual organs of "free martins," of the foal-ass, of the sheep from the West Indies, and others described in his writings. The anomalous condition seen in these and similar preparations he ascribed to an absence of the "stimulus of perfection," which the fully normally formed sexual organs exercise on the development and physical health of the body. The phrase "stimulus of perfection" has been criticized as vague and unmeaning by many of Hunter's commentators, but to us of a later generation, who recognize the influence which internal secretions of various organs exert on the physiology of the body, it has a very definite significance. He even asserted that "the penis, the urethra, and all the parts connected with them are so subservient to the testicles that I am persuaded few of them would have existed if there had been no testicle" (vol. iv, p. 29, Palmer's edition). We are quickly coming round to Hunter's way of thinking. In recent years Professor Shattock¹¹ has shown that when the aged hen puts on the feathers and manners of the cock—a transformation which you can see in specimens preserved by Hunter—her ovaries have assumed certain testicular characters, and we may suppose are then capable of throwing into the circulation an internal secretion similar to that of the testes. In the third month of fetal life the sexual features are being differentiated. Professor Arthur Thomson¹² has shown that the pelvis then takes on its special sexual characters; we infer that the sexual glands must be then acting on the whole organism. It was clearly Hunter's opinion that the primary cause of all malformations of the sexual parts of the body is a temporary or permanent imperfection of the sexual glands. It is a matter of regret that the condition of the sexual organs in many of the preparations now shown has not been determined microscopically, but that is a fault which may be mended soon.

Instead of now showing and describing the various specimens illustrating hypospadias and allied conditions, I propose first to bring before you preparations from the comparative anatomy series—many of them prepared by Hunter—which illustrate steps in the evolution of the penis and vulva, so that, when we come to discuss the malformations of these parts, the significance of their various features may be perceived. The evolution of the external genital organs of man and woman necessitated a complete transformation of the cloaca. The Edentates (sloths, ant-eaters) and some of the Rodentia show an interesting stage of the process. In the ant-eater the cloacal lips are widely open (see Fig. 9); the orifice of the urogenital passage (endodermal cloaca) is seen to protrude between the lips of the cloaca, leaving the anal orifice in the depth of the cloaca. The urogenital passage is being separated from the faecal outlet and carried beyond the cloacal orifice.

In the tortoise or turtle, in Echidna (the Australian porcupine, one of the lowest mammalian forms), and in a marsupial, such as the kangaroo, are seen certain stages in the evolution of the penis. In the tortoise (Fig. 10 A) the penis is intracloacal; it is formed by a modification of the ventral or pubic wall of the cloaca. Practically only the glans is free; this is cleft and forms a groove; when erect the margins of the groove approximate and form a canal. When the glans is extruded during copulation, the cloacal walls contract and complete the urogenital passage;

the musculature of the cloaca serves to ejaculate the contents of the canal. Thus, there is a condition of hypospadias, but the contracted walls of the cloaca supplies the blank in the floor of the temporary seminal passage. In Echidna (Fig. 10 B) a further stage is found. The penis is still intracloacal, but the lips of the glans have fused and formed what may be named the phallic canal. The seminal canal is thus made up of two parts:

Fig. 9.—Perineum of female ant-eater (*Manis longicauda*), showing the urogenital passage being protruded from the cloacal orifice, leaving the orifice of the rectum (C) in the depth. A, A. Margins of cloaca; B, urogenital orifice; C, over anus (Dr. Stanley Beale).

(1) the urogenital sinus derived from the endodermal cloaca; (2) of the phallic canal made by union of the lips of the phallic groove. In copulation the glans and part of the penis are extruded, and the hiatus in the floor of the seminal canal (the primitive urogenital orifice) is temporarily closed. In the marsupial the penis is still intracloacal, but is capable of being almost completely extruded. The two parts of the seminal canal are united

Fig. 10.—Stages in the evolution of the penis. (A) stage seen in tortoise; (B) stage seen in Echidna; (C) stage seen in marsupial (kangaroo); (D) stage seen in man. The phallic canal is shaded. 1, Bladder; 2, Wolffian duct (vas); 3, rectum; 4, urogenital sinus; 5, anus; 6, phallic groove and canal; 7, glans; 8, cloaca; 9, cloacal orifice; 10, floor of phallic canal; 11, Cowper's glands; * position of primitive orifice of urogenital sinus.

to form a permanent urethra; by their union the primitive orifice of the urogenital sinus, occluded only during copulation in Echidna, is now permanently shut. The phallic canal forms merely a small part of the urethra (see Fig. 10 C). In man (Fig. 10 D) the penis is permanently extracloacal. The urethra is made by the union of the phallic canal and urogenital sinus, but the first element is greatly reduced in extent, forming merely that part of the urethra contained in the glans; were the primitive uro-

genital orifice to remain patent it would be found under the prepuce in the frenum (see Fig. 10 D).

A cursory examination of the appearances seen in the developing perineum of the human fetus supports the history of the penis as just sketched, and helps us to understand the various conditions of hypospadias. During the seventh week (Fig. 11, I) the lips of the cloaca are pushed apart, and the penis, carrying the labia minora and urogenital orifice, rises from the floor of the cloaca and becomes extruded; in the next stage, about a week later (Fig. 11, II) the urogenital orifice is separated from the anal orifice by the fusion and growth of the labia minora; the passage for semen and urine is seen being carried forwards with the outgrowing penis, leaving the rectal orifice within the posterior fornix of the cloacal orifice. It is the stage seen in Edentates. In the next stage (Fig. 11, III) three further changes are seen: (1) The phallic groove on the perineal surface of the glans is being converted into a canal by the union of the lips of the groove; (2) the anal orifice is now apparent on the perineum, and the cloacal lips (labia majora) are fusing together between the anal

Fig. 11.—Stages in the development of the human penis and perineum. (Drawings by Dr. Stanley Beale after figures given by Kollmann, Keibel, and Hertzog.) I, human embryo 25 mm. long (about seventh week); II, 29 mm. long (about eighth week); III, 31 mm. long (about ninth week); IV, 45 mm. long (about tenth week). A, lips of cloaca (labia majora); B, urogenital orifice being carried to the surface between labia minora (a a); C, penis becoming extracloacal; D, tail; E, urogenital orifice; F, anus; G, meatus.

and urogenital orifices (Fig 11, III); (3) the urogenital orifice, bounded by the labia minora, is being carried out from between the cloacal lips (labia majora) and has assumed a linear form. In a further stage (Fig. 11, IV) the male urethra is almost complete. The orifice of the urogenital sinus has been carried forwards with the outgrowth of the penis, and is now a small opening on the under surface of the penis behind the glans. The phallic canal is formed, and when the urogenital orifice is closed by the fusion of its lips to form the frenum praeputii the urogenital products will escape by that canal at the permanent meatus in the glans. The scrotal raphe is now apparent (Fig. 11, IV), and extends from the anus to the labia minora, which end at the penis in the frenum praeputii. Stages III and IV make clear the manner in which the raphe is formed. In Stage III the floor of the urethra, from the membranous part to the part in the glans (phallic canal), is open, that opening being the urogenital orifice; the labia minora, which form its margin, unite behind in a falciform lamella which is the fourchette. When the labia majora (cloacal lips) unite they do so within the substance of the fourchette; as they unite the fourchette is raised up to the surface of the perineum and scrotum to form a seam or raphe. The fourchette grows forwards

towards the glans as the labia majora fuse within it, forming a floor to the penile urethra and uniting the lips of the urogenital orifice (labia minora). Hypospadias represents various stages of arrest of the process just described.

The description just given is founded on the investigations of a number of men. First and foremost there is the work of Keibel¹³; it was he that showed that the seminal canal of *Echidna* arose by a closure of the phallic groove; Broek¹⁴ has traced the stages in marsupials, and shown that the urethra of the male is a composite structure arising by the fusion of phallic canal and urogenital sinus. Berry Hart¹⁵ recognized at an early date the separate formation of the part of the urethra within the glans, here named the phallic canal; recently Lichtenberg¹⁶ has investigated its formation in man, and pointed out its relationship to the various forms of hypospadias. Fleischmann¹⁷ does not think the margins of the urogenital sinus fuse to form the urethral floor; he regards the urogenital orifice as being carried forwards by the growth of the penis, the floor of the urethra being formed by a corresponding growth of the fourchette.

Having thus given rather a lengthy account of the development and morphology of the external genital organs, I now turn to the preparations illustrating their malformation. The specimens at our disposal are arranged in the accompanying table in seven groups, the classification adopted seeming to me the most natural.

List of Specimens showing Hypospadias and Allied Conditions.

	Museum of Royal College of Surgeons.	Metro-politan School Museums.	Total.
GROUP A:			
Eunuchs	3	0	3
GROUP B:			
Minor degrees of hypospadias ...	1	2	3
GROUP C (Gynaecoid males):			
Males with arrested development of the floor of penis—			
(a) Human	4	5	9
(b) Animal	13	5	18
GROUP D (Android females):			
Females with development of floor to vulva—			
(a) Human	6	10	16
(b) Animal	1	0	1
GROUP E:			
Imperforate penile urethra ...	2	3	5
GROUP F:			
Anomalous cases	1	1	2
GROUP G:			
Imperforate vagina	2	4	6
	33	30	63

GROUP A.—CONDITION OF THE PENIS IN EUNUCHS.

In the museum there are three specimens of eunuchs, one belonging to the Barnard Davis collection, another presented by Mr. Edmund Owen, and a third by Dr. Lunn. These specimens are produced now (1) because they show a partial atrophy of all the parts relating to the penis and penile urethra, and (2) because they afford me the opportunity of drawing attention to the very clear conception Hunter had formed of the functional significance of the "bulb of the urethra." The bulb, as Hunter pointed out, is small or almost absent in eunuchs. In most modern textbooks of anatomy the term "bulb" has come to be applied to the enlarged posterior end of the corpus spongiosum, but that was not Hunter's conception; he applies the term to the dilatation of the urethra into which the glands of Cowper pour their secretion, and in which the seminal and prostate fluids accumulate during copulation; the bulb is emptied during the paroxysm by repeated contractions of the bulbo-cavernosus (ejaculator seminis of Hunter—formerly, as a constrictor of the cloaca, it also served this function). The constrictor urethrae, situated on

the proximal side of the bulb, prevents the reflux of its contents towards the bladder. Hunter regarded the bulb and its musculature as an apparatus for the forcible emission of semen; the transformation which is seen to take place in the perineum of the male fetus during the second and third months is connected with the adaptation of the urogenital sinus to serve as an ejaculating and conducting apparatus in place of the cloaca, as in the tortoise. An atrophy of the bulb, of its musculature, or an arrest of development may be regarded as due to the absence or the imperfection of the genital glands.

GROUP B.—MINOR CONDITIONS OF HYPOSPADIAS.

In my opening demonstration I remarked we should discover both the merits and defects of the museum, and here we reach a very considerable blank, for there is only one preparation in the museum to show the minor degrees of hypospadias, apparently every one supposing that such a common condition must be already amply represented. In the museums of the metropolitan medical schools I saw only two specimens, and yet in a recent paper Dr. Edington¹⁸ was able to give an account of 28 cases. Thanks to the courtesy of the staff of the London Hospital, I had opportunities of seeing many cases and of forming a first-hand opinion as to the nature of the defects. Minor degrees of hypospadias may be grouped in the three stages shown in Fig. 12; A, stage 1 of that

Fig. 12.—Three types of hypospadias—(A) in which the groove in the glans (phallic groove) is open, and urine passes by the urogenital orifice; (B) in which the floor of the phallic groove is formed, but the urogenital orifice is unclosed; (C) in which the phallic groove is unformed or obliterated and the urogenital orifice serves as a meatus. (Drawn by W. Finerty.) 1, Urogenital orifice; 2, frenum praeputii; 3, phallic groove and canal; 4, permanent meatus.

figure, shows a condition recalling the tortoise form—the part of the urethra formed by the union of the lips of the glans (phallic groove) remains open, thus forming a furrow which terminates behind at the opening of the urogenital sinus. The orifice of this sinus serves as a meatus; it is bounded by two lateral folds, which are continued forwards into the glans and frenum of the prepuce, while behind the orifice they unite in a sharp, thin falciform margin, which undoubtedly represents the fourchette of the female vulva, and therefore may be justly named the fourchette. The primitive urethral orifice is thus bounded behind by the fourchette; each side is bounded by a lateral lip continuous behind with the fourchette, and in front with the frenum of the prepuce; and these lateral lips are derivatives of the inner genital folds (labia minora). In Stage II a condition seen in *Echidna* is represented; the groove in the glans is converted into a canal by the fusion of the lips; but there is still a deficiency between the two parts of the urethra; during micturition most of the urine escapes at this deficiency—the urogenital orifice, but some passes into the canal in the glans (phallic canal) and escapes by the permanent meatus.

Stage III represents a condition which is intermediate between the two just described. The groove on the glans is at first filled with epithelium, which serves as a bridge or medium for the fusion of the mesoblast or connective tissue in the lips of the glans. When the fusion of the lips has taken place desquamation of the epithelium thus enclosed in the glans occurs and a canal is formed. If desquamation fails, then the form shown by Stage III is the result. Dr. Berry Hart, who has done so much to elucidate the development of the genital organs, regards the formation of the canal in the glans as a result of the ingrowth of a rod of epithelium, but an appeal to comparative anatomy and to the embryological evidence placed before me by Dr. J. E. Spicer, I have no doubt that the interpretation given here is the more accurate.

In most cases of hypospadias there are seen on the dorsal surface of the prepuce two groups of sebaceous glands forming raised brownish oval areas; they represent the preputial glands of other mammals, and are found constantly in the female in the recess behind the prepuce of the clitoris. They have been described at length by Mr. Shillitoe and myself.¹⁹

The closure of the urogenital orifice (see Figs. 11 and 12), and the complete fusion of the urogenital sinus with the phallic part of the urethra takes place by a fusion of the fourchette and lateral margins of the urogenital orifice in the frenum of the prepuce (Fig. 12). Thus the minor degrees of hypospadias represent arrested stages of development, and it is probable that the arrest will be found, as Hunter suggested, in some disturbance in the later development of the testes in the fetus. In most cases of minor hypospadias the sexual functions are perfect in the adult.

GROUP C.—MALES WITH ARREST OF GROWTH OF THE FLOOR OF THE PENIS (GYNAECOID MALES).

In this group the testes are permanently imperfect, whereas in the last group the testes, at least in the child and adult, appear to yield the secretions necessary for the growth and full emotional life of the individual. The condition of the external organs seen in this group of cases often represents quite early stages of the

Fig. 13.—Hypospadias in a gynaecoid male (perineal view). (Drawn by William Finerty.) a, Phallic groove on under surface of glans; the posterior depression in the groove represents the lacuna magna; b, urogenital orifice; c, labium majus, uniting behind with opposite lip to form scrotum; d, e, labium minus; f, prepuce; g, anus.

Fig. 14.—Similar specimen to last, seen in profile. a, Glans; b, fourchette; c, urogenital orifice; d, prepuce; e, skin of body of penis; f, scrotum.

development of the penis. In the College museum there are 17 specimens, 4 of which are from the human subject; in the metropolitan medical museums there are 10, 5 of which are human. The specimen represented in Fig. 13 may be taken as typical of the group. The penis is only partly extruded between the lips of the cloaca (labia majora) which form the scrotum; it has been arrested in the process of becoming an intracloacal organ. The arrest in the development of the bulb and all the apparatus necessary for the ejaculation of semen is still more marked. The glans is merely grooved; the meatus shown is the orifice of the urogenital sinus; it is bounded by the fourchette behind, and on each side by folds representing the labia minora.

The lateral lips of the orifice end in front on the glans and also in the prepuce on each side of the glans; behind they are continuous with the fourchette. In the fourchette two other lateral folds are seen to meet and fuse, the

point of fusion giving rise to the median raphe. The two folds on each side are (1) the labia majora (the cloacal lips); (2) the intermediate folds, which seem to have escaped notice by former observers. These folds, when traced forwards, become continuous with the skin of the penis—not with the prepuce or skin of the glans, which is an old structure, but with the skin of the body of the penis, which is, comparatively speaking, a new structure. The intermediate folds also meet behind within the fourchette. The fourchette is the primary scaffolding in which the labia majora and intermediate folds of the two sides fuse, and as they fuse the substance of the fourchette is raised up to form the raphe. The degree of fusion varies greatly; it may be little more than in the female fetus, or it may amount to an almost complete fusion of the scrotal halves. One specimen in the museum shows an extreme degree of arrest, the urogenital and anal orifices being minute in size, and grouped close together in a small flat field on the perineum. In many of these cases the vagina, uterus, and tubes are less atrophied than they are in the normal male child. It seems possible that the internal secretion of the testes causes not only a growth of the parts which are developed in the male, but also an atrophy of the parts which are characteristic of the female. The internal glands may be testicular in structure yet the external organs may be exactly of the female type.

GROUP D.—ANDROID FEMALES.

Females Showing the Development of a Floor to the Vulva. (Hyposynclisis.)*

Six specimens in the College museum illustrate this condition (Fig. 7, Demonstration I), while there are ten in the museums of the metropolitan medical schools. In all of these cases the sexual gland simulates an ovary; the

Fig. 15.—From a specimen in the museum of the medical school of St. George's Hospital. *a*, Labia majora; *b*, clitoris; *c*, labia minora; *d*, urethra; *e*, orifice of vagina; *f*, enlarged fourchette; *g*, anus.

vagina at its orifice is always constricted; the prostate is often developed to a considerable degree; the Wolffian ducts are retained to a greater degree than in the normal female. The extent to which hyposynclisis (the union of the labia to form the penile urethra and scrotum) takes place varies in extent; Fig. 15 represents a specimen in the museum of St. George's Hospital Medical School, which shows the process carried to a minor degree; the falciform web in which the labia majora terminate behind represents a greatly developed fourchette; Macnaughton-Jones²⁰ has recently reported such a case and has seen another. Great hypertrophy of the fourchette is accompanied, I believe, with an incomplete development of the internal genital organs. Blacker²¹ has shown that in 15 per cent. of women the fourchette is continuous with the labia minora and in 85 per cent. with the labia majora. In the common type of android females—individuals with the internal organs of the female type and the external simulating more the male type than the female—the

condition of the penis and scrotum is exactly similar to that seen in gynaeoid males (see Figs. 13, 14). The condition of the external genitals gives no clue to the sex of the internal, but one may justly infer that, whether they are ovaries or testicles, they are in either case imperfect and non-functional. In one case I found that what was unmistakably an ovary from outward appearance was on microscopical examination made up chiefly of tubules which were embedded in a richly nucleated cellular stroma. It is usually said that in the normal female the external genital organs represent the condition of the young embryo, and that positive changes only occur in the male. This appears not to be the case; while in the male the urogenital orifice becomes closed to form the urethra, in the female it opens up to form the vulva. The process in either case is evidently determined by the internal secretion of the sex gland, so that a neutral condition of the external sex organs is an indication of a similar condition in the internal glands. In many primates, especially South American monkeys, the clitoris in the female is nearly the size of the penis in the male, but is furnished with a groove in place of a canal.

GROUP E.—IMPERFORATE PENILE URETHRA.

Occasionally cases occur of congenital occlusion of the urethra within the glans, but of such we have no example in the College collection. Occlusion most frequently occurs between the triangular ligament and the glans, and often the whole of this tract is affected. There are but two specimens in the College museum, and three in other London museums. One of the two College specimens was very thoroughly examined by Dr. J. E. Spicer,²² and presented by him to the museum; his preparations showed an irregular core of epithelium within the corpus spongiosum representing the urethra from the membranous part almost to the glans. The bladder, prostatic and membranous parts of the urethra were so distended that the child, although only in the sixth month of development, was of such circumference that it was delivered with great difficulty. The part of the urethra thus imperfectly developed represents the part which Hunter regarded as specially adapted for the ejaculation of semen. We have seen that the floor of this part of the urethra is formed by the growth of the fourchette. Now, the growing edge of the fourchette is embedded in a mass of epithelium which fills the primitive urogenital orifice as that orifice is carried forwards. Thus the whole of the penile urethra is at first represented by a solid rod of epithelium, which afterwards becomes canaliculized by a process of desquamation from within. These cases represent an arrest of the process of canaliculization, and probably are due to an imperfection of the testicles. In Dr. Spicer's case the rectum opened in the urethra.

GROUP F.—ANOMALOUS CASES.

In this group there are only two cases. In one of these there is a complete arrest of the external genital organs; No. 703 is the pelvic viscera of a girl of 7 years, presented to the museum collection by Mr. Page. In it there are three openings on the perineum: (1) the anus, (2) the vagina, (3) the urethra opening at the tip of an enlarged clitoris. The specimen is interesting, because a condition somewhat similar is met with in lemurs and allied animals. In these forms the urethra in the female, instead of opening into the vulval cleft, is carried forwards on to the clitoris, and thus opens outside the vulval cleft.

GROUP G.—IMPERFORATE CONDITIONS OF THE VAGINA.

So far all the specimens dealt with—imperforate anus, hypospadias in the male, and hyposynclisis in the female—all pertain to the transformation of the cloaca into the sexual organ of the male. But there is also, especially in the human body, a sexual transformation of the cloaca in the female. Dr. Berry Hart and Dr. Wood Jones have investigated these changes, which they found to occur in the female human fetus from the tenth to the thirteenth week (fetuses measuring 60 mm. to 140 mm.). It has already been shown that after the migration of the rectum to the perineum, the endodermal cloaca becomes the trigone of the bladder and the urogenital sinus (see Figs. 3 and 4

* A word to designate the opposite condition to hypospadias is necessary; Mr. Plarr, Librarian to the College, has given me the term employed above.

of first demonstration). In the early fetus (see Fig. 16) the sinus is a long tube receiving high up the genital ducts and urethra. About the commencement of the tenth week the epithelium lining the terminal parts of the Müllerian ducts proliferates (Berry Hart believes the proliferation takes place from the Wolffian ducts), and grows towards the perineum as two solid rods; the mesoblast surrounding the rods is also in a state of active growth. The rods fuse together, the hymen and lower third of the vagina being formed by a canalization of the epithelial rods. The transformation of the terminal parts of the Müllerian ducts results in the opening of the vagina being brought down almost to the

Fig. 16.—Diagrams showing the termination of the vagina about the seventh week (I) and about the thirteenth week (II); after Dr. F. Wood Jones. A, Müllerian ducts (vagina and uterus); B, urogenital sinus; C, bladder; D, rectum; E, vagina represented by a rod of epithelium.

perineum; all that remains in the female of the original cloaca are the trigone of the bladder, the urethra, and that part of the vulval cleft which lies between the labia minora. The migration of the vaginal orifice is a sexual change—an adaptation for impregnation and parturition. In all the cases of android females—females in which hyposynclisis had occurred—two things were noticed about the vagina: (1) the orifice was high up in the urogenital sinus, a position which is normally retained in the male; (2) it is very narrow—clearly in these cases the vaginal migration had failed to occur. In three of the six android females the rectum opened into the clitoric urethra.

Thus it will be seen that Hunter's dictum, that the full development of the sexual characters depends on the testicular or ovarian stimulus of perfection, seems likely to provide the best key to the pathology of all the cases we have considered, and that a more exact study of such malformations is likely to throw much light on certain obscure physiological problems.

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AT the recent half-yearly meeting of the Medico-Psychological Association (Scottish Division) it was reported that Sir John Jardine, M.P. for Roxburgh, had stated his intention to bring in next session the bill drafted by the Division with regard to superannuation allowances. A hope was expressed that all members of Parliament representing Scottish constituencies would be approached in due time by those interested and be persuaded to assist the passage of the Bill. At the same meeting a paper was read on the bacteriology of the cerebro-spinal fluid in cases of general paralysis by Drs. Forbes Robertson and Dods Brown. For the most part the members present were in agreement with the statements made, but Dr. Marr held that general paralysis of the insane was probably not of microbic origin. This opinion was founded on a research carried on by him during the past three years, during which he investigated the condition of the cerebro-spinal fluid in 53 cases of the disease.

Memoranda :

MEDICAL, SURGICAL, OBSTETRICAL.

THE VALUE OF TURPENTINE IN GALL-STONE OPERATIONS.

A WOMAN about 54 years of age, who had been suffering for several months with fever and suppuration of the gall bladder, came under my care in the Native Mission-Hospital. Cholecystostomy was performed, and the gall bladder, which was full of stones, was cleared out. A large mass of impacted stones was found lying apparently in the ductus choledochus, but, on account of the adhesions round the gall bladder, etc., the duct could not be properly exposed. A spoon was passed 3 in. or so through the cystic duct, but the stones could not be removed, and they were so hard that it was impossible to break up the mass or to make any impression upon it. After working at it for some considerable time I feared that I should have to leave the impaction unrelieved, when, suddenly recollecting the well-known solvent action of turpentine on gall stones, I determined to try it.

A piece of indiarubber tubing was fixed on a small glass syringe and 1 drachm of turpentine injected through the cystic duct on to the surface of the impaction. In a few minutes I was able to break up the impaction, and in about ten minutes all the stones were removed from the duct. The patient made an uninterrupted recovery, the opening in the gall bladder healing up in about six weeks.

From my experience in this case it seems to me that the habitual use of turpentine in connexion with cases of choledochotomy in which there is the slightest difficulty in removing the bile concretions might materially lessen the risks of the operation.

Nablus, Palestine.

GASKOIN WRIGHT.

ERYSIPELAS MIGRANS COMPLICATING PREGNANCY.

THE following note of a case where, the day after the onset of a very severe attack of erysipelas, premature birth occurred in a primipara, and in which complete recovery took place, may be of interest.

The patient was seen by me on November 2nd, 1907, and was then, apparently, convalescent from an attack of acute tonsillitis, of which I can only speak from hearsay. Within twenty-four hours of my visit she developed an attack of erysipelas, beginning on the face and extending, in the

course of a couple of days or so, over the head, neck, shoulders, and back, down to the level of the waist behind. It extended for about 3 in. below the point of the shoulder on the outer surface of each arm, and did not affect the front of the trunk at all. A few large blebs formed on the ears and eyelids, which ultimately burst and dried up, leaving no trace of scar.

I take the case to have been one of so-called erysipelas migrans. There was great constitutional disturbance, and, following a recrudescence of the disease in the face, from which it had almost died away, on the evening of November 11th the patient's condition became, for a few hours, extremely critical. The next morning, however, she was