the cases of late years. Antiseptic spray, dressings, and the douche; the uterine suture, uterine and abdominal drainage, etc., have all failed again and again. The suturing of the uterine wound, which has saved some desperate cases in the United States, has failed in eight out of ten operations in Great Britain in the last ten years, and is in consequence held in very doubtful repute. Skill is at a discount; the operation is denominated the "forlorn hope"; the prognosis is very unfavourable; and the knife is avoided as the weapon of death, which it very often proves to be.

There is only one conclusion to be drawn from these facts: *the women are in large measure unfit to endure the operation.* Where they are fit, promptness must meet with encouraging success; where they are not, the time of operation can be of little moment.

The great factors of the disqualifying condition I believe to be poverty; the want of proper nutrition; the existence of malacosteon; and, superadded to these, the habitual drinking of beer or gin.

Fifty women suffering under malacosteon, and 29 deformed by rickets, have been operated upon in Great Britain, as far as is known, in 140 years. Of the former, but 6, or 12 per cent., recovered; and, of the latter, 5, or 17½ per cent. Of the last 20 operations, 10 were upon rachitic subjects; and 4 of the 6 recoveries were in this class. Of the whole 29 operations upon rachitic women, only 5 were early, and but 1 of these recovered. Of the other 24, 4 recovered, or 1 in 6. Cancerous subjects have recovered in larger proportion than either, 4 having been saved out of 10.

In the United States, no case of cancer or malacosteon has been operated upon; but rachitic subjects have constituted one-half of the cases (36 in 112), and 21 of these were dwarfs, from 3 ft. 2 in. to 4 ft. 8 in. Of the whole, 19, or 33½ per cent., recovered; 29, or a fraction over 51 per cent. of the other 56 cases, were saved. Fifteen rachitic women were operated upon in good season, and 10 recovered. In 17 operations of the 112, the uterine suture has been used, resulting in the preservation of 7 women. Rachitic subjects endure delay with us very badly, but promise well under a very early resort to the knife. Unfortunately for the result, postponement seems to be the rule, instead of the exception; and hence the high rate of death, which ought not to be under a proper management.

It is very evident that the Cæsarean operation is much less fatal to women in this country than to those of Great Britain, under what would seem to be almost exactly the same conditions, so far as the character and measure of the dystocia is concerned. But, aside from these, there are other features to be considered in many cases that do not appear in the published reports, based upon the respective habits of the women of the two countries, belonging to the classes to which the operation is very largely confined. It is well known by our surgeons that the worst subjects for accident or operation, even of moderate gravity, are the constant consumers of beer. With gin-drinkers I have had no experience, as such are uncommon here; but a very large one with whiskey-consumers. Those who drink whiskey to great excess are often lost after a moderate injury, and the measure of the habit has an important bearing on the prognosis. Fortunately for our Cæsarean operations, the women upon whom they are to be performed very rarely have their systems undermined by the drinking habit. This, I believe, is far from being the case in England; hence an important difference in the results of the operation as recorded in the two countries; hence, also, the successes in the London Temperance Hospital as compared with the other British hospitals.

Result to Children.—By the 22 successful operations, 15 children were extracted alive, 2 of whom died in a few minutes, leaving 13. How many of these continued to live a reasonable time, we are not informed; but we can judge, in a measure, from the results in the 20 cases which compose the appended table. From the 20 women, 12 children were removed alive; of whom, 2 died in a few moments, 1 in 4 hours, 1 in 9 days, 1 in 7 months, and 1 in 7½ months, leaving but 6 alive beyond this last age; 67 children were extracted alive from the 118 women, but a number of them must have soon died.

Laparo-Elytrotomy as a Substitute.—I cannot believe, with some writers, that this difficult operation has "a great future" before it: 7 cases and 4 deaths in 9 years do not indicate this. It has been tried twice in England with fatal results; and, in view of the local causes of fatality under the old operation, I cannot see that this one is likely to prove any less dangerous. The methods of Porro and Müller appear to have silenced it on the Continent.

Utero-Ovarian Amputation.—Porro's method of completing the Cæsarean section has, in contrast with laparo-elytrotomy, made a wonderful progress. Since the first Italian operation on May 21st, 1876, there have been 15 performed in Italy, with 7 women saved out of 16, one-third of the losses being due to the operation having been executed *in extremis*. In addition to these 16, there have been 20 others on the

Continent, making in all 36, with 17 recoveries, 30 of the cases having been hospital patients, one-half of whom were saved. This, for three years and a half, is a very remarkable record, and shows how the new has taken the place of the old operation in European countries. Of 13 operations after labours lasting from 3 to 15 hours, 8 were successful, which is far in excess of all former results in lying-in hospitals. To what degree this more easily performed substitute is capable of counteracting the fatal tendency under the old operation in England remains to be determined by experiment. It is certainly worthy of a trial, and particularly in the very fatal cases of malacosteon. As this disease has been regarded as beyond remedy, and Professor Späth of Vienna has stated that he cured a case by Porro's method in 1877, it should certainly be tried by English obstetrical operators, and particularly in hospitals, where it has in all probability "a great future". This operation was first devised in England at Guy's Hospital, in 1828, by Dr. James Blundell; and was first performed in the United States, by Dr. Horatio R. Storer of Boston, in 1869. There have been 8 operations, with 4 recoveries, in the Vienna Lying-in Hospital.

SUMMARY OF THE RESULTS OF FIFTEEN CASES OF BATTEY'S OPERATION.*

By ROBERT BATTEY, M.D.,

Fellow of the American Gynecological Society; ex-President of the Medical Association of Georgia; Honorary Fellow of the Medical Society of Virginia; etc.

THE peculiar surgical operation with which the name of the writer has been associated having been fully brought to the notice of the profession of Great Britain by Dr. Marion Sims, through the *BRITISH MEDICAL JOURNAL*, and having been twice, at least, practised by eminent British gynecologists, it is presumed that a brief summary of the results thus far obtained at the hands of the originator will not be without interest to the British Medical Association. The writer is therefore emboldened to offer the accompanying statement of his cases, with deductions drawn therefrom.

Mortality.—Of the fifteen cases, two have died, and thirteen have recovered, showing a mortality of 13⅓ per cent. In seven of the thirteen, the recovery was prompt and uninterrupted.

Secondary Results.—By this term is meant the results obtained at the expiration of six months from the operation.

Separating the thirteen recovered cases into three classes, we have three cases (a) wherein but one ovary was removed, three cases (b) of incomplete removal of both ovaries, and seven cases (c) of complete removal of both ovaries. Tabulating them in the order named, we find:

	a.	b.	c.
Morbid conditions disappeared	1	0	6
Morbid conditions partly disappeared	1	1	0
Not benefited	1	2	0
Too recent to determine	0	0	1
Total	3	3	7

Present Condition.—Continuing the same classification, we have:

	a.	b.	c.
Perfect health	1	0	4
Comfortable health	1	1	2
Not improved	1	2	0
Too recent	0	0	1
Total	3	3	7

If, therefore, we restrict the table rigidly to the seven cases of the operation proper, *i.e.*, those in which both ovaries were completely removed, we find that four of the patients are now in perfect health, two of them are in comfortable health, and one case is too recent for the result to be definitely determined.

Object of the Operation.—This is fourfold: first, to obviate the effects upon the general system of a vicious ovulation; secondly, to obviate the effects of an unrelieved menstrual molimen; thirdly, for the control of exhausting uterine hæmorrhages incident to ovulation; fourthly, to produce the vascular and nervous revolution in the system which attends upon the change of life.

Warrant for the Operation.—The writer foresaw from the first that this operation could not be laid down as the remedy for any particular disease or class of diseases; while, upon the other hand, in certain exceptional cases, the range of its applicability must be widely extended to a variety of diseased conditions. When asked, is it applicable to this disease or that disease? he found himself forced to answer both No and Yes. To escape this dilemma, he formulated the following

* Read in the Section of Obstetric Medicine at the Annual Meeting of the British Medical Association in Cork, August 1879.

proposition. It is indicated in the case of any grave disease which is either dangerous to life or destructive to health and happiness, which is incurable by other and less radical means, and which we may reasonably expect to remove by the arrest of ovulation or change of life. He is to-day equally impressed with the difficulty of defining precisely the field which it is to occupy in the cure of special diseases, and is still accustomed to decide his own cases by propounding to himself the following questions. 1. Is the condition to be remedied a grave one? 2. Is it incurable by other and less radical means? 3. Is it curable by the arrest of ovulation or change of life? If these three questions be answered affirmatively, the case is a proper one; but, if either of them had a negative answer, it is not.

Incision.—Two methods have been followed by the writer: first, a short abdominal incision in the linea alba; second, a much shorter opening in the median line of the posterior vaginal *cul-de-sac*. Whilst in his own cases the fatality has attended the vaginal method only, this is not true of the experience of others; for, of the fifty-four cases he is now enabled to tabulate, in thirty-four the abdominal section was made, with twelve deaths; whilst in twenty cases of the vaginal section, there were but three deaths. In other words, the mortality of the abdominal method was $35\frac{1}{3}$ per cent., and of the vaginal method but 15 per cent.

Dealing with the Pedicle.—In but two of the fifteen cases has the ligature been left upon the pedicle. In twelve cases, the ovaries have been simply crushed off by the *écraseur* chain. In but one of the twelve was there any loss of blood to note; and, in this instance, the loss was inconsiderable, and was readily stopped by passing a small lump of ice into the *cul-de-sac*. Judging from his own experience, the writer is inclined to regard this method of treating the pedicle as quite safe when the details are properly carried out. Obviously, it is most desirable if safe. It is his custom to constrict the pedicle first with a temporary ligature in such manner as to isolate the ovary well from the broad ligament, and, adjusting the chain above the ligature, to bring away the latter with the ovary.

Antisepsis.—In but one of the series was the antiseptic method of Mr. Lister carried out, and this only in a modified way, as the incision was vaginal. The precautions consisted in a thorough cleansing and disinfection of all instruments, and keeping them immersed in the carbolic solution, in the frequent plunging the hands into the same solution, and in keeping the vagina well filled with the carbolic spray during the operation. No after-dressing was used, and no syringing the vagina. There was a marked absence of any vaginal discharge after the operation; and the convalescence was rapid, and uninterrupted by any notable rise of temperature or pulse. The contrast between the getting-up in this case and the best of the other vaginal cases was rather striking, and spoke well for the method.

Effect upon Menstruation.—Without exception, when but one ovary was removed, or both ovaries incompletely removed, the menses have continued as before; and, without exception, when both ovaries were completely removed, the menses have ceased entirely. In one case, the patient did not menstruate prior to the operation, and had repeatedly and at long intervals uterine hæmorrhages for several years after the operation. These hæmorrhages have now ceased. It is curious to note, in some of the cases of partial removal of both ovaries, how small a fragment of ovarian stroma may keep up regular menstruation.

CASE IV.—A letter of inquiry failed to reach her. When seen two years ago, she was in comfortable health, suffering somewhat at her periods, but enjoying life. She was still barren.

CASE VII.—The family physician, Professor D. S. Reynolds of Louisville, Kentucky, in May 1879, said personally: "Her health is perfect. In your published reports, you have not drawn near so heavily upon this case as you ought to have done."

CASE VIII.—The patient writes under date June 10th, 1879: "As yet I have experienced no change: from the operation, the menstrual flow coming at intervals of twenty-four to twenty-eight days; it being in colour, quantity, quality, and duration about normal. At each recurring period, there is the same constitutional disturbance. In addition to the troubles I have experienced for years at the periods, I now have the most exquisite sensitiveness and throbbing through the entire ovarian region. Any effort to bear even a fractional part of my weight produces a sensation as of rupture in this region, the tearing sensation being painfully distinct. The throbbing begins several days prior to the menstrual flow. The uterus continues to be thoroughly alive to every movement of the body, the position of the organ being such as to make the passage of anything through the lower bowel excessively painful. My life is a thoroughly quiet one, not having borne my weight for nearly four years. I sit up some little; but, situated as I am, it can never be a source of pleasure to me. The most difficult feature of my present condition for me to bear is a complete weariness of the entire body, and this in turn produces a depression of spirits that is wholly foreign to my nature. I am still buoyed by hope, feeling assured that time must certainly bear some healing on its wings for me." This case, it is believed, is still susceptible of satisfactory cure by removal of the remnants of ovarian stroma through the abdominal incision, but the patient cannot yet bring herself to the point of another operation.

CASE IX.—In consequence of imperfect removal of the ovaries, this patient continued to menstruate, and was not benefited. She was subsequently submitted to excision of the coccyx at the hands of Dr. Richardson of Louisville, but was still uncured.

CASE XI.—The removal of the ovaries was imperfect, and the operation set down as a failure. She writes, June 10th, 1879: "I have gradually grown better ever since your operation, until now I am, as Mr. — says, almost a well woman. . . . You remember what a difficult task it used to be for me to walk, but now I go wherever I please, and feel no inconvenience therefrom. In fact, I never have any trouble except at my monthly periods, and then comparatively little. Sometimes I think I will finally get so I can pass through it without pain. Every time I suffer less than I did the period before."

CASE XII.—Reports by letter her perfect health.

CASE XIII.—Verbal report of Professor Eve of Augusta, Georgia: "She is entirely well; menopause is complete. She is actively employed, and earning full wages as a house-servant."

CASE XIV.—The family physician writes, June 9th, 1879: "The menopause is complete. She is, and has been since your operation last November, *entirely free* from the terrible sufferings which she previously experienced at each and every return of the menses. There is scarcely a day, however, that she does not suffer some pain of a neurotic character in some of the organs, more frequently the stomach, sometimes in the ovarian region. She still complains of some defective vision, and

TABLE OF CASES.

No.	Age.	Social State.	Morbid Conditions.	Method.	Ovaries Removed.	Treatment of Pedicle.	Primary Result.	Secondary Result.	Present Condition.
1	30	Single	Amenorrhœa and hystero-epilepsy	Abdomen	Both	Ligature	Recovered.	Good	Perfect health
2	32	Married	Ovarialgia	Vaginal	One	"	"	"	Good health
3	38	"	Threatened insanity	"	Both	Écraseur	"	"	Comfortable health
4	24	"	Ovarialgia	"	One imperfect	Finger-nail	"	"	"
5	35	"	Ovarialgia and coccygodynia	"	One	Écraseur	"	Temporary relief	See Case 9
6	30	"	Ovarialgia and threatened insanity	"	Both	"	Died	—	—
7	25	Single	Ovarialgia	"	Both	"	Recovered	Good	Perfect health
8	28	Married	Ovarialgia and cellulitis; cystic ovaries, etc.	"	Both imperfect	"	"	Not good	Not improved
9	35	"	See Case 5	"	Other imperfect	"	"	"	"
10	29	Single	Ovarialgia	"	Both	"	Died	—	—
11	22	Married	Hystero-epilepsy	"	Both imperfect	"	Recovered	Partial relief	Comfortable health
12	34	"	Occlusion of vagina and uterus	Abdomen	Both	"	"	Good	Perfect health
13	28	"	Hystero-epilepsy	"	"	"	"	"	"
14	22	Single	"	Vaginal	"	"	"	"	Comfortable health
15	37	Married	Violent menstro-mania	"	"	"	"	Too recent	Improving mind & body.

CASE I.—This patient states personally that she is now in the enjoyment of health, such as she has never before known.

CASE II.—This patient bore a child from the remaining ovary, and is in excellent health.

CASE III is in comfortable health. She does regularly her cooking and housework, but is still at times a little hysterical.

can only read a few minutes at a time. She rides out to visit her friends. Sometimes walks half a mile, and even a mile, and does not feel that weight and pressure in the pelvis, which she experienced previous to the operation. At last digital examination, the uterus was rapidly becoming senile." This case is of too recent date to have developed the full measure of relief from the operation.

CASE XV.—Operation was done March 27th, too recently to report anything more than the primary result. The husband, himself an experienced medical man, writes, June 10th, 1879: "The menopause is complete. I am very sanguine of a perfect recovery of mind, as soon as she is accustomed to the great change from the operation."

THERAPEUTICAL EXPERIENCES WITH THE DIGESTIVE FERMENTS.

By F. ARNOLD LEES, L.R.C.P., M.R.C.S., F.L.S.;

WITH A REPORT OF EXPERIMENTS,

By GEORGE BROWNE, F.C.S.*

REPORT ON THE DIGESTIVE FERMENTS.

THIS research was undertaken with special reference to the observations of Dr. W. Roberts, published in the BRITISH MEDICAL JOURNAL of November 1st and 8th, 1879. It is therefore, as far as possible and necessarily, a repetition of his chemical experiments, supplemented by additional ones, in order that modifying circumstances and the variety of natural adjuncts to digestion might be considered and taken into account.

For convenience, the tabulated order of digestive juices and their ferments given in Dr. Roberts's paper was followed in the present research.

The experiments upon salivary digestion were performed with both human saliva and that obtained from the salivary glands of the pig, diastase, and extract of malt.

The first portions of saliva ejected from the mouth were almost invariably acid, possibly in consequence of oxidation of the ferment or of the food last taken; the freshly secreted juice was either neutral or feebly alkaline. The acidulous saliva was found, however, to act most powerfully on starch-paste, converting it rapidly into sugar and dextrine. Efforts were made to identify the acid, but the quantity was too minute for complete identification. We have reason, however, to believe it to be lactic acid, from the following experiments: (1) neutral saliva, feebly acidified with lactic acid, acted more rapidly on gelatinised starch than an equal volume of non-acidified saliva; (2) neutral saliva, acting upon starch-paste, rapidly became acid; and (3) neutral saliva, acting upon bread-paste, formed lactic acid as one of the products.

Five hundred grains of human saliva, when "scaled" upon glass below 80° Fahr., gave 6.1 grains of solid residue in the form of semi-transparent horny laminæ, producing a viscid albuminous fluid with water, and giving precipitates with aqueous solutions of mercuric chloride, tannin, and alum. For convenience, we call this substance ptyalin; it is obviously impure, but the impurities are the natural constituents of the saliva, and could not, therefore, be ignored or rejected from this investigation. With this ptyalin or saliva-residue, the following experiments were made. Temperature, 98° Fahr. Time allowed, four hours.

1. Ptyalin, 1 gr.; whole starch, 50 grs.; water, 500 grs.
2. Ptyalin, 1 gr.; whole starch, 50 grs.; soda bicarbonate, 2 grs.; water, 500 grs.
3. Ptyalin, 1 gr.; whole starch, 50 grs.; hydrochloric acid, *P.B.*, 2 grs.; water 500 grs.

These mixtures were frequently agitated to promote action or solution, but the greater portion of the starch-granules remained intact. When some of these were examined by a microscopic power of three hundred diameters, the cellulose appeared somewhat shrivelled, but it still protected the granule cell-contents from the fermenting agent. The three fluids were separately filtered, and tested with the alkaline copper test, and small quantities of sugar were detected—perhaps derived from some pruruptured granules, or from exosmosis of granulose. These results were checked with the following solutions, kept at exactly the same temperature for the same time.

1. Ptyalin, 1 gr.; water, 500 grs.
2. Starch, 50 grs.; water, 500 grs.

We are therefore able to confirm Dr. Roberts's assertion of the indigestibility of uncooked starch; and it may be taken as an established fact, that the value of a farinaceous food depends greatly, if not exclusively, on the extent to which its starch-granules are broken, and their contents permitted to come into contact with digestive ferments.

A second series of experiments was commenced as follows.

1. Ptyalin, 1 grain; dilute lactic acid, 2 ℥; water, 500 grs.
2. Ptyalin, 1 grain; soda bicarbonate, 2 grs.; water, 500 grs.
3. Ptyalin, 1 grain; — water, 500 grs.

* Concluded from page 475.

These solutions were again kept at a temperature of 98° Fahr., and into each was dropped from time to time gelatinised starch (one in ten), as often as a drop of the mixture, removed on the end of a glass rod, failed to give the blue reaction with iodine. After one hour, the following results were obtained.

- 1 had transformed 870 grs. of starch with acid reaction.
- 2 had transformed 610 grs. of starch with feeble acid reaction.
- 3 had transformed 716 grs. of starch with acid reaction.

The necessity for disruption of the starch-cellulose prior to ingestion of starchy food cannot therefore be overestimated; but it is suggestive and curious to observe that the salivary digestion was most rapid when the reaction of the fluid menstruum was feebly acid, least rapid when alkali was present, but that even the alkaline digestion (so to say) of experiment No. 2 generated acid of some kind.

It seems to follow from these experiments that the power of ptyalin may be checked or increased, as well as rendered inactive or inert; and that the blame of inactivity must rest on the nature and condition of the food presented to the salivary secretion, rather than on the saliva itself.

Diastase or vegetable ptyalin exhibits properties remarkably like animal ptyalin. They may possibly be absolutely identical bodies [or having relations to one another similar to those borne by gluten and animal albumen. F. A. L.]. Neither ptyalin nor diastase has yet been obtained sufficiently pure to establish their identity or even isomerism; yet diastase, in the form of malt-extract, may be fairly used as a solvent of starch, with this proviso: that (like ptyalin) it also requires the starch-granules to be broken up, or their solvency and its digesting power is very small and comparatively worthless.

Fifty grains of malt-extract were substituted for the one grain of ptyalin, and the behaviour with cooked and uncooked starch was found to be qualitatively similar in activity and inertness.

A third series of experiments was undertaken to determine the compatibility or incompatibility of the ferments of the saliva and the gastric juice. For this purpose, the following processes were adopted. Two ounces of pure dried starch were gelatinised with twelve ounces of boiling distilled water, and divided into six equal portions (like solid translucent jellies at 100° Fahr.), and they were treated as follows.

To jelly 1	was added diastase, 1 gr.; pepsin, 1 gr.
" 2	" diastase, 1 gr.; pepsin, 1 gr.; lactic acid dil., 5 ℥.
" 3	" diastase, 1 gr.; pepsin, 1 gr.; hydrochloric acid, 3 ℥.
" 4	" pepsin only, 1 gr. [<i>P.B.</i> , 3 ℥.]
" 5	" hydrochloric acid, <i>P.B.</i> , 3 ℥ only.
" 6	was kept without addition, for comparison.

These mixtures were kept at a temperature of 98° Fahr. for four hours, the time prescribed for the pepsin action on albumen by the *Pharmacopœia*. A considerably shorter time was sufficient for this determination, as the jellies 1, 2, and 3 quickly liquefied, in consequence of the conversion of the starch, but Nos. 4, 5, and 6 remained sound and gelatinous. Ten volumes of a weaker starch-paste (6 per cent.), when treated with one volume of a three per cent. watery solution of diastase, liquefied in ten minutes, and was easily filtered.

The deductions from this series of experiments are that diastase, and presumably ptyalin, will act in the presence of pepsin; that diastase still acts even when the pepsin is feebly acidulated; and, therefore, that the combination of pepsin and diastase (in such compound preparations of digestive ferments as "peptodyn", for instance) does not neutralise or destroy the action on starchy food.*

To establish this proposition as a scientific fact, a small starch pudding was made, and a watery mixture (one-tenth volume) of "peptodyn" was added to it. In a few minutes, the whole was liquefied, and the filtrate reduced the copper-test for glucose, etc.

Before passing from the amylotic digestion, we must notice the process of Cohnheim for the preparation of ptyalin from saliva, given in *Watts's Dictionary*, vol. v, pp. 175-6. "If saliva be treated first with dilute phosphoric acid, and then with lime-water, the bulky precipitate of phosphate of calcium carries down with it the greater portion of the ferment together with the albumen. If the separated deposit be agitated with distilled water, it gives up the ferment, but not the albumen, and hence, by filtration, a clear liquid can be obtained, acting powerfully upon starch. From this the ferment may be precipitated by alcohol, forming, when carefully dried, an amorphous mass mixed with phosphates." We have repeated Cohnheim's experiments upon a small scale, and found that the ferment was not destroyed by the action of dilute phosphoric acid for some considerable time, provided the mixture was kept cool. We also noticed that phosphates exist naturally in normal saliva, as well as in association with the other digestive ferments, and most

* Further on, the necessity for the administration of bicarbonate of soda with a dose of pancreatine, to guard the latter from destruction in its passage through the stomach, is similarly disproved. F. A. L.